



INDIAN OIL CORPORATION LIMITED
MARKETING DIVISION
HEAD OFFICE, INDIAN OIL BHAVAN,
G-9, ALI YAVAR JUNG MARG,
BANDRA (EAST), MUMBAI - 400051

NAME OF WORK:

Design, Supply, Installation, Testing and Commissioning of PLC based Terminal Automation System comprising of Tank Truck Loading System, Tank Farm Management System, Access Control System, Fire Alarm System etc along with associated works at Bitumen Drum Filling Plant, Mathura (U.P).

PART-A: TECHNICAL & COMMERCIAL

TENDER NO: MnC/ENG-3/PT-19/26-27

PRE-BID MEETING ON: 11.06.2026 at 1400 Hrs.

LAST DATE & TIME OF TENDER SUBMISSION: 29.06.2026 at 1400 Hrs



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SN	DESCRIPTION	
	<u>TECHNICAL BID-PART-A</u>	
A	Formats	Attached Separately
B	TAS Analytics and Visibility	
C	GCC with appendix	
D	Purchase Requisition with SOR	
E	List of Equipment proposed to be handed Over	

GENERAL TERMS, COMMERCIAL CONDITIONS AND DECLARATIONS-PART-B

SN	DESCRIPTION	Applicable (Yes/No)
	<u>TECHNICAL BID-PART-B</u>	
A	Important guidelines to tenderers	Yes
B	Instructions to tenderer and particular conditions of contract	Yes
C	Reverse auction - Process	No
D	Special clauses on Taxation	Yes
E	List of IOCL GST identification number (GSTIN)	Yes
F	Undertaking by the Tenderer(s) on acceptance of tender terms & conditions	Yes
G	Proforma for Declaration on Proceedings Under Insolvency and Bankruptcy Code, 2016 (Bidding Stage)	Yes
H	Compliance Certificate for bidders from a country which shares a land border with India	Yes
I	Proforma of Tender not Tampered	Yes




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J	Declaration of blacklisting / holiday listing	Yes
K	Details on Relationship with IOCL's Directors (Declaration "A", "B" &"C")	Yes
L	Undertaking for business transaction status of bidders	Yes
M	Particulars of bidder	Yes
N	Undertaking on no multiple bidding	Yes
O	Declaration Form for availing Purchase Preference - Bid Stage	Yes
P	Undertaking for Local Content- Bid Stage	Yes
Q	Certification for Local Content - Bid Stage (Tender value >= 10 Cr.)	Yes
R	Integrity pact agreement along with covering letter	Yes
S	Bank guarantee format for earnest money deposit (if applicable)	Yes
T	Format of Insurance Surety Bonds for Earnest Money Deposit (EMD) (If Applicable)	Yes
	DOCUMENT TO BE SUBMITTED POST LOA	
T	Undertaking for non-engagement of child labour	Yes
U	Format for payment to vendors through electronic mode	Yes
V	Safety declaration	Yes
W	Declaration	Yes
X	Indemnity bond undertaking for PF	Yes
Y	Indemnity bond undertaking for ESIC	Yes
Z	Bank guarantee format for security deposit (for services/works)	Yes
AA	Form of contract (for works/services)	Yes

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	COMMERCIAL DOCUMENT	


COMMERCIAL DOCUMENT

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	NOTICE INVITING TENDER	

NOTICE INVITING TENDER

Indian Oil Corporation Limited invites electronic bids under two bid system from reputed, technically competent, quality conscious, experienced and financially sound parties having experience of similar works and meeting prescribed qualifying parameters along with other details as given below:

1.0	TENDER NO.	:	Tender No: MnC/ENG-3/PT-19/26-27 E-Tender ID: 2026_MKTHO_190135					
2.0	NAME OF WORK	:	Design, Supply, Installation, Testing and Commissioning of PLC based Terminal Automation System comprising of Tank Truck Loading System, Tank Farm Management System, Access Control System, Fire Alarm System etc along with associated works at Bitumen Drum Filling Plant, Mathura (U.P).					
3.0	TENDER FEE	:	Nil Bidders are required to download the tender documents free of cost from IOCL e-tender website https://iocletenders.nic.in					
4.0	ESTIMATED COST Inclusive of all taxes and Duties	:	Rs. 26,19,23,069.02/- (Rupees Twenty Six crore Nineteen lakhs Twenty Three Thousand and sixty nine and Two Paise only) including GST as per details mentioned below:					
Supplies (Inclusive of all taxes and Duties) (In Rs)		Services - Installation and Commissioning (Inclusive of all taxes and Duties) (In Rs)		Composite Works (Inclusive of all taxes and Duties) (In Rs)		Comprehensive AMC for 10 years (Inclusive of all taxes and Duties) (In Rs)		Total (Inclusive of all taxes and Duties) (In Rs)
17,22,97,501.76		1,75,66,802.78		14,05,354.28		7,06,53,410.20		26,19,23,069.02
5.0	EARNEST MONEY DEPOSIT	:	Rs. 6,55,000 /- Mode of Payment of EMD shall be as per Part-B of Tender Document. EMD exemption: EMD is not required in the following cases: <ul style="list-style-type: none">• Government organization & Public Sector Undertaking of the Central / State Government.• JV / subsidiary companies of IOCL.• Startups If the bidder is exempted from the payment of EMD, then the bidder has to mandatorily submit Bid Security Declaration (Annexure-K) of Part B.					

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6.0	TENDER DOWNLOAD PERIOD FROM e-TENDER PORTAL:	
a	Starts on	: As per tender portal
b	Ends on	: As per tender portal
7.0	PRE-BID MEETING/ CONFERENCE	<p>: <u>All are requested to attend the Pre-Bid conference via mode of Physical Meeting as given in NIT.</u></p> <p>Pre-Bid Meeting DATE: 11.06.2026 at 1400 Hrs at address: Indian Oil Corporation Limited, G-9, Ali Yavar Jung Marg, Bandra (East). Mumbai - 400 051.</p> <p>Bidders are required to mail their queries in editable format (Copy attached) to mamtach@indianoil.in, hbm@indianoil.in & nhariharan@indianoil.in by 09.06.2026 at least 2 days before prebid meeting.</p> <p>Note: Refer Clause 2 of Section-2 of Part-B for further details.</p>
8.0	SUBMISSION OF TENDER IN e-TENDER PORTAL:	
a	Starts on	: As per tender portal
b	Ends on	: As per tender portal
9.0	DUE DATE FOR OPENING OF TENDER:	
A	Opening of Tender (Technical Bid Only)	As per tender portal
10.0	TENDER VALIDITY	<p>Offer shall be valid for a period of 120 days from the date of opening of Technical Bid.</p> <p>: On account of exigencies, if parties are asked to extend the validity the same should be without any deviation in the terms and conditions including change in prices. However, parties would be allowed to withdraw. If a party still deviates or changes price, his offer shall be rejected.</p>
11.0	COMPLETION PERIOD	<p>Completion period for the subject work shall be 12 months from the 21st date of issue of commencement order or the date of handing over the site whichever is earlier (excluding CAMC period).</p> <p>: As per Clause 5.0 of STCC.</p>



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		Completion Period for CAMC shall be as defined in Special Terms and Conditions of the contract which shall include up to 2 years warranty + 8 Years CAMC for CAPEX works.
12.0	MODE OF TENDER SUBMISSION	: Submission of documents in tender portal.
13.0	DETAILS OF INDEPENDENT EXTERNAL MONITORS	: Details of IEMs are available in URL: https://www.iocl.com/Integrity%20Pact Common e-Mail ID: jem-iocl@indianoil.in
14.0	REVERSE AUCTION	: Reverse Auction is NOT applicable for this tender.
15.0	NO OF CONTRACTORS REQUIRED	: One No.
16.0	CONTACT PERSON	: <u>During Tendering stage (Upto LOA stage):</u> Name: Mamta Chiniya Designation: Senior Manager (Materials & Contracts) Contact No.: +91 22 26447033 Email id: mamtach@indianoil.in <u>For Site visits and during Execution stage (Post LOA stage):</u> Name: Mahesh Bhat H Designation: Manager (Engineering) Contact No.: +91 9449650407 Email id: hbm@indianoil.in
17.0	PRE-QUALIFICATION CRITERIA (PQC)-	
A	<p>Work completed by the bidder, as main contractor, or as sub-contractor, during last Ten years ending last day of month previous to the original date of bid submission end date i.e. 31.05.2026.</p> <p>The value of completed work for evaluation shall be considered as under:</p> <ul style="list-style-type: none"> ➤ Three similar completed works each costing not less than the amount equal to Rs. 5,73,81,000 	



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or

- **Two similar completed works each costing not less than the amount equal to Rs. 7,65,08,000**

or

- **One similar completed works costing not less than the amount equal to Rs. 9,56,35,000**

A work executed by a bidder for its own plant/projects shall not be considered as experience for the purpose of meeting requirement of experience criteria of the tender. However, jobs executed for Subsidiary / Holding company will be considered as experience for the purpose of meeting experience criteria subject to submission of tax paid invoice(s) duly certified by Statutory auditor of the bidder towards payments of statutory tax in support of the job executed for Subsidiary /Holding company. Such bidders shall submit these documents in addition to the documents specified in the PQ Documents to meet Experience Criteria.

B

DEFINITIONS OF SIMILAR WORKS:

Experience in successful completion of

(a) Terminal Automation System in Petroleum (including LPG / Bitumen) / Petrochemical Industries comprising of Remote loading of Tank Trucks or Tank wagons with Terminal Automation software.

or

(b) Process automation systems in Refineries / Pipelines/ Petrochemical/LPG/Bitumen/Hazardous Chemical process industries.

However, in the case of qualifying works with respect to (b) above, the party **MUST** additionally submit proof of **either**

(i) Successful completion of at least one Terminal automation works irrespective of the value, comprising of Remote loading of Tank Trucks (for at least 6 loading points) or Tank wagons (for at least 8 loading points) with integration of Automatic Tank Gauging system in Tank Farm with Terminal automation software

or

(ii) Having been awarded Terminal Automation Work for similar scope of work (at the minimum) as specified in (i) above by any petroleum oil company in India or abroad in any one of its' locations, the works for which is in progress.

Also, in case of qualifying works with respect to (b) above, other than compliance to (i) or (ii) as mentioned in this Para, the Terminal Automation System software should be available with the bidder with further development, customization and maintenance right for the same.

The above works shall be taken as similar works for the purpose of qualification and the works as mentioned under (a) and (b) may or may not include associated Civil / Mechanical works / Tank Farm management / Access Control / CCTV/ Fire Alarm System/Hydrocarbon Leak detection system/ PAGA System/EPABX system/ HVLR system/Rim seal (if applicable) monitoring system.

Work Order should contain the above similar work items and for qualification purpose the entire executed value of WO (which may contain any other item) shall be considered.



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Note:

For fulfilling the experience criteria against work order(s) following documents may be considered as valid proof for meeting the criteria.

- i) In case of Work Order from Government Bodies/ PSUs:
 - Copies of Contract Document (Purchase Order/Work Order with Schedule of Rates) and
 - Completion certificates issued by client. Copy of contract document may not be insisted if completion certificate / Bill / Invoice copy specifies details otherwise required like Date of PO/contract agreement, Contract Value, Execution value, date of completion and other requirements for prequalification as specified in the tender.
- ii) In case of Work Orders from Private Parties:
 - Certificate from CA certifying value of work done with TDS certificates (where applicable)/ bank statement shall be required in addition to that specified in i) above.
[TDS certificates / Bank statements shall be used as corroborative evidence only]
- iii) In case of works done as a sub-contractor, apart from copy of purchase / work order with schedule of rates / scope of work from the main contractor, the bidder who has worked as a sub-contractor has to submit certificate of completion of work from the end user / owner / main contractor/ consultant of the owner acting as EIC. Bidder shall also submit a CA certificate certifying the executed value of works and shall be submitted along with UDIN no for works executed as a subcontractor. Whenever a contractor had worked as a sub-contractor to main contractor, their experience also can be considered. With regard to sub-contracted work order, the bidder has to submit a certificate from the end user / owner / consultant of the owner acting as EIC stating that the main contractor has intimated them about the engagement of sub-contracting OR have been allowed/ permitted as a subcontractor. In case when an approved sub-contractor and main contractor both participate in the same tender on the strength of the same work/job, orders submitted by both the vendors shall be considered for evaluation against PQC.

Other important Points

- i. In case, the executed value of job is more than work order value and bidder claims for meeting the PQC requirement on the basis of executed value then it is the responsibility of the bidder to submit the documentary evidence of final executed value (such as executed value mentioned in completion certificate etc.) along with his bid.
- ii. The amount considered for meeting the experience criteria of PQC shall be inclusive of Tax. In case the proof/certificate submitted by the bidder does not have clarity regarding inclusion/exclusion of Tax, clarification shall be sought. Internal records/SAP may be checked for obtaining clarity regarding taxes in case of orders issued by IOCL. Even after seeking clarification, if there is ambiguity regarding the exclusion/ inclusion of tax, the amount appearing in the work order/completion certificate shall be considered as inclusive of Tax.
- iii. The executed value of completed work submitted by the bidder shall be considered during evaluation for experience criteria of PQC.
- iv. In case the work orders submitted by the bidder is in multiple currency/ non-INR, the same shall be converted to equivalent INR considering the conversion rate as on the date of issue of the reference order(s) based on SBI TT selling rate or RBI/ Other scheduled bank/ Customs Notified exchange rate. Conversion rates from the above sources shall be used uniformly for evaluation of all bidders participating in the tender.
- v. In case where the bidder cites the reasons of Non-Disclosure Agreement (NDA) for its



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inability to submit necessary documents in support of meeting the experience criteria & turnover criteria, a certificate, in original, certifying all the required information, issued by CEO/ CFO (howsoever designated) of the entity along with a declaration that the bidding company is not in a position to submit the required documents owing to the NDA with an endorsement by Chartered Accountant/ Statutory Auditor/ Certified Public Accountant (not being an employee or a Director or not having any interest in the bidder(s) company / firm) may be accepted.

vi. Wherever Chartered Accountant/ Statutory Auditor/ Certified Public Accountant (not being an employee or a Director or not having any interest in the bidder(s) company/ firm) is not in a position to endorse such CEO/ CFO's (howsoever designated) certificate due to local regulations, CEO/ CFO's (howsoever designated) certificate in original without endorsement may be accepted provided a reference of the local regulation restricting this endorsement is given in the CEO/ CFO (Howsoever designated) certificate.

vii. If bidder has submitted a composite work order for evaluation and the AMC/CAMC /PWAMC/O&M is going on, after supply and installation part is completed by the Contractor as per completion certificate, the same shall be considered as completed work and the amount towards supply and installation shall be considered for qualifying the bidder in PQC towards experience criteria.

Such work orders in which both supply & installation and AMC/CAMC/PWAMC/O&M is completed, the same shall be treated 'At Par' with the other work orders and bidder is required to submit the copy of work order and completion certificate for the complete work including AMC/CAMC/PWAMC/O&M part.

viii. In case of WO from IOCL, the bidder should upload copy of work order and the onus of submission of suitable PO/WO to meet PQC shall be with bidder. The value of work completed, and the completion date of work shall be verified from internal records only for PO/WO document uploaded in technical bid by bidders. Mere mentioning of Vendor Code or work order no. without submission of work order copy, shall not be entertained and the bid shall be liable for rejection.

ix. For the purpose of qualification, the total value of executed supply against single purchase order shall be considered for Evaluation.

x. For the same project finalized against one tender, if separate orders for supplies or variation orders or amendment orders are issued in continuation of the original purchase/work order, then the total value of works completed against the supply components of the original work orders, subsequent variation/ amendment orders put together shall be accepted as one single work completed.

xi. Supplies carried out at multiple locations through a single Purchase order or multiple purchase orders finalized against one tender shall be considered as one similar work for the purpose of qualification.

xii. If any of the above-mentioned documents are in language other than English, the same needs to be translated in English, duly notarized (if in India)/ notarized or authenticated (if in foreign).

xiii. All required documents are to be submitted only with technical/commercial bid. No documents / conditions should be attached with the price bid. In case any essential information given by a bidder is found to be incorrect or a misrepresentation, the bid is likely to be rejected as not responsive, and if the bid has resulted in a contract, the contract is liable to be terminated pursuant to the provisions of Clause 7.0.1.0 of the



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General Conditions of Contract with consequences of termination as provided in Section 7 of the General Conditions of Contract.

C

ANNUAL TURNOVER:

The annual turnover of the bidders (based on standalone financials of bidding entity) shall be at least Rs 11,47,62,000.00 under consideration during any of the preceding three financial years i.e. 2023-24, 2024-25, 2025-26

1. Turnover for this purpose should be as per audited financial statements.

For Indian bidder other than Companies:

Audited Financial statements means below statements duly certified by Practising Chartered Accountant

- Audited accounts under Income Tax Act 1961.
- However, if the Bidder is not required to get its accounts audited under the income Tax Act, 1961, a certificate from "Practicing Chartered Accountant towards the turnover of the Bidder and same is correlated with Annual GST turnover" along with copy of its Income Tax Return or Acknowledgement copy shall be furnished along with UDIN no.

For Indian Companies: As defined under section 2(40) of Companies Act -2013.

For foreign bidders: Similar documents under respective law of land.

The reports issued by any Auditor / Chartered Accountant shall mandatorily bear UDIN (Unique Document identification Number) for such reports of FY 2019-20 onwards.

2. In case of tenders having original bid closing date up to 6 months from the current financial year, and, in case audited financial results of the immediate three preceding financial years are not available, the bidder has an option to submit the audited financial results of the three years immediately prior to preceding financial year.

Wherever the closing date of the bid is after 6 months from the current financial year, bidder has to submit the audited financial results for the immediate three preceding financial years. Turnover for this purpose should be as per audited financial) submit the audited financial results for the immediate three preceding financial years. The immediately preceding financial year shall be considered, accordingly. The audited financial results shall be certified by an auditor on or before the date of bid submission.

3. For the bidders whose financial year is calendar year, the audited financial results shall be considered on calendar year basis in lieu of financial year.
4. If a Foreign Bidder's Audited Financial Report is in currency other than INR, the respective/ desired figures for calculation of Annual Turnover shall be converted into equivalent INR considering the conversion factor indicated in Bidder's Audited Financial Report. In case the same is not indicated, the rate of conversion as on last date of respective financial years, for which the bidder has submitted the financial results, shall be considered. The conversion rates shall be based on SBI TT selling rate or RBI/ Other scheduled bank/ Customs Notified exchange rate. Conversion rates from the above sources shall be used uniformly for evaluation of all bidders participating in the tender.



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	<p>5. The requirement for submission of audited financial statements is sometimes not accepted by some foreign bidders due to their internal/ local regulation (particularly in case such bidders are subsidiaries of other foreign company). Instead, they prefer to submit CEO's/ CFO's (Howsoever designated) certificate (the parent company for itself or for its subsidiary) for their turnover or the financial statements. In such cases, CEO's/ CFO's (Howsoever designated) certificate in original, from the company or from the parent company (in case bidder is a subsidiary) stating the turnover of the bidding entity along with a declaration that the bidding company is not in a position to submit its financial statement as per the local/ internal regulation (clearly specifying the applicable regulation) with an endorsement by Chartered Accountant/ Statutory Auditor/ Certified Public Accountant (not being an employee or a Director or not having any interest in the bidder(s) company/ firm) may be accepted.</p> <p>6. Wherever Chartered Accountant/ Statutory Auditor/ Certified Public Accountant (not being an employee or a Director or not having any interest in the bidder(s) company/ firm) is not in a position to endorse such CEO's/ CFO's certificate due to local regulations, CEO's/ CFO's certificate in original without endorsement may be accepted provided a reference of the local regulation restricting this endorsement is given in the CEO's/ CFO's certificate.</p> <p>7. Published Annual report available in the public domain shall also be acceptable.</p> <p>8. Provisional Balance Sheet and P&L account statement shall not be considered for evaluation, even if the same is uploaded.</p>
D	<p>Financial Net worth of the Bidding Company should be positive in the last audited financial year (immediately preceding financial year as defined in turnover criteria i.e. C (2) as above.</p> <p>To establish the same, the bidder shall furnish the latest Audited Financial Statement including Auditors reports, Audited Balance Sheet, Profit & Loss Account, Notes, Annexures (if any) etc.</p> <p>All documents furnished by the bidder in support of Net Worth Compliance above shall be:</p> <p>a.) Duly audited by Statutory Auditor of the bidder or a practicing Chartered Accountant (not being an employee or a director and not having any interest in the bidder's company) where audited accounts are not mandatory as per law.</p> <p>OR</p> <p>b.) Duly notarized by any notary public in the bidder's country or certified true copies duly signed, dated and stamped by an official authorized for this purpose in Indian Embassy/ High Commission in Bidder's country."</p> <p>OR</p> <p>c.) Self-certification in original from CEO or CFO or Company Secretary of the bidder (Limited company only). This option shall not be applicable to Proprietorship/ Partnership firms</p> <p>The failure to meet Net-Worth Criteria as mentioned above will render the bid to be summarily rejected.</p>
E	<p>i) Being a Domestic Tender, bid from foreign bidders shall not be accepted.</p> <p>ii) Bids from Consortium or MOU parties shall not be accepted. -</p>



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- iii) Relaxation to MSEs for PQ criteria shall not be applicable for this Tender as this being on Works Contract basis.
- iv) Relaxation to Startups for PQ criteria shall not be applicable for this Tender.
- v) Acceptance of PQC documents of related / unrelated parties shall be as follows:

S.No	Scenario	Financial criteria	Techno-commercial experience criteria
1	A New Entity formed as a result of merger of two entities and the earlier entity cease to exist	New Entity can use previous financial credentials of any of the merged companies till 7 years from the date of such merger or of its own.	New Entity can use previous experience of any of the merged companies till 7 years from the date of such merger or of its own.
2	(i) An entity (A) takes over another entity (B) and B ceases to exist. (ii) An entity (A) takes over another entity (B) partially and the said part of entity (B) vertical specific business vertical of B ceases to exist.	(i) Bidder can use previous financial credentials of company taken over by bidder or of its own. (ii) Bidder cannot use previous financial credentials of specific business vertical of company taken over by bidder.	(i) Bidder can use previous experience of company taken over by bidder. (ii) Bidder can use previous experience of the business vertical which has been taken over by bidder (not entire experience of entity B).
3	A new entity formed has taken over all the assets and liabilities of the proprietorship concern or partnership firm wherein one or more of the Directors of the new entity were the proprietor or partners and the erstwhile proprietorship concern/ partnership firm has ceased doing business after taking over of the business by the new entity.	The new entity can use the financial credentials of the erstwhile proprietorship concern/ partnership firm.	The new entity can use the experience of the erstwhile proprietorship concern / partnership firm.

- vi. The experience of bidding entity only will be considered. Experience of works executed as part of JVs/ Consortiums/ MoU Parties shall not be accepted, even if a single involved partner/ party bids for the tender.

18.0

OTHER COMMERCIAL CRITERIA: -

Following other criteria shall also be considered for evaluation:



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SN	Other commercial criteria	Documents to be submitted
1	PAN Card	PAN of bidder
2	PF Registration Certificate	Scan copy of Valid PF registration no. copy to be submitted.
3	GST Registration certificate	The party should submit valid GSTIN number and GSTIN registration certificate shall be uploaded.
4	Partnership Deed or Certificate of Incorporation with Memorandum & articles of Association.	Scan copy to be submitted. In case the bidder is sole proprietor, he will upload 'Undertaking for Sole Proprietorship'.
5	Power of Attorney / Board Resolution in favour of tender signing Authority.	Authority of the person uploading the bids with his DSC (Digital Signature Certificate) shall be required to be submitted. Document required showing the authority of the person uploading & submitting the bid with his Digital Signature Certificate shall be as per Clause 13 of Section-2 of Part-B.
6	Integrity pact agreement along with covering letter	To be submitted as per Annexure 'M' of Part-B <i>(To be executed on plain paper and submitted along with Technical Bid / Tender Document. Integrity Pact agreement is to be signed by proprietor in case of Proprietary firm and by all the partners in case of Partnership firm or by all the partners / members of consortium/ unincorporated Joint Venture / Association of persons or by the authorized signatory in case of a Company including Joint venture)</i>

All the above credentials shall be in the name of the bidder.

19.0 TO BE SUBMITTED BY ALL THE BIDDERS - BID STAGE

S N	Documents	Documents to be Submitted.
1	Undertaking by the Tenderer(s) on acceptance of tender terms & conditions	Annexure 'A' of Part-B
2	Proforma for Declaration on Proceedings Under Insolvency and Bankruptcy Code, 2016 (Bidding Stage)	Annexure 'B' of Part-B
3	Compliance Certificate for bidders from a country which shares a land border with India	Annexure 'C' of Part-B
4	Proforma of Tender not Tampered	Annexure 'D' of Part-B
5	Declaration of blacklisting / holiday listing	Annexure 'E' of Part-B
6	Details on Relationship with IOCL's Directors (Declaration "A", "B" & "C")	Annexure 'F' of Part-B
7	Undertaking for business transaction status of bidders	Annexure 'G' of Part-B
8	Particulars of bidder	Annexure 'H' of Part-B
9	Undertaking on no multiple bidding	Annexure 'I' of Part-B



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10	Declaration Form for availing Purchase Preference - Bid Stage	Annexure 'J (Part-I)' of Part-B
11	Undertaking for Local Content- Bid Stage	Annexure 'J (Part-II)' of Part-B
12	Certification for Local Content - Bid Stage (Tender value >= 10 Cr.)	Annexure 'J (Part-III)' of Part-B
13	Integrity Pact Agreement along with Covering Letter	Annexure 'M' of Part-B
14	Form of Bank Guarantee for Earnest Money Deposit (EMD) (If Applicable)	Annexure 'N1' of Part-B
15	Format of Insurance Surety Bonds for Earnest Money Deposit (EMD) (If Applicable)	Annexure 'N2' of Part-B

Note:

1. It may be noted that mere submission of the relevant information and meeting the qualifying criteria would not entitle the tenderer for technical qualification. The details submitted and the credentials can be verified by the concerned authority. In the event document / information submitted by the tenderer is found to be forged or incorrect, the tender shall be liable for rejection and / or the contract with such tenderer shall be terminated and EMD/SD submitted shall be forfeited. Such tenderer may also be put on Holiday List by IOCL.
2. In case the bidder has been asked to submit price bid/price implication in physical form, the use of white / erasing fluid for correcting the rates is banned. Wherever the rates are corrected with white / erasing fluid, the bids will be summarily rejected.
3. General Condition of contract contains provision for Arbitration and Alternative Dispute Resolution Machinery under section 9, which stands deleted. Further, the reference to Arbitration and Alternative Dispute Resolution Machinery provision contained in any other item and condition of GCC, which may be general and special in nature shall also stand deleted to the extent, the said contents are applicable to the arbitration provisions.
4. Any Addendum/ Corrigendum/ Sale Date Extension in respect of the tender shall be issued on our website <https://iocletenders.nic.in> only & no separate notification shall be issued in the press. Bidders are therefore requested to regularly visit our website to keep themselves updated.
5. IOCL reserves the right to revise/extend any date/time from scheduled timelines of published tender.
6. The Bidders are advised to submit their offers strictly as per the terms and conditions and specifications contained in the tender document and not to impose conditions/ counter conditions. Conditional tenders received subsequent to the pre bid meeting shall be liable for rejection. The Corporation reserves the right to accept any tender in whole or reject any or all tenders without assigning any reasons.

20.0

REJECTION OF TENDER:

Rejection of tender shall be as per Part-B of the tender document.

21.0

TECHNO-COMMERCIAL BID EVALUATION:

21.1 PRICE BID:



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- i. This is two bid public E -tender.
- ii. The tender is invited on a percentage basis and the price bid BoQ is divided into two components:
 - ✓ **Capital Works** related to the project
 - ✓ **Revenue Works** pertaining to CAMC (Comprehensive Annual Maintenance Contract)

Capital Works related to the project:

Tenderers are required to quote their Percentage rate {(+) OR (-)} given in the relevant columns in the Price Bid in Figures only. In case the bidder wants to quote the rate 'AT PAR' of our estimated cost, the bidder shall write "0" (Zero) on the space provided in the price bid BoQ. After quoting of the percentage rate by the tenderer, the final quoted value will automatically get generated in the price bid both in the figures & words. Hence, all tenderer is required to quote strictly as per the format attached.

The finalized rate in % (percentage) shall be applicable equally on all items of schedule of rates for capital works for the project provided in this tender.

Revenue works pertaining to CAMC:

1. For CAMC of CAPEX works, the value for the 8-year period must be at least 30% of the above quoted price for Capital Works. However, bidders have the flexibility to quote a CAMC value greater than 30% of the above quoted price for Capital Works. If the cell in BoQ given for the quoting of the overall CAMC percentage is left blank, then automatically 30% of the above quoted price for Capital Works, shall be considered.

2. CAMC value for 10 years against retained equipment and Resident Support Engineer during warranty period has been calculated and provided in the BoQ. %(percentage) quoted by the bidder for Capital works will automatically be applicable for these line items.

21.2 EVALUATION CRITERIA

The procedure for evaluation of tenders shall be as follows:

- i. Upon receipt of the bids, the documents submitted by all the parties shall be scrutinized with respect to submission of EMD as per NIT, PQC, Other Commercial Criteria, other necessary documents (if any), acceptance to all terms & conditions as per the tender.
- ii. Price bids of only those parties who satisfy the above-mentioned requirements shall be considered for opening.
- iii. Prior intimation will be uploaded on e-tender portal regarding due date and time of opening of Price Bid.
- iv. The **overall L-1 bidder** will be determined based on the **lowest combined quote** for both components of the BoQ—Capital Works and Revenue Works (CAMC).
- v. The evaluation of bidders shall be based on lowest acceptable rate quoted, with or without negotiations as the case may be i.e. Overall Bid amount as above for all Supply, Installation & Commissioning and CAMC items including GST net of input tax credit (if any). However, award of work shall be as per the applicable provisions of PP-MII.

For calculation of input tax credit (if applicable), 'X' percent shall be applied on total GST element of Supply, Installation & Commissioning and CAMC items.



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- vi. Ranking of bidders will be based on lowest acceptable net delivered price.
Net Delivered price = Basic Amount + (GST) minus Input tax credit as available to IOCL. (Full/Part/ Nil). **For this Tender ITC is 100%.**
- vii. Negotiations shall not be conducted with the bidders as a matter of routine. However, Corporation reserves the right to conduct negotiations. Tenderers will have to attend the Office of INDIAN OIL CORPORATION LIMITED as informed by Tender Issuing Authority for negotiations/clarifications at their own cost as required in respect of their quotation without any commitment from INDIAN OIL CORPORATION LIMITED.
- viii. In case of tie between two or more bidders at L-1 position, the following shall be done:
- ✓ In case of tie between two or more bidders at L-1 position, all the L-1 bidders shall be asked to submit discount bid in terms of percentage discount over previous quoted amount in a sealed envelope. Above exercise shall currently be an offline activity outside the e-portal.
 - ✓ The sealed envelopes shall be opened on the specified date by tender committee/TCC. The bidders while seeking revised bids, shall be advised to witness the opening of sealed envelopes.
 - ✓ In case there is a tie again, the bidder with the highest turnover in any of the last three years as submitted against turnover criteria shall be considered as L1 bidder.
 - ✓ In an exceptional case where turnover is also same, the bid submitted earlier in the portal in terms of both date and time shall be considered for award of job.
- ix. IOCL shall not be bound to accept lowest or any tender and the decision of IOCL in this regard shall be the final.
- x. In case lowest qualified bidder increases the price even though still remains the lowest or backs out before the work order is placed, there shall be re-tendering in a transparent and fair manner. In such cases, negotiation shall not be held with the next lowest party. EMD of the lowest party, who has backed out, shall be forfeited and proceedings for holiday listing of the party shall be initiated.
- xi. The bidder shall calculate his final evaluated price as per BoQ and quote accordingly. After quoting the prices by the tenderer, the final quoted value will automatically get generated in the price bid both in the figures & words. Hence, all tenderer is required to quote strictly as per the format attached.

Note: Applicable GST rate has been considered as **18%** in the BoQ for both capital works related to the project and revenue works pertaining to CAMC. Bidders shall note the GST % considered in the BoQ and quote their overall percentage in the BoQ.
- xii. If any bidder (other than L-1) offers suo-moto reduction in the prices after opening the price bid, his bid shall be rejected outrightly. However, if there is a suo-moto reduction by the L-1 bidder who was adjudged on the basis of comparative statement as per price bids before such reduction, the benefit of suo-moto reduction may be availed of at the time of placement of order on the lowest bidder.
- xiii. **APPLICABILITY OF PURCHASE PREFERENCE:**

Since the tendered works is in the nature of works contract, no price or purchase preference shall be applicable to PSUs (State & Central), JVs of IOCL & MSEs/NSICs/Startups in this tender.



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Public Procurement (Preference to make in India) PPP-MII will be applicable for subject tender.

1	Supplier Classification:	
a.	Class-I Local supplier	LC \geq 50%
b.	Class-II Local supplier	LC \geq 20% < 50%
c.	Non-Local supplier	LC < 20%
d.	Deemed Class-II Local supplier	As per clause 2A of PP-MII Order revision Dated 19.07.2024
2	Margin of Purchase preference (PP- MII)	20% (i.e. L1+20%)

Refer Clause no. 22 of SECTION - 2 for Purchase Preference (PP-MII) of Part-B for further details.

The evaluation of bids shall be on the basis of following and the works will be awarded to bidder as given below.

Class-I local supplier shall get purchase preference over Class-II local supplier as well as Non-local supplier as per the following procedure:

- Among all qualified bids, the lowest bid shall be termed as L1. If L1 is Class-I local supplier, the contract for the full quantity shall be awarded to L1.
- If L1 bidder is not a Class-I local supplier, the lowest bidder among the Class-I local supplier will be invited to match the L1 price subject to the Class-I local suppliers quoted price falling within the margin of purchase preference and contract shall be awarded to such Class-I local supplier subject to matching the L1 price.
- In case such lowest eligible Class-I local supplier fails to match the L1 price the Class-I local supplier with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on, and contract shall be accorded accordingly. In case none of the Class-I local supplier within the margin of purchase preference matches the L1 price, the contract may be awarded to the L1 bidder.
- Class-II local supplier will not get purchase preference.
- In case of tie (i.e. identical rates quoted by more than one party) among preferential bidders at other than L1 position, the bidder with the highest turnover in any of the last three years as submitted against Turnover criteria shall be considered for preference.
- In the event of bidder submitting turnover documents for only one or two years, ranking shall be based on turnovers submitted.
- In an exceptional case where turnover is also same, the bid submitted earlier in the portal in terms of both date and time shall be considered for award of job.

Other Important Points:

- If after opening of price bids, it has come to the notice that the L-1 bidder has already been put on holiday list due to any reason whatsoever at any location within IOCL, the party will not be considered for issue of order. In such situations, next lowest shall be considered as L-1.



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	<p>ii. In case of negotiation, it shall be first held with the L-1 bidder and then chance to preferential bidder for matching the final price shall be offered.</p> <p>iii. IOCL reserves the right of allocation of jobs besides to increase or decrease the quantum of works during pendency of Work depending on the performance of the contractors and requirement of the Corporation.</p>
22.0	<p>In case of irreconcilable conflict in technical matters between the provisions in the separate contract documents concerning or governing the same aspect precedence shall be given to the provisions contained in the documents mentioned below in the order in which they are set out below:</p> <ul style="list-style-type: none"> ➤ Formal Contract ➤ Acceptance of Tender ➤ Price Schedule annexed to Letter of Acceptance ➤ Agreed Variations annexed to the Letter of Acceptance ➤ Addenda to the Tender documents ➤ Special Conditions of Contract ➤ Special Instructions to Tenderers ➤ General Conditions of Contract ➤ Instructions to Tenderers <p>Any variation or amendment issued after the execution of the formal contract shall take precedence over the formal contract and all other Contract Documents.</p>
23.0	<p>Legal dispute, if any, arising during the evaluation of the tender shall be within the jurisdiction of local courts.</p> <p>a) For disputes up to stage of LOA - Mumbai</p> <p>b) For disputes during execution stage - Mumbai</p>
24.0	<p>Work Order:</p> <p>i. <u>Project Work Order</u></p> <p>Project work order shall be placed on the successful L1 bidder (Technically qualified bidder quoting lowest acceptable rate, with or without negotiations as the case may be) based on Overall Bid amount for all Supply, Installation & Commissioning Services and Composite Work at finalized rate.</p> <p>Work order for all Supply, Installation & Commissioning Services and Composite Work items shall be placed at their base rate applying net offered premium/discount and applicable GST rate as indicated by L1 bidder in the Price Bid.</p> <p>ii. <u>CAMC Order</u></p> <p>Two Separate CAMC Orders shall be placed:</p> <p>a) CAMC Order for CAPEX Works : Shall be placed after the completion of the warranty at finalized rate. Work order for CAMC year-wise shall be placed based on Project executed amount as detailed in Special Terms and Conditions of the contract.</p>

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	b) CAMC Order for Retained Equipment : Shall be placed immediately after successful commissioning (defined as the date of compliance of all punch points of SAT) with completion period co-terminating with the CAMC Order for CAPEX Works. Year-wise CAMC value shall be as per the break-up provided in the Tender Document.		
25.0	TENDER INVITING AUTHORITY	:	GM (M&C), MKHO

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(FOR TERMINAL AUTOMATION SYSTEM)

1.0 Nature and Scope of Work

Design, Supply, Installation, Testing and Commissioning of PLC based Terminal Automation System comprising of Tank Truck Loading System, Tank Farm Management System, Access Control System, Fire Alarm System etc along with associated works at Bitumen Drum Filling Plant, Mathura (U.P).

Bidders are advised to inspect the site and ascertain the conditions including leads/ lifts involved/ approach to vehicles, power, water geo - political scenario etc prior to quoting the amount.

The work descriptions and specifications are as per enclosed documents.

Location of site: **Mathura, UP**

2.0 **EARNEST MONEY DEPOSIT** -As per clause 5.0 of NIT and conditions stipulated in Part B of the tender document.

3.0 **VALIDITY OF TENDER:** The tender will be valid as specified in NIT. Indian Oil reserves the right to place work order at any time as per validity mentioned in NIT from date of opening of tender.

4.0 **WORK SCHEDULE:**

4.1 Upon award of work, the Contractor shall provide detailed work schedule to the Engineer-In-Charge (EIC) covering all activities related to supply, installation, testing and commissioning falling under the scope of work.


4.2 The vendor is required to prepare detailed activity wise PERT/CPM chart with pre-requisite for every activity wrt IOCL deliverables/fronts for entire job of Design, engineering, material procurement, installation/erection, execution, commissioning of system, trial, SAT within the stipulated time period within fifteen (15) days of the date of LOA. The same shall be discussed and finalized by IOCL Site Engineer/ Engineer-in-charge during Kick Off Meeting before commencement of work. IOCL will furnish site project schedule and shutdown schedule to enable the vendor during KOM for preparing the PERT / CPM chart.

4.3 The time of commissioning / acceptance shall be inclusive of time for mobilisation, engineering, approval of the design & other materials and intervening monsoon, if any.

4.4 There would be a kick-off meeting with the contractor, where in the contractor would present the detailed action plan, work plan schedule, critical/long delivery item plan, etc. along with the fortnightly review schedule.


5.0 **COMPLETION PERIOD :**

5.1 Completion period for the subject work shall be 12 months from the 21st date of issue of commencement order or the date of handing over the site whichever is earlier (excluding CAMC period).

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- 5.2 The works have to be executed in Operating Terminals with restrictions, security formalities etc., The vendor should visit the site, understand the logistics, working Constraints etc., before the pre-bid and seek all clarifications required.
- 5.3 PO will be e-mailed to the successful bidder along with speed post/ Courier as soon as it is ready. If it is not accepted with desired formalities by the successful bidder within this stipulated period as mentioned above, it will be deemed disqualified/rejected. In case of any delay in project completion for reasons not attributable to the vendor, time extension would necessarily be provided before **Contractual Completion Date (CCD)** and can be granted second time or subsequently depending upon the specific site condition. This is in partial modification of GCC clause 4.5.1.1.
- 5.4 **Site Acceptance Test:** The date of acceptance of SAT report (submitted by the vendor in the format forming part of the tender document) without any contrary observations (within the contractual scope of the work of the vendor) by IOCL within 30 days of its submission shall be considered as the date of completion of the job. The date of acceptance of SAT report in this case shall be treated as date of submission of SAT report plus 30 days.
- 5.5 In case, there are finding/observation contrary to the SAT document by functional dept brought to the notice of vendor within 30 days of submission of SAT checklist in prescribed format, the date of completion will be determined based on the tabulation given below:

Scenario	Nature of Observation Recorded	Rectification action taken	Date of completion
1	No shortcoming/fault/contrary observation within 30 days of SAT Report submission	NA	Date of Acceptance of SAT report i.e. date of submission of SAT report plus 30 days
2	Some failure of Core activity* witnessed within 30 days of SAT Report submission	TA System integrator rectified it within 24 hrs	Date of Acceptance of SAT report i.e. date of submission of SAT report plus 30 days
3	Some failure of Core activity* witnessed within 30 days of SAT Report submission	TA System integrator rectified it beyond 24 hrs	Date of problem resolution plus 30 days of hassle free operation wrt such core activities
4	Some Non Core/ Equipment failure recorded within 30 days of SAT Report submission	TA System integrator rectified it within 48 hrs	Date of Acceptance of SAT report i.e. date of submission of SAT report plus 30 days
5	Some Non Core/ Equipment failure recorded within 30 days of SAT Report acceptance	TA System integrator rectified it beyond 48 hrs	Date of Acceptance of SAT report i.e. date of submission of SAT report plus 30 days Or Date of Rectification of the problem, whichever is later
6	Some failure of Core activity* witnessed as well as some noncore /equipment failure	In either of the above combinations	Shall be the later date out of scenario no 2,3,4 or 5 given above, depending on the problem resolution date of the respective Core

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Scenario	Nature of Observation Recorded	Rectification action taken	Date of completion
	recorded within 30 days of SAT Report submission		activities as well as non core activities.


*Core Activity here denotes loss of entire automated operation of TT loading/Tank receipt/Tank despatch/Pipeline Receipt.

- 5.6 In the event, there being a hindrance in conducting the SAT or dispute regarding the SAT Report and observations of the Location in Charge, the vendor shall refer the matter in writing to the concerned Engineering in charge for resolution. The decision of such authority shall be final.
- 5.7 In partial modification of GCC Clause No. 5.5.0.0, the completion Certificate shall be issued by Engineer-in-Charge on written request by the CONTRACTOR on successful completion of the works and after completion of documentation as listed in clause 5.5.2.0 of GCC and including release of final bills within 15 days from the date of receipt of written request for completion certificate by the CONTRACTOR.
- 5.8 These special terms and conditions shall be read in conjunction with the technical specifications, drawings, instructions to tenderers and particular conditions of contract and any other document forming a part of the tender, wherever the tender so requires. This supersedes clause 1.7.0.0, 2.1.1.2 and 4.0.3.0 of GCC.

If the vendor fails on the performance of the contract within stipulated time **period for reasons attributable to the vendor**, the Corporation shall be entitled to recover and the vendor agrees to pay to the Corporation as and by way of price adjustment for delay in completion. Also, wherever the delay is attributable to the contractor, it should be noted that no extra compensation or escalation in prices for extended period is allowed to the contractor.

6.0 SECURITY DEPOSIT:

- 6.1 Submission and Quantum of Security deposit for Project work order and CAMC shall be as per conditions stipulated in Part B of the tender document. The stamp paper of appropriate value is required to be purchased in the name of bank issuing the guarantee, In the Bank Guarantee, the first Party to the Bank Guarantee should be the Bank issuing the Guarantee and the second Party should be the beneficiary i.e. IOCL.
- 6.2 Project work order BG submitted shall be valid for three months beyond the defect liability period plus completion period from the date of LOA as per tender.
- 6.3 The above referred Bank guarantee for project work order shall be returned on completion of warranty and on receipt of revised BG for 8 years CAMC contract period (i.e. 3rd year to 10th year of project completion) during 1st year of CAMC. At the end of every year of CAMC, the BG in lieu of the respective year's CAMC will be returned on receipt of revised BG equivalent to remaining years' cumulative Comprehensive AMC value. In case of delay on the part of the vendor in submission of the BG during the CAMC period, IOCL may encash the earlier BG.
- 6.4 In case, SD is in the form of deductions from bills, the SD amount will be refunded on completion of warranty and on submission of BG/online payment equivalent to Comprehensive AMC value of the total 8 years period (i.e. 3rd year to 10th year of project completion) during 1st year of CAMC. At the end of every year of CAMC, the BG in lieu of the respective year's CAMC will be returned on receipt of revised BG equivalent to remaining years cumulative

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Comprehensive AMC value. In case of delay on the part of the vendor in submission of the BG during the CAMC period, IOCL may encash the earlier BG.

- 6.5 For CAMC of retained equipment, SD shall be submitted upon successful commissioning (either BG or through online payment as stipulated in Part-B). In case of BG, at the end of every year of CAMC, the BG in lieu of the respective year's CAMC will be returned on receipt of revised BG equivalent to remaining years' cumulative Comprehensive AMC value. In case of delay on the part of the vendor in submission of the BG during the CAMC period, IOCL may encash the earlier BG.


- 6.6 SD BG submitted for CAMC should remain valid for a period of 90 (Ninety) days beyond the date of completion of all contractual obligations of the service provider, including warranty obligations and/or Defect Liability period.

6.7 Refund of Security Deposit

The Security Deposit is refundable after completion of defect liability period (warranty period) after satisfactory completion of the work. It should be ensured that the rectification of defects are completed well in time before the expiry of the defect liability period. There is no need for the contractors to claim the refund. Security deposit (SD) shall generally be released within 45 days of expiry of defects liability period. In the contracts where defect liability period is not applicable, security deposit may be released along with the final bill.

7.0 SCHEDULE OF RATES /BOQ

- 7.1 The breakdown of materials pertains to supply of major items. It will be the responsibility of the bidder to supply all materials/ Equipments required for completion of work as per contract, irrespective of whether all items are identified in SCHEDULE OF RATES/ PURCHASE REQUISITION/ BOQ.
- 7.2 Corporation reserves the rights to increase/ decrease the tendered quantity of any or every item at any stage of work at the accepted rates. Contractor's claim for compensation or damages on account of these shall not be entertained subject to provision contained in GCC.
- 7.3 Parties should visit the site to assess the working area and also to assess the local conditions prior to quoting to ensure smooth working.
- 7.4 The Bidders must note that the rates and amount indicated in the schedule of works shall be applicable for all leads and lifts and reach involved. The Corporation also reserves the right to operate or not operate or partly operate any item mentioned in the schedule. The rates quoted for all items below the ground level shall be inclusive of adequate shoring, shuttering, bailing out sub soil water (if found necessary) etc complete. The successful tenderer shall be responsible for implementation of all precautionary measures for ensuring safety for all materials and labor till such time the work is completed in all respects and handed over to the Corporation.
- 7.5 The rates stated in the SCHEDULE OF RATES/ BOQ shall not be subject to escalation or increase on any account whatsoever, other than new taxes, duties, levies etc. imposed by Central or State government subsequent to submission of the bid.
- 7.6 Once the tender is accepted and the contract is placed on the successful tenderer, the rates for the different components in Schedule of Rates shall remain valid till the respective components in Schedule of rates and the Job is 100% completed and SAT is accepted. No escalation whatsoever will be entertained on any ground. No price escalation shall be given. No extra payments other than the rate quoted shall be entertained. No extra payments shall

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be made for working on extended hours, Saturdays, Sundays and Holidays to meet the committed time schedule. Forms C will not be issued by IOCL.

- 7.7 All the items of work mentioned in the SCHEDULE OF RATES/ PURCHASE REQUISITION/ BOQ and covered by the Contract shall be carried out as per the drawings, specifications and under the direction of EIC and shall include all costs/expenses including equipment, labour, logistics, transport, travel & stay arrangements, attending meetings, presentations at IndianOil office, collection of necessary data, other incidentals including supply of materials etc. as may be necessary for rendering the services in totality as per detailed technical specifications of the Tender. The Contractor shall be and remain at all-time exclusively responsible to provide all material, consumables, labour supervision, equipment tools machines, permits, licenses, casements and facilities and other items and things whatsoever required for or in connection with the work, included but not limited to those indicated by expression or implication in the SCHEDULE OF RATES/ BOQ, Technical Specification, approved designs, plans, drawings and/or other Contract documents or howsoever otherwise required either for incorporation within the permanent works or in relative to the execution and performance of the work.

- 7.8 Vendor shall calibrate all the MFM, PD/Turbine meter, Master MFM, Blending Meter and additive injection meter (if required as per deptt of Legal metrology), Prover tank or any other metering equipment for the successful completion of SAT. All statutory fees for W&M stamping shall be borne by IOCL.

However, if the meters/Prover tank requires recalibration and re-stamping by dept of legal metrology due to inaccuracy issue arising within the successful completion of SAT period, the stamping fees in connection with the same , payable to the dept of legal metrology shall be recovered from the vendor, as long as successful completion of SAT is delayed due to the reasons attributable to the vendors.

However, it is the responsibility of vendor to provide necessary documentation, such as detailed product catalogues, OEM certificates etc. to facilitate the W&M stamping process by IOCL.

- 7.9 Rate shall also exclude cost towards exhaustive training to IOCL personnel as per Scope of Work and payment for the same shall be as per SOR line item.
- 7.10 Corporation reserves the right to conduct negotiations.
- 7.11 Work order to be placed from the recipient political state/location.
- 7.12 The Corporation reserves the right to accept any tender in whole or in part and reject any or all tenders without assigning any reasons. The Corporation reserves the right to accept more tenders in part. Decision of the Corporation in this regard will be final.


- 7.13 **Work Order rates: Order will be placed as under-**

7.13.1 Project Work Order

Project work order shall be placed on the successful bidder in line with the tender evaluation criteria.

7.13.2 CAMC Order

i. CAMC Order for CAPEX Works : Shall be placed after the completion of the warranty at finalized rate. Work order for CAMC year-wise shall be placed based on Project executed amount as detailed in Special Terms and Conditions of the contract.

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ii. CAMC Order for Retained Equipment : Shall be placed immediately after successful commissioning (defined as the date of compliance of all punch points of SAT) with completion period co-terminating with the CAMC Order for CAPEX Works. Year-wise CAMC value shall be as per the break-up provided in the Tender Document

8.0 Special clauses of Taxation: -As per Part-B of the tender document.

9.0 PROGRESS REPORT & PROJECT REVIEW MEETING

- 9.1 Progress report wrt activity plan finalized in the contract/ kick off meeting must be submitted to IOCL by the vendor every month. IOCL will provide realistic dates for pending front availability and shutdown planning to enable the vendor to update/ modify the PERT/CPM accordingly.
- 9.2 The contractor shall submit fortnightly and monthly progress report (soft copies) along with catch up plans against slippages to EIC/ Owner.
- 9.3 Owner shall hold project review meetings with Contractor at pre-defined periodicity defined at the onset of project, during project kick-off meeting.

10.0 Project Management Team


10.1 The successful bidder shall be required to position an effective project management team including designated Project Manager, site engineer and dedicated HSE engineer as per qualifications tabulated below. Positioning of safety engineer and site engineer is a pre-requisite during project execution at site. During kick off meeting the date of deployment of these engineers shall be agreed upon & shall be binding upon the vendor.

10.2 The table stipulates only the minimum qualification of manpower required at site:

12. The table separates only the minimum qualification of manpower required at site							
SN	Quantum of work in Rs/Lakhs	Project Manager	QC/QA/ Planning Engineer	HSE Manager	Recovery for non-deployment per month		
					Project Manager	QC/QA Manager	HSE Manager
1.	0-200	1 Engineer with 3 years of experience			Rs.30000		
2.	>200	1 Engineer with 5 years of experience	1 Engineer with 2 years of experience	1 Engineer with 1 year of experience	Rs.40000	Rs.25000	Rs.20000

Note: In case the Engineer concerned is holding diploma qualification against Engineering graduation, the requirement of site experience shall be increased by 2 years.

- 10.3 Vendor will submit the deliverables requirement to IOCL well in advance. IOCL will in turn ensure assigning desired responsibility matrix for facilitating the genuine requirements and execution of the project.
- 10.4 Vendor should deploy qualified engineers having experience in similar type of jobs to execute/supervise the critical jobs like system integration, PLC integration, etc other than the regular project jobs.

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10.5 RESIDENT ENGINEER (s)

10.5.1 Successful Bidder is required to post Resident Engineer(s) in all two/three shifts as per the site requirement during two years of warranty and eight years comprehensive AMC period. The no. of Resident engineers required at site is in the discretion of successful bidder to ensure desired level of flawless/ uninterrupted service level. Until or unless the no. of shifts is specifically mentioned in the Tender condition, the bidder should consider single/ general shift with additional working hours in the scope of work. Moreover, the bidders may get clarified the required no. of shifts during Pre bid meeting and quote as per declared shifts for the location at the time of tender submission. No extra payment will be made on account of RE for location operation in extended hours, as and when required.

10.5.2 However, separate line item for RE support is provided in SOR keeping in view the future requirement in case of location is declared to run in additional shifts, during any point of time within warranty and comprehensive AMC period. Similarly, if operation is reduced from number of shifts to one /general shift/No RE, equivalent recovery on pro rata basis for reduced RE support shall be made from CAMC amount. Vendor shall be asked to remove additional RE from location by giving a notice of three months.

10.5.3 Payment for RE services during warranty period shall be made under a separate line item in the contract at the rate finalized in the tender without any escalation.

10.5.4 Resident Engineer/s at the site shall be responsible for maintenance activities required to maintain the system in healthy condition with the assistance of back-office support.

10.5.5 Vendor is required to arrange to position qualified & trained / experienced Resident Engineers at IOCL terminal / Terminal to facilitate day to day operations and maintenance of the Terminal automation system as supplied by the vendor in an uninterrupted and smooth manner.

11.0 PAYMENT TERMS - PROCEDURE FOR RELEASE OF PAYMENT:


11.1 CAPITAL WORKS - PROJECT (For respective Supplies Items)

11.1.1 Step 1: Against Receipt of Materials at Site

80% of the rates quoted against receipt of the supply items/materials at site in good condition, along with submission of test/inspection, statutory certificates along with invoice. Additionally GST amount as reflected in vendor's tax invoice shall be paid in full i.e. 100% (% GST reimbursed shall be limited to percentage quoted by vendor at the time of tender or actual, whichever is lower).

11.1.2 Step 2: On Successful completion of SAT without any contrary observations (within the contractual scope of the work of the vendor and except any issues pertaining to stabilization) by IOCL within 30 days of its submission (As explained in **Clause No.5.0**):

10% of the rates quoted against supply items/materials will be released after successful completion of SAT within contractual scope of work and except any issues pertaining to stabilisation (with active involvement of the location, specially wrt making required fronts / facilities available in timely manner to conduct the SAT within the intended timeframe) and

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submission of SAT document (format of SAT attached with tender document) by the vendor, and operation of error/breakdown free system for a period of 30 days (The successful completion of SAT will be determined based on Tabulation in **clause no. 5.0**) Within the same timeline OEM inspected and certified satisfactory installation and commissioning report should be submitted by the vendor for all critical field equipments including metering equipments and safety permissive accessories in TLF ~~—TW~~, Tank gauging equipments, DBBV, ROSOV, Barrier gate, BQD, CCTV equipments, PLCs, UPS, Servers. However, it is upto the vendor to involve the other respective OEMs as well wrt installation and commissioning of other equipments, considering the fact that notwithstanding the above the onus of desired upkeep and stability of operation of the equipments till AMC completion lies with the vendor.

In case, the net delay in conducting SAT for reasons not attributable to Vendors wrt the scheduled SAT date as per Activity Planning schedule finalised during Kick of Meeting, crosses 2 months, above 10 % payment of the respective supply component shall be released against a BG/ISB of equivalent amount valid upto a period equivalent to expected SAT date. In case of any further delay in SAT, BG validity shall be extended till actual SAT completion.

The IOCL location in-charge will extend all necessary assistance in conducting SAT. The bidder will not delay the SAT report and its submission for non availability of/ presence of IOCL representative at the place where SAT is being conducted, apart from the issues/areas where location's facilitation/operational assistance are necessarily required. The bidder will communicate in writing any hindrance/ problems in conducting SAT to the Engineering in-charge. The oral request / communication regarding the hindrances/ problems in conducting SAT report will not be entertained.

The Location in-Charge or his authorised representative to check the system operation and efficacy of SAT document within a period of 30 days and comment on the SAT document within 25 days from the submission of SAT document.


In the event, there being a hindrance in conducting the SAT or dispute regarding the SAT Report and observations of the Location in-Charge, the vendor shall refer the matter in writing to the concerned Engineering in-charge for resolution. The decision of such authority shall be final.

In case nothing contrary to the SAT document is received within max 30 days, it will be presumed as successful completion and payment will be released.

Warranty of the entire system in line with conditions mentioned in Section 14 of STCC is applicable from this milestone.

11.1.3 Step 3: On Successful accomplishment of System Stabilisation (Post achievement of SAT completion milestone):

10 % of the remaining Capex Cost for Supply items shall be payable on establishing complete stability of the system performance wrt accuracy and repeatability (wherever the same could be commissioned/established based on available fronts) within the stabilisation period of maximum next 60 days. Location should facilitate product movement in the tanks upto desired levels and taking and recording comparative (manual dip with proper dip tape using Ullage method vs ATG reading) readings and vendor should set it right based on these

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observations and finally there should be joint sign off wrt the accuracy and repeatability achieved. In case the above result is achieved within SAT milestone, the payment can be released against successful completion of SAT milestone.

In case, the net delay in attaining System Stability for reasons not attributable to Vendors wrt the scheduled Stabilisation accomplishment date as per Activity Planning schedule finalised during Kick Of Meeting, crosses 3 months, above 10 % payment of the respective supply component shall be released against a BG/ISB of equivalent amount valid upto a period equivalent to expected System Stabilisation accomplishment date. In case of any further delay in System Stabilisation, BG validity shall be extended till actual System Stabilisation accomplishment.

11.2 CAPITAL WORKS - PROJECT (For respective Installation/Commissioning Services Items)

11.2.1 Step 1 : On successful completion of Power on of individual equipments :


60 % of the rates quoted against Installation and Commissioning items will be released after successful power on of the corresponding sub systems. For Claiming the payment against this milestone, Installation certificate jointly certified by TAS Vendor's site Engineer, OEM Engineer and IOCL site engineer is required to be submitted for Fire Alarm system, MFM, BCU.

11.2.2 Step 2: On Successful completion of SAT without any contrary observations (within the contractual scope of work of vendor and except any issues pertaining to stabilization) by IOCL within 30 days of its submission (As explained in **Clause No.4.0**):

20% of the rates quoted against Installation and Commissioning items will be released after successful completion of SAT within contractual scope of work and except any issues pertaining to stabilisation (with active involvement of the location, specially wrt making required fronts / facilities available in timely manner to conduct the SAT within the intended timeframe and submission of SAT document (format of SAT attached with tender document) by the vendor, and operation of error/breakdown free system for a period of 30 days (The successful completion of SAT will be determined based on Tabulation in **clause no. 4.0**) . Within the same timeline OEM inspected and certified satisfactory installation and commissioning report jointly certified by TAS Vendor's site Engineer, OEM Engineer and IOCL site engineer, should be submitted by the vendor for all critical field equipments including metering equipments barring MFM, BCU and safety permissive accessories in TLF / ~~FW~~, Tank gauging equipments including density probe, Barrier gate, CCTV Equipments, ACS, BQD, PLCs, UPS, Servers. However, it is upto the vendor to involve the other respective OEMs as well wrt installation and commissioning of other equipments, considering the fact that notwithstanding the above the onus of desired upkeep and stability of operation of the equipments till AMC completion lies with the vendor.

In case, the net delay in conducting SAT for reasons not attributable to Vendors wrt the scheduled SAT date as per Activity Planning schedule finalised during Kick of Meeting, crosses 2 months, above 20 % payment of the respective services component shall be released against a BG of equivalent amount valid upto a period equivalent to expected SAT date. In case of any further delay in SAT, BG validity shall be extended till actual SAT completion.

11.2.3 Step 3: On Successful accomplishment of System Stabilisation (Post achievement of SAT completion milestone):

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20 % of the remaining Capex Cost for Installation and Commissioning items shall be payable on establishing complete stability of the system performance wrt accuracy and repeatability (wherever the same could be commissioned/established based on available fronts) within the stabilisation period of maximum next 60 days. Location should facilitate product movement in the tanks upto desired levels and taking and recording comparative (manual dip with proper dip tape using Ullage method vs ATG reading) readings and vendor should set it right based on these observation and finally there should be joint sign off wrt the accuracy and repeatability achieved. In case the above result is achieved within SAT milestone, the payment can be released against successful completion of SAT milestone.

In case, the net delay in attaining System Stability for reasons not attributable to Vendors wrt the scheduled Stabilisation accomplishment date as per Activity Planning schedule finalised during Kick Of Meeting, crosses 3 months, above 20 % payment of the respective services component shall be released against a BG of equivalent amount valid upto a period equivalent to expected System Stabilisation accomplishment date. In case of any further delay in System Stabilisation, BG validity shall be extended till actual System Stabilisation accomplishment.

11.3 CAPITAL WORKS - PROJECT (For Composite Work Items)

11.3.1 For Civil Works

11.3.1.1 Up to 95% of the item rate on completion of each item in RA Bills

11.3.1.2 Balance 5% on completion of all works and in final bill

11.3.2 For Pipeline Works


11.3.2.1 60% of the item rate on supply of items to site

11.3.2.2 35% of the item rate on installation of items

11.3.2.3 Balance 5% on completion of all works & in final bill.

NOTE :

- In case, SAT and / or System Stabilisation cannot be conducted within scheduled time frame (as per Contract/Kick Off meeting) to comply with Contractual completion period, due to reasons not attributable to vendor, time extension will be given by IOCL accordingly.
- In case of delay on part of IOC in infrastructure completion/Product positioning, the payment of sub-systems will be released for which SAT has been conducted and remaining payment will be released on successful SAT of pending sub-system.
- Materials positioning at site should be planned and signed jointly by Vendor and IOCL during Kick Of Meeting in such a manner (considering contractual completion period vis a vis facilities/front readiness anticipated), so that materials/equipments idling at site without provision for installation/power on / commissioning are minimised and unnecessary ageing of equipments at site without installation and commissioning do not take place. Due time extension approval in this regard shall be given by IOCL to the vendor well in advance. In case, vendor position the materials notwithstanding the above referred understanding, then onus of warranty/equipment warranty etc will remain with the vendor and IOCL would not be responsible in any way for any payment against such early supply(without power on). This is in conjunction with clause no 4.3.5.0 and 4.3.6.0 of GCC.

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- iv) Delay analysis along with copy of “Hindrance register” updates to be prepared and submitted by the vendor to IOCL with due acknowledgement from the concerned IOCL representative, on daily basis.
- v) For any extra quantities and/or additional items executed thru amendment of the original PO or new PO (thru Single tender) in connection with the ongoing works, the same shall be governed by the same terms and conditions of the original PO .
- vi) The above referred trials and acceptance tests and their modus operandi shall be read in conjunction with GCC clause no 5.3.1.0, 5.3.1.1, 5.3.2.0, 5.4.7.0, 5.4.9.1 and shall supersede these GCC clauses in case of any contradiction.

11.4 COMPREHENSIVE AMC

Comprehensive Annual Maintenance Contract (CAMC) Charges will be paid on completion of each month (which will be monthly CAMC value for that particular year) on submission of bills by the vendor. CAMC shall be paid thru direct transfer to the bank account within 15 days of submission of the GST invoice and due adjustment of the penalty amount from the bill, if any.


12.0 SUPPLY, INSTALLATION AND COMMISSIONING OF EQUIPMENTS:

12.1 Supply of all equipment shall be from the original manufacturers as per list of preferred makes OEM/Vendor list (or from OEM's authorised distributors/ licensee) or equivalent OEMs (except those makes for which equipment quality and/or performance and/or service has been below satisfactory level as per IOCL experience) meeting the criteria as given below. The purchase order copies shall be raised in the name of original manufacturer (or from OEM's authorised distributor/ licensee) and entire test certificates, spares/ service support, statutory approvals like ATEX/PESO/API/OIML/W&M (from deptt of Legal Metrology)/TUV/EXIDA etc (as applicable) shall be made available from the original equipment manufacturer.

12.2 Equivalent OEM criteria:

- 12.2.1 Must comply to minimum technical specification and functional requirements given in the tender. Better specifications are always acceptable. Bidder needs to submit the PTR regarding installation and satisfactory operation of the items in Refinery/ Petrochemical/POL Marketing locations at least for a period of 3 years.
- 12.2.2 Availability of all statutory certificates for the respective equipment make/model.
- 12.2.3 Availability of PAN India service network to meet the desired level of quality, uptime and service level requirement during project and maintenance as specified in the tender.
- 12.3 Vendor needs to submit required substantiating documents and undertaking on non-judicial stamp paper of appropriate value (as per political state requirement where works are being carried out) in this regard to IOCL, before finalising the OEM by him for procurement of concerned bought out items. This sharing of information with substantiating documents and undertaking will not absolve the TA vendor from his responsibility with respect to appropriate and preferably best OEM selection, successful Project implementation and successful AMC completion including desired performance level and uptime of the equipment/s during commissioning, SAT as well as CAMC period.

12.4 Notwithstanding the above, following clauses shall also apply in such cases:

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12.4.1 IOCL will have the liberty to select any of the items of such make / model at random basis, before dispatch and/or on receipt at site and/or after installation and commissioning, for testing in reputed laboratory in India/ Country of origin as decided by IOCL to verify the conformity wrt technical specifications and statutory approvals. In case the sample is drawn after installation/commissioning, during the period of drawing of sample and till the time the said equipment is put back in operation the vendor shall have to provide suitable replacement for uninterrupted operation of TA system at no additional cost to IOCL. The cost towards transportation of the sample to the specified laboratory, cost towards testing and any other associated cost shall have to be borne by the vendor. If it is found that the test result is not in conformity of the minimum technical specification mentioned in the tender and/or statutory approvals are not in order, vendor shall be liable to replace all the equipments of such make and model immediately at his own cost.

12.4.2 In case of poor performance of the equipment wrt repetitive hardware or software failure and/or failure in terms of noncompliance to performance parameters and/or not meeting the desired service level requirement as specified in the tender during Project or during CAMC, the TAS vendor has to replace all the equipments of the same make/model at his own cost. This may lead to contractual action against the TA vendor including holiday listing, as deemed fit.


12.4.3 Supply of all the cables must be **IS standard / BS standard / EN standard complied as per specification** and wherever only a single standard (like IS) is followed, IS code/ISI should be marked/embossed on outer sheath of the cables. One set of each type of cable sample must be drawn by the vendor during pre-dispatch stage and get it tested from Govt. approved independent Laboratory/NABL accredited lab for ensuring compliance to the specifications and the same test report should be a part of the dispatch clearance from the vendor's side (other than OEM's own factory/QA test reports) subject to Cables test reports (in house as well as 3rd party laboratory) meeting the Specification and test criteria successfully.

Another two samples of each type of the cables should be drawn from the field. One set should be handed over to IOCL, who will have the sole discretion to get the sample tested at any laboratory before acceptance. The 2nd set of samples to be retained by the TA vendor at least till SAT.

12.4.4 The make of equipment shall mean the make/brand of equipment as indicated. Further, all the materials/ equipment for works proposed shall be new and bought fresh for the works. Necessary proof of documents shall also be submitted. IOCL reserves the right to accept any of the preferred makes only based on past performance.

12.4.5 Vendor needs to obtain and produce (before SAT) the OEM inspected and certified satisfactory installation and commissioning report for all critical field equipments including metering equipments and safety permissive accessories in TLF / TW, Tank gauging equipments, Barrier gate, BQD, PLCs, UPS, Servers (as applicable). However, it is upto the vendor to involve the other respective OEMs as well wrt installation and commissioning of other equipments, considering the fact that notwithstanding the above the onus of desired upkeep and stability of operation of the equipments till CAMC completion lies with the vendor.

12.4.6 Metering equipments to be supplied as skid mounted as per the following:
For Top loading:

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Complete metering skid should be fabricated , thoroughly tested and supplied with all Mass flow meter, flow control, safety permissive and process equipments ~~including Rack Monitor~~ (except Batch Controller, Card reader, RIT inclusive of Drivers Acknowledgement Push Button) for main product, additive, blending liquid as applicable for the respective metering points as per product/s loading facility designed for each particular bay with all interconnecting Power/Control/Signal Cables and JBs mounted within covered Aluminium cable tray as per technical specification, which are to be placed below the loading platforms. Tentative skid dimension would be 1.8 m width x 4.8 m length x maxm 2.5 m height . Batch Controller, Card reader, RIT inclusive of Drivers Acknowledgement Push Button should be appropriately positioned on the separate Skid at TLF gantry and integrated with the metering skid. Detail engineering of the skid as per the bay wise product allocation and selected make/models of the equipments/accessories shall be done by the vendor location wise after award of contract.

13.0 INSURANCE

- 13.1 All goods supplied under the contract shall be fully insured by the vendor against loss or damage incidental to manufacture or acquisition, transportation, storage, delivery and erection. The vendor shall take comprehensive insurance policy in favour of IOCL before any payment is released to the vendor by IOCL, for the value of CAPEX amount to the above effect without any cost implication to IOCL. The insurance shall be valid till final bill for the CAPEX works is released. IOCL won't be responsible for any theft, damage or loss of equipment/s during the pendency of the project. Insurance premium needs to be paid by the vendor.

14.0 WARRANTY AND COMPREHENSIVE AMC


Before the commencement of stabilization period, the vendor is required to supply minimum spares as per list attached in the tender. In case minimum spares are not supplied by vendor, the warranty and CAMC shall not commence & vendor to provide RE support without commencement of warranty and CAMC milestone. IOCL shall not make any payment towards services in this extended period.

IOCL will hand over the existing spares inventory to the successful bidder during the site take over by the vendor and same shall be recorded in CAMC take over MOM. These Spares will be kept in the custody of IOCL TAS Officer /location in-charge.

During the CAMC period, Vendor is required to maintain the inventory of free issue handed over spares and new supply Mandatory spares in the warranty & CAMC Period. All the Spares (Existing + new) to be handed over back to IOCL after completion of CAMC contract.

In case spares (New Supplied Spares) are consumed but is not replenished on time then downtime penalty will be applicable as per penalty clause during contract and at the end of contract if the minimum spares are not handed over to IOCL, then the amount equivalent to minimum spares shall be withheld from CAMC amount payable to vendor. Thus, the vendor shall always ensure availability of spares (at minimum) at the site and in the custody of IOCL location-in-charge.

The vendor shall always promptly replenish the spares as & when the same are used. The vendor should do proper spares management by carrying out periodical testing of the spares, safeguards against obsolescence, any up gradation, timely replenishment, etc. Complete Spare Management & Joint verification of Spares available at the site is in the scope of vendor.


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A. WARRANTY

- i. The warranty period shall be 24 months, commencing from the date of successful commissioning, defined as the date of compliance of all punch points of the Site Acceptance Test (SAT) by the vendor.
- ii. In case commissioning delay is not attributable to the vendor, the warranty shall still be for 24 months but will begin from the date of commissioning or 30 months from the date of last supply of the major items by TAS vendor for the project (Quantity limited to original SOR of the tender), whichever is earlier. Major items which shall be considered for determination of this milestone (as applicable for the project) are (i) TLF metering System (MFM/PD meter/DCV/Batch controller/Earthing relay/Rack monitor), (ii) TFMS instruments (Radar gauges/MSTW probe/Density probe), (iii) Control room instruments (Process PLC).
- iii. Vendor shall be responsible for Design, Engineering, Quality, Workmanship, Operation & Maintenance of all equipment, accessories, etc. supplied by the vendor.
- iv. It shall be obligatory on the part of the Vendor that during the defect liability/warranty period, Vendor will take complete responsibility for any defect observed in the system (i.e. in instrumentation software, hardware, communication & networking media's/protocol interfacing with ERP etc.), any modification and/or replacement of any hardware from the supplied equipment, modification the operating system software, Automation software, and any other software, and attend to the maintenance of the system, free of cost, during start-up and on-line operation of TAS.
- v. Cost of all replenishment spares, equipment's, instruments & services (Preventive & Breakdown) excluding Resident Engineer/s support to take care of maintenance, shall be borne by the Vendor during warranty period without any additional cost.
- vi. During warranty period (Post Acceptance of system) vendor shall maintain a resident engineer (RE) at site on chargeable basis to take care of day-to-day maintenance of the system. The rate for RE services shall be finalized in the tender without any escalation & a separate standalone PO for these services (without any additional SD) shall be issued by Location for deployment of RE during the warranty period.
- vii. The vendor shall be required to maintain the system in warranty period & failure to do so shall attract penalty as applicable during warranty period. IOCL also reserves the right to purchase the spares directly from OEM at risk & cost of the vendor.

B. COMPREHENSIVE AMC FOR CAPEX WORKS

- i. Comprehensive AMC (CAMC) shall be for a period of 8 (Eight) years after completion of warranty period.
- ii. Cost of all replenishment spares, equipment, instruments to take care of maintenance, shall be borne by the Vendor during CAMC.
- iii. Vendor to maintain inventory of minimum spares at the site by replenishment as & when required and maintain any additional spare over and above the list mention in tender for maintaining the system in operating condition. The vendor shall always promptly replenish the


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spares as & where the same are used. IOCL officer at location shall send a communication to the vendor on usage of spares as and when required, thru mail/SRMS portal/TAS (TAS to be integrated to SRMS). The vendor should do proper spares management by carrying out periodical testing of the spares, safeguards against obsolescence, any up gradation, timely replenishment, etc

- iv. These spares at the end of CAMC shall be handed over to IOCL & property of IOCL. The vendor shall always ensure availability of spares (at minimum) at the site and in the custody of IOCL-in-charge.
- v. During CAMC period, if issues could not be resolved by the TAS vendor, required visits of Radar Gauge OEM, required visits of MFM OEM, required visits of HCD OEM to be carried out, the rates for which are also included in the CAMC rates per annum. These shall be carried out as & when required. **Settlement for any recovery on account of these visits not carried out resulting in downtime of the system, will be done on annual & pro rata basis.** The deliverable of these visits shall be decided in writing in consultation with IOCL prior to the visit & the visit will be treated as completed only after deliverables are achieved. Hence the visit of OEM vendor for the required duration to be arranged without any additional financial implication to IOCL.

C. COMPREHENSIVE AMC FOR RETAINED EQUIPMENT

- i. Existing TAS components that are still functional and have not reached the end of their useful life will be handed over to the Vendor along with the spares available with IOCL. List of equipment to be taken over to the Vendor and to be integrated with the new system are provided as Annexure
- ii. Retained equipment shall be covered under a Separate CAMC Contract which shall start immediately after the date of successful commissioning (defined as the date of compliance of all punch points of the Site Acceptance Test (SAT) by the vendor) and shall co-terminate with the CAMC Contract for CAPEX Works.
- iii. The retained equipment once taken over by the TAS Vendor, shall be the sole responsibility of the Vendor to be taken care of (including all repairs or replacement as the case may be) and to maintain the entire system in working condition till the obsolescence of retained equipment necessitating the replacement of the same or till the end of CAMC period whichever is earlier.
Note : Vendor may request for declaring a retained equipment as obsolete (based on end-of-life or if the equipment no longer meets operational or technological requirements necessitating full replacement) during the CAMC Period. However, assessment and approval for declaring an equipment as obsolete shall be at the sole discretion of IOCL.
- iv. The Cost of all replenishment spares, equipment, instruments to take care of maintenance, shall be borne by the Vendor during CAMC.
- v. Vendor to maintain inventory of minimum spares at the site by replenishment as & when required and maintain any additional spare over and above the list mention in tender for maintaining the system in operating condition. The vendor shall always promptly replenish the spares as & where the same are used. IOCL officer at location shall send a communication to the vendor on usage of spares as and when required, thru mail/SRMS portal/TAS (TAS to be integrated to SRMS). The vendor should do proper spares management

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by carrying out periodical testing of the spares, safeguards against obsolescence, any up gradation, timely replenishment etc


- vi. These spares at the end of CAMC shall be handed over to IOCL & property of IOCL. The vendor shall always ensure availability of spares (at minimum) at the site and in the custody of IOCL-in-charge.
- vii. During CAMC period, if issues pertaining to retained equipment could not be resolved by the TAS vendor, required visits of OEM of retained equipment to be carried out, the rates for which are also included in the CAMC rates per annum. These shall be carried out as & when required. Settlement for any recovery on account of these visits not carried out resulting in downtime of the system, will be done on annual & pro rata basis. The deliverable of these visits shall be decided in writing in consultation with IOCL prior to the visit & the visit will be treated as completed only after deliverables are achieved. Hence the visit of OEM vendor for the required duration to be arranged without any additional financial implication to IOCL

D. WARRANTY & CAMC CLAUSES

- i. It may be noted that during warranty & CAMC period, vendor will take complete responsibility for any defect observed in any system/sub system/skid/equipment/instrument supplied by or taken over by them. For integration of any IOCL/Third party supplied free issue items with TAS during the above period, while the communication protocol and/or any other available details shall be shared with the vendor by IOCL, no additional charges would be payable on account of integration/any kind of software modification on this account, only any billable HW / Equipment / Materials and its installation/commissioning charges (that form part of original work order), if any required for such integration would be paid as per the rates finalized for original work order plus 4% escalation every year (wrt the original rate). In case Contractual delivery date (CDD) extension is provided, applicable escalation shall be calculated based on the original CDD. Rates applicable from warranty period till 8th year of CAMC from original CDD or actual SAT punch point compliance as the case may be shall be as tabulated below:

SN	Year	SOR rates AS PER WO + % increase over SOR rates
1	First Year Warranty period	SOR rates + 04% increase over original SOR rates
2	Second Year Warranty period	SOR rates + 08% increase over original SOR rates
3	1 st Year of CAMC	SOR rates + 12% increase over original SOR rates
4	2 nd Year of CAMC	SOR rates + 16% increase over original SOR rates
5	3 rd Year of CAMC	SOR rates + 20% increase over original SOR rates
6	4 th Year of CAMC	SOR rates + 24% increase over original SOR rates
7	5 th Year of CAMC	SOR rates + 28% increase over original SOR rates
8	6 th Year of CAMC	SOR rates + 32% increase over original SOR rates
9	7 th Year of CAMC	SOR rates + 36% increase over original SOR rates
10	8 th Year of CAMC	SOR rates + 40% increase over original SOR rates

This clause shall be valid till the last year of CAMC period, considering 4% escalation in rate for every year (wrt the original rate) calculated from original CDD. In case of further extension of contract, 4% per year escalation shall be applied.

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- ii. Any software modification, reconfiguration, upgradation, replacement /hardware up gradation (if required by TA vendor), logic changes, SCADA/HMI modification and/or hardware upgradation required for addition/alteration in equipment/automation features as existed at the time of SAT should be carried out by the vendor without any extra cost to IOCL during any stage of project execution & thereafter till end of CAMC period. These jobs also include addition/alterations in Tanks, Pumps, Products and TLF bays including changes in product assignment (i.e. dosing ratio, additional XG/XP points, additional Additive, Blending, product codes etc.). In case, for some of these items, separate line items are available in the SOR, then those works will be carried out by the vendor on chargeable basis. Besides these specifically mentioned SOR items, all other Software modification jobs as mentioned above shall be in vendor's scope without any financial implication to IOCL. Any billable additional items wrt SW jobs and/or hardware (that form part of original work order) required for integration of additional facilities to existing system, will be undertaken by the vendor on the rates as finalized for original work order plus escalation in rate (wrt the original rate) wef warranty period till end of CAMC, as elaborated above. All SW /HW modifications beyond SOR line items shall be in the scope of the vendor without any financial implication to IOCL. **Vendor shall always ensure**(a) desired system performance level, response time as it was during SAT, (b) mitigation from any hardware incompatibility, (c)mitigation from any software obsolescence,(d) compliance to any compulsory requirement of migration to new software platform or (e) integration with any SAP protocol amendment/addition on IOCL's part (within the scope of ERP system in vogue) wrt communication with TAS.
- iii. Cost of all replenishment spares (other than any items distinctly mentioned as consumables such as and under scope of IOCL), equipment, instruments & services (be preventive & breakdown) to take care of the entire TAS has to be borne by the Vendor during entire warranty and CAMC period. Following replacement schedule (limited to the scope of items supplied vide original work) is minimum and mandatory during entire period. However, this is minimum and any component of any equipment or the equipment itself which needs to be replaced as per OEM recommendation/ field experience, must be replaced well in advance intended to avoid any possibility of failure.

Swivel joints and vacuum breakers of top/bottom loading arms to be replaced if 10000 TTs are filled from the loading point.

SN	Year of CAMC	Hardware to be replaced
1	2 Years Warranty & 1 st year of CAMC	As per OEM and TA vendor's recommendation.
2	2 nd Year of CAMC	<p>Solenoid valves of required DCVs upon 1000000 clicks of operation.</p> <p>Swivel joints and vacuum breakers of required top/bottom loading arms to be replaced as and when 10000 TTs are filled from the loading point.</p> <p>Seal of API coupler for bottom loading arm by OEM.</p> <p>Push buttons lamps, Earthing relay lamps</p> <p>Other hardware as required depending on OEM recommendation.</p>
3	3 rd year of CAMC	Air eliminator float assembly.




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SN	Year of CAMC	Hardware to be replaced
4	4 th year of CAMC	Swivel joints and vacuum breakers of required top/bottom loading arms to be replaced as and when 10000 TTs are filled from the loading point.
		Solenoid valves of required DCVs upon 1000000 clicks of operation.
		Other hardware as required depending on OEM recommendation.
		All servers and all OICs & associated IT hardware etc (this part should be completed within first quarter of the year). <i>Note : Only the Servers and IT Hardware supplied by TAS vendor are to be replaced. Replacement of retained IT Hardware is not in Vendor's scope. IOCL may get the retained IT hardware replaced at any time during CAMC through TAS vendor for which separate payment is applicable in line with Clause 14.0 D(i).</i>
		Solenoid valves of required DCVs upon 1000000 clicks of operation.
		Swivel joints and vacuum breakers of required top/bottom loading arms to be replaced as and when 10000 TTs are filled from the loading point.
5	5 th year of CAMC	Other hardware as required depending on OEM recommendation.
		Seal of all DCVs.
		Swivel joints and vacuum breakers of required top/bottom loading arms to be replaced as and when 10000 TTs are filled from the loading point.
		Solenoid valves of required DCVs upon 1000000 clicks of operation.
		Seal of API coupler for bottom loading arm by OEM.
		Push buttons lamps, Earthing relay lamps
6	6 th Year of CAMC	Load Cells of Weigh Bridge
		Other hardware as required depending on OEM recommendation.
		Solenoid valves of required DCVs upon 1000000 clicks of operation.
		Swivel joints and vacuum breakers of required top/bottom loading arms to be replaced as and when 10000 TTs are filled from the loading point.

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SN	Year of CAMC	Hardware to be replaced
		Other hardware as required depending on OEM recommendation.
7	7th Year of CAMC	Air eliminator float assembly.
		Solenoid valves of required DCVs upon 1000000 clicks of operation.
		Swivel joints and vacuum breakers of required top/bottom loading arms to be replaced as and when 10000 TTs are filled from the loading point.
		Other hardware as required depending on OEM recommendation.
8	8th Year of CAMC	Solenoid valves of required DCVs upon 1000000 clicks of operation.
		Swivel joints and vacuum breakers of required top/bottom loading arms to be replaced as and when 10000 TTs are filled from the loading point.
		Seal of API coupler for bottom loading arm by OEM.
		Push buttons lamps, Earthing relay lamps
		Other hardware as required depending on OEM recommendation.
9	9th Year of CAMC	Solenoid valves of required DCVs upon 1000000 clicks of operation.
		Swivel joints and vacuum breakers of required top/bottom loading arms to be replaced as and when 10000 TTs are filled from the loading point.
		Other hardware as required depending on OEM recommendation.
10	10 th year of CAMC	Seal of all DCVs.
		Solenoid valves of required DCVs upon 1000000 clicks of operation.
		Swivel joints and vacuum breakers of required top/bottom loading arms to be replaced as and when 10000 TTs are filled from the loading point.
		Other hardware as required depending on OEM recommendation.

Note: Mandatory replacement to be carried out by TAS vendor in the first quarter of CAMC. Any other hardware/ spares which are required to be replaced for smooth operations during warranty and CAMC period needs to be done at no additional cost to IOCL.

Depending on the nature of loading (top/bottom) of the concerned location, loading arm related spares replacement option as given above shall be applicable.

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- iv. During Warranty & CAMC, all SW /HW modifications beyond SOR line items shall be in the scope of the vendor without any financial implication to IOCL.
- v. The software at running location will be replaced/ upgraded with upgraded version of TAS software in case the same is required to take care of any bugs and latest logic and functional features at vendor's cost.
- vi. **Preventive maintenance schedule (including servicing as well as component/parts/complete replacement schedule) for all equipment and the entire TA system to meet the service level requirements shall be in line with the checklist given by IOCL. However, further modifications if required can be done by the vendor in line with respective OEM recommendation and vendor's own domain expertise/experience. This revised checklist (if any) same shall be submitted to the location in the beginning of every year of CAMC.**
- vii. Only printer cartridges, printing stationery, barrier gate boom (in case physically damaged at no fault of vendor), Earthing clamp and cable (in case physically damaged at no fault of vendor) shall be considered as consumables under the scope of IOCL. Rest of all items including battery maintenance is part of warranty and CAMC scope of TA vendor.
- viii. Vendor shall enter into back to back agreement with OEMs to cover entire period of CAMC to get required service support for preventive and breakdown maintenance, so that (a) all the preventive maintenance schedule is maintained as per OEM's recommendation or in better manner befitting the uptime requirement, (b) only original spares of the OEM are used for all kinds of maintenance and (c) only OEM own engineers / OEM trained and certified engineers do the preventive / breakdown maintenance for the TAS equipment (which can be done in the field). However, back-to-back agreement/ CAMC from OEM is not envisaged for commodity items like Cables, trays, TBs, JBs, Glands, MCTs etc.
- ix. The unskilled labour for any preventive/ breakdown maintenance jobs during WARRANTY and CAMC period would be supplied by the Location. However, providing all semi-skilled, skilled and technical labours for various jobs shall be in vendor's scope and the entire jobs during the period would be carried out under direct supervision of vendor representative.

E. PAYMENT

i. WARRANTY:

1.0 No payment shall be made on account of maintenance of the system except RE payments.


Cost of all replenishment spares, equipment's, instruments & services (Preventive & Breakdown) excluding Resident Engineer/s support to take care of maintenance, shall be borne by the Vendor during warranty period.

2.0 The RE payment shall be released on a monthly basis after submission of taxable invoice by vendor to location.

3.0 Price adjustment towards delay in services shall be applicable.

ii. COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT:

- Monthly Payments will be made as per the detailed terms & conditions for CAMC as mentioned in the tender. Price adjustments towards delays in services shall be applicable.

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- Fault detection module shall be embedded part of offered software solution which will be able to provide system generated Down time calculation for a stipulated period. Solution should have provision of Auto/Online logging (Active equipment's) of such faults. Also, it should have provision for manual logging of faults for mechanical equipment/ instruments (fault and rectification reporting for which can be made only in offline mode) to be where IOCL representative can log fault and can acknowledge fault rectification after attending of fault. Both the facility with provision for capturing "Remarks wrt fault attribution" column duly filled up and agreed by counterparts would endow with system generated downtime calculation for each Equipment/ Instrument/ Sub system. Software should be flexibility to integrated & fault/complaints/resolution are generated in SRMS portal automatically once it captures in fault detection module.
- CAMC bills must be supported by these reports as well as Preventive maintenance and breakdown maintenance service reports duly certified by designated officer of location. Force Majeure clause is also applicable here.
- Notwithstanding anything to the contrary contained in the post work order Agreement, during CAMC the Company shall always have the right to terminate this Agreement by giving to the Contractor a [90 days] written notice in this regard. Upon such termination the Company shall only be required to pay the Contractor a maximum rupee amount equivalent to the balance outstanding CAMC Price and/or return the BG deposited with IOCL, as proved by the Contractor to be due and payable by the Company to the Contractor after adjustment of any amounts that may be due by the Contractor to the Company. For avoidance of doubt it is clarified that in such circumstances, no other sum of money whatsoever shall be payable or paid by the Company to the Contractor and correspondingly the Contractor shall have no claim whatsoever against the Company.
- Also, notwithstanding anything to the contrary contained in the post work order agreement, during CAMC, in case of delay in services, Corporation (IOCL) shall always have the right to get the work executed by any other agency at the cost and risk of the original contractor and debit/recover the amount from his CAMC bills and/or SD BG. Moreover, in case of such delay in services as per the terms of the tender and/or non- adherence to the terms and conditions of CAMC and/or suspending, aborting the services within CAMC period, necessary actions as per the contractual provision as deemed fit shall be taken by IOCL including Holiday listing of the vendor.

a. Green field Projects/CAPEX works executed by TAS Vendor: -

- CAMC value for 8 years would be minimum 30% of the base price of Supplies plus Installation/ commissioning Services (i.e., 30% of the executed CAPEX amount). The applicable GST as per quoted rate shall be paid extra.

Year of CAMC	1st	2nd	3rd	4th	5th	6th	7th	8th
Payable amount wrt final executed capex amount for the project	2	2.5	3	6	3	4	4.5	5

Note: At the start of the 4th year (i.e, after 2-years warranty + 3 years of CAMC), replacement of IT Equipment is planned. CAMC rate for that year includes the cost of this replacement.

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- ii. If the vendor quotes a CAMC value greater than 30%, the above % shall be proportionately increased to match the quoted CAMC % for payment purpose.
- iii. In cases where the CAMC period is less than 10 years after SAT due to project delays attributable to IOCL(i.e, the warranty period is less than 2 years from the SAT date), the CAMC contract shall be extended at the sole discretion of IOCL as required until the finalization of new contract for TAS maintenance.
- iv. The Maximum extension of CAMC contract shall be 2 years from the original CAMC contractual completion date. For extended period, the CAMC rate for subsequent years shall be escalated by 4% over the previous year CAMC rates(Rounded off to single decimal).

b. For Brownfield projects/ TAS upgradation job: -

- i. In case the new vendor has to integrate his supplied system into the existing system with old equipment's, and the old equipment's are to continue without the service of the old vendors (i.e. it is envisaged that both the old and the new system would run with a combination of old and new equipment's, but eventually the entire system would switch over to the new vendor's software system), the new vendor would take over the old equipment's after the award of work on as is where is basis and maintain the system as per the guidelines applicable for newly supplied equipment's during AMC. The bidder is required to maintain the existing equipment's/system from the time field works in the areas of existing equipment's and/or any other systems having direct/indirect interface with the same equipment's are commenced by them, as per the CAMC cost as explained below. However, as long as existing/old TLF automation Servers are not replaced by the new system or TLF field equipment's replacement works are commenced upon, the TLF automation system shall be maintained by the existing vendor.
- ii. It is the basic responsibility of the prospective bidders to carry out thorough survey of the existing equipment's in case of a brown field project before bidding and seek clarification during Pre bid to understand which are the equipment's IOCL will get rectified within IOCL scope and what all the successful bidder is supposed to take over on as is where is basis and rectify on their account.
- iii. In this case, where the new vendor has to maintain the old/existing system/equipment's as well, besides the supplied equipment's under the respective tender, CAMC charges for maintenance of old equipment's shall also be payable to new vendor.
- iv. To arrive at the CAMC rates of retained equipment handed over to incumbent vendor, finalized rate of the retained item pertaining to new vendor's work order shall be considered as the reference CAPEX for CAMC calculation.
- v. Based on the life of retained equipment handed over to the incumbent vendor, the following CAMC rate % shall be considered from the 1st year after SAT pertaining to the new incumbent vendor's revamped terminal automation system.

Age of Retained Equipment (anticipated year)	Risk Level & Uncertainty	CAMC % of Current SOR Rate (Base Year)
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of handing over to vendor)		
0-5 years	Low	3.0%
6-10 years	Moderate	4.0%
10-15 years	High	5.0%
>15 years	Very High	6.0%

In case of CDD extension for the project from the anticipated year of handing over, the above % shall not be changed and above shall form the basis of CAMC rate % for the retained equipment.

CAMC rate of retained equipment for the subsequent years after the 1st year after SAT, shall be escalated at 4% over the previous year rate (Rounded off to single decimal).

- vi. CAMC rate of retained equipment for the subsequent years after the 1st year after SAT, shall be escalated at 4% over the previous year rate (Rounded off to single decimal).


Example Calculation

Assuming: **Radar Gauge** (12 years old): Finalized SOR value (Based on awarded value): ₹4 lakhs, **CAMC % (Anticipated first year after SAT of new incumbent vendor): 5%**

MFM (12 years old): Finalized SOR value (Based on awarded value): ₹6 lakhs, **CAMC % (Anticipated first year after SAT of new incumbent vendor) : 5%**

Year	Radar Gauge CAMC % (Rounded off to single decimal).	CAMC Cost (₹ Lakhs) (rounded off to three decimal)	MFM CAMC % (Rounded off to single decimal).	CAMC Cost (₹ Lakhs) (rounded off to three decimal)
1	5	0.200	5	0.300
2	5.2	0.208	5.2	0.312
3	5.4	0.216	5.4	0.324
4	5.6	0.224	5.6	0.336
5	5.8	0.232	5.8	0.348
6	6	0.240	6	0.360
7	6.2	0.248	6.2	0.372
8	6.4	0.256	6.4	0.384
9	6.7	0.268	6.7	0.402
10	7	0.280	7	0.420
Total		2.372		3.558

CAMC amount for the system to new incumbent vendor = Payable amount wrt final executed capex amount of new system (A)+ CAMC rates for Retained/Old equipment (B)


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- vii. During CAMC, the incumbent vendor has to take care of the retained equipment (including all repairs or replacement as the case may be) and maintain the entire system in working condition till the OEM driven obsolescence of the retained equipment. This is to be substantiated by the incumbent TAS vendor based on the document published by OEM in public domain or a letter given by OEM authorized signatory for declaration of product related information. In such cases, necessary further action required shall be taken by IOCL in line with clause (i) under “WARRANTY AND CAMC CLAUSES” defined above.
- viii. CAMC for retained equipment may be further extended up to maximum of 2 years from the original CAMC contractual completion date at the sole discretion of IOCL as required until the finalization of new contract for TAS maintenance. For extended period, the CAMC rate for subsequent years shall be escalated by 4% over the previous year CAMC rates.

F. PRICE ADJUSTMENT TOWARDS DELAY IN SERVICE DURING WARRANTY & CAMC PERIOD:

i. WORKS DONE BY TAS VENDOR WITHOUT FREE ISSUED ITEMS BY IOCL (RETAINED EQUIPMENTS):

- During **Warranty and CAMC period**, for any failure of the system attributable to TAS vendor, resulting into loss of entire operation of TT loading/TW loading/Tank receipt/Tank dispatch/Pipeline Receipt/Pipeline dispatch (Including Manual operation of any of these basic operations in Manual mode), for more than free time of 2 hrs. (Two hours) in every occasion, deduction @ **[2 times overall CAMC value for the running month/ (90 x 24)], per hour of operation loss** will be made for down time of system.
- Although there is no payment to be made apart from RE payments during warranty period, CAMC value during 1st year shall be taken for price adjustment calculation and such amount if any shall be recovered from 1st year CAMC payment.
- However in case of failure of equipment resulting partial down time of equipment /complete malfunction in any functional areas including TLF/ TW / TFMS for **more than free time of 48 hrs (Forty Eight hours) during warranty period & CAMC period in every occasion, deduction @ [1% of SOR value (as per WO) of concerned equipment/s]**, per hour of equipment downtime will be made for down time of the equipment/s. The time hence calculated out of any system/ subsystem running on redundant/ non redundant mode or resulting leakages/ spillage etc beyond the stipulated allowable period will be treated as partial downtime and Price adjustment rate will be guided by this clause. However, if restoration of any of the subsystem require prior approval from W&M (In case of Seal opening/ breaking), the countdown will be commenced from obtaining approval of Legal Metrology department by the location/ Vendor. Similarly, for any down time resulted due to established event of Force Majeure (including lightning, floods), physical damages, and permissible lead time for repair as referred above would not be applicable under the purview of calculation of Price Adjustment. Reporting time shall be taken from the time, officer in charge/ any other officer of location reports the issue by mail/SRMS (Service request management system) Portal.
- In case of partial down time/ complete malfunction of equipment/s, if the defective equipment/ instrument is/are not repaired/ replaced within 7 days beyond the initial 48 hrs grace period during warranty & CAMC respectively, deductions shall be applicable for full operational down time/malfunction for the entire period wef immediately after initial 48 hrs


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of downtime/malfunction up to the time of repair/rectification @ **[Overall CAMC value for the running month/ (90 x 24)], per hour of equipment downtime/complete malfunction.**

- Such price adjustments applicable in line with the above shall be provided by the vendor as price discount in the Tax invoice itself, and then only the same must be submitted to IOCL as per payment terms.
- The cumulative amount with respect to delay in services on account of the above over a month shall be adjusted against the comprehensive CAMC payment for the month, subject to maximum deductible amount restricted up to total CAMC amount payable for that month. Total deduction per month will be limited to the monthly CAMC payment only.
- If the financial implication on account of deduction charges against downtime as mentioned above equals Quarterly CAMC value in any two quarters during this period, in such case other than the price adjustment against CAMC amount payable, prevailing SD BG shall be en-cashed and vendor needs to submit a fresh SD BG for CAMC value of the remaining period.

ii. WORKS DONE BY TAS VENDOR WITH FREE ISSUED ITEMS BY IOCL (RETAINED EQUIPMENTS):

- In case of failure of equipment resulting partial down time of equipment /complete malfunction in any functional areas including TLF/ TW / TFMS for **more than free time of 7 days during CAMC period in every occasion, deduction @ [1% of SOR value (as per WO) of concerned equipment/s]**, per hour of equipment downtime will be made for down time of the equipment/s. The time hence calculated out of any system/ subsystem running on redundant/ non redundant mode or resulting leakages/ spillage etc beyond the stipulated allowable period will be treated as partial downtime and Price adjustment rate will be guided by this clause. However, if restoration of any of the subsystem require prior approval from W&M (In case of Seal opening/ breaking), the countdown will be commenced from obtaining approval of Legal Metrology department by the location/ Vendor. Similarly, for any down time resulted due to established event of Force Majeure (including lightning, floods), physical damages, and permissible lead time for repair as referred above would not be applicable under the purview of calculation of Price Adjustment. Reporting time shall be taken from the time, officer in charge/ any other officer of location reports the issue by mail/SRMS (Service request management system) Portal.
- In case of partial down time/ complete malfunction of equipment/s, if the defective equipment/ instrument is/are not repaired/ replaced within 30 days beyond the initial 7 days grace period during warranty & CAMC respectively, deductions shall be applicable for full operational down time/malfunction for the entire period wef immediately after initial 7 days of downtime/malfunction up to the time of repair/rectification @ **[2 times overall CAMC value for the running month/ (90 x 24)], per hour of equipment downtime/complete malfunction.**
- Such price adjustments applicable in line with the above shall be provided by the vendor as price discount in the Tax invoice itself, and then only the same must be submitted to IOCL as per payment terms.
- Although there is no payment to be made apart from RE payments during warranty period, CAMC value during 1st year shall be taken for price adjustment calculation and such amount if any shall be recovered from 1st year CAMC payment.

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- The cumulative amount with respect to delay in services on account of the above over a month shall be adjusted against the comprehensive CAMC payment for the month, subject to maximum deductible amount restricted up to total CAMC amount payable for that month. Total deduction per month will be limited to the monthly CAMC payment only.

14.1 Substitution of Contractor : If the company finds it necessary to employ a person or persons for the purpose provided above, then the company may deduct and retain from out of the sums due to the contractor all such amounts as they may require to pay or to reimburse themselves there from in respect of the costs and expenses which they have incurred in completing the work and or in removing defective work and rebuilding or replacing the same in a manner satisfactory to the company and if such amounts be more than the sums due or thereafter becoming due to the contractor, then the balance shall be a debt recoverable from the contractor by the company. The contractor shall not in any manner do or cause to be done any act, matter or things whatsoever to prevent the person or persons so employed by the company from removing defective work and re-building or replacing the same in a manner satisfactory to the company and / or from, completing the work in the manner aforesaid.


14.2 In cases where the CAMC period is less than 10 years after SAT due to project delays attributable to IOCL (i.e., the warranty period is less than 2 years from the SAT date), the CAMC contract shall be extended at the sole discretion of IOCL as required until the finalization of a new contract for TAS maintenance. For extension of CAMC, IOCL shall intimate vendor before end of CAMC with an advance intimation of 3 months.

The maximum extension shall be 2 years from the original CAMC contractual completion date. For the extended period, the CAMC rate for subsequent years shall be escalated by 4% over the previous year CAMC rates.

15.0 To ensure best performance of the system as a whole & each individual equipment/Instrument in terms of performance parameters like accuracy, repeatability, reliability, sustenance of communication etc & ensure Zero down time of any individual equipment/ instrument or the system as a whole during project, commissioning, trial run, SAT, stabilization period, warranty & CAMC period, the onus of selecting Best quality of equipments lies with the Vendor.

It is presumed that the selected Vendor being the domain expert in the field of Terminal Automation is capable enough to select the best equipments & can provide best of detailed Engineering in all respect in line with the contractual scope & specification. Hence, there is no need to submit datasheets/designs for approval. However, all the documents (viz makes/brands/models/datasheets/detail engineering/ SW logic/ System configuration / certificates / supporting documents as desired in the tender document, along with WO compliance undertaking etc) in line with the Work Order need to be submitted to IOCL/TPI for information only unless IOCL comes out with specific recommendations /requirements under the purview of the contractual scope.

The input wrt Loading/ Facility data like position of FAS, Earth pits, AOPS nozzle reference height, Safe filling Height, Cable route layout, Customised FDS Logic, Configuration parameters, third party/free issue equipment tags, etc (which are location specific and necessarily needs user input) shall be provided by the HO/State/Location, as applicable.

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In case, bidder has any contradiction, anticipated deviation, recommendation regarding any specification, datasheets, makes, scope, terms & conditions, drawings etc, the same must be raised during the Pre-bid meeting. Any point beyond the clarification given thru pre-bid MoM shall be deemed to be in the vendor's scope in line with techno commercial as well as price bid of the tender document.

16.0 Water Supply

- 16.1 The contractor shall arrange water/procure water required for the work at his own cost for all leads and lifts. IOCL shall not be responsible for supplying water and Contractor shall ensure timely and adequate supply of water to meet the schedule.

17.0 Power Supply

- 17.1 The contractor shall make his own arrangement for power required for the work at his cost. DG set of suitable capacity may be installed and operated by the contractor at his cost. IOCL shall not be responsible for power supply and contractor shall ensure proper supply of electricity to meet the schedule.

The electrical works shall be carried out through Licensed Electrical personnel only.

- 17.2 In case, electrical power is given by the Corporation at its discretion then, the electrical charges incurred on monthly basis shall be deducted from the bills payable to the contractors as per the prevailing tariff indicated in the electricity bills. Taxes and duties on such recoveries would be chargeable separately by IOCL. The successful contractor shall make all arrangements to draw power from a single point in the Terminal as per directions at site including all necessary electrical cables, panel boards, energy meters etc. In such an event, the Corporation shall not be responsible for any power outages occurring during the contract period.

However, the Bidders may note that there is no commitment on part of the Corporation to provide electrical power at site.


18.0 Contractor's Scope of Supply

- 18.1 All materials including DG Sets, switchgears, cables, lighting towers and fixtures, structural steel, consumables, testing appliances, tools and tackles necessary for completing the work shall be procured & supplied by the Contractor at his own cost unless otherwise specified in the schedule. No claim/ delay on this account will be entertained by the Corporation.

19.0 Labour Agreement


- 19.1 The Contractors who are working in the establishments through Contract Labour shall be fully responsible for observance of all rules and regulations as per the Contract Labour (Regulation and Abolition) Act 1971 and obtain a licence from the Assistant Labour Commissioner concerned and produce the same to IOCL. In this connection, Bidders shall abide by all the conditions of Appendix I and Appendix II enclosed with the GCC. The Principal Employer certificate shall be given on written request from contractor by IOCL.

- 19.2 **Minimum Wages:** The Contractor, his executors and administrators (and in the case of a Limited Company, its successors and assigns) shall hold the company harmless and indemnified from and against all claims, costs and charges, for which the company shall be liable under the Minimum Wages Act, 1948, the Contract Labour (Regulation and Abolition) Act, 1970 and

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any amendments or modifications thereof, and all expenses it shall be put there under through the acts or omissions whether willful or not on the part of the contractor. This indemnity shall be in addition to and not in lieu of, any indemnity to which the company shall be entitled in law.

- 19.3 Employees State Insurance:** This contractor hereby admits that he is fully aware of his responsibilities under the Employees State Insurance Act, 1948, as an immediate employer of the employees engaged by him for the execution of this contract which he agrees to discharge. The Contractor acknowledge the statutory right of the company (as a principle Employer) to recover the amount of the contributions, paid by it in the first instance in respect of the employees employed by or through him (the Contractor), as well as the employee's contribution, if any, either by deduction from any amount payable to him by the company under any contract or as debt payable by him to the company.
- 19.4 PF regulations:** The Bidders shall indicate his/ their PF code number in the Statement of Credentials enclosed with the tender along with PF registration certificate failing which the tender shall be liable to be rejected. The successful Bidders shall abide by all the requirements and submit copies of all registers/ returns etc filed by them before the Corporation releases final dues.
As per statutory regulations, necessary exemption certificate/gazette notification to be provided, if the above is not applicable.
- 20.0 Force Majeure:** The Term Force Majeure, as employed in this contract, shall mean wars (declared or undeclared) or revolutions, civil wars, riot, terrorism, typhoon /tempest, transporter's strikes affecting the country as a whole, freight embargos, quarantine restrictions, tidal waves, major floods, earthquakes, epidemics, and fire explosion /implosion, storm, other natural calamities affecting the project location i.e. Project Site and strike /lock out at contractor's place or Project Site.
- 21.0 Statutory approvals:** Vendor is required to obtain all the requisite approvals from statutory bodies' viz CMRI, Legal Metrology, CCOE (PESO),ATEX,API,EXIDA,TUV etc as applicable as per tender scope/terms/conditions/specifications/datasheet and as applicable during award of contract; wherever required at no extra cost to IOCL. TAS vendor need to submit PESO certificate for all instrument, Junction boxes, electrical equipment supplied by them that are installed in licensed area in order to enable IOCL to get PESO license for their installation. This includes necessary support to IOC to brief / explain CCOE about the automation system.
- 22.0** The vendor shall execute the work in compliance with the requirements of the relevant regulation or acts in force in the area together with design specification with respect to:
- Indian electricity rules
 - Indian factories act
 - Regulation laid down by Chief Electrical Inspector
 - Regulation laid down by Factory Inspector of State
 - Indian standard specifications
 - Various rules of safety and installation published by T.A.C., C.M.R.S., Fire Insurance etc.
 - OISD requirements
 - Electro Magnetic Compatibility (EMC)
 - Chief controller of Explosives (PESO)
 - any other statutory regulation as applicable

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23.0 INSPECTION

- 23.1 The vendor shall ensure that the manufacturer carries out adequate and all the necessary tests for each equipment for compliance with the specifications as well as overall operational performance/accuracy, without any additional financial implication to IOCL. Also, any tests either on the field or at outside laboratories concerning the execution of the work shall be carried out by the vendor at his own cost. Vendor should forward the certified copies of works test reports for the same to the IOCL.
- 23.2 Vendor is required to submit its Quality Assurance Plan (Q.A.P.) to be observed during execution of work for IOCL's information.
- 23.3 Batch Accuracy test for achieving +/- 0.05% or better including all the metering equipments is to be carried out at vendor's works or in a recognised flow laboratory with appropriate set up, at least for one complete set of metering assembly mounted on skid as per skid details mentioned in the tender document and if required can be witnessed by IOCL. Other than Batch Accuracy Test, other inspection and testing are to be carried out for this metering skid as per respective tender clauses. The satisfactory result of such tests shall not absolve the vendor for his contractual responsibilities of establishing and demonstrating field performance of the equipments as per the tender requirements.
- 23.4 Master meter shall be calibrated at FCRI Palakkad before supply to site. Subsequent checking at site for stamping by Legal Metrology shall be through Master Meter/ prover tank, as the case may be. Automation vendor to note that the cost of testing at FCRI Palakkad shall be included as part of the rates to be quoted in the tender.
- 23.5 IOCL has discretion to engage third party inspection agency for inspection of all items for terminal automation system, although it's not mandatory as because the onus of supplying the best quality equipments and maintaining the equipments in the most efficient manner with intended zero downtime remains with the vendor only, and any kind of inspection by IOCL or IOCL appointed agency shall not absolve vendor from its' responsibility.
- 23.6 In case of imported meters, the master meter shall be calibrated at FCRI Palakkad at vendor's cost. Notwithstanding any inspection carried out by IOCL or its representative, the Vendor/manufacturer shall carry out its own tests to ensure consistent performance.

Automation vendor to note that the cost of testing at FCRI Palakkad shall be included as part of the rates to be quoted in the tender.

For all measurement equipments, model approval of legal metrology should be available in line with Legal Metrology Act 2009 or any revisions thereafter.

- 23.7 For the purpose of maintenance of automation equipments used for any measurement and coming under the purview of Legal Metrology Act 2009 or any revisions thereafter, vendor should comply to the necessary obligation as per the law for the purpose of all kinds of repair and maintenance work.
- 23.8 In case, any of the tank gauging equipment requires on-site stamping by dept of legal metrology, the stamping fees will be paid by IOCL, necessary calibration and all technical and operational assistances shall be in vendor's scope.
- 23.9 All the meters, batch controllers and tank gauging equipments should have the relevant OIML approvals and Legal Metrology approvals besides PESO approvals and required IP level.

24.0 DOCUMENTATION to be submitted- Indicative only



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Sr. No.	Description
1.0	GENERAL
1.1	Vendor engineering and service personnel organization chart including set up for this project
1.2	Training facilities at work
1.3	Descriptive catalogue / literature
1.4	Typical System architecture <ul style="list-style-type: none"> • Terminal automation system • IP based CCTV surveillance system • Tank Farm management system • ROSOV/DBBV/PLUG VALVE/BALL VALVE with actuators/MOV communication system • Process PLC • Safety PLC • Access control system • Fire alarm system • Plant Communication System • IP based EPABX system
1.5	Functional Design Specification
1.6	Progress report
2.0	ENGINEERING DOCUMENTS
2.1	System Architecture
2.2	Detailed list of components
2.3	Individual data sheet
2.4	Power Requirement - KVA
2.5	Heat dissipation - Kcal /H
2.6	Individual G.A. Drawing, Piping drawing for installation <ul style="list-style-type: none"> a) Flow metering system for TT loading/unloading b) Prover system c) PT, DPT, turbine meter, Magnetic flow meter, Single & Multipoint Density Probe d) Additive injection system e) Blue dye dosing system f) Radar level gauge. Multipoint temp. sensor g) Control room layout
2.7	Structural installation and isometrics for 4"/3"/2" piping, valves, loading arms, Mass Flow meters, strainer Air eliminator, other meters/instruments/DCV etc
2.8	Drawings for structural support of Radar Gauges, over fill device, PT, TT, MFM/PD/Turbine/any other Improved version of meters, DCV, Loading arm, valves, Junction boxes, Batch controllers, RIT, Exproof card readers, Blue dye dosing system, Camera, bay queue display boards, associated PA system.
2.9	SYSTEM/ PLC CABINETS
a.	Arrangement of modules, make model
b.	Structure, dimension, construction, etc.
3.0	AUXILIARY CABINETS
3.1	Arrangement of modules
3.2	Structure, dimension, construction etc.




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3.3	Electrical power supply distribution Diagram, Distribution diagram for UPS power supply System
3.4	System drawing (loop diagrams, reports)
3.5	Wiring diagram
3.6	Terminal strip diagram
3.7	Interconnection diagram
3.8	Cable route, cable schedule, cable termination schedules for power, signal , LAN, FO cable, Junction box details & cable trays
3.9	Loop diagram a. for MOVs, b. Batch Controller c. Card reader d. Access control system e. Radar based Tank gauging system. f. CCTV
3.8	Functional flow diagram for Ethanol Blending system, Additive injection system, Blue Dye dosing system
3.9	Tank Farm ROSOV/DBBV/PLUG VALVE/BALL VALVE with actuators/MOV operating logics Product pumps operation logic Pipeline product receipt tank line up logics Functional Design Specification for entire Terminal Automation System
3.10	Earthing System
3.11	Diagnostic software details
3.12	As built drawing
4.0	SPARE PARTS
4.1	Drawings / document
4.2	Commissioning spares
4.3	Comprehensive AMC spares
5.0	CERTIFICATES
5.1	Authority approval for Ex-Proof, IS, IP-65/ Improved version of Ingress Protection enclosure
5.2	Vendor's guarantee /warranty
5.3	Software Licensee
5.4	W&M Certificate
5.5	CMRI/ Equivalent & PESO(CCOE) Certificate
6.0	INSPECTION AND TEST
6.1	Inspection and test report from Vendor's quality control department
6.2	Imported shipping documents along with test certificate
6.3	Factory acceptance tests procedure for system
7.0	MANUALS (BOTH FOR VENDOR'S & SUB -VENDORS SUPPLY)
7.1	Vendor's & Sub-vendor's test Procedure
7.2	Installation manual
7.3	Operating manual for hardware & Software
7.4	Maintenance manual for hardware & software
7.5	Software configuration manual
8.0	ELECTRONIC DOCUMENTATION
8.1	System configuration, software in CD
9.0	QUALITY ASSURANCE PLAN

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10.0	All communication protocol documents for electronic equipments supplied under the scope of contract viz., Batch Controller, DBBV, MOV, PLC, any other third-party systems used etc.
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NOTE :

- The above documents are indicative and as applicable considering scope of equipments/material delivery under the Contract. However, the above documents cover the minimum requirements and shall be supplemented with other requirements listed in the specifications, if any. Any other documents required to understand and maintain the system, as felt necessary till handing over of the project, shall be supplied by the vendor.
- All the as built drawing to be provided.
- Softcopies of the above to be provided.
- All these documents have to be handed over to the Location in-charge under proper receipt in soft form in an external storage device (Hard disk/ Pen drive) over and above the hard copies.

25.0 Notwithstanding the sub divisions of the tender document into several sections and volumes, every part of each shall be deemed to be supplementary of every other part and shall be read with and into the contract so far as it may be practicable to do so.

26.0 Measurements for Works/Record Measurements/ Bills:

26.1 All the payment for quantities certified in the running account/ final bill shall be as per the details recorded in the standard measurement book of the Corporation and jointly signed by the Contractor/ site engineer of IOC.

26.2 Method of measurement shall be strictly in accordance with the technical specification for this work.

26.3 The payment shall be as per the details entered in the standard Measurement Certificate bills of the Corporation.


26.4 BOCW Cess @ prevailing/applicable rate (i.e., presently 1%) if applicable shall be deducted from all RA bills in compliance to statutory norms. However, in case the successful bidder has registered under BOCW and paid requisite cess from its end, deduction shall not be made, on submission of documentary proof of payment.

27.0 On Account Payments: On Account Bills shall be paid for the work done, measured and certified.

28.0 **Price Adjustment for Delay In Completion:** If the vendor fails on the performance of the contract within stipulated time period for reasons attributable to vendors, the Corporation shall be entitled to recover and the vendor agrees to pay to the Corporation as and by way of price adjustment for delay in completion.

28.1 The contractual price payable shall be subject to adjustment by way of discount @ ½ % of CAPEX cost per week of delay up to a maximum of 10% of CAPEX Cost as mentioned in the prevailing GCC clause no. 4.4.0.0, if the works are not completed till SAT and its acceptance as per completion schedule as described in clause no 4.0 of Special Terms and Conditions of Contract.

28.2 However, in partial modification of clause no 4.4.0.0. of GCC wrt the subject matter, the “Mechanical Completion” milestone as referred in GCC clause no 4.4.2.0, 5.5.2.0 shall be

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referred as “SAT of the units followed by 30 days hassle free trial run”. Also, the above price adjustment for delay in completion shall be deducted at applicable percentage from RA bills, on cumulative value of works done up to the concerned Running Account (RA) bill. However, in cases of abandonment of site/termination, price adjustment for delay shall be applied in line with GCC clause 7.0.9.0 on the total Contract Value as specified in the Acceptance of Tender.


Such price adjustment applicable in line with the above shall be done by the vendor in the Tax invoice itself, and then only the same has to be submitted to IOCL as per payment terms.

29.0 CONTRACTOR SUPPLIED MATERIAL:

- 29.1 All the equipments, materials, field instruments, consumables, etc. which are not specifically indicated in Owner’s Scope of Supply but are required for successful completion of the works as per specification, drawing, construction methodology etc., shall be included in the Contractor’s Scope of Supply.
- 29.2 All materials required for the civil works including cement, reinforcement, structural steel, sheeting, consumables, testing appliances, tools and tackles necessary for completing the work shall be supplied by the contractor at his own cost and shall conform to the job specifications and SCHEDULE OF RATES/ BOQ. No claim/ delay on this account will be entertained by the Owner.
- 29.3 The Contractor shall ensure that only the qualified and experienced personnel are appointed by him for discharge of work or part thereof. The Contractor may appoint sub-contractors for various works /certain materials / services for which contractor may seek prior approval from IndianOil.
- 29.4 Contractor may have to work in energized or partly energized conditions. In such cases, it shall be the responsibility of the Contractor to arrange for necessary permits or shutdowns and provide skilled and responsible persons for the execution of works. Contractor shall organize his works during the shutdown periods properly and complete the programmed works within the time given. Contractor shall not be paid any extra payments for working under the above said circumstances.
- 29.5 It shall be entirely the Contractor’s responsibility to provide, operate and maintain all necessary construction equipment, scaffoldings and safety gadgets, cranes and other lifting tackles, tools and appliances to perform the work in a workman like and efficient manner and complete all the jobs as per time schedules. However, if any equipment/ facility are provided by Owner, the same shall be on chargeable basis.
- 29.6 Procurement and supply, in sequence and at the appropriate time, of all materials and consumables shall be entirely the Contractor’s responsibility and his rates for execution of work will be inclusive of supply of all these items.
- 29.7 In case any material is issued by the Owner, then it will be properly used and maintained. Subsequent to completion of its use, it will be returned to Owner in good condition. In case of damage or misuse of such stores, Owner will recover the cost from the Contractor from the payments due to the Contractor.

30.0 Testing Of Materials/ Works:

- 30.1 The work is subject to inspection at all times by the Site Engineer/ Engineer-in-Charge/ representatives nominated by IOCL. The Contractor shall carry out all instructions given during

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inspection and shall ensure that the work is being carried out according to the technical documents and the relevant codes of practice furnished to him during the performance of the work.

- 30.2 Any work not conforming to the execution drawings, specifications or codes shall be rejected forthwith and the contractor shall carry out the rectifications at his own cost.
- 30.3 All results of inspection & tests will be recorded in the inspection reports, proforma, which will be approved by the Site Engineer/ Engineer-in-Charge. These reports shall form part of the completion documents.
- 30.4 Inspection & acceptance of works shall not absolve the Contractor from any of his responsibilities under this Contract.

31.0 Co-operation with Other Contractors:

- 31.1 Entire package will be executed along with execution of other parallel jobs at the same area. Therefore understanding scope of execution in various phases is an important essence of this contract. Moreover, the job is required to be executed in close co-ordination with other agencies so that smooth execution of various jobs at the construction area can be ensured.

32.0 Bill Of Quantities:


- 32.1 Bill of quantities is approximate, and payment shall be made in line with rates given in original work order as per actual certified measurements.
- 32.2 After the placement of the order the successful tenderer shall not be allowed to sublet or assign any part of the work order without Corporation's prior written consent.

33.0 Authorised Representative:

- 33.1 The successful tenderer within 10 days of receipt of acceptance of tender, name an engineer responsible for the job at site on behalf of the contractor as per clause 4.0.3.0 and 4.0.3.1, Performance of work, section 4, of GCC. For this purpose, the selection of the Engineer(s) / supervisors is the sole prerogative of the selected CONTRACTOR, and he need not to furnish the bio-data of the Engineer(s) / supervisors proposed to be appointed by him for the work to the Engineer-in-charge for owner's approval. In this regard this term supersedes the Clauses 4.0.3.0, 4.0.3.1 & 4.7.1.1 of GCC. However, bidder should give in writing, on his company letterhead with company seal, to the Corporation, the name of his authorised and qualified engineer who will supervise the work and shall remain at the site during execution of the job.

34.0 Site Cleaning:

- 34.1 The Contractor shall take care for cleaning the working site from time to time for easy access to work site and also from safety point of view.
- 34.2 Working site should be always kept cleared to the entire satisfaction of the Engineer-in Charge. Before handing over any work to owner, the contractor in addition to other formalities to be observed as detailed in the document, shall clear the site to the entire satisfaction of Engineer-in-Charge.
- 34.3 Contractor shall arrange to dispose of debris and any other waste product created while carrying out the work, outside Corporation's premises. The Contractor shall take due care while disposing of such waste materials and ensure that any rules/ regulations laid down by Municipal Corporation or any other statutory body are not violated. The Contractor shall be

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responsible and answerable to any complaint arising out of improper disposal of waste material. Quoted rate shall involve the cost of same and no extra payment shall be made towards this account.

34.4 The Contractor shall clear the site of works as per the instructions of the Site Engineer. The site of works shall be cleaned of all men, site equipment, materials, etc and shall be delivered back to the Corporation in a clean and neat condition as required by the Site Engineer within a period of one week after the job is completed after ensuring that all surfaces spoiled during the works such as floors, walls, glass panels, etc are spotless clean.

34.5 In case of failure to do so by the Contractor, the Corporation shall have the right to get the site cleared at the risk and cost of the Contractor.

34.0 TEST, INSPECTION AND PERFORMANCE OF WORKS

34.1 The Contractor shall carry out the routine tests as enumerated in the relevant standards/codes, technical specifications, and approved Quality Assurance Plans (QAPs) for respective components/systems and no separate payment shall be made unless otherwise stipulated. The type test certificates shall be submitted at the time of Factory Acceptance Tests (FATs). In case, any type test is scheduled during the period of delivery of the component, the same shall be intimated to Owner for its witness at factory premises.

34.2 All the tests either on the field or at outside laboratories concerning the execution of the work and supply of materials by the Contractor shall be carried out by Contractor at his own cost. All test equipment including all recording/ measuring gauges/ instruments shall be calibrated and necessary certificate of compliance issued by the Statutory agency/body to the effect that the test equipment's /instruments have been calibrated as per standard practices and found meeting the norms shall have to be furnished by the Contractor. The entire cost of carrying out such calibration and furnishing of the compliance certificate from a Statutory Authority/ body shall be at the expense of the Contractor.

34.3 Contractor shall discuss his daily work programme with Site Engineer/ EIC before starting the same every day.


34.4 Any work not conforming to the execution drawings, specifications or codes shall be rejected forthwith and the Contractor shall carry out the rectification at his own cost.

34.5 In addition to the provisions of clause 5.2.0.0 of GCC, on no account shall the Contractor proceed with the backfilling or other underground works by covering up or otherwise placing beyond reach of inspection or measurement before inspection by the Site Engineer or his authorised representative. Should the Contractor do so, the same shall be uncovered at Contractor's risk and expense for carrying out the inspection and measurement.

34.6 The vendor shall ensure that the manufacturer carries out adequate and all the necessary tests for each equipment for compliance with the specifications as well as overall operational performance/accuracy, without any additional financial implication to IndianOil. Also, any tests either on the field or at outside laboratories concerning the execution of the work shall be carried out by the vendor at his own cost. Vendor should forward the certified copies of works test reports for the same to the IndianOil.

34.7 Vendor is required to submit its Quality Assurance Plan (Q.A.P.) to be observed during execution of work for IndianOil's information.

34.8 IndianOil has discretion to engage third party inspection agency for inspection of all items for complete system, although it's not mandatory as because the onus of supplying the best quality equipments and maintaining the equipments in the most efficient manner with

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intended zero downtime remains with the vendor only, and any kind of inspection by IndianOil or IndianOil appointed agency shall not absolve vendor from its' responsibility.

35.0 SETTING OUT OF THE WORKS

- 35.1 The Contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position and levels, dimension and alignment of all parts of the works and for the provision of all necessary instruments, appliances and labour in connection therewith.
- 35.2 If at any time during the progress of the work, shall any error appear or arise in the position, level, dimension or alignment of any part of the works, the Contractor shall at his own expense rectify such error to the satisfaction of EIC or the Site Engineer.
- 35.3 The checking of any setting-out or of any line or level by the EIC or the Site Engineer shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all benchmarks, pegs and other things used in setting out the works.

36.0 PERSONAL ACTS & LIABILITIES

- 36.1 Any money paid to any director, attorney, agent, officer or employee of the Contractor and any receipt, settlement, acknowledgement of liability or other arrangement, agreement or document whatsoever signed by any such director, attorney, agent, officer, or employee of the Contractor or erstwhile director, attorney, agent, officer or employee of the Contractor (without notice of his cessation of interest) or by any person held out to be a director, attorney, agent, officer or employee of the Contractor authorized to act on behalf of and/or to bind the Contractor, shall be binding upon the Contractor and shall constitute a full release and discharge to the Owner and/or settlement, acknowledgement or obligation of, upon or with the Contractor, as the case may be , and the Owner shall not be concerned with the actual application of any money so paid or of the actual authority of such director, attorney, agent, officer or employee (actual, erstwhile or purported as the case may be) vis-à-vis the company to make the settlement, receipt, acknowledgement, agreement or other document concerned.


37.0 PATENT INDEMNIFICATION

- 37.1 Further to General Conditions of Contract clause no. 8.10.0.0, Contractor shall indemnify the Owner against all losses, costs, damages and expenses arising from any claim asserted against Owner that the work or part thereof, or any methods, designs or things furnished or specified by Contractor or any sub-contractor or supplier under this Contract, or any use thereof in the reasonable contemplation of the parties at the time furnished, or any methods, processes or acts employed by Contractor in connection with the performance of its obligations hereunder constitutes an infringement of any patent, trade secret, proprietary information, know-how copyright (statutory or non-statutory), un-patented invention or any unauthorized use of the work of others.

38.0 RESTRICTION OF VISITORS

- 38.1 The Contractor shall not allow any visitors on the work or premises of the site without the approval of EIC and/ or site engineer.

39.0 SAFETY AND POLLUTION CONTROL

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39.1 In addition to the provisions of clause 10.0.0.0 of GCC, the Contractor shall take all reasonable precautions to avoid pollution or contamination of the air, land or water arising out of the performance of the work. Disposal of returns and cuttings produced by the work shall not be allowed to be discharged in the river. Contractor shall make arrangement at his own cost and initiatives to dispose of the return and cuttings generated from the drilling operation, as to avoid any pollution to the environment. Should there be a discharge or escape of appreciable quantity of pollutants or contaminants during performance of its obligations under this contract which occurs as a result of activities of the Contractor or its sub-contractor, the Contractor shall immediately take all necessary actions to contain, control, recover or disperse the substance and to eliminate the safety and environmental risks and correct the damages resulting there from.

40.0 ADHERENCE TO SAFETY PROCEDURES AND PRACTICES

Contractor shall ensure that the prudent industrial safety measure, applicable to the plant as per the norms and statutory requirements are adhered to. In case of accidents depending on the seriousness of injury etc. in addition to the hospitalisation/ treatment charges and group insurance amount, compensation shall be paid by the Contractor to the affected person/ his family members in presence of EIC as per Workmen Compensation Act.

41.0 SAFETY PRACTICES WHILE WORKING AT HEIGHT

41.1 Contractor shall ensure that the prudent safety measure, applicable to the plant as per the norms and statutory requirements are adhered to.

42.0 NO COMPENSATION FOR ALTERATION IN OR RESTRICTION OF WORK

42.1 If at any time from the commencement of the work, the Owner shall for any reason whatsoever not require the whole work or part thereof as specified in the tender to be carried out or, alteration in the work are required, the EIC shall give notice in writing of the fact to the Contractor, who shall have no claim to any payment or compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full or prior to alteration.


43.0 During the execution of the contract, the Contractor shall ensure responsible person with authority to take decisions to be available at site. Such person deputed by the Contractor shall report to EIC for smooth execution and timely completion of the work. The Contractor shall also provide and maintain an office for the accommodation of the agents and the staffs, and such office shall be open at all reasonable hours to receive instructions, notices or other communications. The Contractor shall be responsible for any misconduct/ indiscipline by his employees or sub-Contractor/ agent employee's. The Contractor shall abide by the instructions of the EIC, if given in this regard. The office must be equipped with:

- Storage space
- Seating arrangements for contractor and Owner's representative
- Washroom.

44.0 POWER OF ENTRY

44.1 In case the Contractor does not commence the work in the manner described in the contract documents or if he shall at any time in the opinion of the EIC:

- a) Fail to carry on the works in conformity with contract document/ schedule, or

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- b) Substantially suspend work or the works for a continuous period of 14 days without permission from the EIC, or
- c) Commit or permit any other breach of any of the provisions of the contract on his part to be performed, or
- d) Abandons the works, or
- e) During the continuance of the contract becomes bankrupt.

44.2 In any such events, the Owner shall have the power to enter upon the works and take possession of the materials, temporary works, equipment, tools and stocks thereon, and to revoke the Contractor's order to complete the works by his agents, other Contractors or workmen.

45.0 USE OF COMPLETED PORTIONS

- 45.1 Whenever in the opinion of the Owner, the work or any part thereof is in a condition suitable for use and in the best interest of the Owner requires use, the Owner may take possession of the same. The Contractor shall, however, be not relieved of his pending obligations.
- 45.2 Prior to the date of final acceptance of the work by the Owner, all necessary repairs or renewals in the work or part thereof so used on account of defective materials or workmanship or due to the operations failure shall be at the expenses of the Contractor. Such use shall neither relieve the Contractor or any of his responsibilities under the contract, nor act as waiver by the Owner of the conditions thereof. However, if in the opinion of the Owner, the use of the work or the part thereof delays the completion of the remainder of the work, the Owner may grant such extensions of time as it may consider reasonable. The decision of the Owner in the matter shall be final. The Contractor shall not be entitled to claim any compensation on account of such use by the Owner.

46.0 DEFECTS PRIOR TO TAKING OVER


46.1 If at any time before the work is taken over, EIC shall:

- a) Decide that any work done or materials used by the Contractor or any sub- contractor is defective or not in accordance with the contract, or that the works or any portion thereof, are defective, or do not fulfil the requirements of contract (all such matters being hereinafter, called Defects in this Clause).


AND

- b) As soon as reasonably practicable notice given to the Contractor in writing of the said decision specifying particulars of the defects alleged to exist or to have occurred, then the Contractor at his own expense and with all efforts shall make good the defects so specified.
- 46.2 In case the Contractor fails to do so, the Owner may take, at the cost and risk of the Contractor, such steps as in all circumstances be reasonable to make good such defects. The expenditure so incurred by the Owner will be recovered from the amount due to the Contractor. The decision of the EIC with regard to the amount to be recovered from the Contractor will be final and binding on the Contractor. As soon as the works have been completed in accordance with the contract and have passed the tests on completion, the EIC shall issue a certificate in which he shall certify the date on which the works have been so completed and have passed the said tests and the Owner shall be deemed to have taken over the works on the date so certified.

47.0 QUALITY CONTROL

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- 47.1 The work is subject to inspection at all times by the Site Engineer/ Engineer-in-Charge/ representatives nominated by IndianOil. The Contractor shall carry out all instructions given during inspection and shall ensure that the work is being carried out according to the technical documents and the relevant codes of practice furnished to him during the performance of the work.
- 47.2 Any work not conforming to the execution drawings, specifications or codes shall be rejected forthwith and the contractor shall carry out the rectifications at his own cost.
- 47.3 All results of inspection & tests will be recorded in the inspection reports, proforma, which will be approved by the Site Engineer/ Engineer-in-Charge. These reports shall form part of the completion documents.
- 47.4 Inspection & acceptance of works shall not absolve the Contractor from any of his responsibilities under this Contract.
- 47.5 Entire work shall be executed as per the IndianOil specifications. All the bought-out items used in the construction shall be sourced from the approved vendors of IndianOil. However, on the specific request of the Contractor, IndianOil may approve name of any other vendor not included in the approved list.
- 47.6 IndianOil may appoint Third Party Inspectors (TPI) for inspection of work at various stages of construction and as per the QAP & IndianOil specifications. The fee of TPI will be paid by IndianOil.
- 47.7 Over and above the inspections carried out by TPI, the work will also be inspected by the Engineer / Engineers from Location/State Office/Head Office of IOCL.
- 47.8 Contractor shall provide all necessary assistance to the TPI / IndianOil engineers for carrying out inspections/ tests / measurements of work without any extra cost to IndianOil.
- 47.9 The tenderers to note that they shall arrange the Thirty Party Inspection, for the materials for which TPI inspection specified in the tender, at no extra cost. However, the inspection by TPI does not absolve the vendor from any of his responsibility for the supply of material conforming to the specifications.
- 47.10 IndianOil reserves the right to appoint any additional TPI agency for the inspection.
- 47.11 The vendor/ contractor shall hand over warranty/ guarantee certificate along with manuals from OEM of the materials/ equipments as applicable.
- 47.12 All the materials shall be got approved before use. In case defective/sub standard materials are brought at site and rejected by TPI / IndianOil site Engineer, the same shall have to be removed immediately within 3 days from the site at their own cost. IndianOil shall not entertain any claim from the Contractor on this account. In case, Contractor fails to remove such materials from the site, within 15 days after issue of notice in writing, IndianOil reserves the right to dispose off such materials at the entire risk and cost of the Contractor.
- 47.13 The Contractor shall make arrangements for retention of samples of approved materials till completion of work.
- 47.14 Contractor shall bear all expenses towards testing of materials as per QAP and IndianOil specifications. Repeat tests if required, as per the opinion of IndianOil/TPI shall also be conducted by the Contractor at no extra cost. The lab tests shall be carried out at any Govt Engg College/Govt University/Labs with NABL accreditation /Govt Labs, Govt recognized test houses and test houses with ISO accreditation. However, at its discretion, IndianOil may advise to carry out tests at a particular laboratory, which shall be binding on the Contractor.

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47.15 Contractor shall provide all the necessary equipments required for field tests to maintain the quality of work as per QAP and IndianOil specifications.

48.0 DEALING WITH OUTSIDE PARTIES

48.1 The Contractor should purchase all material from the market, which they require for the work allotted to them, in cash or credit in their own firms' name only.

48.2 In case of any default on the part of the Contractor to clear the payments of their vendors / suppliers / sub-contractors, the Corporation, to protect it's name and image, shall recover the amount from Contractor's pending bills or security deposit and may make the payment to the concerned party.

48.3 Contractor in his own interest should purchase material from the authorized sources and should fulfill all their obligations of all taxes etc. If the Corporation has reasons to believe that any material has been brought to its premises from unauthorized sources, the Corporation can refer the matter to police for verification.

48.4 The Contractor can be debarred/ holiday listed from corporation and EMD/SD shall be forfeited for such lapses.

49.0 SUBMISSION OF AS BUILT DRAWINGS

50.0 Party shall prepare and submit the tracings/ SOFT copy of "As-built drawings" of all the facilities as per the scope of work indicated at the time of conclusion of this contract or as directed by the site engineer in line with the schedule.

51.0 GUARANTEE

51.1 All equipment including components and subcontracted items should be guaranteed by the Vendor within the warranty period mentioned in the tender. In the event of any defect in the equipment or workmanship manifesting themselves, the Vendor will replace/ repair the equipment at Vendor's cost and risk on due notice, failing which the rejected equipment will be sent to the Vendor on Freight to Pay basis for free replacement.

The equipment after rectification of defects will be dispatched by the Vendor on 'Freight Paid' basis. Alternatively, IndianOil reserves the right to have the equipment repaired/ replaced at the locations concerned at the Vendor's risk, cost and responsibility.


52.0 Miscellaneous Requirements:

53.1 The contractor is required to take necessary care to protect the existing nearby structure while carrying out his scope of work. Any damage caused to other property shall be rectified at his own cost.

53.2 Any amendment / Change in the PO shall be incorporated with proper SAP documentation whenever additional requirement is finalised along with appropriate time schedule.


53.3 Stage wise release of work front based on prevailing site conditions to be considered and party should be ready with men/machineries to complete the said job within the given contract period for mobilizing machineries & manpower.

53.4 It shall be contractor's responsibility to inform/obtain approval for any revision and/or modifications (for overall improvement) decided by the vendor with necessary justification, with respect to the engineering/functional design philosophy given in the tender from the Owner/Engineer-in-Charge before implementation. Also such revisions and/or modification if


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accepted / approved by the Owner/Engineer-in-Charge shall be carried out at no extra cost to the owner.


- 53.5 Any changes required for efficient running of system keeping the basic parameters unchanged and which has not been indicated by the Contractor in the data / drawings furnished along with the offer, will be carried out by the contractor at no extra cost to the owner.
- 53.6 All expenses towards mobilization & demobilization including bringing in equipment, clearing the site etc. shall be deemed to be included in the prices quoted and no separate payments on account of such expenses shall be entertained.
- 53.7 It shall be entirely Contractor's responsibility to provide, operate & maintain necessary construction equipments, scaffoldings and safety gadgets, cranes and other lifting tackles, tools and appliances to perform the work in a workman like and efficient manner & complete all jobs as per time schedules.
- 53.8 Preparing approaches and working area for movement and operation of the cranes, levelling the areas for assembly and erection shall also be the responsibility of the Contractor. The Contractor shall acquaint himself with access availability, facilities such as railway siding, local labour etc. to provide suitable allowances in his quotation. The Contractor, at his own cost, may have to build temporary access roads to aid his own work which shall also be taken care while quoting for the work.
- 53.9 The procurement and supply in sequence and at the appropriate time of all materials & consumables shall be entirely the Contractor's responsibility. Rates for execution of work will be inclusive of supply of all these items.
- 53.10 No covered space shall be provided by IOCL for stacking /storage of Vendors materials, Vendor has to make their own arrangement for storage.
- 53.11 Vendor is fully responsible for the equipment/material issued by IOCL for execution of work. In case these are mishandled or lost, the vendor has to arrange the same entirely at his own cost to the satisfaction of the site engineer.
- 53.12 Acceptance of facility/ facilities by the Corporation does not constitute final completion of the contract. The contract shall be deemed to be executed in full and final measurement shall be certified only when the vendor has fully discharged all his obligations in terms of all the contract documents.
- 53.13 All the associated materials/equipments supply and installation, commissioning works in connection with schedule of works (SOW) with billable items given in the SOW , which are not explicitly mentioned in the SOW or in the techno-commercial bid but are essential for the successful commissioning and completion of the project and efficient operation/maintenance of the system, are in vendor's scope. Unless vendor raises any specific query wrt any specific item/s in this regard during Pre Bid meeting itself and get him clarified with IOCL response, the above will be presumed to have understood by the vendor in its content and spirit.
- 53.14 Any material (Indigenous or outsourced) supplied by the vendor at any point of time during contract execution, warranty or CAMC period is found deviating from makes/brands/specifications or relevant codes/ standards during the entire contractual period till culmination of CAMC contract, suitable commercial deductions shall be imposed on the vendor in line with Corporation policy and other provisions of the contract not withstanding other legal rights and remedies available with IOCL as per contract agreement.

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- 53.15 Special Terms and Conditions of Contract (SCC) shall be read in conjunction with the General Conditions of Contract (GCC), Specifications, Drawings and any other document forming part of this tender/contract, wherever the context so requires.
- 53.16 Notwithstanding the sub-division of the documents into these separate parts and volumes, every part of each shall be deemed to be supplementary to and complementary of every other part and shall be read with and into the contract in so far as it may be practicable to do so.
- 53.17 Where any portion of the GCC is repugnant to or at variance with any provision of the SCC, then the provision of the SCC shall be deemed to override the provisions of the GCC and shall, to the extent of such repugnance or variations, prevail.
- 53.18 Wherever it is mentioned in the specifications that the Contractor shall perform certain works or provide certain facilities, it is understood that the Contractor shall do so at his own cost, being deemed to be part of the relevant item in the SCHEDULE OF RATES / BOQ (SOR) whether expressly stated or not.
- 53.19 The materials, design and workmanship shall satisfy the relevant Indian Standards, the specifications contained herein, and codes referred to. Where the specifications stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied.
- 53.20 In so far as the contract does not deal with or provide by expression or implication for any aspect or specification with respect to the product(s) or any of them or with respect to any other matter or thing required to be furnished, done or supplied relative thereto or for the delivery thereof according to the contract, the internationally accepted relevant specification, standard of workmanship and/or codes or practices, as the case may be, shall apply. In the event of any doubt or ambiguity relative thereto, the Contractor shall seek the clarification of IndianOil.
- 53.21 Consultant appointed for the project/ job shall not be allowed to participate in the tender either directly or indirectly. An indirect participation shall include participation through an affiliate or as a sub-contractor, consultant or supplier. The expression 'affiliate' for the purpose of this clause will include any person, or company or association (howsoever designated) who/ which is a member of the consultancy firm (if the consultancy firm is a joint venture or consortium or who or which is directly or indirectly holds 10% (ten percent) or more of the capital or voting capital of consultant (if the consultant or any of its members is a company or a body corporate) or who or which is a consultant or sub-contractor of the consultant with regard to the project.
- 54.0 SAFETY:**
- 54.1 Since works have to be carried out in petroleum storage and distribution establishment, the contractor should ensure that day to day operations, safety and security of the location are not affected in any way on account of the works being carried out. In case of any damage to our properties due to the negligence on the part of the contractor or their workmen, the contractor will be held responsible and liquidated damages as assessed by the corporation would be recovered from them.
- 54.2 The contractor shall also abide by hot work / cold work / height permits to be taken on day-to-day basis from the location as per policy of the Corporation.
- 54.3 When hot works are involved, the following safety precautions have to be strictly observed before commencement of works.

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- 54.3.1 All hot works operations should be carried out under the supervision of IOCL representative and also under the supervision of responsible representative of the contractor.
- 54.3.2 All hot work operations should be undertaken only after issue of hot work permits by the location in charge on day to day basis.
- 54.3.3 It should be ensured that the tanks, pipes, containers where the hot work is required are Hydrocarbon Vapour freed and properly checked to this effect with explosive meters.
- 54.3.4 It should be ensured that the surrounding area is free from oil, rags, oil spillage and other sources of ignition and the area is cleaned/ sprinkled with sand or dry earth. It should also be ensured that metallic trays filled with DCP powder are kept for collecting the welding arc/ hot metal cutting.
- 54.3.5 Hot work should commence only after positioning the portable fire extinguishers and sand/ dry powder in readiness at site and hydrant system made available at the nearest point.
- 54.3.6 Match boxes, lighters etc used for hot work should be kept in the custody of the supervisor only.
- 54.3.7 If hot work has to be carried out in a place close to storage tanks or any other facility under operation, it is necessary to provide fire screen wall to segregate the area to prevent sparks traveling to the hazardous area.
- 54.3.8 All equipments / fittings / machineries / lifting tools & tackles required to be used by the contractor during the job execution of various job vide this contract shall be conforming to the safety norms prevailing at the location. All JB's/light fittings required to be used near hazardous area by the contractor shall be FLP type with a valid test certificate. Use of suitable capacity armoured cable without joint with valid megger test report, fitness certificate for welding transformers, guard for grinding wheels etc. are also required to be ensured.
- 54.3.9 It should be ensured that no workmen carry match boxes or any other source of ignition with them while entering the premises or inside the premises. After the hot work operation of the day, the following precaution should be taken.
- Welding sets should be switched off and power mains disconnected. If the connection is taken from a temporary switch board the fuse carriers should be removed and handed over to the supervisor.
 - Gas cylinder and the cutting sets should be properly closed and the equipment removed to a safe place.
 - The site of work should be examined to ensure that it is free from hot splatters and any other source of ignition.
- 54.4 Contractor shall have to take all safety precaution for carrying out hot work in the premises after obtaining hot work permit from location in charge at his own cost as directed by the Engineer-In-Charge. Necessary safety equipment such as safety belts, helmets and other equipments are to be positioned by the contractor and use as per requirement.
- 54.5 Safety distance as per CCOE/PESO Rules and Oil Industry Safety Directorate shall be maintained strictly.

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54.6 Any casualty or damage caused to property or person by any untoward incidents while executing this contract will be at the contractor's risk and cost.

54.7 The successful tenderer shall be responsible for observance of all conditions as per Appendix III furnished along with GCC with regard to safety.

54.8 During excavation of earth, party should be equipped with FLP pump/motor to bail out water as per direction of site in charge.

55.0 **SECRECY AGREEMENT:**


55.1 CONTRACTOR shall as a part of his obligation sign an agreement for secrecy of the drawings / documents with IOC. CONTRACTOR, hereby, expressly undertake to keep all the drawings/documents as well as other Technical information given in the CONTRACTDOCUMENT secret and shall not divulge or leak or otherwise cause to be known to the competitors or others having any interest in such process in anyway the contents in any form, shape or method. This confidentiality obligation of vendor will be for the entire tenure of CAMC.

IOCL on the other hand will have similar confidentiality obligation for the patented items of the TA vendors unless it is necessary to share with third party for the smooth running / operation / integration of the TA Automation system in the concerned location.

56.0 Following clauses forming part of the GCC issued along with the tender are deleted :

- Clause 2.6.1.0 and 2.6.2.0 - General, section 2 of GCC.
- Clause no. 3.0 - Instruction to tenderers of GCC.
- Clause 4.5.1.1 - In partial modification of the clause, LOA and SAP PO shall be synonymous.
- Clause 2.6.1.0 and 2.6.2.0 - QUANTITIES OF WORK: In partial modification of said clause, no compensation shall be payable to the contractor in the eventuality of the executable quantities being less than 80% of total contract value (as contained in the Order).
- Clause 4.3.8.0 - THE JOB SITE: In partial modification of said clause, "local bandh" shall be included in "force majeure".
- Clause 4.5.1.1 - SCHEDULE OF ACTIVITIES: The clause shall partly be modified. Duration of 30 days shall be read as 10 days.
- Section 9 - ARBITRATION AND ALTERNATIVE DISPUTE RESOLUTION MACHINERY: Stands deleted. Further, the reference to arbitration and alternative dispute resolution machinery provision contained in any other term and condition in GCC, which may be general or special in nature shall also stand deleted to the extent the said contents are applicable to the arbitration provisions.
- In partial modification of GCC clause no. 5.5.0.0. , the completion certificate shall be issued by State Engineering Head on written request by the CONTRACTOR on successful completion of works and after completion of documentation as listed in clause 5.5.2.0. of GCC and including release of final bills within 15 days from the date of receipt of written request for completion certificate by the CONTRACTOR.

57.0 **ELECTRICAL WORKS**

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- a) During the execution of job temporary connections are to be provided by the Contractor and all possible assistance shall be rendered by the Contractor for the smooth operation of the respective Retail outlet/ Depot/ Terminal. No extra payment shall be made on this account.
- b) All temporary connections are to be spark proof/ flame proof as required and shall be got approved from Site Engineer.
- c) Test Report (if required for this job as decided by the engineer) duly approved by the local Electricity Department shall be submitted by the Contractor after completion of the work. Any payment to Electricity Department needed shall be borne by the Contractor.
- d) The entire electrification work shall be carried out by the Contractor under supervision of licensed Electrical supervisor to the satisfaction of local Electricity Dept./Site Engineer.
- e) The entire electrification work shall be carried out as per I.E. Rules/ Local Electricity regulation/ IndianOil specification as applicable.
- f) All metal covering which is used to protect cables and apparatus shall be efficiently earthed. The metal covering used to carry the cable must be electrically continuous and this includes the entire switchgear casing if they are made of metal.

58.0 PENALTY CLAUSE:

57.1 The penalty for breach of safety during execution of works shall be levied by the Corporation as below:

57.1.1 Violation of applicable safety, health and environment related norm, a penalty of Rs 5000/- per occasion plus GST at prevailing rate.


57.1.2 Violation as above resulting in

- Any physical injury, a penalty of 0.5% of the contract value (max. of Rs 2 lacs) plus GST at prevailing rate per injury in addition to Rs5000/- plus GST at prevailing rate as mentioned above.
- Fatal accident, a penalty of 1% of the contract value (max. of Rs 10 lacs) plus GST at prevailing rate per fatality in addition to Rs 5000/- plus GST at prevailing rate as mentioned above.

57.2 In case sub-contractors are engaged by the successful tenderer with prior permission from IOCL on award of works, it will be mandatory on part of the main contractor to furnish a **NO DUEUNDERTAKING** from the sub-contractor (on their letter heads) to IOCL before final payments are cleared by the Corporation.

59.0 SUBCONTRACTING

The contractor shall not subcontract whole of the works on back-to-back basis. The contract may provide for the contractor to get specified works executed from subcontractors included in the pre-qualification application or later agreed to by IOCL, with a caveat that the responsibility for all sub-contracted work rests with the prime contractor. Sub-contracting will generally be for specialized items of work as specified in the tender along with other works, such as reinforced earth retaining walls, pre-stressing works, and so on. However, the contractor shall be required to obtain consent from EIC for purchases of Materials and Services which are in accordance with the Approved vendor list/ Approved makes specified in the Contract or for provisions of labour or for the subcontracts for which the Subcontractors

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are named in the Contract. Procurement of material, hire of equipment or engagement of labour will not mean sub-contracting. Execution of the Works (or any part thereof) by petty contractors or on piece work basis under the supervision of the Contractor (or its representative) shall not be deemed to be Subcontracting under the Contract. Subcontracting by the contractor without the approval of Engineer-In-Charge (EIC) shall be a breach of contract. Completion Certificate shall be issued by the EIC to the approved subcontractor only when the contractor's work is complete.

FOR POST AWARD SUB-CONTRACTING

Necessary documents establishing the credentials of sub-contractor i.e. work order, completion/execution certification from end user, proof of payment, copy of TDS certificate/ tax certificate etc. are to be submitted by the main contractor for approval of EIC. While evaluating the credentials of the sub-contractor, same modalities followed for acceptance of the main contractor with respect to technical and commercial (as applicable) evaluation criteria as laid out in the original tender shall be followed for the sub-contractor as well with the evaluation yardstick set pro-rata/proportionately by EIC.

- 60.0 Vendor is advised to submit construction execution plan for completion of the works as per completion time indicated in the tender during kick off meeting. Site organization chart for works proposed shall also be submitted.
- 61.0 In case the contractor fails to adhere to the time limit specified above or if the rate of progress is considered not satisfactory, the Corporation will be at liberty to terminate the contract and get the same executed by any other agency entirely at the cost and risk of the original contractor and in line with provisions available under the GCC.

62.0 Training:


The vendor shall undertake to train officers / staff nominated from IOCL concerned State Office/Head Office in following areas in two phases so as to make the participants fully familiar with the system and its operation. Organising and conducting such initial trainings program in following two phases needs to be done by the vendor in the location.

Phase 1: Induction Training-Prior to Commencement of Pre-SAT Trial Run

- i. System Operation details
- ii. Operational aspects of the application software and major sub systems
- iii. Basic understanding of the checkpoints for TAS wrt various performance parameters

Phase 2: During handing over of the System after successful completion of SAT:

- i. Operational & maintenance of individual equipment & overall system
- ii. Dos and Don'ts
- iii. Trouble Shooting
- iv. General design & system Engineering.
- v. Operating system software, application software, GUI
- vi. Computer system hardware used.

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- vii. Design criterion, specification, testing, functional aspects, Safety aspects & installation of all other control room mounted & field mounted equipment.


The above training shall be conducted at the site for duration of 3 days at a time in two different phases. The first training i.e., "Induction training" shall be held before starting the Trial/Observation period/SAT, so that effective participation takes place during the aforesaid period. The next training should take place before handing over of the system to IOCL by the vendor. While all the participants shall be issued Training certificate by the vendor, based on performance in quiz/written test/viva/hands on test taken by the vendor just after the second training, 3 best performing candidates would be shortlisted and be issued certificate of commendation/merit by the vendor and IOCL. These 3 candidates would be eligible for advanced training at HO/vendor's works etc.

The TT crews are to be familiarized with the operation of the TLF equipments for which IOCL shall organize the programme and the vendor shall demonstrate the operation on a suitable pre-fixed date at the time of commissioning of the system.

63.0 ACCEPTANCE OF WORK ORDER:

- 63.1 After communication of the Corporation's acceptance of the contractor's tender, the successful contractor will have to execute an agreement with the corporation covering all aspects of the contract in standard form (issued by IOCL), immediately before commencement of the works. The intending tenderers should acquaint themselves with the provisions of standard agreement prior to quoting.
- 63.2 If the contractor fails to return the duplicate copy of the work order and agreement duly signed in token of their acceptance within 15 days, the EMD is liable to be forfeited by the Corporation, with or without any further reference to the contractor.
- 63.3 When the party signing the agreement is not the sole proprietor, necessary power of attorney authorizing the person who is acting on behalf of the firm should be produced before execution of the agreement.
- 63.4 The agreement/undertaking agreement is to be stamped for the aggregate value of stamp duty payable on an agreement and on a general power of attorney in the State in which it is executed.
- 63.5 The agreement/undertaking to be signed on behalf of the Contractor by a Director or other officer either authorized by the Board to execute this undertaking or generally authorized to execute contracts and powers of attorney on behalf of the Contractor and the signature of this agreement/undertaking is to be Notarial Attested.
- 63.6 If the Contractor does not start the work by the above stated period and if the Corporation is not satisfied with the reason for not starting the work in time or if Contractor refuses to carry out the work due to any other reason, the Corporation can cancel that work order by giving a Registered Notice after the expiry of the specified period as per the order and the same work shall be carried out by any other Contractor at the entire risk and cost of original Contractor.
- 63.7 In the event of such cancellation, the ISD/SD for the subject work, Earnest Money Deposit will be forfeited, without any further intimation to the contractor. In addition, the Corporation also reserves the right to holiday list the contractor in the event of such default.

64.0 Intellectual Property

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64.1 No intellectual property rights, patents, copyrights of any nature shall be transferred from one party to the other in the course of performing any obligations or otherwise under this Agreement. The Contractor may use certain tools, processes or methodologies of its own, in performing the services. Ownership of all intellectual property rights and any other rights in these and any materials/deliverables created shall vest with the Contractor, and no rights shall be deemed to have accrued to the Customer.

64.2 Similarly, IOCL may allow the Contractor to use some of its own tools, processes, methodologies, documents, designs or protocols of its own, in enabling the Contractor performing the services. Ownership of all intellectual property rights, patents, copyrights and any other rights in these and any materials/deliverables created shall vest with IOCL, and no rights shall be deemed to have accrued to the Contractor.

65.0 Indemnity against Intellectual Property Infringement

Contractor will indemnify the Corporation (IOCL) fully and effectively indemnified against each and every claim made against Corporation (IOCL) as a result of the Contractor's knowing infringement of any third party's Intellectual Property, provided that IOCL must:

- promptly notify the Contractor of details of the claim.
- not make any admission in relation to the claim.
- allow the Contractor to have the conduct and authority of the defence or settlement of the claim
- give the Contractor all reasonable assistance (at Contractor's expense) in disposition of the claim.

65.1 The Confidentiality clause shall be applicable from the commencement of Works pertaining to a Contract till expiry of Comprehensive Annual Maintenance Contract (CAMC) period for all documentation pertaining to the Contract.


65.2 After the expiry of CAMC period, Contractor should submit a Non-Disclosure undertaking for not divulging the specific document details as advised by and marked by IOCL. In case of a demand by an authorized statutory/Legal/Govt institution to the vendor about sharing some information covered under Confidentiality clause / Non-Disclosure undertaking, vendor shall seek IOCL's permission / views regarding the same and shall be guided accordingly.

66.0 Notwithstanding any other mechanism for dispute resolution provided under the General Conditions of Contract, with a view to a speedy resolution, the Contractor and Owner may at any time endeavour to settle through conciliation a dispute referable for settlement by Conciliation under and in accordance with the Indian Oil Corporation Limited Conciliation Rules 2014 (hereinafter referred to the "said Rules") as amended from time to time. The said Rules may be downloaded from the owners website and if not available, a copy thereof may be obtained from the owner on written request.

In the event conciliation fails, it is agreed between the parties that there will not be any arbitration between the parties and the parties will approach the Competent Court in city where IOCL's State Office/Head Office, which issued the contract agreement is located, alone shall have jurisdiction to entertain any application or other proceedings in respect of any dispute arising under this contract.

67.0 VERIFICATION OF ORIGINAL DOCUMENTS - As per Part-B of the tender document.

End Client verification means the end client which has issued the order and certificate of completion / execution or any such certificate informing execution per requirement.

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In case a sub-contractor is involved who has issued completion certificate, verification shall also be done from the end client.

68.0 Buy back of old equipments at Book Value by Vendor for existing Brownfield location:

The tender calls for the revamping of the automation system, in which equipment has been considered for replacement with new equipment. The selected vendor needs to buyback & take away the old equipment. The book value as on last date of the quarter preceding this date i.e 31.03.2026 of the entire Automation System shall be taken as buyback book value. This book value as on 31.03.2026 shall be **Rs 41,15,824.81 /-**. The entire equipment(except retained equipments as per list given for the location) shall be compulsorily bought back by the vendor at this Book Value. The bidder should consider the same while quoting for the work. Invoice will be raised for the assessed Book Value (buy back value) along with applicable GST and recovered from the vendor while releasing payment for successful completion of SAT and if necessary (In case the amount falls short) in the final bill. Irrespective of the date of Supply/installation/commissioning, the recovery amount shall be the 'Book Value' indicated in the Tender.

The Vendor also has a choice to retain some of the equipment which meets the tender specifications. If the vendor, on being satisfied about the specifications, health, performance etc. of these equipments meeting the tender requirements, chooses to retain this equipment, following conditions shall apply:

1. The vendor shall be fully responsible for integration of these equipments with new TAS system.
2. The vendor should maintain these equipments also for minimum of 10 years after project completion at the prescribed performance levels and in the event of any of the retained equipment needing replacement to meet the performance levels during these 10 years, the entire cost of replacement of these equipments shall be borne by the vendor.
3. The re-installation of the retained equipment (if needed)/integration etc., shall be done with least possible disturbance to Operations and as per the schedule to be jointly finalized by the vendor with the terminal/engineering Dept.
4. The amount of 'Buy Back' shall be reduced to the extent of the Book Value of the Retained Equipment i.e amount to be recovered from the vendor for the 'Buy Back' shall be reduced to that extent from the value indicated in the Tender for the whole system.


For Instance,

Book Value of the Entire System as of Date 'X' = B (Indicated in the Tender)

Book Value of equipment retained by the vendor as of the same date 'X' = B'* (* where B' is to be decided from the original Automation Work Order and its depreciation on the Date as indicated above)

The Buy Back Value i.e the amount to be recovered from the vendor = B-B'

5. It is the basic responsibility of the prospective bidders to carry out thorough survey of the existing equipment's in case of a brown field project before bidding and seek clarification

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during Pre bid to understand which are the equipment's IOCL will get rectified within IOCL scope and what all the successful bidder is supposed to take over on as is where is basis and rectify on their account.

65.0 Mobilization Advance:


Mobilization advance (maximum of 10%) is payable only if the contract value is Rs. 10 Crore and above.

In partial modification of Clause 6.4.5.0 of GCC, the CONTRACTOR may (if specified by him in his bid and accepted by the OWNER) be allowed a Mobilization advance/advance for an amount equivalent to up to 10% (Ten per cent) of the Total Contract Value (CAPEX amount) excluding Tax component. Such advance shall be released in 2 installments as per the following:

- ✓ Mobilization advances up to 5 % of the Total Contract value (CAPEX amount) excluding Tax component.
- ✓ Advance up to 5% after full recovery of previous instalment of mobilization advance paid including interest.

The payment of Mobilization Advance / advance shall be subject to the fulfilment of the following conditions:

- a) The CONTRACTOR shall have signed and sent back a copy (or copies if so required) of the Acceptance of Tender issued by the OWNER in token of unqualified acceptance thereof.
- b) The CONTRACTOR shall have furnished the Initial Security Deposit as stipulated in Clause 2.1.1.0 of GCC and associated clauses hereof.
- c) The CONTRACTOR shall have executed the formal contract in terms of the Form of Contract.
- d) The contractor shall have made a formal application for the release of the Mobilization Advance / Advance and shall have furnished a Bank Guarantee of an amount equivalent to 110% of the Advance from a Bank in a format approved by the OWNER.
- e) The outstanding balance of the Mobilization Advance / Advance shall carry interest at 1% (one percent) above the State Bank of India declared rate of cash credit advances prevailing on the date of opening of price bids.
- f) Without prejudice to any other mode of recovery available to the OWNER, the Mobilization advance / Advance, together with interest thereon calculated on the reducing balance, shall be recovered at the rate of 10% (ten percent) of the gross certified amount of each Running Account Bill, till the advance, together with the interest accrued thereon, is recovered in full. The unrecovered balance if any, and interest may be recovered from the Final Bill of the CONTRACTOR and/or from any other amount due to the CONTRACTOR under any other contract or otherwise.
- g) (i) If the OWNER is satisfied that 25% (twenty five per cent) of the Mobilization Advance / Advance and interest accrued till then on the Mobilization Advance has been repaid to or recovered by the OWNER, the OWNER may on the application of the CONTRACTOR, if the Bank Guarantee submitted by the CONTRACTOR covers and secures only the

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Mobilization Advance / Advance, permit the CONTRACTOR to substitute the Bank Guarantee by a Bank Guarantee acceptable to OWNER for an amount reduced by 25% (twenty five per cent).

(ii) The provisions of paragraph (i) hereof above, shall mutatis mutandis apply to the OWNER's satisfaction that the CONTRACTOR has repaid 50% (fifty per cent) and/or 75% (seventy five per cent), as the case may be, of the Mobilization Advance/ advance, and interest accrued till then on the Mobilization Advance / Advance.

- h) All other conditions stipulated in Clause 2.1.2.0 of GCC hereof shall be applicable to the advance(s).

66.0 At all places in the GCC enclosed with the tender document, OWNER shall mean.

INDIAN OIL CORPORATION LIMITED, MARKETING DIVISION with its office at Mumbai. The court of jurisdiction for all matters under the tender shall be at Mumbai.

67.0 TYPOGRAPHICAL OR CLERICAL ERRORS:

The Corporation's clarifications regarding partially omitted particulars, or typographical or clerical errors shall be final and binding on the Contractor.

68.0 Interest Prohibition Clause: Parties agree that the Contractor shall not be entitled for any pre-filing interest, i.e. date of cause of action till date of filing of civil suit. Parties agree that contractor's claim for any interest shall not be considered and shall be void. The Civil Court/Commercial Court shall have no right to award pre-filing interest in the matter to the Contractor. Where the civil decree is for the payment of money, no interest shall be payable by the Owner on whole or any part of the money for any period till the date on which the suit is filed.


69.0 ORDER OF PRECEDENCE: In case of contradiction between Indian Standards, General Conditions of Contract, Special Conditions of Contract, Specifications, Drawings, Schedule of Rates, the following shall prevail in order of precedence;

1. Formal contract / call up orders.
2. Acceptance of tender
3. Price schedule annexed to the letter of acceptance.
4. Agreed variations / Pre bid clarifications.
5. Addenda to the tender documents
6. Special Conditions of Contract
7. NIT
8. Part B of the tender document
9. General Purchase Conditions of Contract

A variation or amendment issued after the execution of the formal contract shall take precedence over the formal contract and all other Contract Documents.

70.0 Rights of Owner to get Work done at Contractor's Risk and Cost

Under relevant clauses of the GCC, the Corporation has the right to get the work done (Contracts/part offloading of contracts) at contractor's risk and cost, or employ necessary manpower, materials and equipment at the risk and cost of the contractor. Some illustrative


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situations are enumerated herein below:

- i) Engineer-in-charge's or Site Engineer's instructions to increase labour strength, materials and equipment on progress schedule are not complied with by the contractor.
- ii) The Site Engineer on inspection or test is not satisfied with the quality of workmanship of any work and material, and the contractor fails to replace or re-perform the work to the satisfaction of Site Engineer.
- iii) There is any defect in the design or work done by the contractor and the contractor fails to re-perform, replace or otherwise rectify the defects as pointed out by Site Engineer to the satisfaction of Site Engineer, at the time of final tests.
- iv) Defects and imperfections in design or work done by the contractor are noticed during the defect liability period and the contractor fails to rectify the defects at his own cost.
- v) The contractor does not clear the site within seven days of completion of final measurement after completion/ termination of contract.
- vi) Balance work left incomplete by the Contractor on termination of the contract.


71.0 RISK AND COST CLAUSE

- 71.1 The instant clause shall supplement any provision in respect of a Risk & Cost claim by Owner against Contractor/Vendor in General Conditions of Contract or Special Conditions of Contract or NIT or otherwise. In the event there is any conflict between the instant clause and any other clause on risk and cost as mentioned hereinabove, the provisions of the instant clause shall prevail.
- 71.2 The Owner shall be either entitled to terminate contract or to withdraw/offload portion of work and get incomplete/ undone work done/completed by itself and/or through one or more independent agency(ies), at the risk and cost of the Contractor/Vendor, as applicable.
- 71.3 Upon the Owner deciding to exercise its right to impose risk & cost upon the Contractor / Vendor as aforesaid, the Owner may give a written notice to the Contractor/Vendor informing that the incomplete/ undone work is being done/completed by the Owner and/or through one or more independent agency(ies) at the risk and cost of the Contractor/Vendor. Such notice shall be the notice under the Contract for invocation of the right to impose risk and cost upon the Contractor / Vendor as aforesaid.
- 71.4 The Owner shall in writing intimate the Contractor the place and date for joint measurement after and/or along with invocation of risk and cost. The Contractor shall be bound to be present for joint measurement on the date(s) as notified by the Owner.
- 71.5 The joint measurement shall be undertaken by a Third-Party Expert from the empanelled list of the Owner. The cost of engaging the Third-Party Expert shall be on account of the Contractor. The Owner shall make the payment to the third part expert and claim the paid amount from the Contractor by giving a written notice. The Contractor is liable to reimburse such payment within 30 Days from such written notice and in failure shall be liable to interest of 18% p.a.
- 71.6 The Contractor shall, without fail, provide necessary materials, equipment and/or labour as required for joint measurement. In case the Contractor is not able to or does not provide necessary materials, equipment and/or labour as required for joint measurement, then the Owner shall make arrangement for the same at the risk and cost of the Contractor.


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- a. If the contractor does not attend on such date as notified by the Owner for joint measurement, for any reason whatsoever, then the joint measurement shall be undertaken by the Third-Party Expert in absence of the Contractor;
 - b. The joint measurement done by the Third-Party Expert shall be final and binding upon the Contractor; and
 - c. The Contractor hereby agrees that its absence on the notified date for the aforesaid purpose shall preclude itself from raising any objection on a future date to either the validity of joint measurement conducted as per provisions hereinafter or to imposition of risk and cost including the quantum of claim arising therefrom.
- 71.7 The Owner shall in writing intimate the Contractor the place and date for removal of all plant and machineries belonging to the Contractor from the project site. If the Contractor fails to remove its plant and machineries from the project site on the notified date, then the Owner will be entitled to storage/demurrage charges as may be decided by the Owner and the Contractor shall be liable to pay. If the Contractor fails to pay the storage/demurrage charges, then the Owner will have the right to claim the same and recover from any money due to the Contractor on any account, and if such money is insufficient, the Contractor shall be called upon in writing and shall be liable to pay the same within 30 days along with interest @ 18% per annum. In the event the plant and machineries belonging to the Contractor are not removed within the period as stipulated in the Notice, the Owner shall also have the right to dispose / auction the material and recover amount after stipulated time.
- 71.8 The Owner shall be entitled to get the incomplete and/or unsatisfactory and/or defective work completed, by itself or through once or more independent agency(ies)/ supplier as applicable on risk and cost of the Contractor.
- 71.9 The awarding of balance work/supply shall be deemed to construe as crystallization of the recoverable amount on risk and cost from the Contractor.
- 71.10 Any excess expenditure incurred or to be incurred by the Owner in completing the part work/ part incomplete work of any item(s) or the excess loss of damages suffered or as may be suffered by the Owner as aforesaid, shall without prejudice to any other right or remedy available to the Owner in law or as per agreement, be recovered from any money due to the Contractor on any account, and if such money is insufficient, the Contractor shall be called upon in writing and shall be liable to pay the same within 30 days along with interest @ 18% per annum.
- 71.11 If, the Contractor fails to pay the required sum within the aforesaid period of 30 days, the Engineer-in-Charge shall have the right to, upon Notice, sell any or all of the Contractors' unused materials, constructional plant, implements, temporary building at site etc. and adjust the proceeds of sale thereof towards the dues recoverable from the Contractor under the contract and if thereafter there remains any balance outstanding, it shall be recovered in accordance with the provisions of the contract.
- 71.12 In the event the above course is adopted by the Engineer-in-Charge, the Contractor shall have no claim to compensation for any loss sustained by him by reason of him having purchased or procured any materials or entered into any engagements or made any advance on any account or with a view to the execution of the work or the performance of the contract.

76.0 SAP INTERFACE PROTOCOL:

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- 76.1 Bidders to note that the SAP interface protocol shall be used to interface TAS-Management Server with SAP Server (to be positioned by IOCL). As part of the automation works, SAP interface protocol (latest Protocol documents for SAP_LRC direct interface and SAP_LRC interface for TFMS integration, SAP_LRC interface for MFM, TT planning protocol) shall be furnished to the successful Terminal Automation Vendor on award of works. Vendor is requested to submit a Demand Draft/ Pay order of Rs 30,000/- as charges towards the SAP-TAS protocol documents to be issued by the Corporation.
- 76.2 On award of works, the successful automation vendor shall report to **IIPM, Gurgaon** for obtaining a brief on the interface programming and for collecting sample programs.

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LIABILITY AND INDEMNIFICATION

1.0 LIABILITY AND INDEMNIFICATION


1.1 LIABILITY OF CONTRACTOR

Notwithstanding anything to the contrary contained in this Contract,

- (a) In addition to the CONTRACTOR's liability and obligations and the OWNER's remedies provided elsewhere in this Contract, the CONTRACTOR shall be solely responsible for any loss of or damage to the Project Facilities, Project Assets, damage to environment, death or injury to person, and any other liabilities, damages, losses (excluding consequential losses) and reasonable cost and expenses (including legal costs) suffered by OWNER during the Period of Contract.
 - (i) Resulting from any act, omission or negligence of the CONTRACTOR or any other Person claiming through or under it, including CONTRACTORS, and their respective employees, agents, sub-contractors and representatives.
 - (ii) In connection with, arising out of, or resulting from any breach of warranty, material misrepresentation by the CONTRACTOR or any other Person claiming through or under it, or non-performance of any term, condition, covenant or obligation to be performed by the CONTRACTOR under this Contract.
- (b) The CONTRACTOR shall also be liable for any loss or damage which occurs as a result of any act, event, omission, negligence or default (including but not limited to property circumstances, quality of materials used, workmanship, structural, design or other defects, latent or patent, non-compliance with building bye laws, other Applicable Laws, regulatory requirements of Competent Authorities, Specifications and Standards, Performance Standards, terms and conditions of clearances and / or approvals or any other matter) for which the CONTRACTOR is liable or which is attributable to the CONTRACTOR and, in turn, the Persons claiming through or under the CONTRACTOR.
- (c) The CONTRACTOR shall be fully and solely liable for all works, contracts, dealings and activities in relation to the development, design, financing, construction, Operation & Maintenance and implementation of the Project / Project Facilities, as the case may be.

1.2 INDEMNIFICATION BY CONTRACTOR

- (a) Without prejudice to and in addition to the indemnification provisions elsewhere in this Contract, the CONTRACTOR agrees to indemnify and hold harmless OWNER and its shareholders, managers, officers, directors, employees and advisors (each a "OWNER Indemnified Party") promptly upon demand at any time and from time to time, from and against any and all losses (excluding consequential losses), claims, damages, liabilities, costs, penalties, litigation, proceedings (including reasonable attorneys' fees and disbursements) and expenses of any nature whatsoever (collectively, "Losses") to which OWNER Indemnified Party may become subject, insofar as such Losses directly arise out of, in any way relate to, or result from
 - (i) any mis-statement or any breach of any representation or warranty made by CONTRACTOR or
 - (ii) the failure by CONTRACTOR to fulfil any agreement, covenant or condition contained in this Contract, including without limitation the breach of any terms and conditions of this Contract

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by any employee or agent of the CONTRACTOR or Person claiming through or under the CONTRACTOR or

- (iii) any claim or proceeding by any Third Party against OWNER arising out of any act, deed or omission by the CONTRACTOR and / or persons claiming through or under the CONTRACTOR or

- (iv) Design, engineering, construction, procurement, Operation & Maintenance of the Project Facilities.

For the avoidance of doubt, indemnification of losses pursuant to this Clause shall be made in an amount or amounts sufficient to restore OWNER Indemnified Party to the financial position it would have been in, had the losses not occurred.

- (b) Without limiting the generality of Article 1.2 (a) :**

- (i) The CONTRACTOR shall fully indemnify, save harmless and defend OWNER Indemnified Party from and against any and all loss (excluding consequential losses) and damages arising out of or with respect to


- (a) failure of the CONTRACTOR / and or the person claiming through or under the CONTRACTOR to comply with Applicable Laws and Applicable Permits,

- (b) payments of taxes, duties, levies, fees etc. relating to the CONTRACTOR including contractors, suppliers and representatives, income or other taxes required to be paid by the CONTRACTOR without reimbursement hereunder, or

- (c) non-payment of amounts due as a result of materials or services supplied/furnished/provided to the CONTRACTOR or any of its Contractors which are payable by the CONTRACTOR or any of its contractors.

- (ii) The CONTRACTOR shall fully indemnify and defend OWNER from any and all damages which OWNER may suffer due to this Contract or become liable to pay by reason of any demands, claims, suits or proceedings arising out of claims of infringement of any domestic or foreign patent rights, copyrights or other intellectual property, proprietary or confidentiality rights with respect to any materials, information, design or process used by the CONTRACTOR in performing the obligations. If in any such suit, claim or proceedings, a temporary restraint order or preliminary injunction is granted, the CONTRACTOR shall make every reasonable effort, by giving a satisfactory bond or otherwise, to secure the suspension of the injunction or restraint order. If, in any such suit claim or proceedings, the Project, or any part, thereof or comprised therein is held to constitute an infringement and its use is permanently enjoined, the CONTRACTOR shall promptly make every reasonable effort to secure for OWNER a license, at no cost to OWNER, authoring continued use of the infringing work. If the CONTRACTOR is unable to secure such license within a reasonable time, at its own expense and without impairing the specifications and standards, shall either replace the affected work, or part, or process thereof with non-infringing work or parts or process, or modify the same, in 30 days time.

- (iii) The CONTRACTOR further indemnify, that it will defend and hold harmless OWNER from any and all Third Party claims for loss of or physical damage to property or for death or injury and against all losses for personal injury and for damage to or loss of any property arising out of or in any way connected with the CONTRACTOR's performance of this Contract or arising out of any act or omission of the CONTRACTOR, and in turn of the persons claiming through or under the CONTRACTOR.

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- (iv) The CONTRACTOR shall further keep indemnified the OWNER, its employees or Consultant against all actions, suits, claims, demands and proceedings and any loss or damage or cost or expense that may arise in any manner and / or be suffered by them on account of anything done or omitted to be done by the CONTRACTOR in connection with the performance of its obligations under the Contract and / or implementation of the Project;

1.3 LIMITATION OF LIABILITY OF CONTRACTOR:

The aggregate liability of the CONTRACTOR to OWNER (whether based on contract or that including negligence and strict or absolute liability) arising out of or under this contract shall not exceed 100% of the Contract value provided that no such limit shall apply in respect of

- (i) Any loss resulting from fraud , intentional or wilful misconduct or illegal or unlawful acts or omissions of CONTRACTOR, its affiliates or any sub-contractor or any supplier or any of its or their respective officers, directors, employees, servants or agents, or
- (ii) Any damage or loss to have occurred to a Third Party/ies and decided by a Court of Law that the loss or damage has occurred due to any fault or erroneous test report of any plant or machinery installed by the CONTRACTOR, or
- (iii) Any Liability on the part of CONTRACTOR which becomes payable on account of any Taxes, Duties, Levies etc. to any Govt Body or statute

AND Provided always that such limitation shall exclude any amounts recovered under any policy/ies of insurance taken out and / or maintained by the CONTRACTOR pursuant to the provisions of the Contract except insurance, if any, taken for the purpose of insuring liability under this clause.


1.4 LIABILITY OF AND INDEMNIFICATION BY OWNER

- 1.4.1 OWNER shall fully indemnify, defend and hold harmless CONTRACTOR, any direct or indirect parent corporation or shareholder thereof and its and their respective officers and employees, against any and all claims made and losses incurred by any third party or Regulatory Entity which arises out of any breach on the part of OWNER.

- 1.4.2 OWNER will, indemnify, defend and hold harmless the CONTRACTOR against any and all proceedings, actions, third party claims for loss, damage and expense of whatever kind and nature arising out of defect in title and/or the rights of OWNER in the land comprised in the Site adversely affecting the performance of the CONTRACTOR's obligations under the Contract and/or arising out of acts done in discharge of their lawful functions by OWNER Indemnified Party including OWNER Events of Default except to the extent that any such claim has arisen due to a negligent act or omission, breach of contract or breach of statutory duty on the part of the CONTRACTOR, its Subsidiaries, affiliates, contractors, servants or agents including due to CONTRACTOR Event of Default.

- 1.4.3 The aggregate liability of OWNER to the CONTRACTOR (whether based on contract or that including negligence and strict or absolute liability) arising out of or under this Contract shall not exceed 100% of the contract value provided that no such limit shall apply in respect of

- (i) Any loss resulting from fraud, intentional or wilful misconduct or illegal or unlawful acts or omissions of OWNER or any of its officers, directors, employees, servants or agents, or
- (ii) Any Liability on the part of OWNER which becomes payable under the Contract.


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1.5 Payment pursuant to Indemnification

- 1.5.1 Any payment made under this Contract pursuant to an indemnity or claim for breach of any provision of this Contract shall be net of applicable Taxes. For removal of doubts it is clarified that all the payments pursuant to an indemnity or claim for breach of any provisions of this Contract shall be borne and paid by the Defaulting Party.

1.6 Defense of Claims

- 1.6.1 In the event that either Party receives a claim from a Third Party in respect of which it is entitled to the benefit of an indemnity under this Clause 1 (the 'Indemnified Party') it shall notify the other Party ("Defaulting Party") within 14 (fourteen) days of receipt of the claim and shall not settle or pay the claim without the prior approval of the Defaulting Party, such approval not to be unreasonably withheld or delayed. In the event that the Defaulting Party wishes to contest or dispute the claim it may conduct the proceedings in the name of the Indemnified Party provided that the Indemnified Party is secured against any costs involved to its reasonable satisfaction.
- 1.6.2 The Indemnified Party shall have the right, but not the obligation, to contest, defend and litigate any claim, action, suit or proceeding by any Third Party alleged or asserted against such party in respect of, resulting from, related to or arising out of any matter for which it is entitled to be indemnified hereunder and their reasonable costs and expenses shall be indemnified by the Defaulting Party. If the Defaulting Party acknowledges in writing its obligation to indemnify the person indemnified in respect of loss to the full extent provided by this Clause 1, the Indemnifying Party shall be entitled, at its option, to assume and control the defence of such claim, action, suit or proceeding liabilities, payments and obligations at its expense and through counsel of its choice provided it gives prompt notice of its intention to do so to the Indemnified Party and reimburses the Indemnified Party for the reasonable cost and expenses incurred by the Indemnified Party prior to the assumption by the Defaulting Party of such defence. The Defaulting Party shall not be entitled to settle or compromise any claim, action, suit or proceeding without the prior written consent of the Indemnified Party unless the Defaulting Party provides such security to the Indemnified Party as shall be reasonably required by the Indemnified Party to secure, the loss to be indemnified hereunder to the extent so compromised or settled.
- 1.6.3 If the Defaulting Party has exercised its rights under Article 1.6.2, the Indemnified Party shall not be entitled to settle or compromise any claim, action, suit or proceeding without the prior written consent of the Defaulting Party (which consent shall not be unreasonably withheld or delayed).
- 1.6.4 If the Defaulting Party exercises its rights under Article 1.6.2 then the Indemnified Party shall nevertheless have the right to employ its own counsel and such counsel may participate in such action, but the fees and expenses of such counsel shall be at the expense of such Indemnified Party, when and as incurred, unless:
- the employment of counsel by such party has been authorised in writing by the Defaulting Party; or
 - the Indemnified Party shall have reasonably concluded that there may be a conflict of interest between the Defaulting Party and the Indemnified Party in the conduct of the defence of such action; or

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(iii) the Defaulting Party shall not in fact have employed independent counsel reasonably satisfactory to the Indemnified Party to assume the defence of such action and shall have been so notified by the Indemnified Party; or

(iv) the Indemnified Party shall have reasonably concluded and specifically notified the Defaulting Party either:


- a) that there may be specific defences available to it which are different from or additional to those available to the Indemnifying Party; or
- b) that such claim, action, suit or proceeding involves or could have a material adverse effect upon it beyond the scope of the Contract; provided that if clauses (ii), (iii) or (iv) shall be applicable, counsel for the Indemnified Party shall have the right to direct the defence of such claim, action, suit or proceeding on behalf of the Indemnified Party and the reasonable fees and disbursements of such counsel shall constitute legal or other expenses hereunder.

1.7 Consequential Losses

Notwithstanding anything to the contrary contained in this Contract, the indemnities herein provided shall not include any claim or recovery in respect of consequential nature except as expressly provided in this Contract.

1.8 Survival

The provisions of this clause 1 shall survive the expiry or prior termination of this contract.

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SAFETY POLICY FOR CONTRACT WORKERS

A. Responsibilities of Contractor:

Contractor shall adhere to safe Operation & Maintenance practices and guard against hazardous and unsafe working conditions and shall comply with OWNER's safety rules as set forth in GCC /IWPM/HSE Manuals and relevant Policies of Corporation.


Contractors shall refer to the following OISD standards for familiarizing themselves with safety provisions to be adhered to at locations and construction site and for safety management:

- i. OISD-STD-105 - Work Permit System
- ii. OISD-GDN-192 - Safety Practices during Construction
- iii. OISD-GDN-207 - Contractor Safety

In the event of any irreconcilable conflict between the provisions mentioned in the Standards prescribed by the Oil Industry Safety Directorate/Regulations and the Safety provisions set out herein, the Safety Practices established by the Oil Industry Safety Directorate/Regulations shall prevail to the extent of the irreconcilable conflict.

The following guidelines have been outlined as part of statutory / regulatory requirement or good safety practices and compliance shall be ensured by the contractors while undertaking work at IOCL premises.

- To ensure that equipment along with all tools, tackles and brought out items used for execution at workplace are certified/ tested and fit for usage by the contract labour and specifications are in line with the specifications/guidelines issued by Corporation.
- To ensure that necessary permits and permissions have been obtained before execution of job.
- To ensure that the contract workers have completed appropriate health and safety trainings as required by the statute / regulation and as per requirements of IOCL. The documentation of such training imparted to all its workers should be maintained and produced for verification as required.
- To ensure availability of First Aid boxes and First Aid trained attendant and other facilities as per requirement of the Factories Act / the Building & Other Construction Workers Act.
- To ensure participation of Contract workers in Safety trainings including Mock Drills and Emergency situation as per decision taken by Location-In-Charge/Project In-Charge.
- Contractors to ensure that all the incidents and near misses are reported by the supervisor/contract workers to the Designated Safety Officer/concerned officer of the location/project site. The contractor shall be fully responsible for all the action of their authorised supervisor and contract workers during execution of work.
- To ensure social security coverage of Contract labour under the statutes/applicable laws and under PMJJBY (Pradhan Mantri Jeevan Jyoti Bima Yojana), a life insurance scheme, and PMSBY (Pradhan Mantri Suraksha Bima Yojana), an accidental insurance scheme. Any other responsibilities as specified in the terms of contract/tender document, General Conditions of Contract (GCC) and Special Conditions of Contract (SCC).

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In case of non-availability of Supervisor, the said responsibilities shall be of the Contractor himself.

B. Safety Procedures to be adhered to by Contractors:

It is the responsibility of each Contractor or his authorized representative to inspect each work area at the beginning of each shift, and supervise the work execution thereafter, to ensure that safe working conditions are maintained. Contractor must ensure protection of their workers from severe weather conditions (extreme wind, lighting storms, extreme heat, extreme cold etc.) and to provide a safe work environment.


The contractor is responsible for safe execution of work at IOCL premises including but not limited to the following:

- Ensuring all the workers work with safety gears (Safety shoes, safety helmet, cover all & other job specific PPE's). Daily workplace safety inspections (to identify unsafe acts, unsafe conditions at the work area and take necessary actions).
- Inspection of PPEs, tools / lifting accessories / slings / ropes/web belts/ D-shackles etc.
- To ensure that all workers have proper training for their job assignments, including use of appropriate PPE, first aid and firefighting equipment.
- To ensure strict compliance with work permit system by carrying out work only with appropriate work permits and after ensuring that all safety precautions / conditions in the permit are complied with and closing the same after job completion.
- To ensure good illumination for work area to carry out work safely.
- To ensure that all the preventive measures for identified hazards (e.g. Job Safety Analysis, Job Hazard Analysis, HIRA, etc.) are in place and communicated to workers
- To ensure that the workers likely to be exposed to hazardous chemicals/materials have access to appropriate Material Safety Data Sheets (MSDS) and provide necessary mitigation measures.
- To ensure that only medically fit person shall be engaged in work and ensure that sick / or injured workers during course of work should receive timely and appropriate first aid and/or medical attention.
- To ensure that appropriate warning signboards and tags are displayed.
- Ensure adherence to the emergency procedures and roles assigned during emergency within IOCL premises.

C. Safety Procedures to be adhered to by Contract Worker:

The Contractor ensures that contract workers engaged by him must abide by all the applicable SOPs and Safety procedures including the following:

- Comply with relevant SOPs/work instructions in a manner that protects their own safety and health, as well as the safety and health of anyone who may be affected by their acts or omissions at work.
- Ensure that they are not under the influence of any intoxicant so that they would not pose to be a danger to themselves or others while at work.
- Cooperate with their employer regarding safety, health, and welfare at work.

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- Participate in safety and health training and campaigns offered by their employer and by IOCL.
- Ensure participation in Mock Drills and Emergency situation as per decision taken by Location-In-Charge/Project In-Charge.
- Make proper use of all machinery, tools, substances, etc. and of all Personal Protective Equipment provided for use at work.
- Report to their supervisor regarding any defects in the place of work, equipment, etc. which might endanger safety and health. Ensure their social security coverage under the statutes/applicable laws and under PMJJBY (Pradhan Mantri Jeevan Jyoti Bima Yojana), a life insurance scheme, and PMSBY (Pradhan Mantri Suraksha Bima Yojana), an accidental insurance scheme.

D. Work Permits:

The Contractor's Supervisors (or person in charge of the work) should ensure that:


- They have received training in work permit system as applicable in that location or work site.
- They do not start any work requiring a permit, until it has been properly authorized and issued.
- They discuss the job fully with the IOCL Officer or representative receiving the permit.
- The workers are briefed on the details of the permit including any potential hazards, and on all the precautions taken or to be taken.
- The precautions mentioned in the work permit are maintained throughout the work activity.
- Daily tool-box talks are conducted for their workers.
- The worker understands that if circumstances change work must be suspended and inform the supervisor.
- The work group stays within the limitations set on the permit (physical boundaries, type of work and validity time).
- On completion or suspension of the work, the site is left in a safe condition and the permit receiver is informed & permit has been returned for closing.

Contract workers working in IOCL premises with work permit system should ensure that:

- They have received instruction and have a good understanding of the safety work permit system from their supervisor.
- They receive a briefing from the supervisor on the task through daily tool-box talk and they understand the hazards and the precautions taken or to be taken.
- They follow the instructions specified in the permit.
- When they stop work, the site and equipment they are using is kept in a safe condition before leaving the site.
- They must consult their supervisor in case of any doubt of their assigned task or if circumstances change for continuation of the work.

E. Personal Protective Equipment:

The contractor shall ensure that:

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- All the personal protective equipment are of good quality & reputed make & conform to the specification provided by Corporation and shall have the requisite national or international certification.
- All the required & appropriate/ suitable PPEs are provided to the contract workers by the contractor.

If the contractor does not provide the required PPEs to his worker, the job may be suspended/stopped as per Golden Rules.

F. Toolbox Talk:

Contractor supervisor shall deliver the toolbox talk before start of the daily activity.

It should contain the brief work description, probable hazards, controls planned and mitigation measures to be taken.

Use & benefits of PPE's & safety gears as per the job requirements.

A record for each toolbox talk should be maintained by the contractor indicating the topic and number of personnel attended.

G. Gate Pass:

The entry of contract workers and TT crew into IOCL premises shall be allowed only after issuance of appropriate gate pass/ entry permit subject to fulfilment of provisions such as attending induction trainings, submission of Character & Antecedents (C&A) verification of individual worker from concerned authorities.

The requisite formalities in the form of "assessment quiz for visitors & contract worker on viewing of safety briefing film at locations" dt 23.02.2023 shall be ensured by the location.

H. Emergency Evacuation:

In the event of emergency, the Contractor and their personnel are to follow the directions of the Location-In-Charge or the IOCL representative at the work site. The contractor/supervisor shall familiarize the contract workers with the emergency plan at the specific work location including the assembly points. If any contractor/supervisor suspects that an emergency condition exists, they must immediately contact the IOCL Officer or representative.

I. Housekeeping:

Good housekeeping is mandatory. Work areas must be kept neat, clean, and orderly.

All tools and equipment are to be properly stored after use.

Walkways are to be kept free of cords, cables, obstructions and debris.


Changes in walkway elevations or dangerous depressions must be cleared marked with cones, barricade tape or other appropriate warning signs.

The work area is to be cleaned daily and debris are to be disposed of in dumpsters, or off site in accordance with the environmental regulations.

Contractor/supervision must remove all unused material and equipment upon the completion of the work.

J. Alcohol, illegal Drugs and Firearms:

The Contractor must ensure prohibition of the possession, distribution, promotion, manufacture, sale, use, and use of illegal drugs, drug paraphernalia, controlled substances, alcoholic beverages, and weapons by workers within IOCL premises or during work at site.

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K. Training and Awareness:

The contractor shall ensure participation of their workers in safety trainings including Mock Drills as per stipulated timelines or mutually agreed timeframe.

L. Provision of Health and Hygiene of workers:

The Contractor must ensure the following:

- To ensure periodic medical check-up for his/her workers as per statutory norms and IOCL policies and maintaining the records.
- Operating locations conduct periodic campaigns covering a wide range of activities including health camps, eye checkup camps, distribution of spectacles etc. for promoting health and hygiene among the contract workers and TT crew. The contractors shall ensure participation of their contract workers and supervisors in such activities.

M. Contractor Safety Performance Evaluation:

The Objective of the Performance Evaluation of the Contractors is to ascertain the performance of the contractor in respect to the satisfactory execution of the work while maintaining safety and quality standard of work so as to keep the reliable contractors in the system. Upon completion of the project/work, the contractor's safety performance shall be evaluated based on his periodic assessment during the contract period. Case of poor/unsatisfactory rating shall be informed to the contractor and penal action in case of deviation from the stipulated guidelines, safety violation may be initiated in line with the term of the contract. Contractor Performance Evaluation shall be as done.


N. Punitive action for Safety Violation:

For any safety violation within Operating Locations/Project Site by Contractor, the action against contractor shall be initiated in line with the Provisions contain in Penalty for Non-Observations of Safety Norms. The punitive action for common safety lapses by supervisor and worker of Contractors related to personal protective equipment, work permit system & standard operating procedure, which have NOT led to any accident due to such violations, shall be initiated against the concerned supervisor and worker by the contractor as per clauses given below. The applicable clauses are produced below-

For Contract workmen and supervisors:

a) Minor Lapses / Violations

SN	Lapses / Violations	Action for 1 st violation	Action for 2 nd violation	Action for 3 rd violation
1.	Non-compliance to conditions of Work Permit System within the boundary of the location.	Letter to be issued to the contractor for taking suitable action for restricting entry of concerned Labour /	Letter to be issued to the contractor for taking suitable action for restricting entry of concerned Labour / Supervisor for 14 days.	Letter to be issued to the contractor for taking suitable action for permanently prohibiting the entry of concerned Labour / Supervisor at any of the IOCL locations.
2.	Non usage of following PPEs inside licensed areas (as applicable): a) Safety Shoes			

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	b) IFR suits c) Splash Goggles d) Hand Gloves e) Face Shield	Supervisor for 7 days.	It must contain explicitly the nature, date, time and action taken for the 1 st violation also.	It must contain explicitly the nature, date, time and action taken for the 1 st and 2 nd violations also.
7.	Non-compliance to Logout / Tagout (LOTO)			

b) Major Lapses / Violations

SN	Lapses and violation	Action for 1 st violation	Action for 2 nd violation
1.	Non-adherence to the prohibition of taking mobile /smart watch/ match box / lighter in the licensed area.	Letter to be issued to the contractor for taking suitable action for restricting entry of concerned Labour / Supervisor for 14 days.	Letter to be issued to the contractor for taking suitable action for permanently prohibiting the entry of concerned Labour / Supervisor at any of the IOCL locations.
2.	Undertaking a work / activity, which is not covered in issued work permit.		
3	Failed to follow SOP while carrying out the work.		
4	Non usage of following PPEs inside licensed areas (as applicable): a) Safety Helmets b) Fall Arrestor System (Safety Belt, Lifeline, Full Body Harness, etc)		
			It must contain explicitly the nature, time and action taken of the 1 st violation also.


O. Incident Reporting guidelines:

- In case of any incidents/accidents, including near miss incidents, the supervisor of the contractor shall report to DSO or any of the representative of the IOCL at location within an hour of occurrence of such incident.
- The contractor/supervisor shall report any unsafe work, unsafe working conditions to the Designated Safety Officer of the location or other identified IOCL representative.


P. Documentation and record keeping of contract workers:

The contractor shall ensure the availability of following documents/copies at the location for ready reference:

1. ID card
2. ESI card/Insurance documents obtained under Workmen's Compensation Act 1923
3. C&A Verification
4. PF & ESI nominations as well as copy of PF & ESI challans
5. PMJJBY and PMSBY registration and contribution details of eligible contract workers
6. Training Records
7. PPE, health & hygiene record
8. Medical test reports as applicable for various works
9. Work permits and associated JSA
10. Emergency contact no. and other details of nominee of contract workers


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11. Form-A i.e. Register of Contract labour
12. Other statutory registers including Form B, C & D.
13. Other documents as specified in the terms of contract/tender document including General Conditions of Contract (GCC) and Special Conditions of Contract (SCC).


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S N	Particulars	Details	Uploaded: Yes / No
(A)	General Information		
1	Name of the bidder:		
2	Address of the Bidder		
3	Login E-Mail id for portal		
4	Correspondence E-Mail id as per portal		
5	Name of Contact Person:		
6	Contact Person's Mobile no -		
7	Company details: Type of Firm		
(B)	EMD		
1	Earnest Money Deposit-Bid Security declaration		
(C)	PQC Documents		
2	Turn Over Criteria (In Rs.)		
2.1	FY 2022-23 (if 2025-26 not available)		
2.2	FY 2023-24	UDIN no.: Turnover:	Yes / No
2.3	FY 2024-25	UDIN no.: Turnover:	Yes / No
2.4	FY 2025-26	UDIN no.: Turnover:	Yes / No
3	Similar Work: Work completed by the bidder, as main contractor, or as sub-contractor, during last ten years ending last day of month previous to the original end date of bid submission. The value of completed work for evaluation shall be considered as under:		
3.1	1st Work Order	-	Yes / No
a	Description of Work/Purchase/Services		
b	Name of Client with Address		
c	Contact Person & Contact detail of End client		
d	E-mail id of End Client		
e	WO/PO Ref No / Date / Amount		Yes / No
f	Schedule of Rates/ Scope of Works Document		Yes / No
g	Completion Certificate Ref No / Date / Amount/Actual Executed Amount of Work		Yes / No

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S N	Particulars	Details	Uploaded: Yes / No
h	Date of Actual Completion as per Completion Certificate		
i	TDS Certificate/Bank Statement for proof of payment		Yes / No
j	CA certificate for executed work		Yes / No
3.2	2nd Work Order		Yes / No
a	Description of Work/Purchase/Services		
b	Name of Client with Address		
c	Contact Person & Contact detail of End client		
d	E-mail id of End Client		
e	WO/PO Ref No / Date / Amount		Yes / No
f	Schedule of Rates/ Scope of Works Document		Yes / No
g	Completion Certificate Ref No / Date / Amount/Actual Executed Amount of Work		Yes / No
h	Date of Actual Completion as per Completion Certificate		
i	TDS Certificate/Bank Statement for proof of payment		Yes / No
j	CA certificate for executed work		Yes / No
3.3	3rd Work Order		Yes / No
a	Description of Work/Purchase/Services		
b	Name of Client with Address		
c	Contact Person & Contact detail of End client		
d	E-mail id of End Client		
e	WO/PO Ref No / Date / Amount		Yes / No
f	Schedule of Rates/ Scope of Works Document		Yes / No
g	Completion Certificate Ref No / Date / Amount/Actual Executed Amount of Work		Yes / No
h	Date of Actual Completion as per Completion Certificate		
i	TDS Certificate/Bank Statement for proof of payment		Yes / No
j	CA certificate for executed work		Yes / No
(D)	OTHER COMMERCIAL CRITERIA:		

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S N	Particulars	Details	Uploaded: Yes / No
1	Copy of PAN card (For Indian bidders / Indian Agents of Foreign Bidders)		Yes / No
2	Copy of PF registration		Yes / No
3	Copy of GST Registration (For Indian bidders / Indian Agents of Foreign Bidders)		Yes / No
4	Copy of Partnership Deed or Certificate of Incorporation with Memorandum & articles of Association.		Yes / No
5	Power of Attorney / Authority of the person uploading the bids / Board Resolution along with a) Certificate of incorporation (COI), Memorandum of Association (MOA) and Articles of Association (AOA) in case of Company. Or b) Partnership Deed, Or c) Declaration of sole proprietor		Yes / No
6	Integrity pact agreement along with covering letter (if applicable) - Annexure 'M' of Technical Bid Part-B.		Yes / No
(E)	TO BE SUBMITTED BY ALL THE BIDDERS - BID STAGE :		
1	Acceptance of all terms & conditions of tenderer- Annexure 'A' of Technical Bid Part-B.		Yes / No
2	Declaration on NCLT/NCLAT/DRT/DRAT/Court receivership/ liquidation- Annexure 'B' of Technical Bid Part-B.		Yes / No
3	Certificate for bidders from a country which shares a land border with India- Annexure 'C' of Technical Bid Part-B.		Yes / No
4	Undertakings and declarations for non-tampering of data- Annexure 'D' of Technical Bid Part-B.		Yes / No
5	Declaration of blacklisting / holiday listing clearly mentioning the details of Holiday listing or "NIL" in case of no details - Annexure 'E' of Technical Bid Part-B.		Yes / No
6	Declaration "A", "B", "C" & "D"- Annexure 'F' of Technical Bid Part-B.		Yes / No
7	Undertaking for business transaction status of bidders- Annexure 'G' of Technical Bid Part-B.		Yes / No

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	STATEMENT OF CREDENTIALS	

S N	Particulars	Details	Uploaded: Yes / No
8	Particulars of bidder firm- Annexure 'H' of Technical Bid Part-B.		Yes / No
9	Undertaking on no multiple bidding- Annexure 'I' of Technical Bid Part-B.		Yes / No
10	Declaration on purchase preference (linked with local content) (PP-MII) policy- Annexure 'J (Part-I)' of Technical Bid Part-B.		Yes / No
11	Declaration on purchase preference (linked with local content) (PP-MII) policy- Annexure 'J (Part-II)' of Technical Bid Part-B.		Yes / No
12	Certification for Local Content - Bid Stage (Tender value >= 10 Cr.) Annexure 'J (Part-III)'		Yes / No
13	Integrity Pact Agreement along with Covering Letter		Yes / No
14	Form of Bank Guarantee for Earnest Money Deposit (EMD) (If Applicable)		Yes / No
15	Format of Insurance Surety Bonds for Earnest Money Deposit (EMD) (If Applicable)		Yes / No

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	CONTRACTOR PERFORMANCE EVALUATION	

GUIDELINES FOR EVALUATION OF TAS CONTRACTORS' PERFORMANCE

1.0 GENERAL

A system for evaluation of Contractors' Performance is a key process and important to support an effective Contracting and Project execution function of an organization.

2.0 RECOMMENDATION

The purpose of the proposed guideline is to put in place a system to monitor performance of Contractors associated with the subject tender/works so as to support the contracting and project management function in a manner to make it more effective and ensure timely completion of various projects. **Contractor's Performance Evaluation Methodology is an integral part of this tender and the job to be awarded.**

3.0 METHODOLOGY

- 3.1 Standard Format for TAS Contractor's Performance Review Worksheet (enclosed) shall be used for evaluating Contractors' Performance.
- 3.2 The performance evaluation of the Contractor shall be done (a) by the Site Engineer/ Site-in-charge (at Site/SO) and the same shall be reviewed by SEH at State level (for SO based projects) and (b) by the Site Engineer/Site in Charge at site/HO and the same shall be reviewed by minimum DGM ranked officer at HO (for Greenfield projects). The Contractor performance shall be rated based on the marks obtained as per Format.
- 3.3 Based on the performance rating obtained by the contractor, show cause notice shall be given to the contractors having fair or unsatisfactory rating to represent his / their case by Site Engineer/Site in Charge
- 3.4 After considering the representation from the Contractor, the performance rating of the Contractor shall be finalized after due moderations (if applicable) with justifications.
- 3.5 Based on the Final Performance Rating of the Contractor, applicable actions as prescribed in these guidelines shall be taken.
- 3.6 The guidelines shall be reviewed after 2 years.


4.0 EXCLUSIONS

None

5.0 PROCESS OF EVALUATION OF CONTRACTORS' PERFORMANCE

- 5.1 The contractors' actual performance vis-à-vis the Overall Progress finalized during Ordering stage (* can be supplemented by the schedule finalised by IOCL during Kick Off Meeting, considering various readiness) shall form the basis for the evaluation of performance of contractor.
- 5.2 Stages of Evaluation:
For all Terminal Automation (TAS) jobs with Order value for Capex equal to or more than 10 Crores, performance evaluation shall be done in three stages (Sl no i to iii given below). For TAS jobs with Order value for Capex less than 10 Crores , performance evaluation shall be done in two stages (Sl no i and iii given below).

5.2.1 Stages:

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	CONTRACTOR PERFORMANCE EVALUATION	

- i) First performance evaluation shall be done at 50% schedule timeline stage, with adjustment for the delays not attributable to the contractor considering actual achievement vs scheduled achievement at this timeline.
- ii) Second performance evaluation shall be done at 100% schedule timeline stage, with adjustment for the delays not attributable to the contractor considering actual achievement vs scheduled achievement at this timeline.
- iii) Last and Final performance evaluation shall be done after job completion, with adjustment for the delays not attributable to the contractor considering actual achievement vs scheduled achievement at this timeline.

Note:

- 1) Performance evaluation for stages against SN (i) and (ii) shall be completed within a period of 02 (two) months after achieving the designated schedule milestone stage.
It would be necessary and pre requisite to complete and conclude the delay analysis for the period of evaluation prior to performance evaluation of the Contractor for the same period.
- 2) Performance evaluation for stages against SN (iii) shall be completed within a period of 03 (three) months after achieving the designated schedule milestone stage. It would be necessary and pre requisite to complete and conclude the delay analysis and time extension (if applicable) for the period of evaluation prior to performance evaluation of the Contractor for the overall works.

5.3 Allocation of Marks

- 5.3.1 At each stage, marks shall be allocated on proportionate basis for actual physical progress achieved w.r.t. schedule physical progress considering schedule progress and delays on IOCL account (at evaluation stage).
- 5.3.2 In order to take care of delays not attributable to the Contractor delay analysis shall be carried out in detail and effect of delays not attributable to the Contractor on the overall progress and schedule progress shall be worked out accordingly for the purpose of calculating marks.

5.4 Performance Rating:

Depending upon the Total Marks obtained by the contractor, the performance rating of the contractor shall be finalized as under:

SN	% age of Marks obtained	Performance Rating
1	>= 80%	Very good
2	>= 60% but < 80%	Good
3	>= 50% but < 60%	Fair
4	< 50%	Unsatisfactory

5.5 Evaluation Methodology and Action wrt each performance Review/Rating at any stage:

Performance Rating	Recommended Action
Very Good	No further action; Letter of appreciation may be issued, motivating the contractor to maintain the same level of Work or even do better



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CONTRACTOR PERFORMANCE EVALUATION

Performance Rating	Recommended Action
Good	Letter to the contractor for improving the performance in future
Fair/Unsatisfactory	<p>Show cause notice shall be given to the contractors having fair or unsatisfactory rating to represent his / their case.</p> <p>After considering the representation from the Contractor, the performance rating of the Contractor shall be finalized after due moderations (if applicable) with justifications.</p> <p>After the Final Performance Rating of the Contractor is worked out and the same still works out to be either Fair or unsatisfactory, the following modus operandi to be adopted :</p> <p>a) The average of the ACTIVE performance rating (including the rating for the current job at current milestone level) of the Contractor on all India basis for Marketing Division shall be worked out.</p> <p>ACTIVE performance rating of the contractor refers to all mid-term and all final performance ratings of all projects (including the project under evaluation) wherever the Contractor is working/has been working on PAN India basis for Marketing Division.</p> <p>ACTIVE performance rating of the concerned contractor for only those Performance Evaluation shall be considered here , where the evaluation methodology is same as proposed and also , performance rating approval are not older than 6 months wrt the date of the current performance rating for the job.</p> <p>b) In case the average of the ACTIVE performance rating on PAN India basis comes out to be Very Good or Good, letter to the contractor to be issued for improving the performance in future. This is in view of the fact that the rating for the job under evaluation has been Fair or Unsatisfactory.</p> <p>c) In case the average of the ACTIVE performance rating on PAN India basis comes out to be Fair, SHOW-CAUSE NOTICE cum Warning letter for poor performance in all India level as well as concerned Project level to be issued to the Contractor, with clear warning for immediate & time bound improvement of performance.</p> <p>d) Necessary actions to be initiated in line with the Corporation's laid down procedure for putting the party in the Holiday list in either of the following two cases :</p> <p>i) In case the average of the ACTIVE performance rating on PAN India basis comes out to be Fair successively second time for the same project , or</p> <p>ii) In case the average of the ACTIVE performance rating on PAN India basis comes out to be Unsatisfactory at any point of time as per the above process,</p> <p>Example: Say, the First performance evaluation of a specific project work for a Contractor is under consideration. Let's assume, initial performance rating worked out is 40% (equivalent to unsatisfactory) , which comes to</p>




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CONTRACTOR PERFORMANCE EVALUATION

Performance Rating	Recommended Action
	<p>55% (Fair) after considering the representation from the Contractor and with necessary moderations.</p> <p>Say the Performance Rating of the same Contractor for 3 other works with total 5 nos. performance ratings (mid terms/final) are 80%,75%,70%,65% and 60%. These ratings evaluation (approvals) are not older than 6 months wrt the date of the above referred performance.</p> <p>Hence the, average ACTIVE performance rating of the contractor for the subject work (under evaluation) shall be $(80+75+70+65+60+55)/6$ ie 67.5 which is in Good category. Hence the action should be in line with (b) above.</p> <p><u>NOTE :</u></p> <ol style="list-style-type: none"> 1) It is obvious that when the proposed policy comes into effect , there won't be any previous performance rating . Hence, for all practical purpose there won't be any relevance of Average Active performance rating till such time, at least two ratings are generated for a Contractor for same/various projects. In such instances, only the concerned project's rating shall become the evaluating criteria for deciding the action. 2) Terms and Conditions of the Tender/Contract and IOCL's all extant policy guidelines for actions wrt poor performance, safety and/or any other defaults on Contractor's part shall in any case prevail and remain in force. The actions mentioned above wrt the various performance rating are going to be supplementary to the same.

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TAS Contractor's Performance Review Worksheet

Contractor Name: _____

Contractor Code: _____

Work Order No & Date: _____

Work Order Amount: Rs. _____

Scheduled Completion period: _____

Date of Start: _____

Evaluation Stage 1 - If Applicable: Yes/No

Scheduled Date of Completion at 50% scheduled timeline (without considering any delay adjustment not attributable to the contractor):

Scheduled Date of Completion at 50% scheduled timeline (considering delay adjustments not attributable to the contractor):

Executed job value at 50% scheduled timeline (considering delay adjustments not attributable to the contractor), which is due for payment:

Payments released at 50% scheduled timeline (considering delay adjustments not attributable to the contractor):

Evaluation Stage 2 - If Applicable: Yes/No

Scheduled Date of Completion at 100% scheduled timeline (without considering any delay adjustment not attributable to the contractor)

Scheduled Date of Completion at 100% scheduled timeline (considering delay adjustments not attributable to the contractor)


Executed job value at 100% scheduled timeline (considering delay adjustments not attributable to the contractor), which is due for payment:

Payments released at 100% scheduled timeline (considering delay adjustments not attributable to the contractor):

Evaluation Stage 3 - If Applicable: Yes/No

Scheduled Date of Completion at 100% scheduled timeline (without considering any delay adjustment not attributable to the contractor)

Scheduled Date of Completion at 100% scheduled timeline (considering delay adjustments not attributable to the contractor)

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Actual Date of Completion: _____

Final executed works and bill value after job completion:



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GUIDELINES FOR EVALUATION OF TAS CONTRACTORS' PERFORMANCE

SN	DESCRIPTION	MAX MARKS	COMPUTATION PHILOSOPHY					SCORE
1	Safe Work Practises	15	No instances of Safety Lapses, availability of PPE - Full Marks (15)	<i>Violation of applicable safety, health and environment related norm with penalty of Rs. 5000/- per occasion :</i> 3 marks deduction for each instance of penalty	<i>Violation leading to Physical Injury :</i> 5 marks deduction for each instance of penalty	<i>Violation leading to Fatal accident :</i> Full (15) Marks deduction		
2	Timely completion of Works	25						
a	Mobilisation Time (Actual handing over at Site)	3	Within Time as per WO (* can be supplemented by the schedule finalised by IOCL during Kick Off Meeting, considering various readiness) - Full Marks (3)	delay =< 30 days : 2 Marks	delay > 30 days & =<60 days : 1 Mark	delay > 60 days : Nil Marks		
b	Detail Engineering	3	Within Time as per WO (* can be	delay =< 15 days :		delay > 30 days :		



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GUIDELINES FOR EVALUATION OF TAS CONTRACTORS' PERFORMANCE

SN	DESCRIPTION	MAX MARKS	COMPUTATION PHILOSOPHY					SCORE
			supplemented by the schedule finalised by IOCL during Kick Off Meeting, considering various readiness) - Full marks (3)	2 Marks	delay > 15 days & =<30 days : 1 Mark	Nil Marks		
c	Timely ordering and procurement of bought out equipment	3	Within Time as per WO (* can be supplemented by the schedule finalised by IOCL during Kick Off Meeting, considering various readiness) - Full marks (3)	delay =< 30 days : 2 Marks	delay > 30 days & =<60 days : 1 Mark	delay > 60 days : Nil Marks		
d	Timely submission (preferably by Kick Off meeting/ Detail Engg timeline) of comprehensive list of required IOCL deliverables/readiness	3	Within Time as per WO (* can be supplemented by the schedule finalised by IOCL during Kick Off Meeting, considering various readiness) - Full marks (3)	delay =< 15 days : 2 Marks	delay > 15 days & =<30 days : 1 Mark	delay > 30 days : Nil Marks		



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GUIDELINES FOR EVALUATION OF TAS CONTRACTORS' PERFORMANCE

SN	DESCRIPTION	MAX MARKS	COMPUTATION PHILOSOPHY					SCORE
e	Percentage cash flow against WO Value till original CDD	3	> 60% - Full Marks (3)	> 50% & =<60% : 2 marks	>= 30% & =< 50% : 1 mark	< 30 % : Nil marks		
f	Material supply - delivery made on time	3	Deliveries made as per Construction programme prepared during commencement / Kick Off Meeting - Full marks (3)	delay by 1 -15 days -2 Marks	delay by 16 -30 days -1 Marks	delay beyond 30 days -Nil Marks		
g	Completion Time - Complete Commissioning	3	Within time including acceptable delay on IOCL's part or Extensions granted (wherever approved) - Full marks (3)	Price Adjustment for delay =< 2.5 % or Delay <= 35 days on Contractor's part : 2 marks	Price Adjustment for > 2.5% & =< 5 % or Delay >35 days &=< 70 days on Contractor's part : 1.5 marks	Price Adjustment for > 5% & =< 7.5 % or Delay > 70 days & =< 105 days on Contractor's part : 1 mark	Price Adjustment > 7.5% or Delay > 105 days on Contractor's part : Nil Marks	
h	Completion Time - Stabilisation	4	System gets stabilised =< 60 days from date of	System gets stabilised by > 60	System gets stabilised by > 75	System gets stabilised by > 90 days & =< 105	System gets stabilised > 105	



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GUIDELINES FOR EVALUATION OF TAS CONTRACTORS' PERFORMANCE

SN	DESCRIPTION	MAX MARKS	COMPUTATION PHILOSOPHY					SCORE
	(Excluding delay not attributable to Vendor)		SAT - Full marks (4)	days & =< 75 days from date of SAT : 3 marks	days & =< 90 days from date of SAT : 2 marks	days from date of SAT : 1 marks	days from date of SAT : Nil marks	
3	Quality of Work	25						
a	Recoveries due to deficiency in work	3	Nil recoveries; Nil with hold for rectification : Full (3) marks	Recoveries / Amount with held for rectification in Final Bill is =< 2 % of Executed value : 2 marks	Recoveries / Amount withheld for rectification in Final Bill is > 2 % & =<5 % of Executed value : 1 mark	Recoveries / Amount withheld for rectification in Final Bill is > 5 % of Executed Value : Nil marks		
b	Punch points prior to project takeover (post SAT) within contractual scope of work and as per available front	3	NIL punch points : - Full (3) Marks	=< 10 punch points : 2 marks	> 10 & =< 20 punch points : 1 mark	> 20 punch points - Nil marks		
c	Availability and implementation of of QAP Documentation for Procurement / Installation & Commissioning	3	Achievement >= 90% level, Full Marks (3)	Achievement : >= 75 % & < 90% level, Full Marks (2)	Achievement : >= 60 % & < 75% level, Full Marks (1)	Achievement : < 60% level, NIL Marks		



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GUIDELINES FOR EVALUATION OF TAS CONTRACTORS' PERFORMANCE

SN	DESCRIPTION	MAX MARKS	COMPUTATION PHILOSOPHY					SCORE
d	Quality of Products/System provided wrt brand reputation and performance	3	SIC as per recommended vendor list (most reputed makes) and without any inferior performance record in IOCL in the past : Full Marks (3)	SIC as per recommended vendor list (Not the best reputed makes) ; however without any inferior performance record in IOCL in the past : 2 marks	SIC as per recommended vendor list : not the best reputed makes and/or equivalent makes ; with inferior performance record in IOCL (which could be eventually resolved) in the past : 1 mark	SIC in some cases not as per recommended vendor list or equivalent makes with inferior performance record in IOCL : Nil marks		
e	Quality of workmanship	3	Achievement >= 90% level, Full Marks (3)	Achievement : >= 75 % & < 90% level, Full Marks (2)	Achievement : >= 60 % & < 75% level, Full Marks (1)	Achievement : < 60% level, NIL Marks		
f	Availability of as built drawings, documents, statutory certificates, user manuals, protocol documents	3	Achievement >= 90% level, Full Marks (3)	Achievement : >= 75 % & < 90% level, Full Marks (2)	Achievement : >= 60 % & < 75% level, Full Marks (1)	Achievement : < 60% level, NIL Marks		
g	Compliance to performance parameters	3	Achievement >= 90% level, Full Marks (3)	Achievement : >= 75 % & < 90% level, Full Marks (2)	Achievement : >= 60 % & < 75% level, Full Marks (1)	Achievement : < 60% level : NIL Marks		
h	Stability and uptime of the system	4	Cumulative down time of Critical	Cumulative down time of Critical	Cumulative down time of Critical	Cumulative down time of Critical	Cumulative down time of Critical	



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SN	DESCRIPTION	MAX MARKS	COMPUTATION PHILOSOPHY					SCORE
			equipments and or the Core Automation system/s : NIL - 4 marks	equipments and or the Core Automation system/s upto 24 hours - 3 marks	equipments and or the Core Automation system/s for > 24 hours and =<36 marks - 2 marks	equipments and or the Core Automation system/s for > 36 hours and =<48 marks - 1 mark	equipments and or the Core Automation system/s for > 48 hours : Nil marks	
4	Relationship/ Work Interface Management	10						
a	With sub vendor / sub-contractors / Other vendors or OEMs	4	No major complaint/dispute received affecting the Works - Full marks(4)	1 no. major complaint/dispute received affecting the Works - 3 marks	2 no. major complaint/dispute received affecting the Works - 2 marks	3 no. major complaint/dispute received affecting the Works - 1 mark	More than 3 nos major complaint/dispute received affecting the Works - NIL marks	
b	With Statutory authorities	3	No major complaint/dispute received affecting the Works - Full marks(3)	1 no. major complaint/dispute received affecting the Works - 2 marks	2 no. major complaint/dispute received affecting the Works - 1 marks	More than 2 nos major complaint/dispute received affecting the Works - NIL marks		
c	With Location	3	No major complaint/dispute received affecting the Works - Full marks(3)	1 no. major complaint/dispute received affecting the Works - 2 marks	2 no. major complaint/dispute received affecting the Works - 1 marks	More than 2 nos major complaint/dispute received affecting the Works - NIL marks		
5	Project Management	10						



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GUIDELINES FOR EVALUATION OF TAS CONTRACTORS' PERFORMANCE

SN	DESCRIPTION	MAX MARKS	COMPUTATION PHILOSOPHY					SCORE
a	Qualification and experience of site representative	4	Site engineers/in charges profile (a) as per contract requirement , or (b) qualified engineer with domain expertise and experience - Full Marks (4)	Site engineers/in charges profile : Either not qualified engineer Or not having domain expertise and experience - 2 Marks	Site engineers/in charges profile : Neither qualified engineer Nor having domain expertise and experience - Nil Marks			
b	Submission of monthly progress reports and submission of hindrance register duly filled up and certified	2	Timely submission of all the desired reports along with hindrance register duly filled up and certified : Full Marks (2)	Submission of all the desired reports along with hindrance register duly filled up and certified , with cumulative delay ≤ 15 days wrt desired schedule during evaluation period : One Mark (1)	Submission of all the desired reports along with hindrance register duly filled up and certified , with cumulative delay > 15 days wrt desired schedule during evaluation period : Nil Marks			
c	Responsiveness to attend the pending tasks/punch points/issues	4	Pending tasks/punch points/issues resolved in ≤ 1 month - Full marks (4)	Pending tasks/punch points/issues resolved in > 1 month & ≤ 1.5 months - 3 marks	Pending tasks/punch points/issues resolved in > 1.5 month & ≤ 2 months - 2 marks	Pending tasks/punch points/issues resolved in > 2 month & ≤ 2.5 months - 1 marks	Pending tasks/punch points/issues resolved after 2.5 months - Nil marks	




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GUIDELINES FOR EVALUATION OF TAS CONTRACTORS' PERFORMANCE

SN	DESCRIPTION	MAX MARKS	COMPUTATION PHILOSOPHY					SCORE
6	Capacity for resource deployment / Financing	15						
a	Adequate manpower / machinery deployed	8	Achievement \geq 90% level, Full Marks (8) Achievement \geq 85% & $<$ 90% level, 7 Marks Achievement \geq 80% & $<$ 85% level, 6 Marks Achievement \geq 75% & $<$ 80% level, 5 Marks Achievement \geq 70 % & $<$ 75 % level, 4 Marks Achievement \geq 65% & $<$ 70% level, 3 Marks Achievement \geq 60% & $<$ 65% level, 2 Marks Achievement \geq 55% & $<$ 60% level, 1 Mark Achievement $<$ 55 % level, NIL Marks					
b	Instances of work slowdown / stoppage due to site finance	7	Nil slowdown / stoppages - Full Marks (7)	Cumulative affected period \leq 20 days - 5 marks	Cumulative affected period $>$ 20 days & \leq 40 days - 3 marks	Cumulative affected period $>$ 40 days & \leq 60 days - 1 marks	Cumulative affected period $>$ 60 days - Nil marks	
	Total	100						

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	TECHNICAL DOCUMENT	

TECHNICAL DOCUMENT

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	ABBREVIATIONS AND NOTATIONS	

ABBREVIATIONS & NOTATIONS

Unless otherwise specified, following abbreviations & notations shall be applicable to document.

ABBREVIATIONS/ NOTATIONS	DESCRIPTION
A/G	ABOVE GROUND
ACS	ACCESS CONTROL SYSTEM
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
AOPS	AUTOMATIC OVERFILL PROTECTION SYSTEM
API	AMERICAN PETROLEUM INSTITUTE
ATEX	ATMOSPHERES EXPLOSIBLES
ATF	AVIATION TURBINE FUEL
BAE	BULK AIR ELIMINATOR
BCU	BATCH CONTROL UNIT
BG	BANK GUARANTEE
BQD	BAY QUEUE DISPLAY
BV	BALL VALVE
CCTV	CLOSED CIRCUIT TELEVISION
CENELEC	EUROPEAN COMMITTEE FOR ELECTRO TECHNICAL STANDARDIZATION
CI	CAST IRON
CIU	COMMUNICATION INTERFACE UNIT
CM/cm	CENTIMETER
CPU	CENTRAL PROCESSING UNIT
CR	COTROL ROOM/ CARD READER
CRTV	CONE ROOF VERTICAL TANK
CS	CARBON STEEL
CSA	CANADIAN STANDARDS ASSOCIATION
CUM/cum/m3	CUBIC METRE
DBBV	DOUBLE BLOCK AND BLEED VALVE
DCV	DIGITAL CONTROL VALVE
DG	DIESEL GENERATOR
DIA/dia/F	DIAMETER
DIN	DEUTSCHES INSTITUT TUR NORMUNG EV
DP	DENSITY PROBE
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DT	DENSITOMETER
E/E/P/S	ELECTRICAL AND ELECTRONICS PROGRAMMABLE SYSTEMS



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ABBREVIATIONS AND NOTATIONS

ABBREVIATIONS/ NOTATIONS	DESCRIPTION
E-I-C/EIC	ENGINEER IN CHARGE
EMC	ELECTRO-MAGNETIC COMPATIBILITY
EMD	EARNEST MONEY DEPOSIT
EN	EUROPEAN NATION
ESD	EMERGENCY SHUTDOWN SYSTEM
EUC	EQUIPMENT UNDER CONTROL
EWS	ENGINEER'S WORKING STATION
EXD	EXPLOSION PROOF
EXP	EXPLOSION PROOF
FAS	FIRE ALARM SYSTEM
FAT	FACTORY ACCEPTANCE TEST
FE	FIRE ENGINE
FLP	FLAME PROOF
FM	FACTORY MUTUAL
FO	FIBER OPTIC
FO	FURNACE OIL
FRLS	FIRE RETARDANT LOW SMOKE
FS	FIRE SURVIVAL
GDS	GAS DETECTION SYSTEM
GI	GALVANISED IRON
GUI	GRAPHICAL USER INTERFACE
HAZOP	HAZARD AND OPERABILITY STUDY
HCD	HYDROCARBON VAPOUR DETECTOR
HDPE	HIGH DENSITY POLYETHYLENE
HMI	HUMAN MACHINE INTERFACE
HSD	HIGH SPEED DIESEL
HT	HORIZONTAL TANK
HWP	HARDWIRED PANEL
I/O	INPUT/ OUTPUT
IEC	INTERNATIONAL ELECTRO-TECHNICAL COMMISSION
IEEE	INSTITUTE OF ELECTRICAL & ELECTRONICS ENGINEERS
IFRVT	INTERNAL FLOATING ROOF VERTICAL TANK
IR	INFRA RED
IS	INTRINSICALLY SAFE
IS/BIS	INDIAN STANDARD



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ABBREVIATIONS AND NOTATIONS

ABBREVIATIONS/ NOTATIONS	DESCRIPTION
ISA	INSTRUMENT SOCIETY OF AMERICA
ISB	INSURANCE SURETY BOND
ISD	INITIAL SECURITY DEPOSIT
JOB	JOB LUMPSUM
KG/kg	KILOGRAM
LAN	LOCAL AREA NETWORK
LED	LIGHT EMITTING DIODE
LEL	LOWER EXPLOSIVE LIMIT
LIU	LIGHT INTERCONNECT UNIT
LPBS	LOCAL PUSH BUTTON STATION
LRCS	LOADING RACK COMPUTER SYSTEM
LS	LUMPSUM
LS	LEVEL SWITCH
LT	LEVEL TRANSMITTER
M/m/rm/RM	METRE / RUNNING METRE
MCP	MANUAL CALL POINT
MCR	MAIN CONTROL ROOM
MCS	MASTER CONTROL STATION
MFM	MASS FLOW METER
MM/mm	MILLIMETER
MOV	MOTOR OPERATED VALVE
MS	MILD STEEL
MS	MOTOR SPIRIT
MSTW	MULTI SPOT TEMPERATURE CUM WATER BOTTOM SENSOR
MT	METRIC TONNE
MTBF	MEAN TIME BETWEEN FAILURE
MTRR	MEAN TIME TO REPAIR
NAS	NETWORK ATTACHED STORAGE
NC	NORMALLY CLOSED
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NO	NORMALLY OPEN
NO (S) / Nos. / nos.	NUMBER(S)
NRV	NON RETURN VALVE
OIC	OPERATORS INTERFACE CONSOLE



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ABBREVIATIONS AND NOTATIONS

ABBREVIATIONS/ NOTATIONS	DESCRIPTION
OMC	OTHER OIL MARKETING COMPANY
OHT	OVERHEAD TANK
PA	PUBLIC ADDRESS
PB	PUSH BUTTON
PC	PERSONAL COMPUTER (WORK STATION)
PCC	PLAIN CEMENT CONCRETE
PCR	PROXIMITY CARD READER
PLC	PROGRAMMABLE LOGIC CONTROLLER
PPL	PIPELINE
PPM	PARTS PER MILLION
PRV	PRESSURE RELIEF VALVE
PT	PRESSURE TRANSMITTER
PTZ	PAN TILT ZOOM
QMR	QUADRUPLE MODULAR REDUNDANT
QRA	QUANTITATIVE RESEARCH ANALYSIS
RCC	REINFORCED CEMENT CONCRETE
RLW	REGISTERED LADEN WEIGHT
ROSOV	REMOTE OPERATED SHUT OFF VALVE
RS-232/422	STANDARDS ON SERIAL COMMUNICATION PROTOCOL
RTD	RESISTANCE TEMPERATURE DETECTOR
S&D	SUPPLY & DISTRIBUTION
SAN	STORAGE AREA NETWORK
SAP	SYSTEMS APPLICATION PRODUCT (IOCL ERP SYSTEM)
SAT	SITE ACCEPTANCE TEST
SFT/sft	SQUARE FEET
SIL	SAFETY INTEGRITY LIMIT
SIS	SAFETY INSTRUMENTED SYSTEM
SKO	SUPERIOR KEROSENE OIL
SOV	SOLENOID OPERATED VALVE
SPD	SURGE PROTECTION DEVICE
Sqcm	SQUARE CENTIMETER
SQM/sqm/m ² /SM	SQUARE METRE
SQMM/sqmm/mm ²	SQUARE MILLIMETER
SS	STAINLESS STEEL
TAS	TERMINAL AUTOMATION SYSTEM
TAS - MS	TAS MANAGEMENT SERVER




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ABBREVIATIONS AND NOTATIONS

ABBREVIATIONS/ NOTATIONS	DESCRIPTION
TFMS	TANK FARM MANAGEMENT SYSTEM
TLD	TANK LORRY DECANTATION
TLF	TANK LORRY FILLING
TM	TERMINAL MANAGER
TMR	TRIPLE MODULAR REDUNDANT
TRV	THERMAL RELIEF VALVE
TS	TERMINAL SERVER
TSI	TANK SIDE INDICATOR
TSV	THERMAL SAFETY VALVE
TT	TANK TRUCK
TT	TEMPERATURE TRANSMITTER
TTES	TANK TRUCK ENTRY SYSTEM
TTRS	TANK TRUCK REPORTING SYSTEM
TUV	TECHNISCHE UBERWARCHUNGS VEREIN
TWD	TANK WAGON DECANTATION
TWF/ TWL	TANK WAGON FILLING/ TANK WAGON LOADING
U/G	UNDER GROUND
UL	UNDERWRITERS LABORATORY INC
ULW	UNLADEN WEIGHT
UPS	UN-INTERRUPTED POWER SUPPLY
VDU	VISUAL DISPLAY UNIT
VMS	VEDIO MANAGEMENT SOFTWARE
WIP	WATER INTERFACE PROBE
XM	XTRA MILE (ADDITIVE FOR MS)
XP	XTRA PREMIUM (ADDITIVE FOR MS)

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	CODES AND STANDARDS	

CODES AND STANDARDS

- 1.0** The components of Instrumentation and Control system shall conform in design, materials and performance with the appropriate sections of the latest editions and revisions of the standards. The equipment & installation shall also conform to the latest Indian Electricity Rules as regards safety, earthing and other essential provisions specified there in for the installation and operation of electrical plants.
- 2.0** The equipment in the hazardous area shall have CMRI/ATEX/BIS & CCOE/PESO approvals. The equipment & installation shall also conform to the latest standards below

SN	CODE / STANDARDS	DESCRIPTION
1.	ASME B1.20.1	Pipe thread
	ASME B16.5	Steel Pipe flanges and flanged fittings
	ASME B16.20	Ring-Joint gaskets and grooves for steel flanges
	ASME SEC VIII	Boiler & pressure vessel code rules.
2.	ANSI/ISA 575-01	Control valve sizing , capacity test procedures, face to face dimensions, leakage
3.	API RP 520	Fire sizing of safety and control valve
4.	API RP 598	Control valve leakage
5.	OISD 244	Storage and handling of Petroleum products in Terminals and terminals
6.	OIML standard R 117	(Measuring systems for liquids other than water)
7.	ISO 4185	Standard for measurement of liquid flow in closed conduit- weighing method
8	IEC 61131 PARTS 1-4	Programmable controller
9	DIN V VDE 0801	Principles for computers in safety related systems
10	DIN V 19250-1994	Safety consideration for fail safe control for control and instrumentation equipment
11	IEC 61508	Functional safety programmable electronic system
12	IEC 1131-3	Engineering software for development and configuration
13	IEC 68	Environment testing
14	IEEE 802.3, IEC, CSA	International Standards
15	IEC 801/EN 50081/82	Electromagnetic compatibility
16	IEC 79.10/BS 4683	Hazardous area classification
17	IEC-529/ NEMA /IS 2147/ IS 13947:1992	For execution of Instrument Enclosures
18	IEC-85	Thermal Evaluation and classification of electrical insulation



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CODES AND STANDARDS

SN	CODE / STANDARDS	DESCRIPTION
19	IS 1271	Specification for thermal evaluation and classification of electrical insulation.
20	NFPA 70	National electric code for fire fighting system
21	OISD recommendations	For storage, handling and safety systems and transportation
22	CENELEC	European norms for Hazardous area equipment and accessories
	EN 50014-50039	
23	EN 60950-1992	Power supply
24	IS-13314	Solid state invertors run from storage batteries
25	IS-11260	Stabilized power supplies AC output
26	IEC	Solid state invertors
27	IS 10918	Vented type Nickel cadmium batteries
28	ANSI MC 96.1	Thermocouples
29	DIN 43760	Resistance temperature detectors
30	IS 3624	Specification for pressure and vacuum gauges
31	IS 1554/ IS 5831	PVC insulated cables
32	TIA/EIA 568A	Telecommunication cable standard
	ISO/IEC 11801	
33	API MP MS 3-1A	Standard practice for manual gauging of Petroleum and Petroleum product in stationary tank
34	API MP MS 3-1B	Standard practice for level measurement of liquid hydro carbon in stationary tank for automatic tank gauging
35	API MP MS 7-4	Static temperature determination using fixed automatic tank thermometer
36	ISO/TC28/Section 3	Terms relating to calculation of oil quantity
37	ISO 4266	Petroleum and liquid petroleum products - Measurement of level and temperature in storage tanks by automatic methods.
38	OIML R85	Automatic level gauges for measuring the level of liquid in fixed storage tanks.
39	IS 2801	PD meter Accuracy
40	SIGTTO	Society of International Gas tanker and terminal operators



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CODES AND STANDARDS

SN	CODE / STANDARDS	DESCRIPTION
41	BASEEFA/PTB/KEMA/ FM/ATEX/ TUV/ CCE/ CMRS/ERTL/CPRI/ IBR/ RDSO/W&M /EXIDA	Statutory standards
42	BS 5308 Part-I	Instrumentation Cable
43	ISA -S5.1	Instrument Symbol & Identification
44	ISA- S 5.2	Graphical symbol for Process Operators
45	ISA 5.3	Graphical symbol for DCS / Share Display instrumentation logic & computer system.
46	IS 2148/IEC 60079 PESO(CCOE)	Flame proof , enclosure for electrical apparatus
47	IS 3624	Specification for Pressure & Vacuum Gauges
48	ISA 7.3	Quality standards for instrument air
49	IEC-60079	Electrical apparatus for explosive gas atmosphere
50	IEC 61511	Safety of an industrial process through the use of instrumentation
51	API RP 1004	Standard for bottom loading arm
52	IS 3043	Code of practice for earthing

Note: Equivalent Indian standard / certificates are acceptable against foreign standard mentioned anywhere in the document.

3.0 Applicable Regulations/ Policies

- 3.1 IOCL Terminal Automation System Policy
- 3.2 Oil Industries safety directorate norms (OISD)
- 3.3 Regulations relevant to explosion hazardous areas
- 3.4 Petroleum & Explosive Safety Organization norms & regulations
- 3.5 OIML - International Organization for Legal Measurements
- 3.6 Department of Legal Metrology, India
- 3.7 Other applicable standard

Note: Other applicable Codes and standards are mentioned at respective equipment specification.

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Page No. 116**SITE DATA****SITE DATA****1.0 Project Details**

- 1.1 Indian Oil Corporation Limited (IOCL) is proposing recamping/augmentation of facilities at Mathura Bitumen Plant along with additional Tankages.

2.0 Site details

Sl. No.	Description	Details
1	Site Location	Village: Dhana Teja Tehsil: Mathura Sadar Janpad: Mathura District: Mathura State: Uttar Pradesh
2	Nearest Railway station	Mathura
3	Nearest Airport	Agra
4	IOCL GSTIN no. for Mathura UP	09AAACI1681G1ZN
5	Product receipt mode	Pipeline
6	Product dispatch mode	Tank Truck
7	Maximum ambient temperature	48 Deg
8	Minimum ambient Temperature	4 Deg
9	Design operating temperature of field equipment	5 Deg celsius-50 Deg Celsius
10	Design operating temperature of indoor equipment (Control Room, Admin Building, S&D, Security Room etc)	5 to 45 Deg Celsius (Plus temperature due to internal heat dissipation of electrical & electronic component)
11	Relative Humidity	28%-98%
12	Products to be handled	BITUMEN. VG10, VG30, VG40, CRMB 55, CRMB 60

3.0 Area Classification

- 3.1 Hazardous area classification : Zone 1 Gas Group IIA IIB T3/T4
- 3.2 Ingress protection to NEMA 4X or equivalent
- 3.3 Intrinsically Safe (IS) certification is preferred, and shall be used wherever possible for all analogue devices
- 3.4 Explosion Proof (Exd) certification shall be used wherever possible for all electrical and electronic equipments used in hazardous area.



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3.5 Certifying authority: UL/FM/ATEX /BASSEFA/CENLEC/BIS and PESO / CCOE

4.0 Layout plan and facility details mappings:

4.1 The layout plan along with facility details mappings attached with this tender is only indicative and may change during actual execution of the job.

In case the vendor has installed and laid the cables without prior intimation to IOCL, IOCL shall not pay any extra amount for the re-work.



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SITE DATA

FACILITY DETAILS

FACILITY DETAILS

1.0 Operating concepts / Salient features:

SN	Description	Details
1	Normal Working pressure	2 to 8.5 Kg/cm ²
2	Maximum working pressure	10.5 Kg/cm ²
3	Design Pressure	15 Kg/cm ²
4	TLF Loading operation	Through 4" Top loading arms
5	Capacity of Tank Trucks	10 Tonnes to 60 Tonnes
6	No. of compartments	1 to 8

2.0 Products to be handled:

Parameters	VG10	VG30	VG40	CRMB 55	CRMB 60
Specific Density	0.9 to 1.2 gm/cc	0.9 to 1.2 gm/cc	0.9 to 1.2 gm/cc	0.9 to 1.2 gm/cc	0.9 to 1.2 gm/cc
Viscosity	250 cSt @ 135 deg C	350 cSt @ 135 deg C	400 cSt @ 135 deg C	2-6 Poise @ 150 deg C	3-9 Poise @ 150 deg C

3.0 Bay layout with loading points

Total no. of bays: 14 Nos

Total no. of loading points: 14 Nos.

Bay No.	Product	Blending	Additive	Type of loading (Bottom/Top)
1	VG10/VG30/VG40	NA	NA	Top Loading
2	VG10/VG30/VG40	NA	NA	Top Loading
3	VG10/VG30/VG40	NA	NA	Top Loading
4	VG10/VG30/VG40	NA	NA	Top Loading
5	VG10/VG30/VG40	NA	NA	Top Loading
6	VG10/VG30/VG40	NA	NA	Top Loading
7	VG10/VG30/VG40	NA	NA	Top Loading
8	VG10/VG30/VG40	NA	NA	Top Loading
9	VG10/VG30/VG40	NA	NA	Top Loading



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Bay No.	Product	Blending	Additive	Type of loading (Bottom/Top)
10	VG10/VG30/VG40	NA	NA	Top Loading
11	VG10/VG30/VG40	NA	NA	Top Loading
12	VG10/VG30/VG40	NA	NA	Top Loading
13	CRMB55/CRMB60	NA	NA	Top Loading
14	CRMB55/CRMB60	NA	NA	Top Loading

4.0 Main Pipeline Header for TLF Operation

SN	Product	Header Line Dia
1	VG30	300 mm
2	VG40	300 mm
3	VG10	300 mm
4	CRMB 55	300 mm
5	CRMB 60	300 mm

5.0 TANK FARM

5.1 Product & Water Tanks Details:

SL No.	Tank No.	Product (Bitumen)	Type (CRVT/ IFRVT/ UG/ OHT)	Size of Tank (Dia. X Ht) / (Dia. X Length)	Storage Capacity KL)
1	101A	VG40/VG10	CRVT	13M X 16M	2100
2	101B	VG40/VG10	CRVT	13M X 16M	2100
3	101C	VG40/VG10	CRVT	13M X 16M	2100
4	101D	VG40/VG10	CRVT	13.5M X 15M	2150
5	102A	VG30	CRVT	10M X 11M	860
6	102B	VG30	CRVT	10M X 11M	860
7	102C	VG30	CRVT	10M X 11M	860
8	101E	VG10	CRVT	20M X 16M	5060
9	102D	VG10	CRVT	20M X 16M	5060
10	101F	VG40	CRVT	8M X 10.5M	530
11	101G	VG40	CRVT	8M X 10.5M	530



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12	101H	VG10	CRVT	8M X 10.5M	530
13	101I	VG10	CRVT	8M X 10.5M	530
14	101K	VG10/VG40	CRVT	20M X 16M	5060
15	101J	VG10/VG40	CRVT	20M X 16M	5060
16	102F	VG30	CRVT	20M X 16M	5060
17	102E	VG30	CRVT	20M X 16M	5060
18	CRM 1	CRMB 60	CRVT	2.4M X 11.1M	50
19	CRM 2	CRMB 60	CRVT	2.4M X 11.1M	50
20	CRM 3	CRMB 60	CRVT	2.4M X 11.1M	50
21	CRM 4	CRMB 60	CRVT	2.4M X 11.1M	50
22	CRM 5	CRMB 60	CRVT	2.4M X 11.1M	50
23	CRM 6	CRMB 60	CRVT	2.4M X 11.1M	50
24	THSD	HSD	CRVT	2.1M X 6.25M	20
25	102G	VG30	CRVT	30M X 18.5M	12200
26	102H	VG40	CRVT	30M X 18.5M	12200

5.2 Nozzle details for installation of Automation Equipment on tanks and its interface with TAS:

Tank No.	Product / Water / Foam	Nozzle size for Primary Radar Gauge	Nozzle size for Secondary Radar Gauge	Nozzle size for MSTW (mm)	Nozzle size for AOPS (mm)	Nozzle size for Density Probe (mm)
Tank No.	Product (Bitumen)	Level Transmitter Size (PRIMARY)	Level Transmitter Size (SECONDARY)	Pressure Transmitter Size	Temperature Transmitter Size	
1	VG30	6"	6"	4"	3"	
2	VG40	6"	6"	4"	3"	

5.2 Nozzle details for installation of Automation Equipment on tanks and its interface with TAS:

Tank No.	Product / Water / Foam	Nozzle size for Primary Radar Gauge	Nozzle size for Secondary Radar Gauge	Nozzle size for MSTW (mm)	Nozzle size for AOPS (mm)	Nozzle size for Density Probe (mm)
101A	VG40/VG10	NA	NA	NA	3", 150 #, SORF	NA



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SITE DATA

Tank No.	Product / Water / Foam	Nozzle size for Primary Radar Gauge	Nozzle size for Secondary Radar Gauge	Nozzle size for MSTW (mm)	Nozzle size for AOPS (mm)	Nozzle size for Density Probe (mm)
101B	VG40/VG10	NA	NA	NA	3", 150 #, SORF	NA
101C	VG40/VG10	NA	NA	NA	3", 150 #, SORF	NA
101D	VG40/VG10	NA	NA	NA	3", 150 #, SORF	NA
102A	VG30	NA	NA	NA	3", 150 #, SORF	NA
102B	VG30	NA	NA	NA	3", 150 #, SORF	NA
102C	VG30	NA	NA	NA	3", 150 #, SORF	NA
101E	VG10	NA	NA	NA	3", 150 #, SORF	NA
102D	VG10	NA	NA	NA	3", 150 #, SORF	NA
101F	VG40	NA	NA	NA	3", 150 #, SORF	NA
101G	VG40	NA	NA	NA	3", 150 #, SORF	NA
101H	VG10	NA	NA	NA	3", 150 #, SORF	NA
101I	VG10	NA	NA	NA	3", 150 #, SORF	NA
102G	VG30	NA	NA	NA	3", 150 #, SORF	NA
102H	VG40	NA	NA	NA	3", 150 #, SORF	NA



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Design, Supply, Installation, Testing and Commissioning of PLC based Terminal Automation System comprising of Tank Truck Loading System, Tank Farm Management System, Access Control System, Fire Alarm System etc along with associated works at Bitumen Drum Filling Plant, Mathura (U.P)

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FACILITY DETAILS

6.0 MOV

Sr. No	Type	Qty	MOV Location
1	MOV	110 Nos	
2	HOV	425 Nos	
3	PCV	14 Nos	
4	TCV	19 Nos	

6.1 Details of MOV for interface with TAS :

Valve Tag	Line TAG	Size (DN)	P&ID Number
MOV-0307	300-BIT-VG30-3C1A-0302-IH	300	P.020785 G 21068 P201
MOV-0301	300-BIT-VG30-3C1A-0302-IH	300	P.020785 G 21068 P201
MOV-0302	500-BIT-VG30-3C1A-0303-IH(TK-1)	500	P.020785 G 21068 P201
MOV-0308	500-BIT-VG30-3C1A-0303-IH(TK-1)	500	P.020785 G 21068 P201
MOV-0408	300-BIT-VG40-3C1A-0401-IH	300	P.020785 G 21068 P201
MOV-0401	300-BIT-VG40-3C1A-0401-IH	300	P.020785 G 21068 P201
MOV-0402	500-BIT-VG40-3C1A-0402-IH(TK-1)	500	P.020785 G 21068 P201
MOV-0409	500-BIT-VG40-3C1A-0402-IH(TK-1)	500	P.020785 G 21068 P201
MOV-0306	200-BIT-VG30-3C1A-0309-IH	200	P.020785 G 21068 P201
MOV-0305	200-BIT-VG30-3C1A-0309-IH	200	P.020785 G 21068 P201
MOV-0407	200-BIT-VG40-3C1A-0404-IH	200	P.020785 G 21068 P201
MOV-0405	200-BIT-VG40-3C1A-0404-IH	200	P.020785 G 21068 P201
MOV-0405(Same tag No)	Line number of existing	300	P.020785 G 21068 P201
MOV-0406	Line number of existing	300	P.020785 G 21068 P201
MOV-0303	Line number of existing	300	P.020785 G 21068 P201
MOV-0304	Line number of existing	300	P.020785 G 21068 P201
No tag in P & id	Line number of existing	300	P.020785 G 21068 P201
No tag in P & id	Line number of existing	300	P.020785 G 21068 P201



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FACILITY DETAILS

No tag in P & id	Line number of existing	300	P.020785 G 21068 P201
No tag in P & id	Line number of existing	300	P.020785 G 21068 P201
MOV-0454	100-BIT-VG40-3C1A-0450-IH	100	P.020785 G 21068 P201
MOV-0453	100-BIT-VG40-3C1A-0449-IH	100	P.020785 G 21068 P201
MOV-0391	100-BIT-VG30-3C1A-0388-IH	100	P.020785 G 21068 P201
MOV-0456	100-BIT-VG40-3C1A-0452-IH	100	P.020785 G 21068 P201
MOV-0455	100-BIT-VG40-3C1A-0451-IH	100	P.020785 G 21068 P201
MOV-0392	100-BIT-VG30-3C1A-0389-IH	100	P.020785 G 21068 P201
BL-0669	100-BIT-VG30-3C1A-0390-IH	100	P.020785 G 21068 P201
MOV-0473	100-BIT-VG40-3C1A-0464-IH	100	P.020785 G 21068 P201
MOV-0201	100-BIT-VG10-3C1A-0119-IH	100	P.020785 G 21068 P201
MOV-0457	100-BIT-VG40-3C1A-0453-IH	100	P.020785 G 21068 P201
MOV-0105	100-BIT-VG10-3C1A-0108-IH	100	P.020785 G 21068 P201
MOV-0394	100-BIT-VG30-3C1A-0391-IH	100	P.020785 G 21068 P201
MOV-0458	100-BIT-VG40-3C1A-0454-IH	100	P.020785 G 21068 P201
MOV-0106	100-BIT-VG10-3C1A-0109-IH	100	P.020785 G 21068 P201
MOV-0395	100-BIT-VG30-3C1A-0392-IH	100	P.020785 G 21068 P201
MOV-0459	100-BIT-VG40-3C1A-0455-IH	100	P.020785 G 21068 P201
MOV-0107	100-BIT-VG10-3C1A-0110-IH	100	P.020785 G 21068 P201
MOV-0396	100-BIT-VG30-3C1A-0393-IH	100	P.020785 G 21068 P201
MOV-0460	100-BIT-VG40-3C1A-0456-IH	100	P.020785 G 21068 P201
MOV-0108	100-BIT-VG10-3C1A-0111-IH	100	P.020785 G 21068 P201
MOV-0397	100-BIT-VG30-3C1A-0394-IH	100	P.020785 G 21068 P201
MOV-0403	100-BIT-VG40-3C1A-0110-IH	100	P.020785 G 21068 P201
MOV-0461	100-BIT-VG40-3C1A-0457-IH	100	P.020785 G 21068 P201
MOV-0109	100-BIT-VG10-3C1A-0112-IH	100	P.020785 G 21068 P201
MOV-0463	100-BIT-VG40-3C1A-0456-IH	100	P.020785 G 21068 P201
MOV-0668	100-BIT-VG40-3C1A-0398-IH	100	P.020785 G 21068 P201
MOV-0660	100-BIT-VG40-3C1A-0459-IH	100	P.020785 G 21068 P201
MOV-0462	100-BIT-VG40-3C1A-0458-IH	100	P.020785 G 21068 P201
MOV-0110	100-BIT-VG10-3C1A-0113-IH	100	P.020785 G 21068 P201
MOV-0667	100-BIT-VG30-3C1A-0458-IH	100	P.020785 G 21068 P201
MOV-0659	100-BIT-VG40-3C1A-0461-IH	100	P.020785 G 21068 P201
MOV-0463	100-BIT-VG40-3C1A-0460-IH	100	P.020785 G 21068 P201
MOV-0111	100-BIT-VG10-3C1A-0114-IH	100	P.020785 G 21068 P201
MOV-0666	100-BIT-VG30-3C1A-0396-IH	100	P.020785 G 21068 P201
MOV-0471	100-BIT-VG40-3C1A-0462-IH	100	P.020785 G 21068 P201
MOV-0665	100-BIT-VG30-3C1A-0395-IH	100	P.020785 G 21068 P201



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MOV-0200	100-BIT-VG10-3C1A-0115-IH	100	P.020785 G 21068 P201
MOV-0701	100-BIT-CBMB55-3C1A-0703-IH	100	P.020785 G 21068 P201
MOV-0702	100-BIT-CBMB60-3C1A-0703-IH	100	P.020785 G 21068 P201
MOV-0703	100-BIT-CBMB55-3C1A-0704-IH	100	P.020785 G 21068 P201
MOV-0704	100-BIT-CBMB60-3C1A-0704-IH	100	P.020785 G 21068 P201

7.0 Control Valves

7.1 List of PCVs

Valve Tag	Line TAG	Size (DN)	P&ID Number
PCV-0404	250-BIT-VG40-3C1A-0427-IH	250	P.020785 G 21068 P201
PCV-0304	250-BIT-VG30-3C1A-0326-IH	250	P.020785 G 21068 P201
PCV-0304	250-BIT-VG30-3C1A-0326-IH	250	P.020785 G 21068 P201
PCV-0104	250-BIT-VG30-3C1A-0326-IH	250	P.020785 G 21068 P201
PCV-0701	200-BIT-CRMB55-3C1A-701-IH	200	P.020785 G 21068 P201
PCV-0702	200-BIT-CRMB60-3C1A-701-IH	200	P.020785 G 21068 P201
PCV-0602	25-LPS-3C1B-0633-IH	25	P.020785 G 21068 P201
PCV-0603	25-LPS-3C1B-0637-IH	25	P.020785 G 21068 P201
PCV-0604	25-MPS-3C1B-0641-IH	25	P.020785 G 21068 P201
PCV-0605	25-MPS-3C1B-0647-IH	25	P.020785 G 21068 P201
PCV-0606	25-LPS-3C1B-0649-IH	25	P.020785 G 21068 P201
PCV-0607	25-LPS-3C1B-0649-IH	25	P.020785 G 21068 P201
PCV-0608	25-LPS-3C1B-0649-IH	25	P.020785 G 21068 P201
PCV-0609	25-LPS-3C1B-0661-IH	25	P.020785 G 21068 P201

7.2 List of TCVs(indicative)

Valve Tag	Line TAG	Size (DN)	P&ID Number
TCV-0601	65-MPS-3C1B-0602-IH	65	P.020785 G 21068 P201
TCV-0602	65-MPS-3C1B-0615-IH	65	P.020785 G 21068 P201

8.0 PT & DPT

8.1 Pressure Transmitter Details (Indicative)



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Sr. No.	PT Tag	P&ID No.	Location/Line No.
1	PT-0301	P.020785-G-21068-P201, Sh 2, Rev-01	TANK-1. K2: NOZZLE, 4"
2	PT-0401	P.020785-G-21068-P201, Sh 2, Rev-01	TANK-2. K2: NOZZLE, 4"
3	PT 0103	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG10-3C1A-0101B-IH
4	PT 0104	P.020785-G-21068-P201, Sh 3, Rev-01	250-BIT-VG10-3C1A-0102B-IH
5	PT 0602	P.020785-G-21068-P201, Sh 3, Rev-01	25-LPS-3C1B-0633-IH
6	PT 0105	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG10-3C1A-0101C-IH
7	PT 0106	P.020785-G-21068-P201, Sh 3, Rev-01	250-BIT-VG10-3C1A-0102C-IH
8	PT 0603	P.020785-G-21068-P201, Sh 3, Rev-01	25-LPS-3C1B-0637-IH
9	PT 0301	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG30-3C1A-0305-IH
10	PT 0302	P.020785-G-21068-P201, Sh 3, Rev-01	250-BIT-VG30-3C1A-0306-IH
11	PT 0604	P.020785-G-21068-P201, Sh 3, Rev-01	25-LPS-3C1B-0641-IH
12	PT 0303	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG30-3C1A-0312-IH
13	PT 0304	P.020785-G-21068-P201, Sh 3, Rev-01	250-BIT-VG30-3C1A-0313-IH
14	PT 0605	P.020785-G-21068-P201, Sh 3, Rev-01	25-LPS-3C1B-0645-IH
15	PT 0305	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG30-3C1A-0319-IH
16	PT 0306	P.020785-G-21068-P201, Sh 3, Rev-01	250-BIT-VG30-3C1A-0320-IH
17	PT 0606	P.020785-G-21068-P201, Sh 3, Rev-01	25-LPS-3C1B-0649-IH
18	PT 0401	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG40-3C1A-0405-IH
19	PT 0402	P.020785-G-21068-P201, Sh 3, Rev-01	250-BIT-VG40-3C1A-0406-IH
20	PT 0607	P.020785-G-21068-P201, Sh 3, Rev-01	25-LPS-3C1B-0653-IH
21	PT 0403	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG40-3C1A-0412-IH
22	PT 0404	P.020785-G-21068-P201, Sh 3, Rev-01	250-BIT-VG40-3C1A-0413-IH
23	PT 0608	P.020785-G-21068-P201, Sh 3, Rev-01	25-LPS-3C1B-0657-IH



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Sr. No.	PT Tag	P&ID No.	Location/Line No.
24	PT 0405	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG40-3C1A-0419-IH
25	PT 0406	P.020785-G-21068-P201, Sh 3, Rev-01	250-BIT-VG40-3C1A-0420-IH
26	PT 0609	P.020785-G-21068-P201, Sh 3, Rev-01	25-LPS-3C1B-0661-IH
27	PT 0621	P.020785-G-21068-P201, Sh 3, Rev-01	300-BIT-VG10-3C1A-0122-IH
28	PT 0622	P.020785-G-21068-P201, Sh 3, Rev-01	300-BIT-VG30-3C1A-0326-IH
29	PT 0623	P.020785-G-21068-P201, Sh 3, Rev-01	300-BIT-VG40-3C1A-0427-IH

8.2 DPT Details (Indicative)

Sr. No.	DPT Tag	P&ID No.	Location/Line No.
1	DPT 0102	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG10-3C1A-0101B-IH
2	DPT 0103	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG10-3C1A-0101C-IH
3	DPT 0301	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG30-3C1A-0305-IH
4	DPT 0302	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG30-3C1A-0312-IH
5	DPT 0303	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG30-3C1A-0319-IH
6	DPT 0401	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG40-3C1A-0405-IH
7	DPT 0402	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG40-3C1A-0412-IH
8	DPT 0403	P.020785-G-21068-P201, Sh 3, Rev-01	350-BIT-VG40-3C1A-0419-IH

Note: Tags for TLF & calibration Skid are not covered in above list.

9.0 PRODUCT & WATER PUMPS DETAILS (Indicative) for interface with TAS

TAG NO.	SERVICE	FLOW (m ³ /h)	HEAD (m)
P-101B	VG10	350	75
P-101C	VG10	350	75
P-301A	VG30	350	75
P-301B	VG30	350	75



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P-301C	VG30	350	75
P-401A	VG40	350	75
P-401B	VG40	350	75
P-401C	VG40	350	75

13.0 Other System / Sub system

Sr. No	System/ Sub System	Qty (Nos.)	Remarks
1	PA Paging System	1	Potential free contacts (Quantity will be finalised after vendor finalization) / Serial interface for Auto Announcement based on fire alarm
2	Emergency Panel	1	Potential free contact in main panel shall be provided for implementation of Power ESD
3	PMCC Panel	1	Serial Interface with PMCC Panels for Power, Energy and current data
4	Refinery Interface	1	Serial Interface with refinery for Data Sharing
5	Drum filling plant, CRMB Plant, Refinery	1	Potential Free Contacts for implementation of ESD
6	CCTV Surveillance System	1	API Interface with existing CCTV System for ANPR and Alarm Triggered Presets.

*All above lists are indicative. Final list of Facility Details shall be shared with Successful bidder during detailed engineering stage.

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	IOCL SCOPE OF WORK	

IOCL SCOPE OF WORK

1.0 IOCL shall provide the following details (if available) to the successful vendor:

1.1 Indicative Drawings and documents

- i. Plan Layout
- ii. P&I diagram
- iii. Control room and any other room layout where automation work is to be performed.
- iv. GA drawing and wiring details of PCC & MCC (During detailed engineering).
- v. Gantry layout drawing
- vi. GA drawing for product tanks.
- vii. Indicative cable route diagram, Fire Alarm System layout, ACS layout, PT, DPT, MOV, PA paging system instrument layout etc.

1.2 Nozzle for installation of TFMS equipments:

- i. Above ground CR tanks - for Primary & Secondary Radar Gauges, MSTW, AOPS.
- ii. U/G / AG Horizontal Product tank with Radar gauge installation requirement - for Primary Radar (Still well), Density Probe, MSTW & AOPS installation


Note: Nozzle for MST ~~and multi point Density Probe~~ shall be provided in central hatch for CRVT.

1.3 Nozzle for installation of PT at:

- i. All Above Ground Product tanks (CRVT & FRVT)
- ii. TLF header line
- iii. Receipt header line(Product + Steam)
- iv. Air Line
- v. Suction and Discharge of TLF product pumps (as applicable) in pump house
- vi. Fire hydrant network

Note: IOCL shall provide tapping without SS isolation ball valve.

1.4 Nozzle for installation of DPT at:

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	IOCL SCOPE OF WORK	

i. Across strainer for TLF product pumps

ii. Across Steam Line at Tanks

Note: IOCL shall provide tapping without SS isolation ball valve.

1.5 Nozzle for installation of T at:

i. TLF Header Line

ii. Steam Inlet Line

iii. Suction Header towards pump house

iv. Receipt Header Line (Product + Steam)

Note: IOCL shall provide tapping without SS isolation ball valve.

1.6 Piping works for:

~~i. Hooking up of Bulk Air Eliminator (BAE) on TLF and TW header line (as applicable). (IOCL shall erect the piping up to both end of the BAE. Vendor to submit the flange-to-flange dimension of the offered BAE. Required civil foundation along with structural support required for mounting of BAE is in the vendor's scope and vendor to submit the detailed foundation drawing to IOCL prior to start of construction work.)~~

Piping Material Specs: ERW, API 5L, ASME B36.10, Schedule 40, Heavy Class for bitumen line

~~ii. Drainage line from respective Bulk Air Eliminator to UG tank or any other area~~


~~iii. Piping works from TLF header line up to inlet of metering assembly along with ball valve and reducer (if required) for both Main & Blend product.~~

~~iv. Piping Works for Instrument Air Header.~~

~~v. Piping works from Additive tanks to TLF header along with return line from TLF header to additive tanks. Piping work from TLF header to near additive block with isolation valve. Subsequent SS tubing in inlet of additive block and additive block outlet to metering skid shall be in TAS vendor scope.~~

~~vi. Piping works from Vapour Recovery Unit (VRU) to TLF header line upto inlet of metering assembly along with ball valve and reducer (if required) for MS.~~

~~vii. Piping works from TW header line up to inlet of metering assembly along with ball valve and reducer (if required) for Main product.~~

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viii. ~~Piping works from SKO receipt header to Blue dye dosing skid for SKO inlet to Blue Dye tank for dilution and b) outlet from Blue dye skid to individual SKO tank receipt line for dosing.~~

1.7 Potential free/ Auxiliary contacts/ Serial Interface for integration of free issued items:

- i. ~~ROSOVs~~
- ii. ~~DBBVs~~
- iii. ~~MOVs~~
- iv. ~~HVLR (Power ON, Fault, MOV opened / Closed Status)~~
- v. ~~Fire Engines~~
- vi. ~~DG set~~
- vii. ~~PA paging & plant communication System (if free issue items)~~
- viii. ~~Jockey pumps~~
- ix. ~~Foam pumps~~
- x. ~~Product pumps~~
- xi. ~~Bore well (if free issue items)~~
- xii. ~~Additive & Blue Dye dosing pumps and agitators (if free issue items)~~
- xiii. ~~Ethanol blending Pumps~~
- xiv. ~~Submersible pumps for U/G tanks~~
- xv. ~~Tank Lorry Decantation pumps~~
- xvi. ~~Sludge pumps~~
- xvii. ~~PMCC panels for Power ESD~~
- xviii. ~~VRU panel~~
- xix. ~~VFD PLC (Serial Interface/TCP IP)~~
- xx. ~~Effluent treatment plant Panel (At field)~~
- xxi. ~~Power Distribution board for MOVs (At field)~~
- xxii. ~~Panels in PMCC~~
- xxiii. ~~CCTV System~~


1.8 The required termination detail, protocol document of the free issue item shall be shared to the vendor during detail design engineering/execution of the project. API documents for integration of existing CCTV System (for ANPR and Alarm trigger presets) shall be shared with vendor.

1.9 ~~Feeder for raw power to Additive pumps, Blue dye pumps & Agitators in Main panel at PMCC room~~ and 3 nos. of feeders 415 V +10% AC in Emergency panel at PMCC room for taking supply to UPS. Subsequent power distribution to Automation equipments along with power distribution board shall be in the scope of the successful bidder.

1.10 PMCC panel shall be provided with potential free contacts (to take safety PLC output) to trip all plant equipments except equipments connected through Emergency panel during power ESD.


1.11 The input with respect to Loading/ Facility data like position of detectors for fire alarm system, Earth pits, Safe filling height, reference height, Nozzle height for AOPS positioning, Cable route layout, customized FDS Logic, Configuration parameters, equipment tags, etc (which are location specific and necessarily needs user input) shall be provided during Design Engineering or as and when required during implementation stages.

1.12 Approx AOPS length based on GA drawing of all product tanks (Above ground and underground tanks). GA drawing of product tank or Nozzle heights, Reference heights and Safe filling heights of product tank for calculation of AOPS, MSTW lengths during detailed Engineering.

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- 1.13 Reference heights and Safe filling heights, Level Alarm set points for Hi, HiHi, HiHiHi, Lo, LoLo, minimum Stock Level (MSL) for product and water tanks as applicable during design Engineering.
- 1.14 Cable entry details of actuators of ~~ROSOVs, DBBVs and~~ MOVs of all kind which has to be integrated with TAS.
- 1.15 Air-conditioning in Control room with proper lighting arrangement.
- 1.16 SAP connectivity at Control room for SAP-TAS interface, SAP-TFMS interface.
- 1.17 Invoice PCs in invoice room/ lock shed.
- 1.18 Platform along with Shed for mounting of Blue Dye Dosing Skid, Additive Dosing Skid. Tentative position of these skids to be considered in pump house.
- 1.19 Main Cable trays for laying of automation cable in the main cable route. Main cable route includes cable tray below Control room mezzanine floor, Control room to TLF gantry, Control room to pump house, Control room to PMCC building, Control room to Tank farm. All other cable tray to be laid by TAS Vendor.
- 1.20 All the above-mentioned main cable route shall be as shown in the cable route diagram.
- 1.21 Main cable route can be above ground or RCC cable trenches.
- 1.22 Catwalk along with support inside tank dyke and pump house to respective ROSOV, MOV & DBBV for laying of cable tray along the catwalk.
- 1.23 ~~VRU panel in Control room along with required protocol document / potential free contact details for integration of VRU system with TAS – for Automatic Starting/ Stopping of vapour recovery pump (s) based on pump demand for MS with or without additive & blends, ESD input from VRU panel, ESD output to VRU panel, VRU pump running status and % MS recovered from the VRU unit etc.~~
- 1.24 Power cabling of all free issue items like MOV, DBBV, ROSOV, HVLR, ~~foam pumps, jockey pumps, borewell,~~ pumps etc which are to be integrated with TAS.
- 1.25 Installation of PCVs/TCVs with Electro Pneumatic Positioner and required pneumatic line connections
- 1.26 Master Control Stations for integration of MOVs ~~and DBBVs~~ with TAS shall be provided by IOCL. Power cable for Master Control Station to be provided by the TAS vendor.
- 1.27 Firewall device between IOCL LAN and TAS LAN including required number of static IPs.
- 1.28 Router ~~and SAP PCs~~ for establishing IOCL Intranet connectivity.
- 1.29 After installation of loading arms at one bay, if possible IOCL shall arrange Tank Truck for cross checking the bay for operation of loading arms of both the loading points before replicating the installation of loading arm in other bays.
- 1.30 Operation of Fire engines and jockey pumps ~~with pressure switch in local mode. Pressure switch shall be supplied by Mechanical Vendor.~~ to maintain require pressure in fire hydrant line
- 1.31 Platform and shed for mounting of turnstile at security entry/exit gates, license area entry/exit gates, entry to tank farm or wherever provided as per tender document.


Note: If any items which is in scope of IOCL , if leads to delay in TAS work front, TAS vendor may carry out the job on behalf of IOCL with prior approval, Separate Payment shall be done by IOCL.

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	VENDOR'S SCOPE OF WORK	

VENDOR'S SCOPE OF WORK


1.0 GENERAL

- 1.1 The scope of work to be read in conjunction with BOQ, Functional design requirement (FDR), Special terms and conditions, specifications, OISD 244, statutory norms and relevant clauses of the tender document.
- 1.2 The scope of work includes complete automation of Receipt, Storage and dispatch operations carried out in a Petroleum Installation including safety measures and interlocks.
- 1.3 The job includes, Design, Engineering, Supply, Installation, integration, testing and commissioning of all the required hardware, software, logic & GUI development as per FDR for complete Terminal Automation System comprising of:
 - Tank Truck loading Operation
 - ~~Tank Wagon loading Operation~~
 - ~~Tank Wagon unloading Operation~~
 - ~~Tank Truck unloading Operation~~
 - ~~Tank Truck Calibration Operation~~
 - Pipeline Receipt Operation
 - Tank Farm Management System
 - Steam Leak Detection System in Tanks
 - Weigh Bridge System
 - Hand Held Data Entry Terminal based Drum Counting System
 - Tank Temperature Control System
 - Emergency Shutdown System
 - Valve operation
 - Pump operation
 - Fire Fighting System
 - ~~Hydrocarbon Vapour detection System~~
 - Fire Alarm System
 - Integration with CCTV Surveillance System
 - Access Control System
 - PA system
 - Telecommunication system
 - Pipeline / Refinery PLC Interface
 - Heat Tracing System
 - Other sub-systems
- 1.4 All the offered equipments and systems must have proven track record (PTR) of operating satisfactory in Refinery/ Petrochemical/POL plants. Necessary documentary proof, clients list etc. to be submitted if sought by IOCL.
- 1.5 The vendor shall be fully responsible for proper selection of equipments, design engineering, performance and successful operation of the complete system meeting the Functional & Technical requirements of the tender document.

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- 1.6 All the devices and equipments provided by vendor shall be suitable for 24x7 operations.
- 1.7 It is presumed that the Automation Vendor being the domain expert in the field of Terminal Automation is capable enough to select the best equipments & can provide best of detailed Engineering in all respect in line with the contractual scope & specification. Hence, there is no need to submit datasheets/designs for approval. However, all the documents (viz datasheets / detail engg / SW logic / System configuration etc) in compliance with the Work Order need to be submitted to IOCL for information only unless IOCL comes out with specific recommendations and requirements under the purview of the contractual scope. A copy of submitted drawings can be acknowledged by the IOCL site representative.
- 1.8 The operational requirements as specified in the tender might undergo revisions during detailed Design Engineering. The vendor must ensure that the offered system software has the capability and flexibility to take care of these revisions e.g. product changed, bays changed, product codes changed etc. Provision for master edit /configuration facility for above should be available in the offered software package.
- 1.9 Vendor will submit the deliverables requirement to IOCL well in advance during kick off meeting. IOCL will in turn ensure assigning desired responsibility matrix for facilitating the genuine requirements and execution of the project.
- 1.10 Structural Steel (Mild Steel) required for mounting of equipments, JB's etc are included in the item rate of individual equipment and no separate payment for the same shall be made.
- 1.11 All special tools & test equipments, spares, consumables required for installation, testing, calibration and commissioning of the system is to be arranged by the vendor.
- 1.12 All materials including DG Sets, switchgears, cables, lighting towers and fixtures, structural steel, consumables, testing appliances, tools and tackles necessary for completing the work shall be procured/ arranged & supplied by the Contractor at his own cost unless otherwise specified in the tender document. No claim/ delay on this account will be entertained by the Corporation.
- 1.13 All commissioning and start-up spares required up to commissioning, system acceptance and handing over of the system to the owner shall be in the vendor's scope.
- 1.14 Packing, forwarding, transportation, custom clearance, insurance, storage etc. of the terminal automation system/equipments.
- 1.15 Vendor shall have the required approval/ license from Department of Legal Metrology for carrying of Repairing/Maintenance/ Servicing of Metering Equipment for custody transfer as per guidelines from Department of Legal Metrology.
- 1.16 Completion of As-built drawings/documents as per the execution of work at site and submission to IOCL before handing over of the complete system to IOCL.
- 1.17 Maintenance of all the Automation equipments, hardware & software as supplied by the vendor shall be in the scope of the vendor throughout the commissioning, warranty and CAMC period.
- 1.18 Maintenance of following free issued items ROSOVs, MOVs, DBBVs, HVLRS, Fire fighting equipments, DG sets, Vapour recovery System, product & fire water pumps, foam pumps, PA paging System, MCC/PMCC panels as applicable which are to be integrated with Automation System shall be done by IOCL if not specifically mentioned in the tender document or BOQ.

However, hardware / software supplied for integration of the above mentioned free issued items shall be maintained by the vendor.

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Note: All the flanges supplied are to be WNRF (Weld Neck Raised Face) Flange. SORF flanges are not accepted.


2.0 Automation of Tank Truck loading operation:

2.1 TLF Gantry Equipments:

- 2.1.1 Supply, installation, integration, testing and commissioning of TLF metering instruments like ON-OFF valves, Meter proving valve manifold, Temperature Transmitter along with RTD & Thermo well, Mass Flow meter, Digital Control Valve (DCV), Isolation ball valve, Top loading arm, etc. as per Design Engineering, GA drawing, Functional Design Requirement, Tender specifications and BOQ complete in all respects.

Note: ON-OFF valve is to be installed ~~just before the DCV~~ as per GA drawing. The valve is to be connected to Process PLC for its operation as per FDR. Provision shall be there in the TAS for opening and closing of the ON-OFF valve remotely from TAS GUI for testing purpose.

- 2.1.2 Supply, installation, integration, testing and commissioning of associated equipments of metering assembly comprising of Batch Controller Unit (BCU), Remote Interaction Terminal (RIT), Driver Acknowledgement Push Button Station, Proximity Card reader (PCR), Earthing relay (Resistance- Capacitance type with socket & bolt/clamp arrangement for connecting to Tank Truck), ~~Rack monitor~~ etc along with accessories complete in all respect meeting the Functional Design Requirement & technical specification of the tender document.
- 2.1.3 Supply and configuration of proximity cards in TAS database so that the permanent proximity cards can be linked to respective tank truck in line with the requirements stated in the FDR.
- 2.1.4 Supply, installation, integration, testing and commissioning of ON-OFF Valve for Air Line. This valve shall be used for flushing of the product from metering skid by the means of pressurised Air. Provision shall be available in TAS Software for Manual/Auto Flushing with selectable option for each bay to enable Auto Flushing after each TT Loading/At day end/During Product Change and configurable ON time.
- 2.1.5 Supply, fabrication, welding, laying, testing of required MS pipes (Min schedule 40 or higher if required), bends, elbow, Tee, spool piece, WNRF flanges, SS spiral gasket, SS nuts & bolts, studs, copper flat jumpers, structural support etc for metering assembly and between metering assembly, loading arm and TLF Header.
- 2.1.6 Supply, installation, integration, testing and commissioning of Flameproof local and plant ESD push button stations at each battery (TLF shed comprising of 8 bays) of the TLF gantry and other places as detailed in the BOQ and tender document.
- 2.1.7 Civil / Mechanical / Electrical works including fabrication and erection of support structures for instruments, equipments, Junction Boxes, RIT, Driver Ack Push Button, Batch Controller, MFM, Digital Control Valve, other valves, piping etc including the casting of foundation or welding the support structure as per requirements for support wherever required.
- 2.1.8 Supply and installation of suitably designed pre-fabricated Metering Skid of Mild Steel structure at respective loading point for mounting of complete Metering assembly of main

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product, blend product and additive dosing system along with associated equipments as per product configuration detailed in the tender document.

The skid is to be designed taking into account of inter changeability of metering equipment with other reputed make with minimum modification by altering length of spool piece whenever required.

~~All metering skid shall have the provision for installation of metering assembly for one main product, one blend product and one additive.~~ All unused opening of the metering line to be blind flanged.

In addition to above, entire cabling works from respective equipments in the skid up to respective Power, Signal and Control JB within the skid are to be done and loop tested prior to shipment of the skid to site. The cabling within skid are to be done in such a way that at site only subsequent cabling from respective JBs to respective TLF JBs/ Control room equipment are required to be done for integration and commissioning of the entire metering and associated equipments.

Required FLP JBs, FLP double compression glands, Exd plugs, cables, cable trays with covers, mounting structure, FLP isolators etc as per design Engineering are to be provided on the Skid. Use of common JB for power, signal and control cables termination of respective cables within skid or TLF gantry is not acceptable.

~~For bottom loading points, entire metering skid along with associated equipments are to be installed at the bottom of the TLF gantry of respective loading point. The skid so designed shall have dimensions which can be easily installed within the TLF gantry platform. The dimension of the skid along with metering assembly and associated equipment shall be within the clearance of 1.8 m width x 4.5 m length x maximum 2.5 m height from the bottom of the platform. (Vendor needs to verify the same prior to start of fabrication work).~~


Two nos. of FLP Socket with cap shall be provided in the metering skid. One no. for providing power supply to mobile master MFM & another for integration of Mobile Master MFM with TAS for proving of main product MFM. The power supply to FLP socket shall be provided from Automation UPS.

~~For MS loading points, additional two nos. of FLP socket to be considered for blend product MFM.~~

All the equipments, JBs, cable trays, interconnecting cables, glands etc as stated above to be installed and loop tested at factory before despatch to site.

The skid to be designed and fabricated by the party taking into consideration of all the equipment sizing, space available for mounting of the skid at the bottom & top of the gantry, ease of carrying out maintenance activities etc.

The design engineering along with drawing, weight calculation of individual metering skid excluding equipments, piping fittings, flanges, stud bolts, Gaskets is to be submitted to IOCL prior to taking up fabrication job for review purpose.

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2.1.9 The entire metering skid to be painted as per specification after surface preparation and colour band to be provided on loading arm & product piping as per IS code of the base product.

2.1.10 ~~TRV along with isolation valves to be provided between the blocked portions of the product line.~~

~~In case of Bottom loading arm, TRV shall be provided in between bottom loading arm and first isolation valve in upstream and shall be installed near to isolation valve.~~

~~The outlet of TRV along with isolation valve shall be connected to main product line between ON-OFF valve and MFM as shown in TLF loading drawing.~~

2.1.11 Supply, installation, testing and commissioning of Industrial grade Layer 2 Managed Ethernet switches at TLF gantry inside FLP junction boxes along with LIU, power supply, OFC components etc for establishing communication of respective BCUs with LRCs over TCP IP link. The Ethernet switch to be connected to Terminal Server over OFC link and the switches shall have at least 20 percent spare active ports.

2.1.12 The communication between BCU and TAS has been detailed in the specification of the BCU. In addition to above, the BCU to be hardwired to Process PLC for ESD input and pump demand generation for automatic Start/Stop and sequencing of TLF pumps.

2.1.13 Card reader at TLF gantry can be connected to BCU directly over Serial interface.

2.1.14 Earthing Relay/Grounding units, Rack Monitor and Proximity Card Reader station along with accessories to be provided at each bay.


2.1.15 ~~The TCP IP output of Rack monitors and Mass Flow meters of each loading point are to be connected to DCS/Process PLC for status and interlock development as detailed in tender document in addition to their interface with BCU.~~

2.1.16 Each metering skid shall have meter proving manifold for online calibration of the mass flow meters ~~(Main and Blend product)~~ at respective loading points.

2.1.17 Supply of trolley mounted Mobile Master Meter Skid comprising of Master MFM, Master temperature transmitter, RTD, thermo well and other accessories for online calibration of main and blend product MFMs and Temperature transmitters. Master Temperature transmitter shall be connected to Master MFM.

2.1.18 The output of Master MFM provided on mobile skid is to be transmitted to Control room so that Master MFM readings are available in OIC during calibration. Vendor has to supply and install FLP socket on each metering skid for connecting Master MFM to Control room for both main and blend product. FLP Plug to be provided in Master MFM to connect it to the FLP socket for signal interface. Separate GUI to be provided in OIC for calibration with Master MFM readings for both main and blend products.

2.1.19 Design, Supply, installation, testing and commissioning of Heat Tracing System along with Heating Cable, Control Panels, Insulation, Cladding as per BoQ and technical specification for

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entire Loading Line and Equipment on Metering skid after the Isolation Valves from Main TLF Header

2.1.20 ~~Supply of skid mounted mobile Prover tank along with accessories for calibration of main and blend product meters. The prime mover required for positioning the prover tank at respective loading point and shifting of loaded prover tank to respective unloading point near TLF gantry shall be arranged by the bidder during commissioning, warranty and CAMC period at no additional cost to IOCL. Penalty clause assuming downtime of the loading bay shall be applicable in case there is delay in arranging prime mover by the vendor within 48 hours from the time of intimation/requirement.~~

2.1.21 Proving and W&M stamping of all MFMs, ~~Prover tanks, additive injection meter, turbine flow meter~~ etc (as applicable) and calibration of Master meter to be carried out as detailed in special terms and conditions of the contract.

2.2 Header Line Instruments:

2.2.1 ~~Supply, installation, testing and commissioning of Bulk air eliminator along with accessories to be provided on each main product header line of TLF gantry. The job includes making required foundation and support for mounting of the bulk air eliminator.~~

2.2.2 Supply, installation, integration, calibration, testing and commissioning of Pressure Transmitter and Temperature Transmitter along with isolation valves & accessories etc on each main product header line. Real time pressure & temperature reading of header line should be displayed in TAS GUI and readings to be stored in TAS for future analysis. If pressure and temperature in the delivery pipeline header exceeds specified value (configurable) or reduced below specified value (configurable), an audio visual alarm should be generated in TAS.

2.3 Tank Truck Entry System at TT Parking area gate:

2.3.1 Supply, installation, integration, testing and commissioning of barrier gate, proximity reader, LED display board (bilingual) in Tank truck Parking area entry/exit gate.


2.4 Tank Truck Reporting System:

2.4.1 Supply, installation, integration, testing and commissioning of instrument/equipment for TT reporting, TT queue generation and subsequent reporting to SAP as per SAP-TAS TT planning protocol.

2.4.2 TT reporting shall be done as per the latest TT reporting philosophy attached in the tender document.

2.4.3 Supply, installation, integration, testing and commissioning of 15 lines LED Bay Queue Display board along with annunciation system, structural support and accessories at TT parking area for status display and annunciation of the TTs as per FDR.

2.4.4 Supply, installation, integration, testing and commissioning of LED display along with accessories, hardware, software, converters etc at Driver's Rest Room for repeat display of

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the messages of 15 lines BQD. The job includes supply and installation of lockable ceiling/wall mounting enclosure as per site requirement for mounting of the LED display screen complete in all respect.

2.5 Vehicle Entry/Exit System at Main security gate:

- 2.5.1 Supply, installation, integration, testing and commissioning of One number of RFID reader, and One Barrier gate with infrared sensor at each main entry/exit gate for vehicles other than tank truck.
- 2.5.2 RFID readers at entry/exit gate is for identification of vehicles fitted with RFID tags and providing access to authorized vehicles inside the location.

2.6 Tank Truck Entry/Exit System at License area gate:

- 2.6.1 Supply, installation, integration, testing and commissioning of Barrier gates along with redundant PCR & redundant coloured LED display boards at each entry lane to License Area.
- 2.6.2 Supply, installation, integration, testing and commissioning of Barrier gates along with 1 no. of PCR at each exit lane of License area.

2.7 Weigh Bridge System:


- 2.7.1 Supply, installation, integration, testing and commissioning of 70 ton Weigh Bridge along with Digital weight indicator, load cell, related cables, printer, Software, Computer etc.
- 2.7.2 Provision to be provided in TAS Software for Tare Weight and Loaded Weight checking of TTs along with integration with PCR, CCTV Camera (for ANPR), Barrier Gate, Traffic Lamp, LED Display etc as per FDR.
- 2.7.3 The system shall check the observed tare weight of the TT, as recorded on the weighbridge, against Unladen Weight(ULW) in SAP which will be received from SAP and shall be populated in TAS.

3.0 Packed Truck Counting System:

- 3.1 Supply of Hand Held Data Entry Terminal along with accessories for wireless integration with TAS
- 3.2 TAS Software shall have provision for integration with Hand Held Data Entry Terminal for counting and validation of Bitumen Drums loaded on to the trucks.
- 3.3 Details of the truck and quantity shall be automatically displayed on the Data Entry Terminal and it shall have provision for validation of the same by Security/Officer.

4.0 ~~TT CALIBRATION SYSTEM:~~

- 4.1 ~~Design, supply, installation, configuration, testing and commissioning of tank truck calibration system comprising of strainer cum air eliminator, Master Mass Flow meter, DCV, spool piece with isolation valve & vacuum breaker, Batch Controller unit, cables, cable trays, JBs, structural supports, connecting pipes, bends, WNRF flanges, gaskets etc complete in all respect. These are also to be mounted on skid which is fabricated at OEM place and tested.~~

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4.2 ~~Calibration of TT shall be done using water, hence equipment so selected must be compatible with the same. Calibration shall be done in local mode, however the BCU needs to be connected to TAS for status and alarm feedback including local loading batch download when the BCU is configured to Remote mode of operation. DCV to be installed at the extreme end of the metering system so that once the DCV is closed, entire water after DCV goes to the TT under calibration using hose pipe.~~

4.3 ~~Calibration, Proving and W&M stamp philosophy, periodicity of calibration, legal fee etc shall be same as that of product master MFM.~~

5.0 TANK FARM MANAGEMENT SYSTEM

5.1 Supply, installation, integration, testing and commissioning of Tank Farm Management system comprising of Primary Radar Gauges, Secondary Radar Gauges, Multi Spot Temperature Sensor cum Water Interface Probe (MSTW), ~~Density Probe~~, Vibrating Tuning Fork Type Overfill Detector, Tank Side Indicators (TSI), Redundant Communication Interface Unit (CIU), TFMS server, Work station along with accessories, cables, JB's, cable trays, structural supports, licensed TFMS software for Server and client workstation, SAP- TFMS interface etc. complete in all respective meeting the Technical specification, typical TFMS Architecture Drawing and Functional Design Requirements.

5.2 Separate run of main cable to be used for Primary and Secondary Radar Gauges of product tanks from control room to Field Junction Box.

5.3 Each above ground product tanks to be provided with Primary Radar Gauge, Secondary Radar Gauge, MSTW, Vibrating Tuning Fork Type Overfill Detector, PT for density measurement and TSI (Tank Side Indicator) for both primary & Secondary Radar Gauges.

Note: 1) SS counterflange and SS nut bolt to be supplied for mounting and installation of radar gauges

5.4 Each above ground water & ~~sludge tanks~~ to be provided with Primary Radar Gauge and TSI.

5.5 ~~Each underground product tanks to be provided with Primary Radar Gauge, MSTW, AOPS, TSI and Density probe or ATG probe as per BoQ.~~

5.6 The above ground product, ~~water and sludge tank~~ are to be provided with a local display at the tank top.


5.7 TFMS OEM software to be provided and installed in the TAS-Management Server (TAS-MS) while allowing all data required by Process PLC to be accessed over communication link.

5.8 The output of pressure transmitter for density measurement shall be calibrated based on primary radar gauge reading and to be connected to TAS-MS/ Process PLC.

5.9 The output of AOPS and the relay outputs of Primary & Secondary Radar Gauges of product tanks are to be hardwired to Safety PLC.


5.10 TFMS data along with density data as sensed to be interfaced with SAP as per SAP-TFMS protocol through TAS-MS only.

5.11 ~~Supply, installation, integration, testing and commissioning of Level switches along with accessories & mounting structure on underground sump tanks of static water, service water etc.~~

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~~The level switches are to be interfaced with TAS for low level & high level alarms and its interlock development related to Start/Stop of respective pumps/borewell and opening/closing of respective line SOVs/MOVs as detailed in tender document/ site requirement.~~

- ~~5.12 Supply, installation, integration, testing and commissioning of Magnetic flap type level transmitter along with accessories & mounting structure on Blue dye tanks and Additive tanks (as applicable).~~
- ~~5.13 Supply, installation, integration, testing and commissioning of Bi-colour magnetic flap type level gauges with transmitter along with accessories & mounting structure on Foam Mother tanks, Foam daughter tanks, Overhead HSD day tanks for DG sets & Fire engines.~~
- ~~5.14 Supply, installation, integration, testing and commissioning of Turbine flow meter with transmitter along with Totalizer, accessories & mounting structure for consumption to pipeline Division.~~
- 5.15 The level transmitter are to be interfaced with TAS for level measurement, low & high level alarms and its interlock development related to Start/Stop of respective pumps and opening/closing of respective line MOVs/ SOVs as detailed in tender document/ site requirement.
- 5.16 The job for external modifications (Hot and cold work) required on tank's manhole cover plate and blind flange plate for installation of Radar Gauges, MSTW, AOPS, TSI, level switches, level transmitters etc along with all accessories is included in the respective item rates and no separate payment shall be made for the same.
- 5.17 All power, control, Signal, earthing cabling and communication cables, JBs, cable trays, supports, glands etc required for TFM system and its interface with TAS and Process PLC are in vendor's scope. The job also includes cabling and integration of the relay outputs of respective gauges/ field equipment's with Process PLC/TAS, logic development as per FDR and tender document.
- 5.18 HMI shall have provision for proof testing of radar gauge relay output as per FDR of the system.
- 5.19 Existing TFMS System including TFMS Servers, CIUs, TFMS Instruments, OICs, System Cabinet etc and necessary License will be handed over to the vendor. It shall be vendor's responsibility to select TFMS instrument for new tanks compatible with the existing system and integrate the same.
- 6.0 EMERGENCY SHUTDOWN SYSTEM**
- 6.1 Supply, installation, integration, testing and commissioning of FLP Emergency Shutdown Push Button stations for local and plant ESD activation along with mounting accessories at following locations:
- 6.2 Local ESD push button Station:
 - a. Each Battery of TLF / CRMB TLF
 - b. Pump house
 - c. CRMB Plant
 - d. Drum Filling Plant
- 6.3 Plant ESD push button Station:
 - a. Control Room
 - b. Each battery of TLF


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- c. Cabin of location in-charge
- d. Security Cabin
- e. Each tank dyke
- f. TLF Pump house
- g. CRMB Plant
- h. Drum Filling Plant

- 6.4 ESD push button Stations to be hardwired to ~~Safety~~ PLC and suitable interlocks to be developed as detailed in FDR.
- 6.5 Whenever local ESD, plant ESD and power ESD is invoked either from ESD push button stations or from OIC or process alarms, system should take action as per FDR.
- 6.6 Following equipments shall be hardwired to ~~Safety~~ PLC for ESD input: BCUs, Barrier gates, DCS/Process PLC, ACS equipments, VRU panel, OWS panel, ROSOVs, DBBVs and header line MOVs of TLF.
- 6.7 Supply, laying, glanding, feruling and termination of control cables from ~~Safety~~ PLC to MCC and UPS power distribution panel for cutting power supply when power ESD has been activated as per details mentioned in the FDR.
- 6.8 During Power ESD, system shall hold last updated status & data of all the TAS equipments and this status & data shall be made available in TAS GUI. GUI shall differentiate the real time data & status with the last hold data & status. Once the ESD condition gets reset, system shall restore all the real time data & status automatically.


7.0 VALVE CONTROL SYSTEM

- 7.1 All the Tank Body Valves ~~ROSOVs~~ are to be hardwired to the ~~Safety~~ PLC for status indication and control of the Tank Body Valves ~~ROSOVs~~ as per FDR and tender document. ~~SIL Barriers, if required for integration of the ROSOVs for open/close feedback are to be considered as a part of ROSOV's integration and no separate payment shall be made.~~
- 7.2 Supply, installation, testing and commissioning of Ex-proof Local push button station (LPBS) along with mounting structure outside tank dyke for remote operation and status indication of Tank Body Valves ~~ROSOVs~~. Operation of Tank Body Valves ~~ROSOV~~ through LPBS shall get logged in TAS with date and time stamp-
- 7.3 All ~~DBBVs & MOVs~~ installed at TLF, ~~Product tanks body valve~~, water draw off line of product tanks, valve pit manifold (OWS & Storm water drain), common header of product line, re-circulation line outside dyke, TLF & ~~TWL~~ header line, pump house manifold (TLF, ~~TWL~~, ~~TWD~~), ~~sprinkler and foam pourer line~~, hydrant line, ~~Foam line~~, ~~Water tanks~~, ~~U/G static water sump~~, ~~foam daughter tanks~~, ~~foam day tanks for HVLR~~ ~~Foam Mother tanks~~, ~~U/G Foam sump~~, etc are to be integrated with TAS via Master Control Stations. The cabling philosophy/ Topology to be followed shall be as per tender document and shall be in line with the communication protocol of the free issued MCS and MOVs.
- 7.4 Signal Repeaters along with its cabling, if required for integration of MOVs over two wire communication are to be considered as a part of MOV integration and no separate payment shall be made.
- 7.5 Installation, Integration, Configuration, testing and commissioning of free issued Redundant Master Control Stations of MOVs with TAS. The job also includes supply, laying, glanding and termination of power cables for powering the MCS.

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Note: In case MCS are free issued items, then IOCL shall arrange OEMs visit for the first time configuration and testing. If subsequent visits of OEM are required, the same has to be arranged by the TAS vendor at no extra cost to IOCL.

- 7.6 ~~Supply, installation, integration, testing and commissioning of Solenoid operated Valves (SOVs) at the inlet of Foam daughter tanks, day tanks of HSD for DG sets and Fire Engines along with manual bypass arrangement as detailed in the tender document.~~
- 7.7 All MOVs installed at critical locations used for firefighting like Fire hydrant line, ~~Foam line, Sprinkler & Foam pourer line,~~ Fire water and Service water lines, Borewells, day tanks of HSD for Fire Engines & DG sets, Mother tanks, daughter tanks and day tanks of foam system, and fire hydrant and foam line manifold etc shall not be linked with ESD so that the same can be operated even in emergency conditions.
- 7.8 PCV(Pressure control valve) ,TCV(Temperature control valve) ,ON-Off valve for TLF metering skids for product flushing and air flushing etc. to be integrated with PLC for their remote Auto/manual operation.
- 7.9 ~~Supply and installation of cable glands and reducers for all cable of complete ROSOVs, DBBVs and MOVs. Vendor to note that the cable glands and reducers are to be procured considering the cable entry size and type of cable to be used. Cable entry size shall be provided by IOCL to the successful bidder as and when actuator makes and model no. is confirmed. Vendor shall provide cable gland and reducer for control & signal cables only.~~
- 7.10 Supply, laying, glanding, ferruling and termination of Signal and Control cables along with accessories like FLP JB, glands, reducers, plugs, cable trays, mounting structure, civil and mechanical work etc for integration of ROSOVs, DBBVs, MOVs, SOVs, Master Control Station and LPBS with TAS as per cabling philosophy mentioned in the tender document.
- 7.11 Required signal interface, logics, interlocks, software & GUI development for operation of ROSOVs, DBBVs, MOVs, SOVs etc as per Functional Design Requirements and tender document is in the scope of the vendor.
- 7.12 Supply, installation, integration, testing and commissioning of Ex-proof and weatherproof Hooter cum Beacons near tank dyke wall for Audio Visual alarms in field whenever the MOVs installed at Dyke drain and water draw off line of product tank is not fully closed. On acknowledgement of alarm from control room, hooter shall stop blowing however beacon shall continue to glow till alarm condition has been normalized.
- 8.0 **PUMP AUTOMATION**
- 8.1 All the product pumps of TLF, ~~ethanol, bio-diesel, additive (XG, XP), blue dye, submersible pumps of U/G product tanks, sludge pumps, OWS pumps, Service water pumps, static water pumps,~~ fire water pumps (as applicable) etc are to be integrated with TAS for feedback and control as per FDR and tender document.
- 8.2 Supply, laying, glanding, ferruling and termination of Control cables along with accessories like FLP JB, glands, plugs, cable trays, mounting structure, civil and mechanical work etc from respective pump feeders at MCC/PMCC/ starter panel to Control room for integration of the respective pumps with TAS.
- 8.3 Required logics, interlocks, software & GUI development for operation of all the pumps as per Functional Design Requirements and tender document is in the scope of the vendor.

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9.0 FIRE FIGHTING SYSTEM


- 9.1 Integration of Fire Engines, Jockey pumps, Centralized Foam Feeding System, Sprinkler system, Fixed Foam Pourer system, Borewell, Make up water/Fire water sump pumps, HVLRS (whichever applicable) with TAS as detailed in FDR and tender document.
- 9.2 Supply, laying, glanding, ferruling and termination of control and signal cables along with accessories like FLP JBs, glands, plugs, cable trays, mounting structure, civil and mechanical work etc from respective pump feeders at MCC/PMCC/FWPMCC/ starter panel, Fire Engine Panels, HVLR Panels at field to Control room for integration of Fire Fighting equipments with TAS.
- 9.3 Required signal interface, logics, interlocks, software & GUI development for operation of all the Fire Fighting equipments as per Functional Design Requirements and tender document is in the scope of the vendor.

~~10.0 HYDROCARBON VAPOUR DETECTION SYSTEM~~

- ~~10.1 Vendor is required to conduct Fire and Hydrocarbon Vapour Mapping study (Dispersion Modelling Study) through reputed agencies having proven track Record of conducting similar studies for oil Installations across the globe, using standard licensed software as a part of Quantitative Research Analysis (QRA) for selection of type of detectors and correct positioning of the detectors as detailed in the tender document.~~
- ~~10.2 Supply, installation, integration, calibration, testing and commissioning of Point type & Open path type Hydrocarbon Vapour detectors along with portable calibrator, accessories and to be interfaced with TAS for alarms and % LEL indications of hydrocarbon vapour in OICs. The job also includes periodic calibration of the detectors throughout the CAMC period as detailed in the tender document. HC detectors quantity to be provided as per DMA results.~~
- ~~10.3 It shall be the responsibility of the vendor to demonstrate the proper functioning of the HCD at site. The detector should detect the presence of MS/ hydrocarbon vapours around the area where the detectors have been installed by physically positioning a fixed qty of MS liquid (3-5 litres) in open tray/container and generate alarms accordingly.~~
- ~~10.4 Supply, installation, integration, testing and commissioning of Ex-proof and weather proof Hooter cum Beacons along with accessories and structural supports near each tank, pump house, VRU, ETP and other areas where detectors are installed for Audio Visual alarms in field. On acknowledgement of alarm from control room, hooter shall stop blowing, however beacon shall continue to glow till alarm condition has been normalized.~~
- ~~10.5 Required signal interface, logics, interlocks, software & GUI development of Hydrocarbon Vapour Detection System as per Functional Design Requirements and tender document is in the scope of the vendor.~~

11.0 PLANT COMMUNICATION (PA) SYSTEM

- 11.1 Supply, installation, integration, testing and commissioning of Plant communication System comprising of Network Racks, Redundant server, Ethernet switches, Master call station, Outdoor field call station, 6W Ring type/Box type speaker, 25 W Horn type speaker, Ex-proof/weather proof housing for installation of switches, LIU, OFC accessories etc., PA system with software and licenses.

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- 11.2 Fire alarm system to be interfaced with PA paging system for Auto announcement of pre-recorded messages with respect to the location from where fire is detected or MCP has been pressed.
- 11.3 PA paging system to be integrated with VHF handsets for broadcast of messages (To be done only in case provision for integrating VHF handsets is available in existing VHF system).
- 11.4 Supply, laying, glanding, ferruling and termination of power, OFC and CAT 6 cables, OFC components, media converters, LIUs, patch cords, pigtails, connectors etc along with accessories like FLP JBs, Explosion proof housing for mounting of field components, glands, plugs, cable trays, HDPE pipes, mounting structure, civil and mechanical work etc for complete plant communication system and its interface with TAS as detailed in tender document.
- 11.5 Required signal interface, logics, interlocks, software & GUI development of PA System as per Functional Design Requirements and tender document is in the scope of the vendor.

~~12.0 IP BASED EPABX SYSTEM~~

- ~~12.1 Supply, installation, integration, testing and commissioning of IP based EPABX system comprising of Network Racks, IP EPABX system, Ethernet switches, RJ I/Os, IP based desktop phones etc~~
- ~~12.2 EPABX system to be interfaced with VHF handsets for broadcast of messages.~~
- ~~12.3 Supply, laying, glanding, ferruling and termination of power, OFC and CAT 6 cables, OFC components, media converters, LIUs, patch cords, pigtails, connectors etc along with accessories like FLP JBs, Explosion proof housing for mounting of field components, glands, plugs, cable trays, HDPE pipes, mounting structure, civil and mechanical work etc for complete plant communication system and its interface with TAS as detailed in tender document.~~
- ~~12.4 Required signal interface, logics, interlocks, software & GUI development of EPABX system as per Functional Design Requirements and tender document is in the scope of the vendor.~~

13.0 FIRE ALARM SYSTEM

- 13.1 Supply, installation, integration, testing and commissioning of Fire alarm System comprising of Main panel, Repeater panel, smoke detectors, heater detectors, combination / multisensor detectors, MCP, hooters, beacons, response indicators, fault isolation modules (if required) along with accessories & mounting structures and to be interfaced with TAS as detailed in the FDR and tender document. All the detectors in the control room preferably are to be wireless. In case of any additional hardware requirement for achieving the functionality, the same to be provided by vendor at no additional cost to IOCL.
- 13.2 Fire alarm system to be interfaced with PA paging system for Auto announcement of pre-recorded messages with respect to the location from where fire is detected or MCP has been pressed.
- 13.3 Supply, laying, glanding, ferruling and termination of power, control and signal cables along with accessories like FLP JBs, glands, plugs, cable trays, mounting structure, civil and mechanical work etc for complete fire alarm system with TAS including necessary interface with PA paging system.
- 13.4 Required signal interface, logics, interlocks, software & GUI development of Fire alarm System as per Functional Design Requirements and tender document is in the scope of the vendor.
- 13.5 H2 detector to be installed in battery room.

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14.0 CCTV SURVEILLANCE SYSTEM

- 14.1 CCTV Surveillance system is available in the Plant. The system is NOT to be taken over by the vendor and will continue to be maintained by the existing CCTV Vendor.
- 14.2 Supply, Installation, Testing, Integration and Commissioning of additional CCTV Cameras, Storage, Network switches and allied items are in the scope of vendor.
- 14.3 IOCL will provide necessary support through existing CCTV Vendor during integration. However, it is TAS vendor's responsibility to complete the integration and commission the additional cameras in existing system.
- 14.4 ANPR license is available in the existing CCTV system. Integration of ANPR Cameras for TT Reporting and at Weigh Bridge shall be done with TAS. IOCL will provide API documents and necessary support through existing CCTV Vendor.

Note: 1. GI Foundation bolts are to be supplied for installation of CCTV camera poles.

~~2. Provision for ON/OFF through TAS system as per user defined configurable timings for CCTV lighting is in scope of TAS vendor.~~


- 14.5 Submission of drawing for CCTV JB's during detailed engineering. CCTV JB's to be prewired with assembly of all necessary equipment's such as LIUs, patch cords, pig tails, connectors, power supply unit, MCB, switches etc on the DIN rail and the same to be supplied at site.
- 14.6 CCTV system shall be interfaced with TAS for critical inputs from TAS like ESD, product Tank HiHi and HiHiHi alarms etc. On receipt of such alarms from TAS, CCTV system shall position the respective PTZ cameras to pre-defined positions.
- 14.7 Ladders if required for installation, maintenance, testing and commissioning of the system are to be arranged by the vendor.
- 14.8 Supply, laying, glanding, ferruling and termination of power, OFC and CAT 6 cables, OFC components, media converters, LIUs, patch cords, pigtails, connectors etc along with accessories like FLP JB's, Explosion proof housing for mounting of field components, glands, plugs, cable trays, HDPE pipes, mounting structure, civil and mechanical work etc for complete CCTV system and its interface with TAS as detailed in tender document. Cable shall be laid three meters away from the boundary wall as extant as possible towards.

~~15.0 TT UNLOADING METERING SKID~~

- ~~15.1 Supply, installation, testing and commissioning of suitably designed pre-fabricated Metering Skid of Mild Steel structure at respective unloading point for mounting of complete Metering assembly along with associated equipment's as per product configuration detailed in the tender document.~~

16.0 ACCESS CONTROL SYSTEM

- 16.1 Design, supply, installation, testing and commissioning of Access control system comprising of face recognition, Bio-metric access control system, proximity smart card reader, Boom barrier, Turnstile, RFID readers, Flap Barrier, Door frame metal detector, Handheld metal detector, magnetic lock for rolling shutter, electro-magnetic lock for doors, Server, ACS software, visitor management system etc as detailed in FDR, tender document and BOQ.
- 16.2 Supply and configuration of smart cards, face and fingerprints of all the employees and authorized person of the terminal.

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- 16.3 One number of Authentication device (Biometric reader) and Bar/QR code reader shall be in scope of supply of vendor at no additional cost to IOCL.
- 16.4 The ACS shall be interfaced with TAS and all ACS equipment's (turnstile, flap barrier, barrier gate, magnetic door lock etc) are to be hardwired to Safety PLC so that during ESD and fire condition, respective ACS equipment's gets de-latched and free access can be made during emergency conditions.
- 16.5 Supply, installation, testing and commissioning of Visitor management PC along with ~~Visitor Management software~~, web camera, printer at security gate along with accessories.
- 16.6 Supply, laying, glanding, ferruling and termination of power, control, signal, CAT 6, Optical fiber cables along with accessories like FLP JB's, glands, plugs, cable trays, OFC components, mounting structure, civil and mechanical work etc for complete Access Control System as detailed in tender document.

17.0 OTHER SUB-SYSTEMS

- 17.1 ~~Supply, installation, integration, testing and commissioning of Blue Dye Dosing System (as applicable) along with accessories complete in all respect and to be interfaced with TAS as detailed in FDR and tender document.~~

~~Required signal interface, logics, interlocks, software & GUI development of blue dye dosing system as per Functional Design Requirements and tender document is in the scope of the vendor.~~

- 17.2 ~~Integration of Bio diesel pumps, tank farm instruments, valves etc required for Bio diesel blending (as applicable)~~
- 17.3 Integration of PDBs of MOVs and feeder in PMCC as detailed in FDR and tender document.
- 17.4 Supply, installation, integration, testing and commissioning of Automatic Wailing Siren along with controller and accessories complete in all respect. Provision shall be there to operate the siren locally as well as from Control Room/ OIC. The Siren shall also blow automatically in case of MCP/BGU/ESD activation as detailed in FDR and tender document.
- Siren code to be adopted as per PNGRB guidelines, conveyed during the project execution.
- 17.5 Supply, installation, integration testing and commissioning of smart Pressure transmitter with inbuilt display unit at suction and discharge line of product pumps, Foam line header, Fire hydrant header line, product header line of TLF, Pipeline header from pipelines division in exchange pit, Instrument Air Line, Jockey Pump & Fire Pump discharge header TWL & TWD (as applicable) etc.
- 17.6 Supply, installation, integration, testing and commissioning of smart differential pressure transmitter with inbuilt display unit across strainer of product pumps of TLF, across strainer in fire pump house, strainer in Ethanol & B-100 receipt header and discharge line ~~TWL & TW~~ unloading (as applicable) The system should generate alarm for cleaning of the strainer in case strainer is choked by 50% or more.
- 17.7 Supply, installation, integration, testing and commissioning of Rodent Repellant System for Control Room, Security room, Admin building, S&D room & Invoice room (as applicable) as per tender document and BOQ.

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17.8 Supply, laying, glanding, ferruling and termination of control and signal cables for integration of free issued TCV,PCV,On-Off Valves, Air Compressors along with GUI developments, logics and interlocks complete in all respect as per FDR and tender document.

17.9 ~~Integration of Vapour Recovery Unit system with TAS along with signal interface, logics, interlocks & GUI development for sharing of following signals :-~~

17.9.1 ~~From TAS to VRU :-~~

- ~~Pump demand of MS loading points of TLF for automatic Start/Stop of vapour recovery pump(s)~~
- ~~ESD output to VRU panel~~

17.9.2 ~~From VRU to TAS:-~~

- ~~ESD input from VRU panel~~
- ~~%MS recovered from the VRU panel.~~
- ~~Pump running~~
- ~~Fault~~

17.10 ~~Supply, laying, glanding, ferruling and termination of Control & signal/ CAT6/Optical fiber cables along with accessories like FLP JBs, glands, plugs, cable trays, OFC components, mounting structure, civil and mechanical work etc for integration of VRU system with TAS over Serial/TCP IP communication.~~

18.0 CONTROL ROOM EQUIPMENTS

18.1 Supply, installation, configuration, integration, testing and commissioning of Process PLC complete as per specification and tender document.

18.2 ~~Supply, installation, configuration, integration, testing and commissioning of Redundant SIL 3 PLC complete as per specification and tender document.~~

~~Safety system shall communicate with Process PLC for execution of inter dependent interlocks.~~


18.3 All programming software for modification/ Configuration of both Process PLC to be made available on common Engineering Work Station (EWS).

18.4 Supply, installation, configuration, integration, testing and commissioning of control room equipment complete as per Design Engineering, System Architecture, FDR, BOQ and tender document.

18.5 Design, Supply, Installation, Configuration, Testing & Commissioning of Complete Terminal Automation Software for integrated Process PLC including required software and GUI complete as per specifications and tender documents meeting the requirement of complete Terminal Automation System.

18.6 TAS software shall be interfaced with following but not limited to major sub-systems / equipments along with GUI development for monitoring, logging, reporting and Controls-Interlocks etc as per specification and tender document.


- ✓ Process PLC
- ✓ TLF Automation System (TT reporting, registration & entry system, TT Queuing, FAN generation, Weigh Bridge, Bay allocation, ~~Additive Dosing system, Ethanol blending System,~~ Interface with TLF equipments like BCU, MFM, Barrier Gates, Bay Queue

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Display, Bay allocation Display, Invoice generated display, rack monitors, Proximity card readers etc)


- ✓ Tank Wagon Loading System (Rake reporting, Rake registration, Tank Wagon Loading Advice note, Loading sequence, Dispatch of Rake, TW metering system etc)
- ✓ Tank Wagon unloading Automation System
- ✓ Tank Lorry Decantation System
- ✓ Valve Automation System (MOVs, PCV, TCV, On-Off Valves, MCS Interface, SOVs, etc)
- ✓ Tank Farm Management System (TFMS Servers, Primary & Secondary Radar Gauging, AOPS, Level transmitters, level switches, Density probes, MSTW, CIU etc)
- ✓ MCC, Pump, Borewell, DG Sets
- ✓ Plant communication system (PA paging, VHF system and their interface with TAS)
- ✓ VHF system integration for tracking of handsets.
- ✓ HC Detection System Interface
- ✓ Fire Fighting System, HVLR, Fire Alarm System Interface, Fire Engines, DG Sets, Jockey pumps, Foam pumps, CFFS, Sprinkler & Fixed foam pourer System etc
- ✓ Vapour Recovery System
- ✓ Effluent treatment plant System
- ✓ CCTV systems
- ✓ Weigh Bridge System
- ✓ Packed Truck Drum Counting System
- ✓ Heat Tracing System
- ✓ Access Control System
- ✓ ESD System, Emergency panel, Power ESD, Local ESD, Wailing Sirens
- ✓ Pressure Transmitters, Temperature Transmitters, Differential Pressure Transmitters.
- ✓ UPS & Power distribution boards
- ✓ IOCL's SRMS (Service request management system) portal
- ✓ Any other System, Sub-system, Third Party Interface devices etc as per scope of the work order

- 18.7 Terminal Automation Software shall have provision for manual FAN generation without disturbing communication from SAP.
- 18.8 Terminal Automation Software shall have provision for storing & displaying the signature of Customer Authorized person (Yellow Card Holder). The S&D Officer shall physically verify the signature on the invoice and Approve/Reject the same in TAS Software. Based on this action, Barrier Gate of Security Exit shall Open/Remain closed for the respective TT along with appropriate message on EDU as per FDR.
- 18.9 Secured Wireless zone should be created in admin building and control room of the terminal, using wireless access points by TAS vendor.
- 18.10 Terminal Automation system should have the feature of viewing terminal operations, generation of alerts through push notifications in mobile, within the wireless zone and same to be validated by a multi-level password end-to-end encrypted system.
- 18.11 Supply and installation of interface equipment required for integration of VHF sets with IPABX/EPABX system is in the scope of vendor.
- 18.12 Additionally, the interfaced VHF sets should be tracked as per specification given in the tender.

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- 18.13 All OICs, Workstations, Servers other than that of CCTV, ACS & TFMS are to be connected to both plant management and control LAN so that all the GUIs can be seen in all the PCs irrespective of its nomenclature like TTES, OIC, EWS, TM PC etc.
- 18.14 Printers are to be connected to Plant Management LAN and to be configured to all PCs, Workstation, TTES etc so that printout command can be issued from any of the Machine.
- 18.15 TAS-MS to be interfaced with SAP as per latest version of SAP-TAS, SAP-TFMS, TT planning and other interfacing protocols, communication protocol over TCP/IP communication link via firewall device.
- 18.16 Fault detection module software to be kept in the TAS Software which will be able to provide system generated Down Time calculation for a stipulated period as detailed in tender document.
- 18.17 Web server shall be provided for remote viewing of site parameters. It shall be interfaced with IOCL network for providing site data to the users over intranet as detailed in tender document.
- 18.18 All the equipments of Control room, Security room, S&D room, Terminal Manager Room, invoice room which includes TAS-MS/ TFMS Server, OIC/TFMS client/ TTES, EWS, Terminal Server, Process PLC, etc. shall be connected to Dual redundant LAN system and shall have redundancy in communication link. There shall not be any single point failure in connectivity of equipments over LAN.
- 18.19 System should have redundancy for critical communication links like Batch Controllers to Process PLC interface; TFMS CIU / TFM Computer to TAS-MS/ Process PLC interface, Process PLC to TAS-MS interface, MCS to Process PLC interface etc to ensure availability of the system.
- 18.20 Providing support to IOCL for configuration, testing and commissioning of free issued Firewall device between TAS LAN and IOCL LAN to minimize the risk of Cyber Threats and it must be ensured that there is no direct path or communication between corporate network (IOCL LAN) and automation network(TAS LAN) as detailed under Functional specification and Software testing.
- 18.21 Supply, installation, testing and commissioning of LED display screen (wall mounted) & hooter (connected to Process PLC) for critical alarm display and annunciation with provision to acknowledge the alarms and fire fighting system display.
- 18.22 All the critical alarms are to be configured in the system and display only active alarms. Active alarms should blink if not Ack, Steady if acknowledged & alarm conditions persists and Auto clear if Alarm condition is cleared & acknowledged.
- 18.23 Supply, installation, integration, testing and commissioning of parallel redundant UPS of suitable capacity for powering the entire Automation System and its equipments. The offered UPS must have additional 30% spare capacity for future load connection. The scope also includes supply of Sealed- Maintenance free VRLA battery bank (2x50%) for ½ hour back up time at rated load along with structural supports for mounting of the UPS and batteries complete as per specification and tender document.

Power supply to Master Control Stations, ~~VRU system~~, OWS system and IOCL internal LAN network shall be fed through Automation UPS. Vendor is required to consider additional connected load of ~~10 KVA~~ 5 KVA while sizing the capacity of the Automation UPS.

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- 18.24 Supply and laying of power cable for parallel redundant UPS from MCC/PMCC room to Control Room. Individual Power cable shall be laid to each of the parallel redundant UPS & Auxiliary unit through separate feeder provided by IOCL in MCC/PMCC room.
- 18.25 Supply and installation of System cabinet/Panel (42 U) complete as per specification and tender document.
- 18.26 Supply and installation of operator consoles as per specification and BOQ for mounting IT hardware. Each console will consist of necessary electrical wiring, power sockets, MCBs, Light, Louvers & FAN etc as required.
- 18.27 Supply of furniture like chairs & printer stands with paper mounting racks at control room.
- 18.28 Integration, testing and commissioning of existing OIC/ TFMS workstation, CCTV client PC with LED Display along with networking components, software, OS, antivirus etc complete as per specification and tender document at Terminal Manager's Room with new Terminal Automation System.
- 18.29 Supply, installation, integration, testing and commissioning of CCTV client PC with LED Display, Access Control Visitor management PC, Laser printers for printing of FAN & Visitor pass, web camera, networking components etc complete as per specification and tender document at Security Room.
- 18.30 ~~Supply, installation, integration, testing and commissioning of redundant TTES, redundant Terminal Server, networking components etc complete as per specification and tender document at S&D room.~~
- 18.31 Supply, installation, testing and commissioning of heavy duty ~~Line matrix~~ laser printer for invoice printing, TTES, LED monitor display, networking components etc complete as per specification and tender document at lock shed room/ invoice room.
- 18.32 Supply of standard computer table & printer table in TM room, security room, lock shed and S&D room for mounting of OIC, workstation, printers and other TAS equipments.
- 18.33 Supply of computer stationary, printer cartridges required for printing reports, FAN etc during commissioning and trial run period.
- 18.34 Supply and laying of OFC along with OFC components from Control room to admin building, S&D room, invoice/lock shed room and security room for establishing TAS LAN connectivity from Control Room to respective building wherever TAS equipments are to be connected in TAS LAN.
- 18.35 Supply and laying of all required Fiber Optic Cabling, CAT 6 Ethernet Cables, UTP to Fiber Optic Convertor, Fiber Optic Patch Cord, LIU, Connector Panel, Coupler, mounting rack, RJ 45 Connector, switches etc required for building dual LAN network within Control Room, ~~S&D~~, Admin building, Security Room, Invoice/lock shed room, Driver's rest room and other places wherever TAS LAN connectivity is required as per design Engineering including supply and laying of power cables for powering LAN switches, media converters & TAS equipments connected to LAN.
- 18.36 Supply, installation, testing and commissioning of network components for establishing IOCL intranet LAN connectivity inside Admin Building, Control Room, S&D room, Invoice room along with LAN face plate and associated accessories.

Supply, laying, glanding, ferruling, splicing, termination of all required Fiber Optic Cabling, CAT 6 Ethernet Cables, Fiber Optic Patch Cord, LIU, Connector Panel, Coupler, mounting rack,

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RJ 45 Connector, PVC conduits, cable trays along with structural support etc complete in all respective as per design Engineering for establishing IOCL Intranet LAN network inside Admin Building, Control Room, S&D, Invoice room along with LAN face plate and inter building connectivity between switches using OFC cables along with accessories etc. The job also includes supply and laying of power cables for powering LAN switches, media converters and other network accessories used for establishing LAN connectivity.

- 18.37 Supply and installation of **Multi Cable Transit (MCT) Blocks** at the Automation cable Entry point to control room, S&D room, Invoice/ lock shed room, security room and Admin building for proper sealing of the cable entry point. All works relating to the sizing, designing and installation of MCT Blocks is within the scope of the vendor.
- 18.38 Supply, Laying and termination (at both ends) of requisite earth cable between the earthing point in the Control panels and the earth bus bar and GI strip from earth bus bar to respective earth pit. Tying of screens of shielded cables to the respective instrument earth bus.
- 18.39 Supply, installation, testing and commissioning of external / inbuilt lightening and surge protection devices as detailed in BOQ and tender document.

19.0 Cabling and Earthing


- 19.1 Supply, laying, glanding, ferruling, termination of all types of FRLS and FS cables (Signal, Power, Control, CAT 6, communication, OFC, UTP, earthing cables, GI Strips etc) along with associated hardware like FLP Junction Boxes, certified Exd. double compression cable glands, PVC shrouds, Exd plugs for unused cable entries of JB's & instruments, FLP isolator switch, cable trays with covers, OFC components (like 12/24 port LIU, splice trays, loaded adaptor and blank plates, UTP and optical patch cords, pigtails, media converters etc), splicing, jointing, testing optical fiber cables, SS 316 engraved tag plate, mounting clamps & SS 316 fasteners, conduits, hume pipes, making trenches, pedestal for mounting cable tray, cable route makers, structure steel for making supports for mounting of cable trays, JB's etc, anchor fasteners, nuts, bolts, screws, foundation, isolators for mounting of GI strip on TLF structure, Earthing bus bar, Al clamp for clamping of cables inside cable tray, connectors etc required complete as per specification and tender document for integration & commissioning of the Automation & free issued equipments for following system/ sub system Automation:
- 19.2 Complete TLF Automation System for integration of field equipments comprising of Mass Flow meters, Temperature Transmitter with RTD, Differential Pressure Transmitter across strainer, DCV (piston type), On-Off valve (Piston Type), ~~Bottom Loading arm parking Position sensor, Rack Monitors~~, Earthing Relay/ Grounding Units, RIT, Driver's Ack PBS, Batch Controller, pump demand & ESD control cables from respective BCU to Process PLC, Proximity card readers (TLF, Entry & Exit gates, Security Gate, TT parking and other areas), Layer 2 switches, FLP Sockets at each metering skid, Pressure & Temperature Transmitters at Header line of TLF and TW unloading, ESD PBS (Local & Plant ESD at gantry and other places as specified in the tender), Ethanol blending system, Additive dosing system, Barrier gates, LED display boards for TT registration, Bay Queue display board along with accessories, LED display Screen at lock shed/ Invoice Room & Driver's rest room, LED display board at license area Entry barrier Gate for displaying allocated bay no. to TT, any other equipments supplied and installed for complete Tank Truck Automation System as per BOQ.

Note: Separate Power supply isolators to be provided for isolating power supply of common bay equipments (Earthing relay, Rack Monitor, BCU, Card Reader).

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All Power supply isolators for TLF instruments are to be provided in Control room.


- 19.3 ~~Complete Automation of TT calibration system comprising of DPT across strainer cum air eliminator, Master MFM, DCV (piston type), Batch Controller, pump demand signals & ESD control cables from respective BCU, MFM to Process PLC & Safety PLC. Start/ Stop Push button station for TT calibration pumps in case the pumps are kept in local mode, any other equipment supplied and installed for complete Automation of TT calibration System as per BOQ etc.~~
- 19.4 ~~Complete Automation and integration of Tank Farm Management System for A/G product & Ethanol tanks, U/G product & Ethanol tanks, Sludge Tanks, Fire Water Tanks, U/G service water sumps, U/G fire water sump, U/G TT calibration sump, Day tanks for Fire Engines & DG sets, Daughter tanks & Mother tanks of Foam System, Additive & Blue dye tanks etc comprising of Primary Radar Gauges, Secondary Radar gauges, MSTW, Tank side indicators, AOPS, density probes, level switches (Hi & Lo), Bi-colour magnetic flap type level gauge with transmitter, ATG probes , any other equipments supplied and installed for complete Tank farm Management System as per BOQ~~
- 19.5 ~~Complete Automation and integration of Bio-Diesel Blending system.~~
Cable to be laid for Bio-Diesel Skid:-
Cable required for MOV PDB : By Electrical vendor from PMCC.
Cable required for Instrument including Fibre optic cable for integration : By TAS vendor from Control room.
- 19.6 ~~Complete Automation and integration of RON booster dosing system using static mixer and additive mono block supplied by automation vendor.~~
Cable to be laid for RON booster Skid:-
Cable required from PMCC by Electrical vendor.
Cable required from control room for Automation Feedback and control by TAS vendor.
- 19.7 ~~Complete Automation and integration of CCTV system, Hydrocarbon Vapour Detection system, Fire detection System (FAS), Access Control System, wailing siren, integration of PA paging system, Vapour Recovery System, DG sets, Effluent Treatment plant (OWS), Rodent repellent system.~~
- 19.8 ~~Complete Automation and Integration of Fire fighting System comprising of Fire engines, Foam pumps, Jockey pumps, bore wells, make-up water pumps, Pressure Transmitters installed on fire hydrant & foam network line, Centralised foam feeding System, Sprinkler & Fixed foam pourer System, integration of HVLR, any other equipments supplied and installed / free issue items for complete Automation for firefighting System as per BOQ and tender requirement.~~
- 19.9 ~~Complete Automation and integration of all the product loading & unloading pumps (TLF, TWD), Ethanol pumps, additive pumps, blue dye pumps, agitators, submersible pumps for U/G product tanks, U/G Service water, U/G fire water, U/G static water (TT calibration) sump pumps, sludge pumps, TW unloading pumps, bio diesel blending pumps, any other pumps mentioned in BOQ and tender requirement.~~
- 19.10 ~~Complete Automation and Integration of PT installed at TLF & TWD product pump suction & Discharge end and other tapping points mentioned as per BoQ; DPT installed across TLF & TWD pump strainer, steam lines; level switch installed at U/G Service water, U/G fire water, U/G static water (TT calibration) sump tank and other tapping points mentioned as per BoQ.~~

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- 19.11 Complete integration of PCVs, TCVs and On-Off Valves.
- 19.12 Complete Automation and Integration of hooter cum beacons installed outside dyke for dyke drain valve & water draw off line.
- 19.13 Complete integration and control of Tank Body Valves ~~ROSOVs, DBBVs~~, MOVs, SOVs, Master Control Stations for MOVs & DBBVs along with Local Push button station for local operation of the valves from outside dyke wall.
- 19.14 Complete integration of TAS equipments installed at Control room, panel room (including UPS and Battery), ~~S&D~~, Security Gate/Room, Lock room, TM room, Driver rest room along with inter building redundant TAS LAN cabling over OFC from Control Room to respective buildings - ~~S&D~~, Security room, Lock Room, Admin Building, Driver rest room, PMCC room and any other places complete as per tender requirements. Apart from the automation equipments & instruments, cables from MCC room to UPS in the Control room, all equipments connected on the UPS or any other TAS equipments shall be in the scope of the Vendor.
- 19.15 ~~Complete LAN cabling for IOCL intranet network inside Admin Building, Control Room, S&D, Invoice room, Lab building along with LAN face plate. Cabling to be done from all LAN face plate to respective LAN switches of the building and from all LAN switches to main Layer 2 switches at Admin building. Inter building connectivity between switches to be done over OFC cables and LAN cabling inside building shall be done using CAT 6 cables inside PVC conduits with proper support above false ceiling, below false flooring etc complete in all respect for establishing IOCL LAN network.~~
- 19.16 Any other system/ sub system as mentioned in BOQ

Note: Power cable for free issued items shall be done by IOCL except Master control Stations if not specifically mentioned in the tender.


- 19.17 ~~All field Power, Signal and Control cables outside Product tank dykes shall be FRLS Copper armoured type and inside product tank dykes shall be FS (Fire Survival) Copper armoured type. For ROSOV, all cables from control room leading to ROSOV and its push button stations outside dyke wall shall be FS (Fire Survival) Copper armoured type.~~
- 19.18 Vendor shall provide separate Signal, Control and Power JB and there should not be any common JB for any combination of different types of cables.
- 19.19 All the Automation equipments, JB's etc supplied by the vendor are to be properly earthed as per OEM's recommendations and tender specification.
- 19.20 All earthing cables shall be of minimum 1C x 6 sqmm FRLS unarmoured copper cable (Green Colour).
- 19.21 G.I strip shall be provided for interconnecting Earth pits, connecting UPS and other equipment / panel with earth pit, TLF gantry in two layers with isolators for TT earthing, TLF earthing bus bar for equipment earthing, CCTV pole with Earthing grid/ Earth pit.
- 19.22 Supply, fabrication & erection of all the structural & other materials for installation of Automation equipments.
- 20.0 SS counterflange and SS nut bolt to be supplied for mounting and installation of all the automation instruments supplied.
- 20.1 Cable tray and pedestal with structural support for cable tray, RCC trenches with structural support for cable tray, hume pipes, TLF Gantry & overhead pipeline/cable bridge with

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structural support for cable tray as shown in the cable layout drawing shall be provided by IOCL. Subsequent/ any additional requirement of cable pedestals, RCC trenches, hume pipes, etc as per site requirement shall be in the scope of the successful bidder. Separate payment under composite works shall be applicable for such items.

- 20.2 Vendor to consider the supply and laying of entire cable trays with cover, trenches, HDPE pipe, required civil & mechanical work etc in the quoted price. No separate payment for the same shall be made except for the structural steel.
- 20.3 The cable trench, pedestal, bridge layout drawing attached herewith are only indicative and may undergo some change during execution of the job.
- 20.4 Vendor to propose and submit the complete cable route diagram along with structural support, interspacing of the pedestals, earthing of cable trays and other details prior to physical execution of the cabling works at site.
- 20.5 Payment shall be made in running meter. Supplied cable should not be more than 10% of the required cable.
- 20.6 Supply, installation, testing and commissioning of complete Earthing system for entire automation equipments and Tank Trucks as detailed in tender document.
- 20.7 Supply, fabrication and installation of support structures, frames, sunshields for field mounted instruments such as pressure transmitters, tank side indicators and other instruments having local display and are exposed to direct sunlight and rain.
- 20.8 Minor civil works like chipping / grouting of pavement for the instrument panels/supports stand, and chipping and refilling of the pavement for conduits is in the scope of vendor with no additional payment. However, if the work involves demolishing cement concrete, RCC, cutting of reinforcement bars, demolishing brickwork, etc same shall be payable under composite work items.
- 20.9 Civil works associated grouting and fixing of equipment and entry/ exit of cables at the control equipment room, all masonry work associated with entry and ingress of equipment or cable inside the control room including making goods, painting and finishing, all masonry work associated with erection of cabinets, junction boxes, card readers, Plant and local ESD switches, within the control rooms, ~~S&D room~~, security room & Terminal Manager's room etc. are in vendor's scope
- 20.10 Painting of all structural supports for trays, instruments, ducts, supporting structural etc. Painting of metering assembly product piping supplied by TAS vendor (Aluminium paint) with colour bands as per product classification. Depending on the environment the following primer and finish coats shall be applied:

S. No.	Environment	Description	Minimum Requirements
1	Coastal and Marine	Primer	1 coat of Inorganic Zinc Ethyl Silicate (65-75 microns) thick.
		Intermediate	2 coats of Polyamide cured HB Epoxy Mio, each 100-125 microns thick.
		Finish Coat	2 coats of two pack aliphatic acrylic polyurethane, each 25-30 microns thick.

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S. No.	Environment	Description	Minimum Requirements
2	Normal - Industrial	Primer	2 coats of Redoxide Zinc Phosphate Primer, each 30-35 microns thick.
		Finish Coat	2 coats of aluminium finish paint, each 15-20 microns thick.
			(Any values refer to dry film thickness).

All signal cables to be grounded to Instrumentation Earth pit near control room and all Electrical Cables and Body Earthing to be done in Electrical Earth pit.

Isolation Spark Gap need to be connected between Instrumentation Earth pit and Electrical Earth pit to have equipotential in case of any surge in the system.

Body earth of Field equipments, JB's and Tank top devices to be done in nearby Electrical Earth pit/separate earth pit as the case may be.

Cable trays - Power /signal to be connected to nearest earth pit , at every 30 meters .

~~21.0 Provision for wireless communication:~~

~~21.1 Vendor can also go for wireless communication with Automation System for following equipments.~~

~~21.1.1 Serial communication of Secondary Radar Gauges for above ground product tanks.~~

~~21.1.2 Radar Gauges installed on water tanks, Underground product tanks, Slop tank, sludge tank.~~

~~21.1.3 Density probes installed on Aboveground and underground product tanks.~~

~~21.1.4 Pressure transmitters excluding those installed on Fire hydrant and foam network which has interlock for starting of Jockey pumps, Fire Engines and foam pumps/ fixed foam pourer system.~~

~~21.1.5 Level transmitters (Side mounted Magnetic bi-color flap type) installed at Additive tanks, Blue dye tanks, Foam Mother tanks, DG set & HSD day tanks.~~

~~21.1.6 DPT across Strainers installed at product pump house.~~

~~21.1.7 Trolley mounted Mobile Master Mass flow Meter and Mass flow meter at TLF for Process PLC communication.~~


~~21.1.8 Earthing relay direct communication with Process PLC except hardwire to batch controller.~~

~~21.2 Wireless access points to be provided by vendor using necessary hardware for providing mobile application access of plant operation.~~

~~21.3 Required hardware, software, transmitters, etc required for establishing communication with TAS shall be in the scope of the vendor at no additional cost to IOCL. Line item for Gateway and Repeaters is provided in BOQ. This line item shall be executed only when vendor provides wireless communication.~~

~~21.4 Note: Vendor opting for Wireless Communication for any of the above mentioned shall ensure that all the parameters of the equipments must be available in Automation System including diagnostic features if available in the respective equipment.~~

~~21.5 The communication modules required for wireless communication shall be part of vendor scope and same to be supplied for required hardware integration at no cost to IOCL.~~

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21.6 ~~Maintenance and replacement of battery (if used for powering of above mentioned equipment) shall be in the scope of the vendor throughout the contract period including CAMC period.~~

21.7 ~~All hardware used for establishing wireless communication shall be proven in use as per hazardous area classification.~~

22.0 METERING SKID INSPECTION & TEST: -

22.1 IOCL at its discretion may inspect the complete Metering Skid (review of Material test certificate, welding quality and its test report, hydro testing, painting, proper mounting of instruments, proper laying and dressing of cables over cable trays with tray cover, proper tagging, ferruling, glanding and termination at JB and equipment ends, terminations details, power ON and functionality testing in local mode etc.) with installed metering equipments, piping, instruments, JB's, switches, cables etc as per design engineering at Vendor's work prior to dispatch of the skid.

22.2 Vendor to make an arrangement to demonstrate the complete functionality of the metering system either through simulation/ N2 purging or any other suitable means.

23.0 FACTORY ACCEPTANCE TEST: -

23.1 Factory acceptance test shall be carried out at Vendor's premises and the required setup for demonstration of the functional and technical requirements has to be arranged by the vendor at no cost to IOCL.

23.2 Vendor shall initially perform tests at his works to ensure that all components are in accordance with tender specification and functional requirements.

23.3 All equipments and sub-systems shall undergo minimum of 72 hours burn in period prior to start of the test.

23.4 During testing period, if there is a malfunction of a component/module in a sub-system, the test shall terminate and Vendor shall replace the failed component/ module.

23.5 Thereafter the test shall commence all over again. If even after this replacement, the sub-system fails to meet the requirements, vendor shall replace the full sub-system to the one meeting the requirements and the system shall get tested all over again.


23.6 If a sub-system fails during the test and is not made successfully operational within four hours of active repair time after the failure, the test shall be suspended and restarted all over again only after the Vendor has replaced the device into the acceptable operation.

23.7 A test report shall be submitted to the purchaser for review within two weeks of completion of tests by the vendor.

23.8 Once all the tests are successfully carried out by the vendor upto their satisfaction level and in line with tender requirement, vendor shall give FAT call to IOCL along with FAT procedure and test result against each of the parameters of the FAT procedure.

23.9 On receipt of call and test result, IOCL representatives shall attend the FAT.

23.10 During Factory Acceptance Test, vendor shall test and demonstrate the functional integrity of the offered system hardware and software to IOCL. No FAT material or equipment shall be transported until all required tests are successfully completed and certified ready for Shipment by IOCL.

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23.11 IOCL reserves the right to be involved and satisfy itself at each and every stage of inspection. The Purchaser shall be free to request any specific test on any equipment considered necessary by him although not listed in this specification. The cost of performing all tests shall be borne by the Vendor.


23.12 Vendor shall note that acceptance of any equipment or the exemption of inspection or testing shall in no way absolve the Vendor of the responsibility for delivering the equipment meeting all the requirements specified in the Bid Package.

23.13 It shall be Vendor's responsibility to modify and/or replace any hardware and modify the software, if the specified functions are not completely achieved satisfactorily during testing and factory acceptance or in field during actual operation / functioning.

24.0 FAT SETUP & TEST GUIDELINES:

24.1 The FAT setup shall consist of following hardware as minimum to demonstrate the complete functionality of the offered system as per tender requirements:

SI No	Hardware/ Equipment's Description	Qty
1	TAS-MS	2
2	OICs	2
3	TTES	2
4	Layer 3 LAN Switches	2
5	Terminal Servers	2
6	Process PLC	2
7	FAN Printers	2
8	Proximity Card Readers (TTES, TT Registration, Security barrier gate, Licence Area Barrier gate)	4
9	Proximity Card	30
10	Batch Controllers	2
11	LED Display (TT Registration)	1
12	LED Display (Bay No)	1
13	Metering Simulators (Pulse generators-MFMs, RIT, Driver ACK, Earthing Relay, Rack Monitor, solenoid valves of DCV & ON-OFF Valves etc)	2 sets
14	Simulator for DI/DO (ROSOV, Pumps, SOVs, Barrier Gate, Plant ESD, Local ESD, AOPS (HHH), Radar (HH), Fire Engine, foam pump, etc) whichever applicable	2 Sets

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15	Tank Farm Simulator (Product, foam and water)	2 sets for each
16	Analog/HART/Modbus simulator	LS
17	Any other hardware/ simulator / toggle switches/LED indication lamp etc required.	LS

24.2 All the sub-systems shall be interconnected to simulate the total items. Vendor shall use simulators for simulating field inputs to flow control units. Before start of tests, Vendor shall keep the complete integrated systems powered for minimum 150 hrs prior to start of FAT.

24.3 Factory acceptance tests shall be carried out as per FAT procedure submitted by the vendor. However IOCL shall have rights to ask the vendor to demonstrate any other tests not mentioned in the FAT procedure but are covered in tendered scope of work. IOCL shall also have right to ask the vendor to modify the logic, GUIs, Report formats, seek additional GUIs, reports etc as per site requirement.

24.4 The FAT procedure shall cover following tests as minimum.

SL no	Area	Tests
1	Hardware checks	Check the complete setup of the FAT, including offered hardware and software are as per tender specification and requirements.
2	Redundancy checks	Redundancy checks for Process PLC (processors, IOs, Rack power supply), TAS-MS, Terminal Server, TAS LAN switches, BCU communication links with Process PLC, etc
3	Power ON/ System login checks	Verification of power up and login procedure (including different level password and user ID verification).
4	TLF Loading sequence	Complete TT loading cycle along with all interlocks as per FDR starting for TT reporting to TT exit from the Terminal.
5	Data updation/ Response time	Checking of scan time values/ response time for TAS-MS, flow control units, field data from BCU and other devices etc
6	Local Mode Loading	<ul style="list-style-type: none"> • Loading using batch controllers in case of communication failure • Auto Updation of load results when communication is restored
7	TT overfill sensors activation	Demonstration of the interlocks in case of overfill alarm generation. Stop loading in-case mismatch in nos. of compartment and nos. of active sensors.




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8	Local & Plant ESD	Demonstration of functionality of Local ESD, plant ESD including power ESD and its interlock with respect to stoppage of loading operation, pump closure command, opening of barrier gates, generation of power ESD etc as per FDR along with ESD Reset and ESD override
9	HH & HHH interlocks	Demonstration of interlocks on activation of relay output of Radar Gauge (HH) and AOPS (HHH) as per FDR - simulation.
10	Tank sequencing	Demonstration of tank sequencing, tank modes selection, tank level alarms and its interlocks - Simulation.
11	Pump Automation and sequencing	Demonstration of pump sequencing and its interlocks - Simulation including simulation of VFD PLC integration.
12	Fire fighting equipment integration	Remote operation, feedback and Control of Fire Engine, Jockey pump, foam pump, borewell, central foam feeding system - simulation
13	Tank Body Valve, SOVs	Open/close command from LPBS and OIC and its status as per FDR - Simulation
14	Third party integration	HVLR, HCD, Fire alarm panel, DG set, UPS, PT, LTs, LS and its interlock - simulation.
15	Down time report	Generation of down time report as per special Terms and Conditions
16	System Diagnostics	System diagnostics shall be thoroughly checked for all sub-systems on local level as well as on OIC consoles. These shall include failure of a sub-system, module, power supply, interface unit, failure of transfer to redundant module on main module failure etc. and other detailed diagnostic displays
17	System clock	Auto synchronisation of system clocks on all OICs, Servers and peripheral devices.
18	System Restart after power failure	Simulation of power failure and system restart self-booting up of system configuration and program after power restoration
19	Alarms and Event Logs	Check for generation of alarms and event log report
20	GUIs	Check for GUIs for all system and sub system as per Tender in all OICs, TTES, work station etc.
21	Report Generations	Check for reports generation as per tender.

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24.5 Any deficiency / problem identified during testing or any changes required in data/ configuration etc shall be clearly brought out during FAT and the same have to be incorporated/ corrected by the vendor.

25.0 ~~SIL LOOP VERIFICATION, VALIDATION AND WITNESS~~

25.1 ~~The target safety integrity level (SIL) for following Safety Instrumented Function (SIF) loop shall be minimum SIL 2 for all above ground product tanks.~~

~~SIF Loop 1: AOPS- safety PLC- ROSOV~~

~~SIF Loop 2: Secondary Radar Gauge (relay output)- Safety PLC- ROSOV~~

~~SIF Loop 3: Primary Radar Gauge (relay output)- Safety PLC- ROSOV~~

~~Hence vendor is required to design and select all components of the above mentioned SIF loops accordingly. ROSOV in the SIF loop shall be free issue item with safety integrity level of SIL 2. Average PFD values and other parameters of the ROSOV shall be provided by IOCL during design engineering.~~

25.2 ~~Verification of targeted SIL level for above mentioned SIF loops through Reputed Third party Agencies who are authorised to carry out the SIL verification of the SIF loops as per IEC 61511. The job includes required documentations and submission of SIL verification report meeting the desired SIL level.~~

25.3 ~~In order to achieve the targeted SIL level of SIL2, vendor to consider the proof test interval period of minimum 1 year. Required proof testing as per SIL report to maintain the targeted SIL level is to be done by the vendor during commissioning, warranty and CAMC period at no additional cost to IOCL. Proof test is to be carried out in presence of IOCL representative and the same to be documented as per IEC 61511.~~


25.4 ~~Validation of entire Safety System (SIS) for SIFs shall be carried out from third party agencies prior to SAT completion. Automation contractor shall bear the responsibility of its co-ordination and logistics. The third party has to submit a detailed report along with certification for SIS which is to be vetted by automation vendor along with all other required documentation as per specification and tender documents.~~

25.5 ~~Witnessing of Safety Instrumented System testing in presence of Safety, Operation and Engg. team from user. Demonstration of safety system during pre OISD / OISD & statutory audits & there after periodic testing complete as per specifications / tender documents.~~

26.0 SITE ACCEPTANCE TEST: TEST RUN / TRIAL RUN: Refer to SPECIAL TERMS AND CONDITIONS OF CONTRACT

27.0 OTHERS

27.1 Any other work not specifically mentioned above but is included in the BOQ/ FDR/ Tender document and facility for the same is available at site, the same also need to be covered in the scope of work of the vendor.

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FUNCTIONAL DESIGN REQUIREMENT OF TAS FOR BDFP MATHURA AUTOMATION SYSTEM

Functional Design Requirement for TAS has been divided into following sub systems.

I. Tank Truck Loading System:


1.0 Tank Truck Reporting and Entry System (TTES)

- 1.1 Tank Truck Reporting System is for recording of physical reporting of TTs at supply location.
- 1.2 Tank Truck Entry System is for authorizing the TT for loading particular product, for a particular consignee, at particular Loading Bay within a specified time frame.
- 1.3 Permanent proximity card shall be issued to each TT which shall be used for TT reporting as well as TT loading.
- 1.4 Minimum 2 nos. of Proximity Card Readers (PCR) along with 1 no display board shall be provided at security gate/TT parking entry. PCR along with display board can be more, depending on the location specific requirement. Tank trucks are to be provided with HSRP plates for efficacy of ANPR system.
- 1.5 Tank Truck reporting to be done through permanently issued TT specific Proximity Card (PC) which would be shown at security/TT parking gate Proximity Card Reader (PCR).

However, considering that Bitumen locations handle Ex-MI tank trucks only, the TT reporting system should be equipped with a feature to record tank truck details based on ANPR (Automatic Number Plate Recognition) capture, with or without the use of a proximity card at the PCR.

There can be two possible scenarios under which TT details are to be recorded:

- Scenario 1: The tank truck is having a valid proximity card, which is shown at the PCR, and its number plate is validated through ANPR system.
 - Scenario 2: The tank truck does not have a proximity card, but the number plate is validated through the ANPR system alone.
- 1.6 TAS shall check if Proximity card is in Master and Truck Number is mapped with proximity card number etc. In case the TT does not have a proximity card at the time of reporting, the system to be provided in TAS for mapping and issuance of a proximity card to such vehicles, which shall be used for all subsequent loading operations of that tank truck.
 - 1.7 TT number plate (Based on ANPR system) validation with the TT number mapped to the proximity card shown in the card reader is done by TAS for physical verification of the TT. However, in cases where TT details are recorded based solely on ANPR data (i.e., without proximity card), the physical presence of TT shall still be verified by TAS using the ANPR system data.
 - 1.8 TT reported list shall be created in TAS after validations, when Proximity Card is shown at the security/TT parking gate PCR or through ANPR system and the same to be pushed automatically to SAP simultaneously.
 - 1.9 As a part of confirmation of Proximity Card having been successfully read by the system, TT registration number along with current status as given below to be displayed in English and local language on display board provided along with PCR for TT reporting, based on the status of TT in TAS considering the feedback received from SAP.


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SN	MESSAGE TO BE SHOWN IN THE DISPLAY (BILINGUAL)
1	Invalid Card
2	Acknowledgement Pending
3	Blacklisted Vehicle
4	Calibration Expired
5	Vehicle Age/Registration date older than permitted
6	Error other reasons. Not updated in SAP
7	Fitness License Expired
8	Green Card Expired
9	Insurance Expired
10	Road Permit Expired
11	Suspended Vehicle
12	Explosive License Expired
13	Record Successfully updated in SAP
14	VTS Failure
15	TT Queue Not Activated
16	Card Number not in master
17	Welcome to Indian Oil, Show card

Note: For error and success messages, font colour to be distinctively displayed.

Upon subsequent swipe of card on proximity card reader, current status/any other error of TT in TAS, should be displayed on LED display along with card reader.

- 1.10 In longer perspective, supply location's geo-fence of VTS shall be utilized to access TT presence. When Proximity card is presented at PCR, the TT queue shall be generated. Thus, sensing of TT presence through VTS and expressing its readiness to take load on presentation of PC to PCR will push TT to SAP for TT queue generation in SAP.
- 1.11 SMS indents shall be received in SAP and Sales Orders would be created at the backend.
- 1.12 TTs queued in TAS , populated in SAP, shall be used for planning and scheduling.
- 1.13 Once the Shipment is received by TAS, it shall download the same to Tank Truck Entry System (TTES) Terminal.
- 1.14 Auto FAN shall be generated and printed by the system when bay is available at TLF considering 1+1 queuing (configurable). FAN (System should have provision to configure English or Hindi or English & Hindi for printing of FAN) shall be printed at ~~Security Gate~~ designated place without bay no.
- 1.15 Once FAN is generated, status of TT would change to 'AUTHORIZED' in EDU. Auto printing of FAN is followed by automatic announcement in the local language and Hindi for the TT to report to security gate for collection of FAN and proceed for loading.
- 1.16 Bay allocation shall be done by TAS once the driver of corresponding Authorized TT shows the proximity card at the PCR installed at the License Area Entry Gate.

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1.17 Serial Number of the configured card and expiry date and time shall appear in FAN.

1.18 FAN should contain minimum following details

- ✓ Location code
- ✓ Contractor name
- ✓ Customer name
- ✓ Destination name
- ✓ Tank Truck Registration No.
- ✓ Date & time of authorization
- ✓ Proximity card time validity
- ✓ Owning oil company
- ✓ Details of products to be filled i.e. Name, Quantity and Code
- ~~✓ Number of compartments with their capacity and product to be loaded in each compartment.~~

1.19 List of all pending FANs showing the TT Registration no. (which are yet to be authorized/printed) to be displayed on TTES Terminal.

1.20 TT status along with auto announcement shall be displayed as rolling text on 15 lines Bay Queue Display board/ outdoor LCD/LED displays installed at TT parking area & Driver's rest room as tabulated below:




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FUNCTIONAL DESIGN REQUIREMENT OF TAS


Sequence	Display Location	Status Display	PA System (TTPA)	Duration of Display	Text to be Displayed	Explanation of the Status
One	TTPA, Driver rest room	All Authorized TTs	One by one sequential announcement in Local Language and Hindi (as decided for the location) as "TT number..... to Proceed for Loading"; Maximum no. of cyclical display and announcements for a particular Authorized TT shall be restricted to a configurable count for each truck.	As long as all the Authorized TT is announced	AUTHORIZED	FAN Printed at Security Room
Two	TTPA, Driver rest room	All TTs which has been assigned Load but FAN yet to be printed	No Announcement	Min 30 sec.	ASSIGNED	Load assigned but FAN not Printed due to Bay restriction (1+1)
Three	TTPA, Driver rest room	Time out TTs / Truck Cancel	No Announcement	Min 30 sec.	TIME OUT/CANCELLED	The Predefined time, after FAN printing, is over but TT not entered security gate

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Sequence	Display Location	Status Display	PA System (TTPA)	Duration of Display	Text to be Displayed	Explanation of the Status
Four	Driver rest room	All Reported TTs	No Announcement	Min 30 sec.	REPORTED	Successfully reported.

Note: Display can be continuous for different TT status. Minimum Display time shall be 10 sec + 5 sec per truck in the list even no TT number is required to be announced.

- 1.21 In case TT reports without permanent allotted proximity cards, temporary card to be issued with mapping to same truck. The temporary card will be valid for only one trip and same to be returned by TT Crew after leaving the License area exit barrier gate but before exit from terminal main gate.
- 1.22 At security Entry Gate, one no. Proximity card reader, one no. traffic lamp, one no. LED display (bilingual) at security/main entry Gate along with Barrier gate including infrared sensor are to be provided for capturing of physical reporting of TTs along with authorized TT crew.
- 1.23 TAS shall integrate with IOCL TT Crew Portal using the REST API provided by IOCL to periodically fetch and update TT Crew data. When a TT Crew member presents their card at the PCR (Proximity Card Reader), TAS will retrieve and display the crew details in handheld data entry terminal (DET) (connected to TAS) at security gate from the database of TT crew available from TT crew portal. TT Crew identification shall be based on the entry of data by location's security in the DET. Alternatively, terminal's security can scan the TT Crew Pass QR Code and validation of TT crew data can be done in the terminal automation system. System should have provision to bypass the requirement of TT crew data in case of connectivity issues or non-availability of TT crew data from portal.
- 1.24 Barrier gates shall have infrared sensors so that Boom Barrier should not close before the TT has passed the barrier gate completely.
- 1.25 In case hardware becomes nonfunctional, software to have provision for integrating alternate hardware and same should be configurable.
- 1.26 Traffic lamp shall be provided with three nos. of Lamps (RED, AMBER & GREEN). The lamp shall glow as per methodology described below:
 - RED: When barrier gate is completely closed.
 - AMBER: When barrier gate is in between closed and opened position
 - GREEN: When barrier gate is completely opened
 - RED flashing: When Invalid card is shown or delay in reporting to security entry gate (Timed Out/Cancelled or any other error)
- 1.27 TT driver should present proximity card on PCR at security entry gate within specified period (depending upon location constraints, configurable under administrative password) of issuance of FAN. Ideal time being in the range of 20-45 minutes as per current assessment.
- 1.28 When valid Proximity card is shown at Security Entry Gate Proximity Card Reader, Terminal Automation System shall do the following checks:
 - a. TT Crew data from TT crew portal entered by the location's security or bypassed for the TT.

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- b. ~~TT/Driver/Helper is already inside.~~
 - c. Truck Timed Out/Cancelled.
 - d. TT is not authorized.
 - e. Truck/Card not in Master.
- 1.29 On successful validation of all interlocks, TAS system shall allow the TT to enter inside terminal premises.
- 1.30 Status of validation to be displayed in bilingual on LED display at main/security gate:-

SN	Message To be Displayed in EDU (Bilingual)	Traffic light	Barrier Gate
1	<TT Registration No.> "TIMED OUT, CONTACT OFFICER"	Red flashing	Remain Closed
2	TT is not Authorized/Card is not Valid	Red flashing	Remain Closed
3	TT No: XXXXX authorized to Enter	Green	To Open
4	INVALID CARD	Red flashing	Remain Closed
5	Card Number not in master	Red flashing	Remain Closed
6	Welcome to Indian Oil, Show card	Red	Remain Closed
7	Barrier gate failed to open	Red flashing	Remain Closed

Note: For error and success messages, font colour to be distinctively displayed. Traffic Lamp shall lit red in case of barrier gate closed.

- 1.31 Manual Status override option to be available in TAS under password control as per level of authorizations for TT wise and/or for Crew Identification. Master configuration for bypass/override revoke of Crew identification to be provided in TAS software. Provision to be given separately in the system for automatic/ manual revoke of bypass based on the desired configuration in Master.
- 1.32 The system should have the provision for temporary authorization of TT crew in case of non-availability of permanent driver or helper or both. This mapping shall be valid for one trip only.
- 1.33 In case TT has not presented card on PCR at security entry gate within timeout period, the FAN shall be automatically cancelled, and proximity card gets invalid. TT has to report to IOCL officer for re-registering in TT queue. List of TTs to be generated in TTES which have not reported at security entry Gate for loading within the allocated time i.e., before the expiry of validity of FAN.
- 1.34 Indent against the cancelled FAN to be given highest priority and to be assigned to TT through TT Planner & Scheduler. Time slot management feature / system shall be part of SAP system.
- 1.35 At license area Entry Gate, one PCR and one Display board to be provided along with each boom barrier.
- 1.36 TT driver should present proximity card at PCR of TLF Entry gate. Once Proximity card is shown at the TLF Entry Gate Card Reader, following should be the sequence of events depending on the condition.

SN	Message To be Displayed in EDU (Bilingual)	Traffic light	Barrier Gate	Condition
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1	<TT Registration No.> “PROCEED TO WEIGH BRIDGE”	Green	To open	FAN has been generated and within timeout period.
2	<TT Registration No.> “TIMED OUT, CONTACT OFFICER”	Red flashing	Remain Closed	FAN has been generated and exceeds timeout period. / Any other undefined error
3	INVALID CARD	Red flashing	Remain Closed	FAN has not been generated/ In valid card.
4	CONTACT OFFICER. TT STATUS INSIDE TLF AREA.	Red flashing	Remain Closed	FAN has been generated and within timeout period, & status changed to Inside TLF area.
5	CONTACT OFFICER. “TO BE TARE WEIGHT”	Red flashing	Remain Closed	FAN has been generated and within timeout period, & status changed to “To be Tare Weight” (i.e ULW is not available in system)
5	Card Number not in master	Red flashing	Remain Closed	Card number not available in the Card master.
6	Welcome to Indian Oil, Show card	Red	Remain Closed	Default message.
7	Barrier gate failed to open	Red flashing	Remain Closed	Open command sent to barrier gate and open feedback is not received within time.

Note: For error and success messages, font colour to be distinctively displayed. Traffic Lamp shall lit red in case of barrier gate closed. Suitable message to be provided for non-filling cards and no other validation are required except card is valid and recorded as exception.

- 1.37** Weigh bridge to be provided for the mandatory tare weight of all bulk tanks trucks before TLF loading operation. At weigh bridge, one number CCTV camera for TT registration number, one no. Proximity card reader, one no. traffic lamp, one no. LED display (bilingual) are to be provided for capturing the tare weight of the tank truck.]
- 1.38** TT driver should present proximity card at PCR of weigh bridge. Once Proximity card is shown at the weigh bridge Card Reader after placing TT at weigh bridge & TT crew are alighted, following should be the sequence of events depending on the condition.

SN	Message To be Displayed in EDU (Bilingual)	Traffic light	Barrier Gate	Condition
1	<TT Registration No.> “PROCEED TO” <Bay no.>	Green	To open	FAN has been generated and tare weight is validated in TAS
3	INVALID CARD	Red flashing	Remain Closed	FAN has not been generated/ In valid card.
4	CONTACT OFFICER. “TARE WEIGHT ABOVE TOLERANCE WRT RC ULW”	Red flashing	Remain Closed	FAN has been generated and within timeout period, & tare weight is beyond ULW tolerance limit
5	CONTACT OFFICER. “TARE WEIGHT ABOVE TOLERANCE WRT RC RLW”	Red flashing	Remain Closed	FAN has been generated and within timeout period, & total of tare weight and preset quantity is beyond RLW tolerance limit
5	Card Number not in master	Red flashing	Remain Closed	Card number not available in the Card master.

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6	Welcome to Indian Oil, Show card	Red	Remain Closed	Default message.
7	TT number mismatch with TT number mapped with card.	Red flashing	Remain Closed	Open command sent to barrier gate and open feedback is not received within time.


Note: For error and success messages, font colour to be distinctively displayed. Traffic Lamp shall lit red in case of barrier gate closed. Suitable messages be provided for non-filling cards and no other validation are required except card is valid and recorded as exception.

The system shall check the observed tare weight of the TT, as recorded on the weighbridge, against the Unladen Weight (ULW) in SAP which will be received from SAP and shall be populated in TAS. A configurable tolerance limit shall be available in the system to permit acceptable variation. If the difference between the observed tare weight and the ULW exceeds the defined tolerance, the system shall prevent the TT from proceeding to loading operation. System should also have provision to override this check.

The system shall compare the total of the tare weight and preset quantity with the Registered Laden Weight (RLW) of the TT in SAP. A configurable tolerance limit shall be available in the system to permit acceptable variation. If the combined weight exceeds the RLW beyond the allowable tolerance, the system shall prevent the TT from proceeding to loading operation. System should also have provision to override this check.

The system shall have provision to regularize such Tank trucks post authorization from Officer automatically and adjust the preset quantity to ensure the final loaded weight remains within the permitted RLW tolerance limit. The revised preset quantity shall be clearly displayed on the Batch Control Unit (BCU) which shall be acknowledged by TT crew before starting loading operation.

- 1.39 Bay allocation logic by the TAS must assign a loading bay in a way that ensures the truck authorized for loading is filled in the shortest possible time, while also following the principle of optimal bay utilization.
- 1.40 ~~Mixed load TTs should be allocated on mixed bays only. Preferably mono product TTs should get allocated on mono bays if available. In case of full MS TTs, Mono MS bays availability shall be checked first, after that it can be allocated to mixed bay as per their FIFO sequence.~~
- 1.41 ~~Mono (HSD) product TTs to get allocated on mixed bays incase total nos. of TT under loading + inside loading area at mixed bay + FAN generated for Mixed load/ full MS and not reported at security Gate + Total nos. of shipment for Mixed load/ Full MS available in TTES is less than total nos. of Mixed load TTs that can be loaded at Mixed bay in 1+1 logic.~~
- 1.42 ~~TTs with branded fuels indent can get allocated to the bays with branded fuels provision only. However, in the bays with Branded fuels provision, other TTs can get allocated only incase total nos. of TTs with branded fuels under loading + inside loading area at Branded fuels bay + FAN generated for Branded fuels and not reported at security Gate + Total nos. of shipment for Branded fuels available in TTES is less than total nos. of Branded fuels TTs that can be loaded at Branded fuels bays in 1+1 logic.~~
- 1.43 ~~In case of locations with only mixed bays for a particular product, bay allocation to be done for as per their FIFO sequence for that product.~~
- 1.44 Auto bay priority sequence for the day to be decided as per cumulative bay utilization (i.e. total quantity loaded) till the end of previous day on a daily basis by TAS system.

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1.45 While auto allocation of bay, the bay should be decided based on the shortest possible waiting time determined based on the total quantity pending to complete the loading at each bay. For mixed bay, loading time for both the products to be considered. If two or more bays require equal determined time to complete loading, the bay priority sequence for the day shall be used to allocate bay for the TT.

1.46 ~~Top & Bottom Loading bay Allocation: - There should be provision in the system to designate the Bay to Top or Bottom or both Top & Bottom.~~

~~1.46.1 In case, Top & Bottom Loading bays are independent: - Top Loading TT shall be assigned to Top Loading Bay and Bottom Loading TTs shall be assigned to Bottom Loading Bay or Common Bay.~~

~~1.46.2 When Top & Bottom Loading bays are common, System should be able to recognize the Vehicle as either Top or Bottom Loading through the Vehicle Master in TAS/SAP. Accordingly, TAS shall allocate either to common bay or independent designated bay.~~

1.47 Bay allocation logic should also restrict the number of trucks inside the loading area to 1+1. Restriction of 1+1 should be made configurable. Total number of TT (loaded, under-loading and to be loaded) inside operational area should not be more than 2.5 times the number of bays.

1.48 The normal loading operation will be through post-invoicing. However, provision shall be kept in the system to switch over to pre-invoice system, if needed. In case of pre-invoicing, exit barrier gate opening will not be linked to invoice generation but only to loading completion confirmation from TAS.

1.49 TTES should have the following facilities of

- ✓ Re-authorization: for increasing the validity of FAN for loading.
- ✓ Abort: In case TT develops a mechanical defect at any stage of loading.
- ✓ Re-allocation: In case bay develop a defect at any stage during loading.

Note: Reason for such exception to be captured in the system mandatorily.

1.50 After the truck is identified at the bay, TTES should have provision only for Aborting or Re-allocation.


1.51 When aborted, further loading process for the truck will be stopped & preset quantity in the batch controller buffers will be cleared but would appear in the loading report at the day end. In such a case partly loaded TT has to be decanted and certified by the officer concerned in the system through his login Id.

1.52 In case of re-allocation of truck after part/full filling of one or more compartment at the assigned bay, system need to debar further loading of the truck from the same bay. Message shall also to be displayed at the batch controller giving the bay no. to proceed for further loading of balance quantity. The system to ensure that only the balance quantity gets filled at newly allotted bay. Simultaneously, the existing buffer details at previous bay batch controller to be cleared to start next TT loading. Day end loading report to indicate bay-wise quantity loaded at each bay in above such cases.


1.53 Valid status of TT is required in order to enter into the Loading Area and to identify the Truck at an assigned Loading Bay.

2.0 Loading Sequence:

Following shall be the sequence of operation for loading tank trucks in an Automated Terminal:

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- 2.1 Once the TT enters loading area, its status in the system should change to “INSIDE LOADING AREA”.
- 2.2 TT to proceed to assigned bay for loading. In case loading bay is free, BCU and RIT status should be as under:
- BCU : CONNECT GROUND
- RIT : RED (steady)
- 2.3 Once a TT is positioned on loading bay, driver to connect the Earthing, ~~connect plug of Rack monitor to the socket for Overfill Sensor assembly.~~
- BCU : SHOW CARD
- RIT : RED (steady)
- 2.4 TT identifies itself at the bay by showing the Proximity card at PCR. In case it is a wrong card, card validation fails or has reported to wrong bay, BCU displays following message and driver to report to the TLF Officer/~~control room/invoice room officer~~ for further instructions. BCU and RIT status to be
- BCU : NO ORDER FOR THIS CARD or CARD NO LONGER VALID or GO/PROCEED TO BAY NO - X
- RIT : RED” (steady)
- 2.5 TT Driver to do below pre-requisite safety checks
- ✓ Has disconnected the Battery Cut Off Switch
 - ✓ Has placed 10 kg Fire Extinguisher in front of TT.
 - ✓ Has applied the Hand Brakes of TT, Put TT in neutral and put dunnage under wheels by pressing the acknowledge push button in Integrated Remote Interaction Terminal (RIT).
- 2.6 Further, TAS to disallow loading under following situation:
- Proximity card corresponds to a TT which has already been loaded.
 - Proximity card is invalidated by TAS based on cancellation from TTES. In such a case, BCU shall display “INVALID CARD”.
 - TT status is not inside loading area. In such case, BCU shall display “TT No. XXXX status is XXXXXX”
- 2.7 System should check if the TT has been electrically grounded (Both for Bottom and Top loading), loading arm properly connected (~~bottom loading/ Vapour arm disconnected from parking position~~) and Overfill device properly connected to the system.
- 2.8 If TT is not grounded, BCU should display “CONNECT GROUND” and this message should continue till the TT is grounded properly. Loading should also not start in case of BCU port is disabled for grounding/earthing. Serial or TCP/IP output of earthing relay is to be connected to DCS/Process PLC and potential free output of the earthing relay is to be connected to respective batch controller.
- 2.9 ~~In case of bottom loading, unless the Loading Arm is not removed from Loading arm parking adaptor, an appropriate message (viz., “CONNECT LOADING ARM properly”) to be displayed on the BCU display. In case of MS loading, unless the vapour arm is not removed from vapour loading~~

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arm parking adaptor, an appropriate message (viz, "connect vapour arm") to be displayed on the BCU display and loading should not start.

- 2.10 Overfill prevention sensor to be provided on the TT (Both for Bottom and Top loading). Rack monitor provided in individual bays must have suitable diagnostic features to check the healthiness of all overfill sensors installed in the TT at any point of time (even before commencement of the loading), in addition to triggering of overfill alarm.

The healthiness of overfill sensors is to be sensed by the system before start of loading/during loading and if BCU loading action is disabled, in such event loading will not start or will stop if loading has already started.


In case of overfill up to the position of overfill sensor, BCU should stop loading by closure of Digital Control Valve (DCV) and Process PLC should close the ON-OFF valve. TAS senses the alarm condition and BCU status to be

BCU _____ : _____ OVERFILL

RIT _____ : _____ RED (Flash)

Serial or TCP/IP output of rack Monitor is to be connected to DCS and potential free output of the Rack Monitor is to be connected to respective batch controller.

- 2.11 In case even after activation of overfill alarm, loading in the respective TT still continues beyond a threshold limit (configurable), then the DCS/Process PLC should stop the corresponding product pump and closes the respective header line MOV.
- 2.12 In case overfill feedback is received by TAS from Batch Controller, invoice should not be generated even if batches for the TT are completed by the system, without taking confirmation from control room.
- 2.13 When all TT connections are healthy/all pre-loading permissive are OK, TAS now goes on to prepare the BCU for loading and presets the batch quantity to be loaded into the current compartment on the BCU.
- It should display the following message.
- BCU _____ : TT Registration Number COMP N: Product Name: XXXXX Lts Kgs PRESS
ACK
- RIT _____ : Amber (steady)
- 2.14 Once the batch quantity is successfully downloaded and driver is ready, he needs to push "ACK" push button on the RIT to indicate his readiness to commence filling. Green lamp on the RIT is set to flashing to indicate that the TAS is preparing the BCU to start the loading.
- 2.15 Batch quantity to match with calibrated capacity of the compartment as per TT master in SAP. Compartments are to be loaded in ascending order starting from first compartment from the TT cabin side. In case of mixed load – MS/HSD, MS to be loaded starting with first compartment from cabin side and HSD starting from the last compartment from cabin side both products to be loaded simultaneously. In case of single product, loading has to start from the first compartment from the cabin side.
- 2.16 The Driver to press the "START" button in the RIT. Upon sensing this, the TAS to issue "Remote Start" command to BCU to start the loading operation. While loading is in progress, all the

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primary loading control functions like Flow Rate etc are to be handled by the BCU. Following information shall be displayed on the BCU display.

- i) Up Count - Quantity of Product filled so far.
- ii) Preset- Preset Quantity.
- iii) Down Count - Balance quantity remaining to be filled.

All Items mentioned above are dynamically updated on the BCU display while the loading is in progress. The loading operation continues until one of the following conditions is encountered.

- ✓ Emergency stop command issued by the Driver from the Bay
- ✓ Stop command issued by the OIC (Weigh Bridge/Control Room) Operator
- ✓ Process Alarm condition at the Bay i.e., No Flow, Low Flow, High Flow, Overrun etc.
- ✓ Earthing interlock failure / Overfill sensor in the TT not sensed/ overfill sensor activated.

- 2.17** In emergency, Loading may be stopped from the loading bay either by pressing the “STOP” button on the BCU or using the emergency stop push button in the RIT. The Weigh Bridge/control room operator should also be able to stop loading at any of the Bays from OIC.

Pressing any of the above buttons / activation of process alarm conditions will cause the BCU to stop the loading operation immediately.

TAS senses that the loading has been stopped locally from the loading Bay or stopped from control room and indicates the same by setting the RED lamp on the RIT to flash.

In such a case TAS issues a stop command to the BCU. The BCU immediately stops loading. The following message to be displayed on the BCU “LOADING STOPPED”. The “RED” lamp on the RIT is set to flashing.

BCU : LOADING STOPPED
RIT : RED (Flash)

Note that in such a case, to restart the loading, the consent to restart loading has to be given by the control room operator only.

When the control room operator issues a restart command from the OIC, TAS prepares the BCU for restarting the loading, the RED lamp on the RIT stops flashing and the BCU display changes to as shown below.


BCU : <UP COUNT><PRESET><DOWN COUNT>Comp n XXXXX
RIT : Amber (Flashing)

Driver will have to repeat step 2.16 to resume the loading operation.

- 2.18** When the BCU senses a process alarm during the loading operation like Overrun (threshold limit 1 (configurable)) etc. loading should automatically get stopped by closing DCV and ON-OFF valve connected to respective loading arms.

In case loading does not stop and over run qty exceed threshold limit 2 (configurable) then the system should stop the corresponding product pump and closes the respective header line MOV.

TAS senses the alarm condition and indicates the same as given below by flashing the RED lamp on the RIT.

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BCU : ALARM CONDITION<Specify the condition>

RIT : RED (Flash)

- 2.19 The RED lamp on the RIT will continue to flash until the alarm condition is cleared on the BCU. Weigh bridge/Control Room Officer clears the alarm condition and acknowledges the alarm on the BCU from TAS/OIC.

BCU : <UP COUNT><PRESET><DOWN COUNT>

RIT : RED (Steady)

Once the alarm condition is cleared on the BCU, the Driver will have to repeat step 2.16 to resume the loading operation.

- 2.20 If earthing Interlock/ ~~Overfill inactive~~ alarm activated during loading, then loading will automatically be stopped by the BCU. The RED lamp on the RIT is set flashing.

BCU : CONNECT GROUND ~~or OVERFILL INACTIVE~~

RIT : RED (flashing)

Alarm condition may be rechecked for correction. Once the alarm condition is cleared on the BCU, the Driver will have to repeat step 2.16 to resume the loading operation.

- 2.21 The loading proceeds smoothly if no alarm conditions are encountered. Loading starts at slow flow and ramp up at full flow thereafter. BCU to automatically initiate a multistage shutdown process based on configured parameters and the loading is stopped when the preset quantity is fully loaded.

- 2.22 ~~TAS senses that the compartment is completely loaded and checks the FAN data to see if any other compartment is to be filled at the same Loading Bay, if so, TAS goes on to fill the next compartment.~~

~~The sequence of operation from step 2.13 onwards will now be repeated to fill the next compartment.~~

- 2.23 ~~If no other compartment is to be filled at the same Loading Bay, then TAS displays a message "LOADING OVER" on the BCU display. In addition, the RED lamp on the RIT is lit to indicate loading completed.~~

BCU : LOADING OVER

RIT : RED (Flash)


~~This message appears on the BCU until the driver disconnects the earthing. When the earthing is disconnected, TAS also checks if the Truck is to be moved to a different Loading Bay to load one or more of the remaining compartments, then BCU displays "MOVE TO BAY NO XX".~~

- 2.24 ~~In such a case, driver to move to the next bay and loading sequence from Step 2.2 to be repeated at the new Loading Bay to fill the remaining compartments.~~

BCU : LOADING OVER

RIT : RED (Flash)

- 2.25 The following loading related parameters corresponding to each of the compartments of the truck is needed for preparing the loading reports & delivery documents.

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- ✓ Rounded off volume.
- ✓ Average Product density (sampling rate 30 seconds during loading period).
- ✓ Average loading temperature (sampling rate 30 seconds during loading period).

- 2.26** TAS shall update the truck database with the above loading completion data and push the load confirmation data to SAP as per SAP TAS protocol. On receipt of load confirmation, SAP shall automatically generate invoice for the transaction without waiting for a confirmation from either TLF or Customer service officer. Invoice shall be printed at invoice room/ lock shed.

The BCU will now be released for filling the next Truck in queue.

BCU : CONNECT EARTH

RIT : RED (Steady)


Since Ex-MI TTs are handled at Bitumen location and only Yellow Card authorized person are permitted to receive the product & sign the invoice, the invoice printing is to be done close to the area accessible to the transport representative who are authorized to receive & sign on behalf of the customer. Display to be provided in area accessible to transport representatives for showing updated status of TT enter for filling operation.

Provision to be provided in S&D to validate in TAS that the signature has been done by the yellow card authorized person and same to be integrated with out gate which shall not open until TT is validated in TAS by the officer.

- 2.27** TAS shall have provision for clearing alarms from control room for tank truck loading as per Alarm clearance matrix and user authorization: -

SN	Alarm from control room
1	Overspill
2	Power Failure
3	Unable to Shut/Close valve
4	Unauthorized flow
5	K factor Change Alarm
6	DCV Actuation over MTBF
7	W&M Switch Status Change
8	Overrun Alarm

Rest alarm can be cleared from field. Upon power failure, ESD command to be sent to BCU & on-off valve, upon acknowledgement from control room as per authorization matrix, same can be reset and activity can be resumed.

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2.28 Typical parameter setting to be maintained in Batch controller, however site-specific changes can be done based on site requirement and validation for effective functioning of the system.


- ✓ High Flow : As per designed flow rate
- ✓ High Flow Alarm : +/- 5 % of High Flow
- ✓ Low Flow Alarm : +/- 20 % of Low flow
- ✓ Blend tolerance : 1 %
- ✓ Strainer Choke Alarm : 50 %
- ✓ Low Flow Rate : 400 LPM / flow corresponding to 1 meter /second whichever is lower.
- ✓ No Flow (Time out) : 45 Sec.
- ✓ Unauthorized flow Alarm : 10 Litre
- ✓ Slow start Quantity : 150 Litre /Volume required to submerge fill line outlet and deflector at least two fill line diameter whichever is greater.
- ✓ Pre stop Quantity : 150 Litre

2.29 At license area exit Gate, boom barrier to be provided along with PCR & traffic lamp. TT status to be validated by system before opening of barrier gate. Traffic lamp should be red/ red flashing/ amber/ green correspondingly to close position of barrier gate /validation failed upon swiping card/ barrier gate in travel/ open position of barrier gate.

TT driver should present proximity card to PCR at Operational/TLF out gate. Once Proximity Card is shown at the TLF Entry Gate Card Reader, following should be the sequence of events depending on the condition.

SN	Message To be Displayed in EDU (Bilingual)	Traffic light	Barrier Gate	Condition
1	<TT Registration No.> "PROCEED TO COLLECT INVOICE"	Green	to Open	Invoice has been generated.
2	<TT Registration No.> "INVOICE NOT GENERATED"	Red flashing	Remain Closed	Loading complete but Invoice is not generated
3	INVALID CARD	Red flashing	Remain Closed	FAN has not been generated/ In valid card.
4	Card Number not in master	Red flashing	Remain Closed	Card number not available in the Card master.
5	Welcome to Indian Oil, Show card	Red	Remain Closed	Default message
6	Barrier gate failed to open	Red flashing	Remain Closed	Open command sent to barrier gate and open feedback is not received within time

Note: For error and success messages, font colour to be distinctively displayed. Traffic Lamp shall lit red in case of barrier gate closed. Suitable message to be provided for non-filling cards and no other validation are required except card is valid and recorded as exception.

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- 2.30 At security exit gate, one no. Proximity card reader, one no. traffic lamp, one no. LED display (bilingual) at security/main exit Gate along with barrier gate including infrared sensor are to be provided for capturing TTs.
- 2.31 TT driver should present proximity card to PCR at security exit gate within specified period.
- 2.32 When valid Proximity card is shown at Security Exit Gate Proximity Card Reader, Terminal Automation System shall allow the TT to exit terminal premises.
- 2.33 Status of validation to be displayed in bilingual on LED display at main/security exit gate: -

SN	Message To be Displayed in EDU (Bilingual)	Traffic light	Barrier Gate	Condition
1	<TT Registration No.> "TIMED OUT, CONTACT OFFICER"	Red flashing	Remain Closed	Configured Time out period exceeded
2	TT is not Authorized /Status is not Valid or TT status is XXXXX	Red flashing	Remain Closed	Status is not Valid
3	TT No: XXXXX INVOICE VALIDATION OF YELLOW CARD AUTHORIZED SIGNATORY IN TAS NOT DONE.	Red Flashing	Remain Closed	Invoice is Generated but Sign is not validated by S&D Officer
3	TT No: XXXXX authorized to Exit	Green	To open	After validation of yellow card authorized signatory in TAS.
4	INVALID CARD	Red flashing	Remain Closed	Invalid Card
5	Card Number not in master	Red flashing	Remain Closed	Wrong Card
6	Welcome to Indian Oil, Show card	Red	Remain Closed	Default message
7	Barrier gate failed to open	Red flashing	Remain Closed	Open command sent to barrier gate and open feedback is not received within time


Note: For error and success messages, font colour to be distinctively displayed. Traffic Lamp shall lit red in case of barrier gate closed. Suitable message to be provided for non-filling cards and no other validation are required except card is valid and recorded as exception.

3.0 Tank Truck Metering System

3.1 Batch Controller Unit:

Each loading bay to be provided with an electronic Batch Controller Unit (BCU) capable of handling at least Two main product, Two blend product and Four Additive product.

Batch Controller would control various loading parameters as programmed for main product(s), blend product(s) and additive(s). It shall communicate with TAS and corresponding TLF equipment's. Under normal circumstances BCU is supposed to be operating under Remote Mode. In case BCU is to be operated in local mode, it must have sufficient memory to store the loading details while in local mode of operation and download the same to TAS when it comes to remote mode. Change of mode has to be password protected. In case of local loading, system should

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ask for Bay officers PIN id for every batch to be loaded manually. Batch Controller should have the provision to control the flow of main product, blend product at different stages of the batch.

BCU diagnostics e.g., Card health status, SOV actuation counts, W&M lock status, valve faults, additive diagnostics etc. to be captured in TAS for generating alerts.

3.2 ~~Strainer cum Air Eliminator:~~

~~A combined unit of Strainer cum Air Eliminator is required to be provided at the upstream of each MFM for improved product delivery standard for both main and blend product.~~

~~Differential Pressure transmitter shall be provided across the Strainer cum air eliminator to trigger loading suspension thru BCU in case of choking of strainer exceeds preset value of 50% (configurable). In case of pressure drop across strainer exceeds 30 %, alarm to be generated in TAS system.~~

~~Air Eliminator shall be self-operated in-built Float actuated of suitable size. It should release the air trapped in the system so that air in the system does not get metered by Mass Flow Meter.~~

3.3 Temperature Transmitter:


Temperature transmitter along with RTD and Thermo-well is to be provided on each loading point for both main and blend product immediately after MFM. The output of temperature transmitter is to be connected to Mass Flow meter / Flow computer. The integrated assembly should have temperature accuracy of 0.25 deg C or better with a resolution of 0.1 deg C.

Online temperature and average temperature of the product loaded in each TT is to be transmitted to TAS via MFM for recording and subsequent posting in SAP.

3.4 Mass Flow Meter:

~~Each Loading point to be provided with MFM of suitable size (both main and blend product line).~~ The MFM shall have in built API / ASTM table for conversion of Volume & Density at 15 Deg C and 29.5 Deg C. The pulse output of MFM shall be connected to BCU for Mass/Volume flow at ambient temperature. Other measured and derived parameters as stated below to be transmitted to TAS over TCP/IP or RS 485 communication protocol. Pressure drop across MFM should not exceed the limit specified as per process parameter requirement in specifications. However, the pressure drop across the Mass Flow Meter (MFM) shall be limited to a maximum of 1 kg/cm²

- Mass and Volume flow rate
- Mass and Volume totalizer reading
- Online Temperature as sensed by inbuilt temperature sensor/ External Temperature Transmitter if provided.
- Weighted Average Temperature of the Batch
- Online Density at ambient temperature
- Online Density@ 15°C/29.5°C (Selectable)
- Weighted Average Density of the Batch
- Corrected Volume @ 15°C/29.5°C (Selectable)
- Weighted Average Volume of the batch

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- Meter-factor
- Critical Diagnostic data of MFM

Weighted average Density (sampling rate 30 sec.) and Temperature (sampling rate 30 sec.) of the product loaded TT wise, to be pushed to SAP as per SAP-TAS protocol. TAS system to generate alarm in case parameter affecting accuracy is beyond range. TAS system should have provision for in-situ verification of MFM working in specifications. It should be possible to schedule through the software for in-situ verification when no load is present in TAS software.

~~For Ethanol blended MS/ XP, average density of ethanol @ 15 Deg C needs also to be posted in SAP as per SAP-TAS protocol.~~

Master MFM to be calibrated at FCRI, Palakkad at an interval of 3 years and stamping of the Master MFMs/slave MFMs at location by Dept of Legal Metrology shall be done every year.

Note: In case MFM do not have in built API/ASTM table as stated above, flow computer with inbuilt API/ ASTM table to be provided.

3.5 Digital Control Valve:

Digital control valve (DCV) (Piston type) is to be provided at each metering assembly of main and blend product before loading arm for controlling the flow as per programmed instructions from the Batch Controller. Pilfer proof locking arrangement of DCV needle valves to be provided. In future there should not be requirement of tuning of needle valves.

3.6 On-Off Valve:

Each loading point (Main line with or without blend) to be provided with ON-OFF valve (~~Diaphragm type~~) and hardwired to Process PLC.


During normal operation, the valve shall be kept in open position and shall close under following conditions:

- ESD is active.
- ~~➤ Overfill alarm from BCU active (due to product coming in contact with Overfill Prevention sensor provided in each TT compartment).~~
- Over run qty beyond threshold limits 1 (configurable)
- Close command from TAS for testing purpose
- BCU Power failure

The ON-Off valve(s) shall re-open under following conditions:

- ESD if activated has been reset.
- ~~➤ Overfill alarm if activated has been reset.~~
- Over run qty beyond threshold limits (configurable) if activated has been reset.
- Open command from TAS except in above mentioned alarm conditions.
- Power failure alarm clearance from control room.

3.7 Loading Arm:

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Each loading point to be provided with loading arm (Top / ~~Bottom~~). The loading arm should be able to fill all compartment of the TT without needing to move the vehicle.

Loading arm to be drained dry into the chamber within 10-15 seconds after completion of batch. Even after draining of loading arm, to take care of collections of droplets if any, provision shall be made to collect the product seepage in funnel shaped container to divert the product during idle condition in case of top loading arm.

3.8 ~~Vacuum Breaker:~~

~~In case of top loading, loading arm shall be provided with either diaphragm or spring loaded Vacuum Breaker so that loading arm is drained dry into the chamber within 10-15 seconds after the batch is completed.~~

3.9 ~~Thermal Relief valves:~~

~~Thermal Relief valves are to be provided across each block portion of the piping (between loading arm & DCV, across header line MOV/DBBV, etc) so as to release the excess pressure built up into the piping during idling condition due to thermal expansion of the product. The product thus travels back to storage tank through thermal release line, ensuring safety. Set pressure of TRV should be in line with API requirements.~~

3.10 Meter Proving System:

Provision shall be there in the metering assembly for connecting mobile master meter skid for online calibration of the corresponding flow meter (Both main and blend product). Double isolation manual ball valves with spacer/blind provision shall be provided in tandem across the meter prover tap-off point to enable meter proving. ~~A single meter prover skid shall be considered for proving TLF metering skids(main, blended product flow meters) and TW skids.~~

~~In addition to mobile master meter skid, mobile prover tank of suitable capacity (3 KL tank for main product & 1 KL for blend product) to be provided.~~

Metering proving functionality to be developed in TAS system.


3.11 Earthing Relay:

There need to have an earthing interlock with system such that until and unless TT is earthed to a healthy earth pit or earthing grid, loading should not start and if this earthing connection is broken or path resistance goes up beyond a set point during loading for some reason, loading should immediately stop. Earthing interlock also to be provided for TTs unloaded at Tank truck decantation and unloading should be stopped by closing the corresponding inlet valve of the tank (if available).

Such earthing faults should appear as alarm condition in the system database. System should restart loading only after ensuring that TT has been earthed again to a healthy Earth pit or Grid.

Earthing Relay/ Grounding unit shall be Resistance - Capacitance type and shall utilize the inherent parameter of the TT i.e., capacitance of the TT. The system should recognize whether the earthing socket/crocodile clamp of the grounding unit is connected to Tank Truck or any other structure by analyzing the capacitance of the tank truck as a part of the grounding circuit. Earthing relay should have suitable diagnostic features to check the status of earthing, Resistance and capacitance monitoring at any point of time i.e., before start of loading and during loading operation, in addition to triggering the alarm. Communication failure between earthing relay and the TAS should be logged as an Alarm.

The proposed earthing relay will have minimum following features:

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- i. It should read minimum TT capacitance of 1200 pF.
- ii. Checks for healthy earth pit/grid for smooth dissipation of static charge.
- iii. System becomes non permissive if path/grid resistance is/goes more than 10 ohm.
- iv. System becomes non permissive if potential difference between TT and earthing relay goes beyond 1 volt.

3.12 ~~Overfill Protection Device and Rack Monitor:~~

~~Each compartment of the tank truck to be provided with overfill protection sensor/probe. Each loading bay shall be provided with Rack Monitor. Rack Monitor to be interfaced with TT overfill sensors, BCU and TAS.~~

~~Rack Monitors should have suitable diagnostic features to check the healthiness of all overfill sensors installed in the TT at any point of time i.e. before start of loading and during loading operation, in addition to triggering the overfill alarm.~~

~~In the event of overfill alarm or overfill sensor inactive/bypassed or nos. of connected overfill probes are less than total nos. of compartment of the TT, system should not allow to start loading operation or will stop if loading has already started. Communication failure between Rack Monitor and the TAS should be logged as an Alarm.~~

3.13 Remote Interaction Terminal (RIT) cum driver acknowledgement Push button Station:

RIT cum DAPBS is used for interaction between the bay operator/ TT driver and the BCU. It is used for regular feedback from the operator for loading operation like Ready for loading, Start loading, Stop loading, Alarm Condition etc. RIT should have an emergency shutdown emergency shutdown to stop loading at particular Loading point in case of any emergency. Light is used for attention of user in case of alarm etc.

3.14 Proximity Card Reader:

Proximity card Readers to be provided at each bays, barrier gates etc for identification of the TT and subsequent action be TAS.

Proximity Cards should be of Robust Design. Dirt, Oil or rough handling should not affect its performance.


3.15 ~~MFA dosing Sub System (Additive Dosing Sub System):~~

~~MFA Dosing facility is to be provided on selected MS/HSD loading point. ADSS will have PD/turbine metering system. Flow through the ADSS metering system shall be controlled by the main product Batch Controller. Additive should be dosed uniformly during 0% – 80% or in between 10% – 90% of the batch length of the Main product. Metered quantity of additive shall be injected in the main product pipeline before the Mass Flow meter. TAS System should have provision to load both dosed and undosed (normal) MS /HSD. % age dosing in PPM should be made configurable under Admin Password with logging.~~

~~MFA dosing Sub System shall have its own storage tank and pumping arrangement. PRV to be provided on the delivery line of the pump and discharge should be routed to the MFA storage tank to avoid extra pressure built up in the line.~~

~~Storage tank shall have appropriate level measuring device.~~

3.16 ~~Ethanol Blending Sub system:~~

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~~Blending facility is to be provided on loading point inside TLF. Blending system will have its own metering system similar to one being used for the main product (on smaller scale). Pressure drop across MFM should not exceed the limit specified as per process parameter requirement in specifications. However, the pressure drop across the Mass Flow Meter (MFM) shall be limited to a maximum of 0.5 kg/cm². Flow through the blending metering system shall be controlled by the main product Batch Controller. Blending is done uniformly during middle 0% – 80% or in between 10% – 90% of the batch length of the Main product. Metered quantity of Ethanol shall be injected in the main product pipeline after main product DCV. TAS System should have provision to load both blended and non-blended product. % age blending should be made configurable under Admin Password with Id logging.~~

~~All (main, blending and additives) products shall be reconciled at the day end.~~

4.0 Header Line Equipment's:

4.1 ~~Bulk Air Eliminator:~~

~~Bulk Air eliminator of suitable capacity to be provided in each main product header line leading to TLF and to be positioned as close as possible to TLF gantry.~~

4.2 Pressure Transmitter:

Each header line to be provided with pressure transmitter for monitoring the header line pressure and pressure trend should be available in TAS. Alarm/ Alert to be generated for High pressure alarm.


IV. Tank Farm Management System:

The Tank Farm Management Systems (TFMS) shall be a complete inventory management gauging system for the entire Tank farm. The Tank farm system shall get real time accurate measurement of the basic parameters like Gross level, Water level, Product temperature & Product density for all the product tanks.

TFMS, should have inbuilt system of Level Alarms i.e., Low, Low-low, High, High-High and High-High-High. Levels for these alarms shall be decided on case-to-case basis but in any case, High-High-High shall be the safe filling height of the tank. Once these levels are set, only system administrator shall have the power to make any change. Such critical changes shall have the provision for audit trail.

The TFMS system shall mainly consist of following components: -

- Primary Radar level gauge
- Averaging Temp. Sensor and Spot Temp. Sensor with water bottom interface.
- Pressure transmitter for density measurement in AG tanks and density probe for UG tanks.
- Tank side indicators
- Secondary Radar Level Gauge
- Automatic Overfill Protection System (AOPS)
- Redundant Communication interface units (FCU/CIU)
- TFMS Client Workstation
- OEM Software

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Proof testing requirements: -

Proof testing is an important requirement for Safety Instrumented System (SIS), Safety Instrument Function (SIF), and Safety Integrity Level (SIL). It ensures the related instrumentation or equipment is functioning as expected. Proof test interval to be made configurable in TAS. Popup “Proof test due for RTG-P or S / AOPS for Tank No. X” to be generated in case, it is due before fifteen days in advance to alert user to take action.


To proceed for proof testing, the tank should be in dormant mode. Proof testing can be carried out under administrative authorization. Necessary precaution should be taken prior to proof testing is started. Proof testing period should be configurable & reports to be available with user, time and date stamp.

Proof Test for Hi-Hi Alarm: -

- Proof testing of all primary and secondary radar gauges installed on tanks to be carried out on half yearly or frequency as defined in SIL verification report whichever is earlier to maintain the SIL integrity of system/loop.
- To proceed for proof testing, the tank should be in dormant mode.
- ROSOV of tank need to open from the field for which proof test to be done.
- Proof test button can be visible if the tank is in dormant mode.
- Once proof test command is initiated, Radar Relay contact (HH) to be simulated through OEM software. In future if advancement in technology allow, it can be simulated through TAS software directly.
- The Radar gauge would simulate alarm and activate the SIL relay.
- Once HH alarm is activated and ROSOV close feedback is received in system, Proof test will be disabled automatically stating “Proof test successful and auto disabled”.
- In case either HH alarm is not generated or ROSOV close feedback is not received within 30 min (Configurable), Proof test will be automatically disabled, and alarm will be logged “Proof test unsuccessful and auto disabled”.
- In case proof test button is disabled manually by operator, an alarm will be logged “Proof test unsuccessful and disabled manually by operator action”.
- Proof test can be stopped from TAS software, or it would automatically be terminated once the testing duration is over.

Proof Test for Hi-Hi-Hi Alarm: -

- Proof testing of all AOPS installed on tanks to be carried out on half yearly or as per SIL verification report whichever is earlier to maintain the SIL integrity of system/loop.
- To proceed for proof testing, the tank should be in dormant mode.
- ROSOV of tank need to open from the field for which proof test to be done.
- Proof test button can be visible if the tank is in dormant mode.
- Once proof test is enabled, test to be initiated by TAS software.
- Once proof test command is initiated, HHH to be simulated through control room / field / software as applicable.
- Once HHH alarm is generated and ROSOV close feedback is received in system, Proof test will be disabled automatically stating “Proof test successful and auto disabled”.

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- In case either HHH alarm is not generated or ROSOV close feedback is not received within 30 min (configurable), Proof test will be automatically disabled, and alarm will be logged “Proof test unsuccessful and auto disabled”.
- In case proof test button is disabled manually by operator, an alarm will be logged “Proof test unsuccessful and disabled manually by Operator action”.
- Proof test can be stopped from TAS software, or it would automatically be terminated once the testing duration is over.

1.0 Radar Gauges:

Radar gauges shall have instrument accuracy of +/- 1mm and installed accuracy of minimum +/- 4 mm (as per OIML R85 standard Edition 2008).

AG & Semi buried tanks are to be provided two Radar gauges. Both Primary and Secondary Radar Gauges shall conform to SIL 2 standard. Provision to be made in system such that in case primary Radar Gauges fails, then reading of secondary Radar Gauges shall be utilized for basic process flow, TFMS data posting in SAP, etc. linked with Primary Radar Gauges.

The SIL relay output of both primary and Secondary Radar Gauges to be hardwired to Safety PLC in OR GATE Logic and to be configured for HH level alarm.

In addition to above, provision shall also be there in the system to generate alarm in case the difference between primary & secondary Radar Gauge level reading exceeds +/- 4 mm.

UG Tanks are to be provided with one number SIL2 radar gauge along with Tank side indicator.

Both primary & Secondary Radar Gauges to be provided with Tank Side indicator to display the product level, water level, tank temperature & density reading etc.

~~2.0 Radar Gauge for Water Tank:~~


~~One number of Radar level gauge with instrument accuracy of +/- 3 mm or better is required to be provided on each water storage tank. Water storage tanks shall have provision to give Low & High-Level Alarm. Once the water level reaches predefined low level, system should raise an audio-visual alarm. ID of Operator acknowledging the alarm should get logged on to the system and bore well should start automatically to replenish the water till the water level reaches high level. Once the high-level reaches, the bore well should stop automatically.~~

~~There need to be a timer to record cumulative hours of pumps. There should be a provision to define Minimum Stock Volume. In case water level goes below minimum stock (Volume) cumulative, SMS to go to location in-charge and State Operations Head.~~

3.0 Temperature Probe (MST):

Each product tank (AG / semi buried / UG) to be provided with multi-spot Temperature probe with integrated water bottom sensor (MSTW). The system measurement accuracy shall be $\pm 0.25^{\circ}\text{C}$ or better with resolution of 0.1°C for temperature and +/- 4mm installed accuracy for water bottom sensor over entire probe length of 500 mm.

MST should be installed at the central hatch of the tank with water bottom sensor up to the edge of the sump for CR tanks and in gauge well in case of IFR tanks. The MSTW probe shall provide average temperature of the tank product and water level in the tank. The System should be able to account water even below the datum plate.

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~~Water bottom sensor is not required for ethanol tanks.~~

4.0 Density measurement:

Each above ground tank to be provided with pressure transmitter calibrated for density measurement based on pressure reading of PT and level reading of respective Primary Radar gauge. Installed accuracy of product density of the tank shall be within $\pm 0.5\%$ of the actual, for product level above 4m from datum plate.

When product goes below 4 meter, system shall retain last measured converted density (at 15 deg C) when product was at 4 meter. This density will be used for all practical purpose and the ambient density is back calculated using the actual temperature from MSTW.

As per referred API document the acceptance limit of density variation wrt measured density of composite (All level) sample by legacy method is recommended to be $\pm 0.5\%$ of the actual for product level above 4m from datum plate.

~~The isolation valves for PT installation to be fire safe & ROISOV Type.~~

~~Each Underground product tank shall be provided with density probe for the instrument accuracy of $\pm 0.0005 \text{ gm/cm}^3$ for density. Overall installed accuracy of the system shall be within $\pm 0.0015 \text{ gm/cm}^3$.~~

5.0 Automatic Overspill Protection Device:

Overspill Protection device (AOPS) shall be vibrating fork type and shall conform to minimum SIL2 standard. The same to be installed on a spool piece of approx. 500 mm length above tank nozzle in case of above ground tank / semi buried tanks / underground tank to take care of future changes in safe filling height of the tank.

The AOPS to be hard wired to process PLC. There need to be an inbuilt system to check the efficacy of the system at regular intervals. Actuation of this device should be logged on to the system and raise an audio-visual alarm.

~~6.0 Redundant Communication interface units (FCU/CIU)~~


~~One redundant communication interface unit for all Primary gauges and secondary gauges to be provided for converting two wire field communication into Serial/ TCP IP data link for digital data handling.~~

7.0 TFMS Client Workstation:

OIC provided for TAS shall be used as TFMS Client workstation and shall be provided with original OEM's software with graphic user interface. At any given point of time, operator should be able to monitor tanks at least equal to number of products being handled at the location. If separate server client architecture is required for TFMS, TAS-MS (LRC) to be used as TFMS server.

TFMS system shall also be interfaced with TAS and suitable GUI to be developed in TAS OIC for following parameters:

- Tank Type
- Tank capacity
- Tank Safe filling capacity
- Product Level
- Ullage


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- Pumpable Volume
- Gross Volume as % of safe filling capacity.
- ~~Water level~~
- ~~Water Volume~~
- Net Volume
- Density
- Tank product temperature
- ~~Tank vapour temperature~~
- Tank Mode- i.e., Delivery/Receipt/Dormant/Maintenance/ Receipt Sequence/ Dispatch Sequence etc.
- Status of Body & Line Valves on Receipt, Delivery /Recirculation/Water Draw off line/ Dyke Valves.
- Discharge/ Receipt rate of flow.
- Tank-wise logged data.
- Level and Temperature trend- both real time and historic as required.
- Tank-wise event log report.
- Settings of level alarms.

8.0 Interfacing with SAP

TFMS need to have interface with SAP through TAS-MS as per latest SAP-TFMS protocol. TAS-MS shall transfer following details at a pre-determined time to SAP for product accounting. In case primary gauge fail, secondary gauge data shall be used for SAP-TFMS posting on declaration of primary gauge in maintenance. In case, possibility of connecting the MST with both the gauges in future, data available from secondary gauge shall be used for SAP-TFMS posting in event of failure of primary gauge. The data transfer would be as per SAP- TFMS protocol.

- Location Tank no.
- SAP tank no.
- Gross level.
- Gross Qty.
- Water Level.
- Water Qty.
- Net Qty.
- Dead stock.
- Pumpable stock.
- Tank Temperature.
- Tank Density.

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➤ Tank mode.

The TFMS data also need to be archived in TAS-MS (LRC) server at predefined interval. Any changes should get reflected as exception report with audit trail.

TFMS shall have provision to generate following reports (indicative).

- 1) Tank Receipt/Despatch out-turns.
- 2) Product-wise Bulk Stock Ledger.
- 3) Tank-wise Logged data report
- 4) Tank-wise Tank trend report
- 5) Exception Report- tank-wise & between time periods
- 6) Event Report- tank-wise & between time periods
- 7) Alarm Data Report- tank-wise & between time periods

9.0 Tank Level alarms and its corresponding Control functions:

**ROSOV to be read as "Tank Body Valve" in below table*

** Operation of DBBV is not applicable*

LEVEL ALARM	SET POINT DETAILS	ALARM INITIATOR	CONTROL FUNCTION
HI Levels - All Types			
Hi	Hi Hi -(minus) Tank specific estimated Level Rise as per drawing/ calibration chart corresponding to (Operator response time of 15 mins X location specific Max. product receipt Flow Rate in LPM)	Primary Radar Guage or Secondary Radar Gauge	1. Activating Alarm Annunciation in LED Alarm Display Unit as well as in OIC
			2. Alarm Popup with Tank No & Product in OIC
			3. At this level system allows the operator authorized to either continue the receipt or close receipt line sequence valve MOV, DBBV & ROSOV. ID of operator shall get logged. Before closing the MOV, DBBV followed by ROSOV, operator should check / ensure closed status of isolation valve from PL / Refinery or TW decantation pump / Tanker pump based on operator's physical coordination with PL division /Refinery Divn/internal people / Boarding Officer in case of Tanker.
			4. If Tank is in Inter Tank Transfer mode, popup window with appropriate message will be displayed by OIC and allows to either continuing




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LEVEL ALARM	SET POINT DETAILS	ALARM INITIATOR	CONTROL FUNCTION
			transferring the product or operator to close receipt line sequence valves, followed by ROSOV (delivery / recirculation line, in case ITT is being done through Delivery / recirculation line). However, Operator authorized has to stop the pumps prior to valve closure. ID of operator shall get logged.
Operator-Hi	Hi Hi -(minus) Tank specific estimated Level Rise as per drawing/ calibration chart corresponding to (Operator response time of 5 minutes X location specific Max. product receipt Flow Rate in LPM)	Primary Radar Guage or Secondary Radar Gauge	1. Activating Alarm Annunciation in LED Alarm Display Unit as well as in OIC.
			2. Alarm Popup with Tank No & Product in OIC.
			3. In case no other tank is available with Receipt Sequence mode, system will popup window with "Check Receipt Status and Stop Pumping" message.
			4. In case another tank is in Receipt sequence mode and product reaches this level then switching over of the Tank should take place successfully by opening of receipt sequence valve of the Receipt Sequenced tank, followed by closure of the subject tank's receipt line DBBV and ROSOV closure simultaneously
			5. If receipt in the tank in Receipt Sequenced Tanks doesn't start for any reason whatsoever, popup window with appropriate message "Switch over Unsuccessful" shall be displayed on OIC and operator would be required to take further necessary corrective action either for manual switch over or ensure that further receipt into the tank is stopped before it reaches Hi-Hi level and close receipt line MOV / DBBV and ROSOV.
			6. If Tank is in Inter Tank Transfer Mode, popup window with appropriate message "Tank Number X Operator-Hi alarm activated, Confirm to continue or stop" will be displayed on OIC and allows Operator to either continue or close ITT

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LEVEL ALARM	SET POINT DETAILS	ALARM INITIATOR	CONTROL FUNCTION
			operation. However, Operator has to stop the pumps prior to valve closure. ID of the operator should get logged.
HiHi	HHH-(minus) Tank specific estimated Level Rise as per drawing/ calibration chart corresponding to (Operator response time of 10 mins X Max. product receipt Flow Rate in LPM)	Primary or Secondary Radar Gauges	1. Activating Alarm Annunciation in LED Alarm Display Unit as well as in OIC.
			2. Alarm Popup with Tank No & Product in OIC
			3. Sending Distress signal to Pipeline / Refinery PLC from Process PLC / stoppage of TW decantation / ITT pump as the case may be. If TW decantation / ITT pumps are not dedicated, stop all pumps on that product group and close ROSOV and DBBV / MOV on the receipt line in case of TW decantation and in case of ITT close ROSOV & DBBV / MOV of receipt & delivery line of both the tanks involved. (At some locations, ITT is done through delivery / recirculation line).
			4. Pipeline / Refinery PLC in turn will close pipeline / refinery station inlet valve (linked to their ESD) and provide 'valve closed' feedback signal to safety PLC/DCS/Process PLC of marketing. In case of TW decantation, closure status of the pump to be available in Safety PLC/DCS/Process PLC.
			5. Upon receipt of 'valve closed' feedback from Pipeline/Refinery PLC or TW decantation pump as the case may be, Safety PLC / DCS/Process PLC shall close the ROSOV and DBBV / MOV at tank inlet simultaneously along with exchange pit DBBV.
			6. If closed feedback signal from Pipeline / Refinery PLC or for TW decantation pump is not received in 150 secs, either of the following should happen:
			a) In case receipt from PL/Refinery and Mktg terminal having exchange pit DBBV then Safety PLC/DCS/Process PLC shall close the exchange pit DBBV and on receipt of exchange pit DBBV closed




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LEVEL ALARM	SET POINT DETAILS	ALARM INITIATOR	CONTROL FUNCTION
			<p>feedback, shall close the Tank inlet DBBV & ROSOV simultaneously. In case exchange pit DBBV closed feedback not received within 150 Secs then Safety PLC/DCS/Process PLC shall issue the close command for the tank inlet DBBV and after 60 secs (configurable) issue close command for closure of ROSOV to avoid surge in the pipeline.</p> <p>b) In case of receipt from PL/Refinery and Mktg terminal not having exchange pit DBBV then Safety PLC/DCS/Process PLC shall issue the close command for the tank inlet DBBV and after 60 secs (configurable) issue close command for closure of ROSOV to avoid surge in the pipeline.</p> <p>7. In case close feedback is received in the system within configurable time from either ROSOV or DBBV of respective lines, no action is required to be taken by system. Else, Popup to be generated "Tank No. X inlet line valves failed to close". Operator has to alert others for necessary actions.</p>
Hi-Hi-Hi	Safe filling height (SFH)	Overspill Level Switch	<p>1. Activating Alarm Annunciation in LED Alarm Display Unit as well as in OIC</p> <p>2. Alarm Popup with Tank No & Product in OIC</p> <p>3. Sending Distress signal to Pipeline/Refinery PLC from Safety PLC (via DCS/Process PLC) for closing pipeline station inlet valve linked to their ESD / stoppage of TW decantation/ ITT pump as the case may be. If TW decantation /ITT pumps are not dedicated, stop all pumps on that product group and close ROSOV and DBBV on the receipt line in case of TW decantation and in case of ITT close ROSOV & DBBV / MOV of receipt & delivery line of both the tanks involved.(at some locations ITT is done through recirculation / delivery line).</p> <p>4. Safety PLC / DCS/ Process PLC will close the ROSOV and DBBV / exchange pit DBBV at tank inlet line simultaneously.</p>

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LEVEL ALARM	SET POINT DETAILS	ALARM INITIATOR	CONTROL FUNCTION
			5. In case close feedback is received in the system within 60 seconds (configurable) from either ROSOV or DBBV of respective lines, ESD will not be activated. Else, ESD should be activated.
ESD (excluding ESD generated due to HHH) or Tank Receipt or Receipt sequence mode interlock failure except HH/HHH	Upon Activation	Operator / TAS System	1. Sending Distress signal to Pipeline/Refinery PLC from Safety PLC/DCS/Process PLC.
			2. Activating Alarm Annunciation in LED Alarm Display Unit as well as in OIC along with Alarm popup.
			3. In case receipt from PL / Refinery is going on, Pipeline / Refinery PLC in turn will close pipeline / refinery station inlet valve (linked to their ESD) and provide ‘valve closed’ feedback signal to safety PLC / DCS/Process PLC of marketing within 60 secs (configurable) as per pipeline / refinery station inlet valve closing time.
			a. Upon receipt of ‘valve closed’ feedback from Pipeline/Refinery PLC, Safety PLC/DCS/Process PLC shall close the ROSOV and DBBV at tank inlet simultaneously along with exchange pit DBBV.
			b. If closed feedback signal from Pipeline / Refinery PLC is not received in 60 secs (configurable), Safety PLC/DCS/Process PLC shall close ROSOV and DBBV at tank inlet simultaneously along with exchange pit DBBV.
Note: Wherever / as long as provision of feedback receipt from Pipeline or Refinery PLC or exchange pit DBBV regarding their isolation valve is not available, Safety PLC/DCS/Process PLC will close the tank inlet & outlet DBBV followed by ROSOV without waiting for the feedback.			

The arrangements that are proposed for receipts by pipelines/tankers/tank wagons/ITT should also be made for transfers to OMCs and vice-versa.




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LEVEL ALARM	SET POINT DETAILS	ALARM INITIATOR	CONTROL FUNCTION
Low Levels - All Types			
Low	Configurable, tank specific estimated level drop as per calibration chart corresponding to max product outflow in 5 minutes above low-low level.	Primary Gauge or Secondary Radar Gauge	1. Activating Alarm Annunciation in LED Alarm Display Unit as well as in OIC.
			2. Alarm Popup with Tank No & Product in OIC.
			3. If tank is in dispatch sequence mode, then switching over of the Tank should take place successfully once the product reaches this level, followed by closure of the subject tank's delivery line MOV, DBBV and ROSOV closure simultaneously after getting the open feedback from the sequence valve of delivery line of sequenced tank.
			4. If none of the tank is in Dispatch sequence Mode, or the tank in dispatch sequence mode doesn't start the dispatch for any reason whatsoever, popup window with appropriate message "Switch over Unsuccessful" will be displayed on OIC and Allows Operator to either continue the delivery or close Delivery Line ROSOV and DBBV / MOV of the Tank. However, Operator has to stop the concerned Dispatch pumps prior to valve closure. ID of the operator should get logged.
			5. If Tank is in Inter Tank Transfer Mode, popup window with appropriate message "Tank Number X Low alarm activated, Confirm to continue or stop" will be displayed on OIC and allows Operator to either continue the delivery or close Dispatch line ROSOV and DBBV / MOV of the dispatch Tank. However, Operator has to stop the pumps prior to valve closure. ID of the operator should get logged.
Low Low	Tank Delivery Nozzle level for	Primary Gauge or	1. Alarm Popup with Tank No & Product in OIC.

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LEVEL ALARM	SET POINT DETAILS	ALARM INITIATOR	CONTROL FUNCTION
	CR Tanks or Roof Low Leg Level for FR tanks plus Tank specific estimated Level as per drawing/ calibration chart corresponding to (10 mins max product outflow as per max installed pumps capacity)	Secondary Radar Gauge	2. Stopping All concerned Delivery Pumps of the Product group.
			3. Upon receipt of “pump stopped” feedback, close Dispatch line DBBV & ROSOV of the Tank.
			4. If “pump stopped” feedback is not received in 60 secs, close dispatch line DBBV / MOV & ROSOV of the Tank. PMCC Pump feeder / Power ESD to be generated. “Pump fail to stop” popup should be generated.
			Note - For product withdrawal below Low Low level, tank has to be assigned to maintenance or stripping mode as the case may be specific to location.
Fire Water Level Alarms			
Fire Water Tank Low Level Alarm	Configurable as per user requirement	Radar Gauge	1. Activating Alarm Popup window on OIC.
			2. Starting all designated bore-well pumps.
			3. In case any or all bore-wells fails to start; alarm should appear on OIC with bore-well number. In case borewell fail to start, “Borewell Number X fail to start” popup should be generated.
Fire Water Tanks High Level Alarm	Configurable as per user requirement	Radar Gauge	1. Activating Alarm Popup window on OIC.
			2. On reaching high level, all operating bore-well pumps to stop automatically.
			3. In case any or all bore-wells fails to stop, alarm should appear on OIC with bore-well number. In case borewell fail to stop, “Borewell Number X fail to stop” popup should be generated.

In case Hi-Hi-Hi level alarm is actuated at the location, system should send an SMS to location in-charge and State Operations Head.

There need to be an inbuilt system to check the efficacy of the system at regular intervals.

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V. Pumping Operation

All the product pumps (TLF loading, Drum Filling Loading Pumps, CRMB ITT Pumps ~~TLF unloading, TW loading, TW unloading, OMC dispatch, TT decantation, additive, blue dye, Ethanol, Biodiesel~~ etc), bore well, ~~makeup water pump~~ etc. are to be integrated with TAS for Remote monitoring and Control. Along with main product pumps, ethanol and additive pumps shall also operate in auto on the basis of pump demand from Batch Controller.

There shall be two modes of operation of the pumps:

- Remote
- Local
 - i. **Remote Mode:** Remote pump operation should be feasible only from OIC in control room or through system generated commands.
 - ii. **Local Mode:** Its operation should be feasible from the Start/Stop push button located at site.


When a tank truck identifies itself on TLF by showing its proximity card on PCR and batch is set on the batch controller, system should generate pump demand based on the flow requirement at TLF vis-à-vis pump's rated flow rate. Pumps shall start as per the auto /selected sequence. Following interlocks to be provided for operation of pumps in Remote auto/manual mode: -

- ✓ All valves on the tank delivery line up to pump suction are open (Product Group Tank Lineup).
- ✓ All valves from Pump Discharge are open either for ITT/recirculation/ Dispatch or any other mode.
- ✓ Tank level is above low-low.
- ✓ ESD (Local/plant) is not activated.
- ✓ Suction Pressure healthy (above NPSHR).
- ✓ DPT pressure is not high.
- ✓ Discharge pressure is not high.
- ✓ Delivery header pressure is not high. (Not applicable in case of ITT operation)
- ✓ TLF Overfill/Overrun Alarm. (Applicable only in case of TLF Dispatch operation)
- ✓ Pump should not be in trip condition.
- ✓ In case of ITT operation, pump should be stopped on HH/HHH of receiving tanks.

Configurable delay (configurable) off timer to be provided for pressure interlocks for pumps to avoid frequent start/stop.

In case of Local mode of operation of pumps, following interlock shall be considered for operation of pumps: -

- ✓ ESD (Local/plant) is not activated.


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- a) There should be time counter on OIC so that actual run hours of each pump can be known to decide sequence of operation and for drawing the preventive maintenance schedule of pumps.
- b) Pump should have provision of running in remote auto based on run hour / manual priority selected by user. Auto Pump priority should be set on daily basis automatically by day start bit. There should be a provision to select the sequence of operation of pumps on OIC. Either one should be active at a time.
- c) There should be a provision in the system to put pumps under maintenance so that system should not attempt to give it a 'Start' / 'Stop' command. Such events should get logged on to the system with a time stamp so that downtime for the equipment can be known in the form of report.
- d) In case of actuation of Emergency Shutdown (ESD), all pumps must stop irrespective of the pump mode selected.
- e) In case of any of the pump fails to start despite the command from the control room, an alarm should be generated, next pump in the sequence or standby pump should start.
- f) In case of tripping of Pump, the acknowledgement shall be required from control room operator before restarting the pump.
- g) Pressure Transmitter to be provided on inlet and out of pump to avoid dry runs. Pressure transmitter to be linked to Pump tripping for low suction/high discharge pressure.
- h) First interlock failure alarm to be provided leading to stopping of pumps.
- i) Electrical signature to be captured in TAS with regards to pumps.
- ~~j) Pump in UG tanks should have interlock for alarms e.g., Low-Low alarm, dispatch line open feedback ESD, discharge pressure interlock etc.~~
- ~~k) Additive pumps also to have interlock for Low-Low alarm, ESD etc. for pump to run.~~

VI. Modes of Storage Tanks:

Storage tanks to be operated under the tank modes for auto operation of valves. OIC Screen to be used for changing the tank mode. Shift In-charge should be able to change the Tank Mode through OIC. Supervisor level authorization is required for setting up tank mode. This activity shall be logged in the system as an event and shall have provision for audit trail.

- a) Receipt Mode
- b) Delivery Mode
- c) Delivery Mode (for Drum Filling)
- d) Receipt Sequence Mode
- e) Dispatch Sequence Mode
- f) Inter-Tank Transfer Receipt Mode

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- g) Inter-Tank Transfer Dispatch Mode
- h) Recirculation Mode
- i) Dormant Mode
- j) Maintenance Mode

1.0 Operation of Tank Mode Selection


- i. Default Tank Mode will be Dormant Mode.
- ii. Authorized user can select required Tank Mode from combo box given under Tank Mode for each tank.
- iii. Upon selection, “Is Tank Quality Certified” (if tank being selected is for delivery) or “Is Gauging & Sampling Done” (if tank being selected is for receipt) popup message shall appear with YES or No buttons. If user selects “YES” then system will prompt to “Confirm” the mode setting. If “NO” is selected, tank will remain in Dormant mode.
- iv. Confirmation button is to be pressed to confirm the mode selection.
- v. If user is valid, system will operate appropriate valves after checking the prerequisite permissive and interlocks.
- vi. Confirmation button will be disabled after successful mode setting by the system to avoid multiple mode setting. Only Stop mode button will be available at this time. Tank mode can be stopped if required by the user as per authorization available (minimum supervisor level privilege is required). Activity shall be logged for audit trail.
- vii. Once tank mode is stopped, Tank mode will be changed to dormant mode. User can set any other tank mode after setting tank in dormant mode only. System will not check sequenced tanks for switch over if tank mode is stopped by user.
- viii. Tank Mode can be stopped by user at any point of time.
- ix. Normally only one tank of a product group can be put on receipt/ delivery mode. However, based on site specific requirement, multiple tanks on same product group can be put in Receipt mode if receipt source/line is different. But if source is same, other tank can only be put into receipt sequence mode. Similarly, multiple tanks on same product group can be set into Delivery mode if dispatch is for different destination like Pipeline Transfer, TW Siding, TLF etc. But if destination is same, other tank can only be put into dispatch sequence mode.

- 1.1 **Receipt Mode:** Receipt Mode is for receipt of Product either through Pipeline, Rails, and TT. DBBV & ROSOV on delivery line has to be closed and ROSOV on the receipt line has to be open for the tank to be put on receipt mode. DBBV/MOVs on receipt line would open automatically when tank is put in Receipt mode.

When Tank is in receipt Mode, Receipt line DBBV/MOVs shall be closed automatically after stopping the Receipt mode by the shift in charge & his Id should get logged.

For remote manual closure of DBBV/MOV, System would ask for a confirmation for closure of inlet DBBV / MOVs if tank is in receipt mode i.e. **“Tank no --- is in Receipt Mode, Please confirm if its inlet DBBV or MOV no ----- is to be Closed”** but would close by any system generated “CLOSE” command i.e. because of ESD, TFMS Level Alarms or through Push Buttons Station outside the dyke area.

Interlock to assign tank into receipt mode.

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- ✓ ESD is not active.
- ✓ Tank Level should not be HiHi / HiHiHi.
- ✓ Designated Tank Receipt Line ROSOV open feedback healthy.
- ✓ Designated Tank all ROSOVs & DBBVs should be closed except Receipt line ROSOV.
- ✓ Water draw off valve (body) close feedback is healthy (if available).
- ✓ No other Tanks in the product group in receipt mode (For locations with only one source of receipt i.e wagon/Pipeline etc)

Note: Once all sequence MOV open feedback is healthy after start of mode, open feedback of sequence MOVs should remain healthy to maintain the tank in selected mode (Tank should withdraw from mode in case of sequence valve open feedback is not there).

- 1.2 **Delivery Mode:** Delivery Mode is for dispatch of product from tank through Rail, Pipeline, TT, Drum Filling. MOVs of receipt line has to be closed and MOV on the delivery line has to be open for the tank to be set in Delivery Mode. DBBV/MOVs on delivery line would open automatically when tank is put on delivery mode. ~~DBBVs/MOVs at Exchange pit of terminal (if available for OMC dispatch) need to be opened from Control Room when tank is put on delivery mode for transfer to OMCs.~~

When Tank is in delivery mode, DBBV/ MOVs on delivery shall be closed automatically after stopping the delivery mode by user and his Id would get logged.

For remote manual closure of DBBV/MOV, System would also ask for a confirmation for closure of outlet DBBV/ MOVs if tank is in delivery mode i.e. " **Tank no --- is in Delivery Mode, Please Confirm if its Outlet DBBV or MOV no ----- is to be Closed**" but would close by any system generated "CLOSE" command i.e. because of ESD, TFMS Level Alarm or through Push Buttons Station outside the dyke area

Interlock to assign tank into delivery mode.


- ✓ ESD is not active.
- ✓ Tank Level should not be Low-Low.
- ✓ Designated Tank Delivery Line ROSOV open feedback is healthy.
- ✓ Designated Tank all ROSOVs & DBBVs should be closed except delivery line ROSOV.
- ✓ Water draw off valve (body) close feedback is healthy (if available).
- ✓ No other Tanks in the product group in delivery mode.

Note: Once all sequence MOV open feedback is healthy after start of mode, open feedback of sequence MOVs (Except TLF header valve) should remain healthy to maintain the tank in selected mode (Tank should withdraw from mode in case of sequence valve open feedback is not there).

- 1.3 **Receipt Sequenced Mode:** Receipt Sequenced mode is for putting the tank in sequence for receipt of product if the tank under receipt does not have sufficient ullage to receive the parcel.

Interlock to assign tank into in receipt sequence mode :

- ✓ One of the tanks of the same product is under Receipt mode.
- ✓ ESD is not active.

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- ✓ Tank Level should not be HiHi / HiHiHi.
- ✓ Same Tank Receipt Line ROSOV open feedback is healthy.
- ✓ Same Tank all ROSOVs & DBBVs should be closed except Receipt line ROSOV.
- ✓ Water draw off valve (body) close feedback is healthy (if available).
- ✓ No other Tanks in the product group in receipt sequence mode. (For locations with only one source of receipt i.e wagon/Pipeline etc)

Note: Once all sequence MOV open feedback is healthy after start of mode, open feedback of sequence MOVs should remain healthy to maintain the tank in selected mode.

- 1.4 **Dispatch Sequenced Mode:** Dispatch Sequenced mode is for putting the tank in sequence for dispatch of product if the tank under delivery does not have sufficient stock to cater the expected demand for the product.

Interlock to assign tank into in dispatch sequence mode:

- ✓ One of the tanks of the same product is under Delivery mode.
- ✓ ESD is not active.
- ✓ Tank Level should not be Low-Low.
- ✓ Designated Tank Delivery Line ROSOV open feedback is healthy.
- ✓ Designated Tank all ROSOVs & DBBVs should be closed except delivery line ROSOV.
- ✓ Water draw off valve (body) close feedback is healthy (if available).
- ✓ No other Tanks in the product group in dispatch sequence mode.

Note: Once all sequence MOV open feedback is healthy after start of mode, open feedback of sequence MOVs (Except TLF header valve) should remain healthy to maintain the tank in selected mode (Tank should withdraw from mode in case of sequence valve open feedback is not there).


- 1.5 **Inter tank transfer Mode:** Tank can be either in Inter Tank Receipt (ITR) Mode or Inter Tank Transfer Dispatch (ITD) Mode. System should not allow having more than one tank of same product group in either ITR mode or ITD mode.

Interlock to assign tank into in Inter Tank Receipt Mode:

- ✓ ESD is not Active.
- ✓ Tank Level should not HiHi/HiHiHi.
- ✓ Designated Tank Receipt/Delivery line ROSOV open feedback is healthy depending upon the location because at some locations inter tank receipt is carried out through the delivery line of the tank and in some locations, it is through the receipt line.
- ✓ Designated Tank all ROSOV's and DBBV's should be closed condition except for Receipt/Delivery line ROSOV.
- ✓ Water draw off valve (body) close feedback is healthy (if available).

Interlocks to assign tank into for Inter Tank Dispatch Mode,

- ✓ ESD is not Active.

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- ✓ Tank Level should not be Low-Low.
- ✓ Designated Tank Dispatch line ROSOV open feedback is healthy.
- ✓ Designated Tank all ROSOV's and DBBV's should be closed condition except for Dispatch line ROSOV.
- ✓ Water draw off valve (body) close feedback is healthy (if available).

DBBV/MOVs on corresponding line would open automatically when tank is put under ITR or ITD mode and corresponding pump for ITT is selected in OIC. However, pump operation for ITT shall be done in manually in remote/local mode. Pump kept in manual mode, to be used for ITT operation and valves for corresponding pump to be opened automatically required for ITT operation.

Note: Once all sequence MOV open feedback is healthy after start of mode, open feedback of sequence MOVs should remain healthy to maintain the tank in selected mode (Tank should withdraw from mode in case of sequence valve open feedback is not there).

- 1.6 **Recirculation Mode:** Recirculation mode is to be assigned for recirculation / churning of product within a particular tank.

Interlocks to assign tank into for Inter Tank Dispatch Mode,

- ✓ ESD is not active.
- ✓ Tank Level should not be HiHi/HiHiHi or Low Low
- ✓ Designated Tank Dispatch & Recirculation line ROSOV open feedback is healthy.
- ✓ Designated Tank all ROSOV's and DBBV should be closed except Dispatch line & Recirculation Line ROSOV's


DBBV/MOVs on corresponding line would open automatically when tank is put under Recirculation mode and corresponding pump for recirculation is selected in OIC. However, pump operation for recirculation shall be done in manually in remote/local mode. Pump kept in manual mode, to be used for recirculation operation and valves for corresponding pump to be opened automatically required for recirculation operation.

Note: Once all sequence MOV open feedback is healthy after start of mode, open feedback of sequence MOVs should remain healthy to maintain the tank in selected mode (Tank should withdraw from mode in case of sequence valve open feedback is not there).

- 1.7 **Dormant Mode:** When there is no operation on the tank, tank should be kept under dormant mode. For putting the tank in dormant mode, earlier mode should be stopped. On putting the tank into dormant mode, ROSOV & DBBV on Receipt, Delivery and Recirculation line would close. Dormant mode is the default mode. Tank can be put into any mode from dormant mode if pre requisites of the selected mode are fulfilled.

- 1.8 **Maintenance Mode:** If tank is to be taken for maintenance, it needs to be kept under Maintenance Mode under admin authorization with logging of events. To put the tanks under Maintenance mode Receipt, Delivery and Recirculation line ROSOV & DBBVs have to be in closed condition.

Delivery line ROSOV & DBBV can be opened or closed any number of times when tank is in Maintenance mode and id shall be logged.

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Under maintenance mode product can be drawn even below the LL level but receipt line DBBV cannot be opened.

Under tank maintenance mode, system should not generate Low-Low level alarm.

The following is prerequisite interlocks,


✓ ESD is not Active.

2.0 Tank Sequencing:

Tank Sequencing is required to be done for Receipt and Dispatch when tank under receipt does not have sufficient ullage to receive the full batch or tank under delivery or tank under delivery does not have sufficient stock to meet the demand for the day.

2.1 Receipt Sequence Mode

1. If anyone of the Tank is selected for Receipt Mode, then only, Receipt Sequence mode will be available for rest of the Tanks in the same product group.
2. Select the Tank for Receipt sequence Mode.
3. Receipt Sequence Tank for receipt can be assigned at any point of time but before reaching System Operator-Hi level of Receipt Tank.
4. During receipt mode of a tank, system will continuously monitor/check if any other tank is assigned for Receipt Sequence mode.
5. If Operator-Hi level of the tank is reached and no other tank is available with Receipt Sequence mode, now system will popup window with "Check Receipt Status and Stop Pumping" message.
6. If System Operator-Hi level of the tank is reached and another tank is available with Receipt Sequence mode, system will open receipt line valves of receipt sequenced tank and after getting successful open feedback from sequence valves, system will close receipt line DBBV followed by ROSOV of Receipt Tank which was currently receiving the product and tank will be set in Dormant mode.
7. If system does not get open feedback from receipt line valves of the sequence tank within predefined period of time, then it will popup window with "Switch over Unsuccessful" message and an audio alarm. Based on the same, operator to take necessary action.
8. If the system does not receive close feedback from sequence valves of the tank which was currently under receipt within prescribed time limit, it will popup window with "ROSOV/DBBV/MOV Failed to Close" with audio alarm. Based on the same, operator to take necessary action.
9. Receipt Sequence Tank Mode can be stopped by pressing stop mode button any time before switching over with supervisor privilege level and shall be logged for audit trails. System will prompt appropriate message "Tank Sequence will be Disabled".
10. Tank mode is set to automatically dormant mode upon stopping of tank mode.
11. Fail to close/Fail to open alarm for all DBBV, MOV and ROSOV shall be provided in OIC GUI with audio alarm.


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2.2 Dispatch Sequence Mode

- Once anyone of the Tank is selected for Particular Delivery Mode, then only, Dispatch Sequence mode will be available for rest of the Tanks in the same product group.
- Select the Tank for Dispatch sequence Mode.
- Dispatch Sequence Tank for Dispatch can be assigned at any point of time but before reaching system Low level of Dispatch Tank.
- System will continuously monitor if any other tank is assigned for Dispatch Sequence mode.
- If system low level of the tank is reached and no other tank is available for sequence, now system will popup window with “Check Dispatch Status and stop delivery pump” message.
- If system low level of the tank is reached and another tank is available for dispatch sequence, system will open delivery line sequence valves of the tank in dispatch sequence and after getting open feedback from sequence valves , system will close delivery line sequence valves followed by ROSOV of delivery Tank which was currently delivering the product.
- If system does not get feedback from sequence valves within predefined period of time, then it will popup window with “Switch Over Un successful” message with audio alarm. Based on the same, operator to take necessary action.
- If the system does not receive close feedback from sequence valves of the tank which was currently under dispatch within prescribed time limit, it will popup window with “ROSOV/DBBV/MOV Failed to Close” with audio alarm. Based on the same, operator to take necessary action.
- Dispatch Sequence Tank Mode can be stopped by pressing Stop Mode button with supervisor privilege level at any point of time and same shall be logged for audit trails. System will prompt appropriate message “Tank Sequence will be Disabled”.
- Tank mode is set to automatically dormant mode upon stopping of tank mode.
- Fail to Close/Fail to Open alarm for all DBBV, MOV and ROSOV shall be provided in OIC GUI.

Permissive for Tank Mode: -

SN	Tank Mode	Permissive
1	Delivery Mode	Common ESD healthy (Plant)
		Tank Outlet line ROSOV Open
		Tank Inlet and recirculation line ROSOV & DBBV closed
		Tank Water draw offline MOV (Body) closed (If available)
		Primary Radar gauge & Secondary Radar gauge LL Healthy

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SN	Tank Mode	Permissive
		Any other tank of same product group not in dispatch mode (For locations with only one dispatch i.e Pipeline Transfer, TW Siding, TLF etc)
		Sequence MOVs in Remote Auto mode
		At least one pump in Remote Auto, should have suction & delivery MOV of pump in Remote Auto & recirculation MOV closed
		MOV towards Header line in Remote Auto
2.	Dispatch seq. Mode	Common ESD healthy (Plant)
		Tank Outlet line ROSOV Open
		Tank Inlet and recirculation line ROSOV & DBBV closed
		Tank Water draw offline MOV (Body) closed (if available)
		Primary & Secondary Radar gauge LL Healthy
		Sequence MOVs in Remote Auto mode
		At least one pump in remote Auto, suction & delivery MOV in Remote Auto & recirculation MOV closed
		Same product group at least One Tank in Dispatch
		MOV towards Header line in Remote auto
3.	Receipt Mode	Common ESD healthy (Plant)
		Tank Inlet line ROSOV Open
		Tank Outlet and recirculation line ROSOV & DBBV closed
		Tank Water draw offline MOV (Body) closed (if available)
		Primary and Secondary Radar gauge HH Healthy
		TANK HHH Healthy




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SN	Tank Mode	Permissive
		Any other tank of same product not in receipt mode (For locations with only one source of receipt i.e wagon/Pipeline etc)
		Tank inlet line DBBV and all sequence MOV in Remote Auto mode
4.	Receipt Seq. Mode	Common ESD healthy (Plant)
		Tank Inlet line ROSOV Open
		Tank Outlet and recirculation line ROSOV & DBBV closed
		Tank Water draw off MOV (Body) closed (if available)
		Primary and Radar gauge HH Healthy
		Tank HHH Healthy
		Tank inlet line DBBV & all sequence MOV in Remote Auto mode
		Same product group at least one tank in receipt
5.	ITT Receipt	Common ESD healthy (Plant)
		Tank recirculation line ROSOV Open feedback
		Tank Inlet and Outlet line ROSOV & DBBV closed
		Tank Water draw off MOV (Body) closed (if available)
		Primary and Radar gauge HH Healthy
		Tank HHH Healthy
		Any other tank of same product group not in ITT Receipt
		Sequence MOVs from the tank to pump house recirculation line connected to recirculation header till the Pump discharge line in Remote Auto mode.
6.	ITT Dispatch Mode	Common ESD healthy (Plant)
		Tank Outlet line ROSOV Open feedback

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SN	Tank Mode	Permissive
		Tank Inlet and Recirculation ROSOV & DBBV Close Feedback
		Tank Water draw off MOV (Body) closed (if available)
		Primary and Radar gauge LL Healthy
		Any other tank of same product group not in ITT dispatch mode
		Sequence MOVs from the tank outlet line till the Product Pump suction line in Remote Auto mode.
		At least one pump in Remote manual ITT /Recirculation Mode, should have suction & recirculation MOV in Remote Auto & discharge MOV closed.
7	Maintenance Mode	Common ESD healthy (Plant)
		Receipt line ROSOV and DBBV close feedback
		Recirculation line ROSOV and DBBV close feedback
		Dispatch line ROSOV and DBBV close feed back
		Tank Water draw offline MOV (body) closed
8	Recirculation Interlock Mode	Common ESD healthy (Plant)
		Tank Recirculation & outlet line ROSOV Open
		Tank Inlet line ROSOV & DBBV closed
		Tank Water draw off MOV (Body) closed (if available)
		Primary & Secondary Radar gauge HH Healthy
		Tank HHH healthy
		Primary & Secondary Radar gauge LL Healthy
		Any other tank of same product not in recirculation/ITT mode
		Sequence DBBV & MOV Open feedback healthy (Along with Configurable Timer for action)

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SN	Tank Mode	Permissive
		At least one pump in Remote Manual ITT/ Recirculation should Mode, should have suction & recirculation MOV in Remote Auto & discharge MOV should be closed.
		MOV of Tank outlet and recirculation line up to pump house in Remote Auto mode.
		Tank Outlet & Recirculation line DBBV in Remote Auto mode.

Note: -

1. In case of ITT / recirculation mode, Interlock may be specific to location based on the line (Inlet / Outlet / Recirculation) used for operation.
2. Any other interlock required for auto operation of Tank mode, may be included with due diligence if any specific to location requirement.
3. Based on the availability of Motor operated valves in locations, interlock with respect to MOV may also be included/excluded.
4. In case Tank having receipt and delivery from multiple sources, Interlock shall be provided in between manifold valves segregating the sources.
5. ~~Tanks mode for UG tanks to be configured e.g., for UG to AG for transferring the product and for receipt in UG tanks.~~
6. ~~Earthing relay to be provided in TTD area. In case of all locations, it should be an interlock for setting UG tanks in receipt mode, i.e., Opening of receipt line valves of UG tanks to be linked with earthing of TT under decantation.~~
7. ~~Stripping mode to be created for emptying of tanks in case stripping facility is provided in the location. Under stripping mode product can be drawn even below the LL level but receipt line ROSOV/DBBV cannot be opened similar to maintenance mode.~~
8. First interlock failure alarm to provided leading to stopping of pumps / Tank Modes etc.
9. Suitable prompt /pop up messages to be provided in case operator opens / closes the DBBV / MOV (second body valve) in remote manual of Tank already lined up (Auto / manual) including same product group tanks. ROSOV open feedback is to be checked for prompting message.
10. Suitable Logic to be developed to take care swing tank operation as applicable for particular location to avoid the modification of logic later on.

3.0 Operation of Tank Valves:

~~For AG & semi-buried storage tanks for Unclassified products: ROSOV (Electro-hydraulic (EH) type) and DBBVs (Electrical) MOVs shall be provided as the first and second body valves on Receipt, Delivery and Recirculation line(if provided).~~

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~~For AG & semi-buried storage tanks for C Class products: MOVs (Electrical) and DBBVs (Electrical) shall be provided as the first and second body valves on Receipt, Delivery and Recirculation line (if provided)..~~

For AG & semi-buried storage tanks for unclassified products: MOVs (Electrical) shall be provided as the first and second body valves on Receipt, Delivery and Recirculation line (if provided).

For UG storage tanks: Body MOVs (Electrical) shall be provided in Receipt and delivery line.

Tank Body & line Valves shall have the following modes of operation.

- a) Local
- b) Remote

3.1 Local Mode:

Under Local Mode, ROSOV & DBBV should Open/Close through buttons housed on the actuator/Local Control Station (LCS) and close through push buttons station outside the dyke. There should be provision to stop opening/ closing of valve in-between and reverse the process of opening or closing in DBBV.

Opened/closed status of the ROSOV and DBBV shall be available on the actuator/LCS.

Provision shall be there to open/close ROSOV and DBBV manually in case of power/motor/actuator failure.

Receipt, Delivery and Recirculation body ROSOV (EH) shall have the provision for its closure just outside the dyke. This provision shall be hardwired, so that tank can be isolated from outside the dyke in case of emergency irrespective of the selected mode of operation of the valve at site. There should be different action for Opening and Closing the valve and should be uniform at all locations. The push button should be protected by a guard to obviate accidental closure.

If Local Mode of operation is selected on ROSOV, they would not operate on remote from Control Room except in case of any of the following:

- 1) Closure command from ESD pressed from anywhere in the plant.
- 2) Closure command is generated by PLC/DCS based on the Level Alarm from TFMS.
- 3) Manual Closure command from Push button located just outside the dyke wall for ROSOV.


If Local Mode of operation is selected on DBBV, they would not operate on remote from Control Room except in case of any of the following:

- 1) Closure command from ESD pressed from anywhere in the plant.
- 2) Closure command is generated by PLC/DCS based on the Level Alarm from TFMS
- 3) Manual Closure command from Push button located just outside the dyke wall if provided for DBBV.

3.2 Remote Mode:

Once the Remote mode of Operation is selected on the ROSOV & DBBV, it shall not operate locally.

In Remote mode, body valve (ROSOV- EH) shall accept commands from the following:

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- 1) Closure command generated by the system i.e., ESD & TFMS Level Alarms.
- 2) Close/Open command from the hardwired push buttons located just outside the Dyke.
- 3) Only Close command given by Operator from Operator Interface Console (OIC).


In Remote mode, line valve (DBBV) shall accept commands from the following:

- 1) Closure command generated by the system i.e., ESD & TFMS Level Alarms.
- 2) Close/Open command from the hardwired push buttons located just outside the Dyke if provided.
- 3) Close/Open command given by Operator from Operator Interface Console (OIC).

VII. Emergency Handling System:

1.1 Audio Visual Alarm Unit:

- i. LED display of minimum 55" to be provided, where all individual critical active alarms to be displayed prominently to attract attention along with hooter.
- ii. Recommended list of critical alarms to be displayed on LED alarm display unit are as follows:
 - ~~ROSOV~~ Tank Body Valve failed to open / close.
 - ~~DBBV~~ 2nd Tank Valve failed to open / close.
 - Pump failed to start / stop excluding power failure case.
 - Tank level alarms.
 - ESD
 - BGU
 - Dyke Valve MOV open alarm.
 - Fire Hydrant Pressure is LOW
 - ~~Actuation of Rim Seal Fire Protection System.~~
 - ~~Alarm from Hydrocarbon Detector~~
 - ~~Fire Hydrant (FE failure to start/ Jockey pump fails to start / Hydrant system not in Auto)~~
- iii. The alarm text message should automatically disappear from the screen once the alarm conditions has been normalized and the same has been acknowledged and reset in the system and ID of the person acknowledging the alarm should get logged.
- iv. If any of the ESD /BGU is actuated in the field, it should also give Location/ zone where from ESD /BGU is actuated along with auto announcement of the location of emergency through PA paging. The system should also actuate the wailing siren.
- v. All other alarms shall be available in OIC along with popup in addition to critical alarms mentioned above. System shall have provision to Acknowledge and Reset the alarms. ID of the Operator acknowledging and resetting the alarm should get logged on to the system. Critical alarms should come as event in the exception report with operator's Id.

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- vi. An alarm annunciation panel should be placed at Jetty also which should have provision to give audio visual alarm for Hi, Hi-Hi, Hi-Hi-Hi for individual tanks and ESD. This panel should have provision to send audio visual signal to vessel control room through portable siren so that vessel master can stop vessel pumps to avoid pressure build up in coastal line.

1.2 Break Glass Units (BGU):

Location should be provided with Break Glass Units at various critical points in the field. So that in case, someone breaks the BGU in the field on noticing an emergency situation, audio-visual alarm should get raised on the fire alarm panel positioned in the control room. Fire Alarm panel should indicate the field position where from BGU has been broken. It shall actuate the Automatic Wailing Siren and auto announcement of the location of emergency through PA paging.

Siren code to be followed in case of activation of BGU & ESD :

- FIRE activation: The siren code should as per latest PNGRB guidelines.

1.3 Automatic Wailing Siren Panel.

Location should be provided with Automatic Wailing Siren Panel. It should get actuated on actuation of ESD or BGU provided in the field. Panel should have provision to give clear signal manually. Provision should also exist to give continuous wailing siren manually.

Provision should also exist to test the panel/ alarm system by bypassing the siren. There should be a clear indication in control room if panel is on testing mode.

1.4 Emergency Shut Down (ESD):

ESD is the procedure to be invoked in case of any emergency at the location. Purpose of ESD is to stop all on- going processes/Power at the location. ESD has been bifurcated into two i.e.,

i. Process Emergency Shut Down:

Process ESD has been further bifurcated into two: -

- I. Local ESD - to stop all ongoing processes at the local workstation.
- II. Plant ESD- to stop all on-going processes at the location.

ii. Power Emergency Shutdown:


Power ESD is to trip the power supply of predefined equipment's/area.

A. Local ESD

Local ESD Push button stations shall be provided at the following locations:

- Each Battery of TLF
- ~~Each Cluster of TW Gantry (at an interval for 4 BTPN/BTPFLN wagons)~~
- ~~TW unloading area (at an interval for 4 BTPN/BTPFLN wagons)~~
- ~~TW unloading pump House.~~
- TLF pump House.
- Drum Filling Plant
- CRMB Plant

There should be clear demarcation of Local ESD provided along with plant ESD.

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- When Local ESD from TLF Gantry is invoked, following action shall take place:
 - a) Stop loading operation and close all the respective TLF metering points DCV, ON-OFF valves.
 - b) Stop the corresponding TLF loading pumps
 - c) Closes TLF header line MOVs/DBBVs
 - d) Audio Visual Alarm at Control Room

TLF loading operation to resume after RESET of Local ESD.

- ~~➤ When Local ESD from TW Gantry is invoked, following action shall take place:~~
 - ~~a) Stop loading operation and close all the respective TW metering points DCV, ON-OFF valves.~~
 - ~~b) Stop the corresponding TW loading pumps~~
 - ~~c) Closes TWL header line MOVs/DBBVs~~
 - ~~d) Audio Visual Alarm at Control Room~~

~~TW loading operation to resume after RESET of Local ESD.~~

- ~~➤ When Local ESD from TW unloading area/ TW Unloading Pump House is invoked, following action shall take place:~~

- ~~a) Stop the corresponding TW unloading pumps~~
- ~~b) Closes TW unloading header line MOVs/DBBVs~~
- ~~c) Audio Visual Alarm at Control Room~~


~~TW unloading operation to resume after RESET of Local ESD.~~

Note: Local ESD push buttons design should be such that it does not get pressed accidentally and should be protected to obviate accidental operation.

B. Plant ESD

Plant ESD push button to be provided at the following location in addition to soft switch to be operated through OIC

- Control Room
- Each battery of TLF
- Cabin of location in-charge
- Each Cluster of TW Gantry
- One number for each Tank Dyke
- TLF Pump House
- TWG Pump House
- Security Cabin
- Man entry/exit to Tank Wagon unloading area

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When Plant ESD is pressed from anywhere in the location, Process and Power Emergency Shutdown are supposed to get activated in tandem with time lag of approximately 100 seconds (configurable) so that field equipment's which uses non-UPS power like MOVs, Barrier Gate etc. can come to their desired position before Power Shutdown get invoked. Time lag of 100 seconds should be made configurable under admin password with audit trail. Software should also demonstrate the cause-and-effect diagram on OIC w.r.t real time status of various equipment's/Devices connected to ESD.


➤ When Plant ESD is invoked, following action shall take place:

- Blowing of wailing siren at the location and at the Jetty in case of coastal location.
- Open all mechanized barrier gate for smooth evacuation of hazardous area.
- Stop all process pumps irrespective of the mode they had been operating at.
- Close all ROSOVs, DBBVs and MOVs of Delivery, Receipt, Recirculation line of the tanks, TLF header line, TWL header line, TW unloading header line, P/H manifold, custody transfer point, exchange pit, etc irrespective of mode of the ROSOVs, DBBVs and MOVs i.e., whether Local or Remote Mode

However, for PPL/ Jetty receipt location, closure of ROSOVs, DBBVs and MOVs on receipt line of the tanks including valves on custody transfer point to be delayed by a time lag equivalent to the time required for closure of station control valve in pipeline station/ stoppage of pumps on the vessel to avoid unwanted surges. The above delay timings can be fine-tuned location-wise.

- Send ESD signal to Pipeline pumping station (Marketing DCS to PLC) which in turn shall raise audio visual alarm in their control room and to actuate their ESD process automatically to close their Station Control Valve and Delivery valve.
- Send ESD signal to OMC (Marketing DCS to PLC) which in turn shall raise audio visual alarm in their control room, stop their corresponding product transfer pump (incase IOCL is receiving product from OMC), close their exchange pit valves.
- Send an emergency signal to Jetty in case of Coastal locations. This signal to jetty should be connected to portable siren which should be placed in the vessel control room so that Vessel Master can immediately take shutdown of pumps to avoid pressure built up in coastal receipt line of marketing tank under receipt.
- "EMERGENCY" screen should pop-up at all computers connected on TAS LAN at the location.
- Whenever an ESD is pressed, it should get logged on to system with a time stamp.
- System should send an SMS/Mail to location in-charge and State Operations Head. Pressing of Process ESD should pop up a screen giving two options namely: DRILL or EMERGENCY. On selecting DRILL, system should send a SMS- "ROUTINE EMERGENCY DRILL AT IOCL <name of the location> to all the contact in the contact list for sending the SMS regards the drill. On selecting "EMERGENCY", system should send SMS-"EMERGENCY AT IOCL <name of the location> YOUR HELP IS REQUESTED IMMEDIATELY" to all the contact in the contact list for sending the SMS regarding the Emergency. In case of no selection within 60 sec., message for Emergency message shall be send by the system.

Note: Plant ESD push buttons design should be such that it does not get pressed accidentally and should be protected to obviate accidental operation. Hardwired ESD to be shared between DCS and Safety PLC.

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Power ESD

Power ESD should get actuated automatically after approximately 100 sec (to be configured location wise) of actuation of Plant Process ESD. Actuation of power ESD should switch off the power to all the facilities except the following: -

- a) Siren
- b) Bore wells.
- c) Power in Fire P/H, DG, Foam shed and PMCC.
- d) Security Block
- e) Control room including UPS and UPS fed equipment's.
- f) CCTV and lights along the CCTV
- g) 3-4 High Mast lighting Towers in the hazardous and non- hazardous area
- h) Lighting at the gate.
- i) All MOVs connected in fire hydrant/sprinkler/ Foam lines.
- j) HVLR
- k) Dyke MOVs

Above facilities should be fed through a separate emergency panel.

Once the ESD is activated, a provision of "time bound override" for selected equipment like AOPS, Radar level gauge, ESD Push button Station etc. which has led to activation of ESD should be available under separate highest level of authorization, so that selected facility can be brought back into function for a configurable time limit within overall ESD active condition. This is required in specific case to take appropriate actions required to restore normalcy.


Two types of MOS (Manual override system) to be provided e.g., Process and safety MOS. Time bound override shall fall under safety MOS and will be reset automatically as per based on timer and provide pop up for user intimation before withdrawn. However, Process MOS reset at day end, such as LL, feedback of MOV / ROSOV /DBBV, other than tank under pipeline receipt, TLF permissive etc. after operation completion.

- 1.5 PA Paging:** Local call points shall be provided in Control Room, each tank dyke, Pump House, each battery of TLF gantry, Railway siding, PMCC, DG room, TLD, Fire Pump House, Centralized Fixed Foam Installation, TM's Cabin, Amenity Block & S&D(as applicable). All local call points should have provision for manual broadcast/ announcement by any employee in case of emergency or otherwise.

PA paging system should be integrated with Fire Alarm Panel/ TAS so that in case any ESD / BGU is actuated, it should automatically announce prerecorded message w.r.t the location from where it is pressed. There should be provision available for simulation for testing the announcements.

1.6 SMS/MAIL Alerts:

TAS software shall have functionality to send the SMS/Mail alerts based on critical events (e.g., Tank HiHiHi, Water level goes below MSL, ESD, HI-HI alarm, CCTV alerts, Visitor management system alerts etc.). TAS software shall have feature to configure such events by operator under administrative password control. Location shall keep on updating contact lists for Mail & SMS.

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TAS system shall generate exception alerts at the day end for user's attention/action. TAS system shall also identify and generate alert for actionable points in advance.

VIII. CCTV Surveillance System:

CCTV surveillance system is to be provided to ensure effective surveillance of various locations handling Petroleum products and also to create a record for post event analysis. The Surveillance System shall provide an on-line display of video images on monitors/LED screens of Client PCs within the location through LAN.

Primary area of Surveillance:

- Entry / Exit Gate
- TLF Gantry
- Tank Farm Area
- Railway Siding
- Product Pump House and Manifold
- Tank Truck Parking Area
- Exchange Manifold
- Perimeter
- Control Room
- OWS
- Oil Jetty
- Complete location
- Fire Engine Pump House
- PMCC
- Security cabin

Note: Area mentioned is tentative. Coverage of CCTV system to ensure the security guidelines are adhered.


The System shall always have recorded video of last 90 days at any given point of time.

CCTV system to be interfaced with TAS for critical inputs from TAS like ESD, Product Tank Hi-Hi and Hi-Hi-Hi alarms, HCD etc. On receipt of such alarms from TAS, CCTV system shall position the respective PTZ cameras to pre-defined positions.

CCTV/TAS system shall send alert via SMS/ Mail to users for intrusion detected by camera. System also sends alerts as per escalation matrix in case intrusion is not acknowledged by user/ operator within predefined time.

IX. Access Control System:

The Access Control System to be provided for authorized entry and exit to main gate and all other restricted zones/areas.

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Following building/ Areas are the minimum that require access Control System

- i. Security Entry/ Exit Gate - Turnstile with Biometric cum card reader
- ii. Control Room Entry/ Exit Door (Bio-metric cum Card Reader)
- iii. Access to TLF area (Turnstile with Biometric cum card reader for pedestrian entry & Boom barrier with proximity card reader for movement of vehicle)
- iv. Access to Tank farm, pump house, license area etc (Turnstile with Biometric cum card reader for pedestrian entry)

Access control System shall be interfaced with TAS to disarm/ disable all the door locks, turnstiles, boom barriers etc. during ESD. Access control System shall be integrated with IOCL TOAMS system on real time event basis as per API requirements.

Note: Wherever boom barrier is already provided for TT entry/exit, separate boom barrier for ACS is not required.

X. Automatic Fire detection & Alarm System:

Fire Detection and Alarm System to be provided to facilitate automatic detection of fire in the incipient stage and its annunciation, so as to prevent the spread.

Fire detection system shall cover all areas of the terminals like Admin. Building, Amenity Building, control room, S&D room, MCC Room, Security Room, QC Lab, Fire Water Pump House, sample room etc. Manual Call point shall be provided in terminal area. Flameproof/ IS detector to be provided as per hazardous area requirement.

Main Fire Alarm panel to be provided in Control Room and repeater panels to be provided at Security Room, Fire pump house & Pipeline Control room (if in same premises). Fire alarm System to be integrated with TAS for generating alerts.

XI. Hardware Requirement:

- 1.1 **Operator interface Consoles (OIC):** OIC shall be of appropriate specification as required by the software design with min. 24" flat monitors.

Following shall be the distribution of OICs.

Control Room : 2 nos.


TM's Cabin : 1 no.

Control room OICs given above shall be used for TTES, TFMS client workstation.

Control Room OICs given above and/or additional minimum 55" LED screen shall be used for alarm display and fire-fighting system.

- 1.2 **Communication Interface Units (CIU):** One redundant CIU shall be of appropriate design specification and shall have redundancy and spare ports.
- 1.3 **Tank Truck Entry System (TTES):** TTES shall be of appropriate specification as required by the software design with min. 24" flat monitors. Following shall be the distribution of TTES.

Invoice/S&D room : 1 no.

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1.4 **TAS-Management Server (TAS-MS):** TAS-MS shall be of appropriate specification as per software design. TAS-MS would be two in numbers- one as main and other as hot standby. They shall work in Master- Slave mode. Both should be online having same status all the time. There should be seamless switch over from one another.

1.5 **Programmable Logic Controller (PLC) and Distributed Control System (DCS):** There shall be SIL-3 Certified Safety PLC and Distributed Control System (DCS)/Process PLC as per site requirement. Each PLC and DCS shall be of appropriate design specification. Both Safety PLC and DCS/Process PLC would have in built redundancy to ensure availability. Redundant PLCs & DCS should be online having same status all the time. There should be seamless switch over from one another. In case of failure of safety PLC, safe shut down to be initiated by the system without tripping the power. If required for tripping the power, action can be taken by operator.

DCS shall be used in locations with IO requirement more than 1200 Nos including spare requirement for the location.

1.6 **Engineering Workstation:** One number Engineering Workstation is to be provided at control room for any logic modification in both DCS/Process PLC and Safety PLC. It shall be of appropriate specification as required by the software design with flat monitor.

1.7 **Terminal Server (TS):** TS shall be of appropriate design specification and shall have redundancy and spare ports.

1.8 **Local Area network (LAN):** All equipment's shall be connected on dual LAN having redundancy.

1.9 **Printers:** Laser jet/high speed online dot matrix printers to be provided for printing FAN at Security Gate and Invoice room, TAS & TFMS reports in control room, Invoice at Invoice room. Distribution of printers shall be as follows.

Control Room : 2 nos. laser printer (1 no. reports + 1 no. alarms/events) for TFMS and TAS.

Security Gate : 2 nos. laser printer for printing FAN

Invoice room : 2 nos. heavy duty laser printers for printing invoice

1.10 **CCTV Surveillance system:** CCTV Server and client workstation shall be of appropriate specification as required by the software design with at least 24" flat monitors. Following shall be the distribution of CCTV Servers/workstations.

Control Room : Server for VMS
Video analytics server in case of server-based analytics
Client workstation + Display monitor

TM's Cabin : 1 nos. client workstation + Display monitor

Security gate : 1 no. client workstation + Display monitor


Display monitor : Ultra HD LED (4K) or better technology screens to be provided.

Sizing of Monitor should be as per following: -

In control room, window for all cameras should be available on single screen of area of 300-400 cm².

In location in charge cabin, viewing window size should be preferably between 250-300 cm².

In security cabin, each viewing window should be preferably between 150-200 cm².

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In case of location in charge cabin and security cabin, all cameras can be monitored through more than one page i.e., one for perimeter and other for operational area.

- 1.11 **Access Control System (ACS):** Visitor management Workstation shall be of appropriate specification as required by the software design with monitors. Following shall be the distribution of ACS workstation: -

Security Gate : 1 no. Visitor management Workstation + 1 no. web camera +1 no. laser printer

- 1.12 **Electronic safe:** TAS-MS, CCTV servers, CIUs, NAS/SAN shall be positioned into lockable enclosure in the control panel with biometric reader and shall be used only by authorized person and the details to be logged in TAS/ ACS.

- 1.13 **Note:** IT Hardware requirement shall be optimized based on the virtualization and shall be finalized in due course. Monitor requirement can be minimized based on the requirement of operator available in control room. In that case multiple CPU are connected to one monitor. For monitors mounted in 42 U Rack, size can be lower than 24 inch and rack mounted type.

XII. Software:

It should be window based, multi-user, multitasking, and interactive operating system with Graphic user interface (GUI). Software provided should have all the operating features given above and should be such that it can marry different kind of hardware -plug and play. It should be open with expansion capabilities i.e., it should be able to accept additional product, tanks, bays, pumps, blending & dosing etc. It should be configurable i.e., change in product service of storage tanks, TLF bay etc. under the administration passwords. It shall have self-diagnostic mechanism. First out interlocks to be captured in case of failure of interlock and to be displayed. The servers, client machines, switches and connected TAS devices which support clock syncing feature should be configured in such a way that all the system is time synchronized with the IOCL SAP system. System shall have provision to stop the entire operation based on the safety system parameter violations e.g., non-availability of mains fire engines, Fire water MSL, ESD system not functioning, Foam stock non-availability etc. As per SAP protocol, required safety violations data to be transferred to SAP for suitable action. System should also have to record the remarks in case of bypassing the same in system.

Following Pop-Ups to be generated: -

SN	Alarm	Condition	Popup
	Tank Level Alarms		
1	Low	Upon activation & any other tank is available for dispatch sequence Mode.	Tank No X - Product Name -Low Alarm activated.
2	Low	Upon activation & no other tank is available for dispatch sequence Mode.	Tank No. X - Product Name - Low alarm activated, confirm YES/NO to Continue/Stop. In case of selection "NO", message "Check dispatch Status and Stop Pumping" to popup.



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SN	Alarm	Condition	Popup
3	Low	ITT Mode	Tank No. X - Product Name - Low alarm activated, confirm YES/NO to Continue/Stop. In case selection "NO" & pump do not stop, "Pump failed to Stop" to be popped up.
4	Low-Low	Upon activation	Tank No X - Product Name -Low-Low Alarm activated.
5	Low-Low	ITT Mode, Pump do not stop	Pump failed to Stop.
6	Hi	Upon activation	Tank No X - Product Name - Operator-Hi Alarm activated.
7	Operator-Hi	Upon activation & any other tank is available for Receipt sequence Mode.	Tank No X - Product Name - Operator-Hi Alarm activated.
8	Operator-Hi	Upon activation & no other tank is available with Receipt Sequence mode.	Tank No. X - Product Name - Operator-Hi alarm activated, confirm YES/NO to Continue/Stop. In case of selection "NO", message "Check Receipt Status and Stop Pumping" to popup.
9	Operator-Hi	ITT Mode	Tank No. X - Product Name - Operator-Hi alarm activated, Confirm YES/NO to Continue/Stop. In case selection "NO" & pump do not stop, "Pump failed to Stop" to be popped up.
10	Hi-Hi	Upon activation	Tank No. X - Product Name - Hi-Hi Alarm activated.
11	Hi-Hi	Failed to Close inlet/Recirculation line	Tank No. X inlet/Recirculation line valves failed to close.
12	Hi-Hi-Hi	Upon activation	Tank No X - Product Name - Hi-Hi-Hi Alarm activated.
13	Tank Level Diff Alarm and Dormant Level Change Alarm	Upon activation	Tank No X - Product Name - Live Diff Alarm and Live Level Change Alarm.
14	Tank Mode		
15	Tank delivery mode	Upon start of mode	Is Tank Quality Certified?
16	Tank receipt mode	Upon start of mode	Is Gauging & Sampling Done?
17	Receipt Sequence Tank Mode	Stopped by Operator	Tank Sequence will be Disabled.
18	Dispatch Sequence Tank Mode	Stopped by Operator	Tank Sequence will be Disabled.



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SN	Alarm	Condition	Popup
19	Tank Mode Set Failure	Tank Mode Set failure	Tank Mode for Tank No. X is failed.
20	Tank is in delivery Mode	Remote manual closure of DBBV/MOV of same Tank	Tank No. X is in Delivery Mode, Please Confirm if its Outlet DBBV or MOV no X is to be Closed?
21	Tank is in delivery Mode	Remote manual Open of other DBBV/MOV of same Tank	Tank No. X is in Delivery Mode, Please Confirm if its Inlet/Recirculation DBBV or MOV No. X is to be Opened?
22	Tank is in Receipt Mode	Remote manual closure of Inlet DBBV/MOV of same Tank	Tank No. X is in Receipt Mode, Please Confirm if its Inlet DBBV or MOV No. X is to be Closed?
23	Tank is in Receipt Mode	Remote manual Open of other DBBV/MOV of same Tank	Tank no X is in Receipt Mode, Please Confirm if its Outlet/Recirculation DBBV or MOV No. X is to be Opened?
24	Tank is in delivery Mode	Remote manual Open of DBBV/MOV of same product group Tank, only if Other Tank ROSOV in open condition	Tank No. X is in Delivery Mode, Please Confirm if its Outlet DBBV or MOV No. X is to be Opened?
25	Tank is in Receipt Mode	Remote manual Open of DBBV/MOV of same product group Tank, only if Other Tank ROSOV in open condition	Tank No. X is in Receipt Mode, Please Confirm if its Inlet DBBV or MOV No. X is to be Opened?
26	Tank is in ITT Receipt/ Recirculation Mode	Remote manual closure of Inlet DBBV/MOV of same Tank	Tank No. X is in ITT Receipt/Recirculation Mode, Please Confirm if its Inlet DBBV or MOV No. X is to be Closed?
27	Tank is in ITT Receipt/ Recirculation Mode	Remote manual Open of other DBBV/MOV of same Tank	Tank No. X is in ITT Receipt/Recirculation Mode, Please Confirm if its Outlet/Recirculation DBBV or MOV No. X is to be Opened?
28	Tank Mode Failure		
29	Low Level Alarm in Dispatch sequence Mode	Open feedback from delivery valves of sequence tank not received, within predefined period of time	Switch Over Un successful.
30	Low Level Alarm in Dispatch sequence Mode	Does not get open feedback from delivery valves of dispatch tanks, within predefined period of time	ROSOV/DBBV/MOV Failed to Close.



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SN	Alarm	Condition	Popup
31	Operator-Hi Alarm in receipt sequence Mode	Open feedback from receipt line valves of sequence tank not received, within predefined period of time	Switch Over Un successful.
32	Operator-Hi Alarm in receipt sequence Mode	Does not get open feedback from receipt valves of tank, within predefined period of time	ROSOV/DBBV/MOV Failed to Close.
33	TLF		
34	Overrun alarm	Product over run at TLF	Overrun at Bay number / LP Number X.
35	DCV fail alarm	DCV fail to close Alarm	DCV fail to close at Bay Number X.
36	Unauthorized flow alarm	Unauthorized flow at bay	Unauthorized flow at Bay Number /LP Number X.
37	BCU Power failure (in case ESD is not there)	Activation of alarm	BCU Power off Bay Number / LP number X.
38	Rack Monitor Fail Alarm	Rack Monitor Failed	Rack monitor failed at Bay Number X.
39	Strainer chock Hi-Hi Alarm	Activation of alarm	TLF strainer of Bay / LP number X is chocked.
40	Fire water		
41	Fire water Tank Level low	Activation of alarm	Fire Water Tank Number X Level Low.
42	Fire water Tank Level low	Borewell pump fail to start	Borewell pump no. X fail to start.
43	Fire water Tank Level High	Activation of alarm	Fire Water Tank Number X Level High.
44	Fire water Tank Level High	Activation of alarm	Borewell pump no. X fail to stop.
45	Fire water Tank below MSL	Activation of alarm	Fire water volume below MSL.
46	Fire Engine Alarm (LLOP/ EOS/ HWT/ FTLL/ Fail to start/ Battery Low/ Charger fail)	Activation of alarm	Fire Engine No. X Alarm type activated.
47	Fire water Tank low Upon FW tank Low alarm	Activation of alarm	Fire water Tank No. X & Low Alarm activated.
48	Fire water Tank High Upon FW tank High alarm	Activation of alarm	Fire water Tank No. X & High Alarm activated.
49	Misc.		
50	Dyke Drain valve	Upon losing closed feedback	Dyke Drain Valve N. X is not closed.
51	BGU	Activation of alarm	MCP/BGU No. X is pressed.



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SN	Alarm	Condition	Popup
52	Strainer chock Hi-Hi Alarm	Activation of alarm	Strainer of pump No. X is chocked.
53	Tank Density	Beyond range	Tank No. X - Product Name -Density out of range.
54	HCD Activation (Hi/Hi-Hi)	Activation of alarm	HCD X - Hi/Hi-Hi alarm activated.
55	Pump Tripped due to pressure Alarm (Suction PT LL/ Discharge PT HH/ DPT HH/ Discharge PT LL/ TLF Header PT HH)	Activation of alarm	Pump No. X - Tripped due to Type of Alarm.
56	DG alarm (LLOP/HWT/Battery or Charger Failure/ DG fail to start)	Activation of alarm	DG No. X - Alarm type is generated.
57	Water Draw off valve	Upon losing closed feedback	Water Draw off valve X is not closed.
58	Pipeline ESD	Upon Activation of ESD	Pipeline ESD Activated.
59	Pipeline Receipt MFM vs Tank Volume Diff Alarm	Upon activation	MFM Tag Number vs Tank Volume - Difference occurred.
60	Proof Test Reminder	Upon activation	Proof test due for RTG-P or S / AOPS for Tank No. X.
61	ROSOV Abrupt Closure	Upon activation	Tank no X - Product Name -ROSOV No. X abruptly closed.
62	PLC/DCS controller faulty	Upon activation	PLC/DCS A/B Controller down/unhealthy.
63	UPS Mains Fail more than Pre-Defined Time	Upon activation	UPS Mains Power Fail.
64	Serial Data Communication Failure	Upon activation	Serial Comm fail for Device name.
65	Proof Test result	Upon success	Proof test successful and auto disabled.
66	Proof Test result	Upon failure	Proof test unsuccessful and auto disabled.
67	Proof Test result	Upon stoppage by user	Proof test unsuccessful and disabled manually by operator action.
68	UPS incomer power failure	Incomer power failure	UPS incomer power failure.

To be implemented if any mentioned in any section of FDR and missed above.


3.1 Software security:

Software should have following level of security.

- ✓ **Administrative level** - for location in-charge

Under Admin Password one should be able to do the following:

- Change in System configuration.

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- Time out configuration.
- Bay queue setting changes.
- ESD, HHH, HH interlock overrides.
- Taking Exceptions in the system on need basis.
- Addition/deletion of Bay, Tank, Product etc.
- Modification in Product-Bay, Product-Tank, Product-Pump combination.
- Addition/Deletion of a user at supervisor /operator level.
- Revalidation of password of supervisor /operator level.
- All other functions possible under Supervisor and operator level.
- Master data entry wrt H,HH,HHH level.
- Maintenance mode operation.
- Additive / Blending configuration changes.
- Timer configurations.
- Proof Test operation.
- All other functions possible under supervisor level.

✓ **Supervisor level- for shift in-charge**

Under Supervisor Level Password one should be able to do the following:

- View system configuration.
- Acknowledging and clearance of Alarms.
- Operation of Tanks mode, Pumps and MOV etc.
- Access to all the screens and operation of all normal functions.
- All other functions possible under operator level.


✓ **Operator level-for BCW Employee.**

Under Operator Level Password one should be able to do the following:

- Generation of Reports.
- Monitoring of various screens as decided with the administrator.
- Operation of valves and pumps.
- Operation of ESD through OIC.

Administrator should be able to define access to various Graphic User Interface for different level of users depending on the job profile.

Password shall be valid for a fixed period & shall be automatically locked after the expiry of period. Resetting of own password shall be possible by using old password by user himself. Administrator can lock any user any time. Moreover, three wrong entries of password shall lock the password for user & needs to contact Administrator to reset the same.

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1.14 Reports

The system should support a flexible reporting package to allow easy generation of report data. The reports provided should include pre-configured standard reports for common requirements such as Alarm Event reports and customized report generation facilities using standard report generator tools such as Crystal Report that are configurable by the user. Exception reports are to be generated by the TAS system and Automatic mails are triggered for exception on daily/ weekly/ monthly & yearly basis.

TAS Monitoring report shall be part of software reports.

Checklists to be generated automatically from the system: -

SN	Description	Instances	Remarks
1	Numbers of TTs with loading time > 60 mins (from TLF entry barrier gate to TLF exit barrier gate)		
2	Average TT Cycle Time from TLF Entry Barrier to TLF Exit Barrier (In mins)		
3	Numbers & % of compartments Loaded with overrun / underrun beyond 0.05% in a chamber		% to be obtained by dividing number of compartments with underrun/overrun by total number of compartments filled that day
4	Numbers & % of TTs Loaded with overrun / underrun beyond 0.05% in a chamber		% to be obtained by dividing number of TTs with overall underrun/overrun by total number of TTs filled that day
5	Numbers of FANs Cancelled		
6	Numbers of FANS Manually Completed		
7	Numbers of FANs with validity reauthorized		
8	Numbers of Batches operated with BCU in Manual Mode / Manual FAN Slip		
9	Numbers of instances of changes made in Meter-Factor/K-factor (Batch controller / MFM)		
10	Numbers of instances of override and its type like tank sequencing, pump sequencing, overfill sensor.		

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SN	Description	Instances	Remarks
11	Numbers of TTs deleted from TT queue		
12	Numbers of Tank Body MOVs kept in Local / Off Mode - Cumulative		Mode Change from Remote to Local / Off or Mode already in Local / Off Mode to be considered by system as local for the entire day for respective ROSOV/MOV/DBBV. Thus cumulative number of valves for the day to be specified.
13	Error logs DCS / PLC and Safety PLC		CPU Failure / IO Module failure / LAN Failure / Battery failure (if available) / Bulk power supply status to be considered for the entire day and cumulative number to be specified.
14	Numbers of Barrier Gate in local mode - Cumulative		Remote to Local Mode or already in Local Mode to be considered for the entire day for a barrier gate and cumulative number to be specified.
15	Occurrences of erratic density data (abnormal variation) - cumulative		Instance of Density out of range for storage tank and TLF loading point to be considered for the entire day and cumulative number to be specified.
16	% uptime of both primary and standby TAS-MS / DCS / Safety PLC / Terminal Server / MCS / TFMS Server/ CIU		Average uptime to be mentioned in the report
17	Numbers of exceptions of all safety equipment's/systems- Fire Engines/DGs/UPS/Jockey pump/Bore well/dyke valve etc.-Cumulative		<p>Exceptions to be considered:</p> <p>Fire Engines: (To be considered for Main only)</p> <p>(i) Fail to Start,</p> <p>(ii) Not in auto mode,</p> <p>(iii) Battery low / Charger fail alarm,</p> <p>(iv) Low lube oil pressure</p>




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SN	Description	Instances	Remarks
			(v) High coolant temperature (vi) Engine overspeed (vii) Maintenance Mode Jockey Pump: (To be considered for Main only) (i) Fail to Start, (ii) Tripped, (iii) Not in auto mode (iv) Maintenance Mode DG set: (i) Fail to Start, (ii) Battery low, (iii) Low lube oil temperature (iv) High coolant temperature (v) Engine overspeed UPS: (i) Battery low, (ii) Overload, (iii) Load on bypass Borewell: (i) Fail to start, (ii) Trip (iii) Maintenance Mode Dyke drain valve: (i) Valves loses close feedback to be taken <u>As per availability in facility to be considered.</u>
18	Number of alarms bypassed in product and water tanks - Cumulative		Radar / AOPS, maintenance / MOS to be considered
19	Events of Tank Body MOV abrupt closures, if any, during PLT/Tank Wagon receipts - Cumulative		After ROSOV open command and Open feedback received in the system, ROSOV close feedback is

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SN	Description	Instances	Remarks
			received, even no ESD / Normal close command generated by TAS system to be consider as ROSOV abrupt closure.
20	Instances of Hydrant pressure less than 7 kg/cm ² or more than 11 Kg/cm ² - Cumulative		
21	Instances of login in database		No of logins to be consider
22	Instances of HCD alarms		
23	Numbers of Bay reauthorization/No of manual allocation of TT queue		
24	Number of Instances of Earthing interlock failure		
25	Exceptions in auto dosing of additives/ethanol		Number of Compartments where Auto-Dosing of Additive has not been completed. (System to include the cases where additive was not dosed in Auto and where preset quantity of additive was not dosed)

XIV. Analytics Requirements

TAS software should have capabilities for alert generation for users, exception reporting and real time dashboards for monitoring. The analytics framework should be multi-level role-based access system. Analytical solution enables user, to extract actionable insights, able to trigger to do list from PM / PDM charts and trigger exceptions automatically and suggest solutions to optimize operational process flow. TAS software shall have the provision for PM/PDM activities. It should also provide utilization insights, interlock live status including summary, maintenance and visibility status across the various sub systems to users.

XV. Fault detection Requirements

Fault detection module shall be embedded part of offered TAS software solution , able to provide system generated down time report for a stipulated period. Solution must have provision of Auto/ online logging (Active equipment's) of such faults. Also, it should have provision for manual logging of faults for mechanical equipment/ instruments (fault and rectification reporting for which can be made in offline mode) where IOCL representative can log fault and can acknowledge fault rectification after attending of fault. Both the facility with provision for capturing "Remarks wrt fault attribution" column duly filled up and agreed by counterparts would endow with system generated downtime calculation for each Equipment/ Instrument/ Sub system. Software should be integrated to SRMS system for online ticketing for fault/ complaints/ resolution generated automatically once it captures in fault detection module.

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XVI. Supplementary Requirements

1.1 Product Pump House Manifold

- Number of MOV should be bare minimum, based on proper analysis, rather than conventional practice in vogue.
- All valves to be provided at entry/exit of pump house manifold have to be MOV.
- All MOV to be operational on remote from control room along with position indicators, apart from local operation.
- All the corresponding MOV in line must automatically open/close based on tank mode selection in OIC.

~~1.2 EH ROSOV closure – Power failure~~

- ~~EH ROSOV shall be stay put type on power failure i.e., it should not close on power failure, but must close on ESD activation.~~

~~1.3 Remote monitoring and control of Dyke Drain Valve~~

- ~~All tank dykes drain valve to be provided with MOV.~~
- ~~MOV to detect crack opening of valve and Audio-visual alarms to be generated in control room when the MOV's status is not closed. Popup to be generated on OIC.~~
- ~~The provision of remote monitoring and control of Dyke MOVs shall be available in Control Room. Control room to have only close option & opening can only be from field.~~
- ~~Recording of events with time for valve operation.~~
- ~~MOVs will have manual overriding/provision for opening/closing.~~
- ~~Local push button to be provided in case of MOVs are not accessible/ operation of through actuator housing is difficult.~~
- ~~Suitable interlock between OWS drain and storm drain valves to be provided.~~


~~(The discharge from dyke in future will be based on sensors that will distinguish between pure water and oil water emulsion. Based on these sensors, alerts shall be generated to divert water/ water emulsion to OWS/ Storm water drain).~~

~~1.4 Automation of Sprinkler and Fire Hydrant System~~

- ~~MOVs (with option of manual override/opening) in sprinkler system of tanks.~~
- ~~Upon declaration of fire from operator, Automatic operation of valves to be implemented.~~
- ~~In case tank having both 1 LPM and 3 LPM line, suitable interlock to be provided for opening of one line at a time.~~
- ~~Valves in fire hydrant ring for section isolation will continue to be HOVs.~~

~~1.5 Automation of Fire engine and Jockey Pumps:~~

- ~~Fire Engine and Jockey pump shall be integrated with Terminal Automation System for Remote monitoring and Control, however local independent panel shall continue to be provided with local start/stop provision.~~


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- b. ~~There should be a provision in TAS for auto start of Fire Engine & auto start/stop of Jockey pumps based on fire hydrant line pressure. TAS software shall capture the Jockey Average running frequency between consecutive starts on daily basis.~~
- c. ~~There should be a provision in TAS to select the sequence of operation of Fire Engines and Jockey pumps i.e., assigning priority to Fire Engines and Jockey pumps in OIC.~~
- d. ~~There should be a provision to put Fire Engine/ Jockey pump under maintenance mode so that the system should not attempt to give it a Start command.~~
- e. ~~In case any of the Engine/ pumps fails to start in spite of the command from Control Room, an alarm should be generated and next Engine / pump in the sequence or Standby Engine/pump should start automatically.~~
- f. ~~Following minimum parameters of each Fire Engines must be available in OIC:-~~
 - ~~Running / Stop Status~~
 - ~~Low Lube Oil Pressure alarm~~
 - ~~High Water Temperature alarm~~
 - ~~Fire Engines Local / Remote mode~~
 - ~~Fuel Level of Fire Engine's Day tank~~
 - ~~Battery low / charger fail alarm~~
 - ~~Engine Over speed~~
 - ~~Engine fail to start~~
 - ~~Fire Engine start command~~
 - ~~RPM~~
- g. ~~Following minimum parameters of each Jockey pumps must be available in OIC:-~~
 - ~~Running / Stop Status~~
 - ~~Trip/ Alarm feedback~~
 - ~~Local/ Remote mode~~
 - ~~Start/stop command~~

~~1.6 Automation of Centralised Foam Feeding and Fixed Foam Pourer System (not applicable to trolley-based foam system)~~

- a. ~~Provision for remote operation of Fixed Foam Pourer system from control room.~~
- b. ~~Remote operation and monitoring of foam pumps & connected MOVs/SOVs (MOV will have manual overriding/opening provision)~~
- c. ~~Remote monitoring of foam tank level.~~
- d. ~~Provision of Auto operation of Centralised foam feeding and fixed foam pourer system from Control Room in remote auto and remote manual mode.~~

~~1.7 Remote monitoring of water consumption:-~~ Electromagnetic flow meters to be used in water line to monitor the water consumption.

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1.8 Remote monitoring of UPS system parameters in OIC:

a. Following minimum parameters of UPS system must be available in OIC:

- i. Running Status
- ii. Load on Bypass
- iii. Incomer Fail alarm.
- iv. Overload
- v. Battery Low
- vi. Spike / Surge Voltage beyond range - if available on UPS
- vii. Output Frequency beyond range-if available on UPS

Pop-up to be generated in case of UPS incomer power failure. Reminder to be pop up in case power is not restore after every 15 mins even if it is acknowledged.

~~**1.9 Remote monitoring of DG Set parameters in OIC:**~~

~~a. Following minimum parameters of each DG set must be available in OIC:~~

- ~~i. Running Status~~
- ~~ii. Low Lube Oil pressure alarm~~
- ~~iii. High water temperature alarm~~
- ~~iv. Battery low / charger failure alarm~~
- ~~v. Output Voltage and Frequency~~
- ~~vi. RPM and Ampere~~
- ~~vii. Fuel Level of DG set's Day tank~~

~~**1.10 Cathodic protection of critical pipeline parameters in OIC:**~~

~~a. Cathodic protection of critical pipeline to be provided, wherever the facility and the panel is available, as auxiliary input in TAS for following available parameters:~~


- ~~i. Pipe to Soil potential (PSP)~~

~~**1.11 POL Storage Tanks Water Draw Offline:**~~

- ~~a. Water draw off line to be provided with fire safe MOVs.~~
- ~~b. MOV to detect crack opening of valve and Audio-visual alarms to be generated in control room when the MOV's status is not closed.~~

~~**1.12 Integration of OMC transfer Mass Flow Meter**~~


- ~~a. Mass Flow Meter are being provided at~~
 - ~~➤ Pipeline Station for pipeline receipt at Mktg. Location~~
 - ~~➤ Marketing locations for giving Pipeline Transfer to OMCs~~
 - ~~➤ OMC location for giving pipeline transfer to IOCL~~

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- Jetty/Location for coastal receipts
- b. ~~MFM installed at marketing location for OMC transfer and jetty receipt to be integrated with TAS and following parameter shall be available in OIC:~~
 - ~~Mass and Volume flow rate~~
 - ~~Mass and Volume totaliser reading~~
 - ~~Online Temperature as sensed by inbuilt temperature sensor/ External Temperature Transmitter if provided.~~
 - ~~Weighted Average Temperature of the Batch~~
 - ~~Online Density at ambient temperature~~
 - ~~Online Density@ 15 deg C/29.5 deg C (Selectable)~~
 - ~~Weighted Average Density of the Batch~~
 - ~~Corrected Volume @ 15 deg C/29.5 deg C (Selectable)~~
 - ~~Weighted Average Volume of the batch~~
 - ~~Meter factor~~
 - ~~Critical Diagnostic data of MFM~~
- c. ~~MFMs installed at Jetty/location for coastal receipts should be as far as possible at jetty end/ closer to jetty, and wherever the same is not possible it can be installed within terminal premises in tank pipeline manifold.~~
- d. ~~MFM being provided to be integrated with SAP through TAS for generation of Receipt/Dispatch Out turn and same to be accounted for generation of AC-2A and other product accounting documents.~~

~~4.13 Integration with OMC PLC:~~

- a. ~~TAS DCS of marketing location with OMC dispatch/receipt is to be integrated with OMC PLC for sharing of following signals:~~
 - i. ~~Below mentioned MFM parameters is to be shared by dispatch location~~
 - ~~Product name.~~
 - ~~Name of the Transaction Companies.~~
 - ~~K-Factor (functionality of date and time stamp of calibration).~~
 - ~~Volume in KL at Ambient temperature.~~
 - ~~Volume in KL at 15⁰ C.~~
 - ~~Quantity transferred in kg.~~
 - ~~Weighted Average Density Kg/m³ of the product transferred.~~
 - ~~Weighted Average Temperature in Degree Centigrade for the product transferred.~~
 - ~~Initial and final Totalizer readings in KL.~~
 - ~~Flow rate in KL/hr & Flow rate in Tonnes/hr.~~

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ii. ESD signal of IOCL to OMC.

iii. ESD signal of OMC to IOCL.

1.14 Integration with Refinery PLC:

a. At pipeline receipt locations where product receipt through Pipeline Division, following signals / parameters are to be shared between Marketing and Pipeline Divisions:

I. From Marketing to Refinery Control System

➤ Through MODBUS communication on serial interface/ MODBUS TCP(IP)

- Product tank Level
- Tank Alarms-Hi-Hi & Hi-Hi-Hi
- Open & Close status of ROSOV in inlet line of tanks
- Open & Close status of MOV/DBBV in inlet line of tanks
- Plant ESD
- Low air pressure for pneumatic ROSOV
- UPS Failure Alarm

➤ Hardwired ESD Output to PPL PLC

II. From Refinery to Marketing Control System

➤ Through MODBUS communication on serial interface / MODBUS TCP(IP)

- Open and Close Status of Station Inlet Valves.
- Open & Close Status from Pipeline-end exchange pit valves.
- Alarms (When MFM reading equals or crosses the Safe Ullage of receipt tank)
- Mass Flow Meter readings.
- Pressure readings.

➤ Hardwired ESD input from PPL PLC to Marketing DCS.

~~1.15 Integration of Rim seal~~

~~Rim seal fire protection system shall be integrated with TAS for status and alarm indication. In case of fire alarm, system shall automatically trigger ESD and in case of fault alarm, system shall generate Audio Visual Alarm only.~~


~~1.16 Integration of ETP/OWS~~

~~ETP / OWS system shall be integrated with TAS for status and alarm indication. In case of PPM is beyond the threshold value, system shall generate Audio Visual Alarm only.~~

~~1.17 Integration with VRU system~~

~~VRU system shall be integrated with TAS for status and alarm indication. TAS shall monitor VRU status. Following minimum signal be exchanged between VRU and TAS:~~

~~a. From TAS to VRU:-~~

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~~✓ Pump demand of MS loading points of TLF for automatic Start/Stop (If Required by VRU vendor)~~

~~✓ Command ESD (Plant ESD and Local ESD) to VRU.~~

~~✓ Any other signal required for functioning of VRU from TAS.~~

b. From VRU to TAS:-

~~✓ VRU Mode (Auto/Manual/Maintenance etc.)~~

~~✓ VRU health Status~~

~~✓ ESD input~~

~~✓ % MS recovered~~

~~✓ VRU Running~~

~~✓ Any other signal required for functioning of VRU.~~

~~MS loading should stop in case of VRU is not functioning/healthy/ESD or in maintenance mode. MS loading interlock bypass provision under the rights of administrator to be provided.~~

~~**1.18** Remote IO panel for DCS/Process PLC/Safety PLC should be preferably provided, wherever the inter facility distance from control room is more than 500 metres.~~

~~Communication shall be established between Control Room DCS/PLC controllers and Safety PLC through redundant Fibre Optic Cables.~~

1.19 Critical Back up of Events


TAS including TFMS (Tank farm management system) shall be integrated for backup of Critical events at Remote locations in line with OISD requirements. Back up data shall be retained for a minimum period of 30 days. The critical events includes all equipment's like HH, HHH, Radar gauge data , fire engine events, HCD alarm, Product / Jockey pumps events, Dyke valve event, UPS, Fire hydrant pressure exceeding upper limit, Fire hydrant systems, MCP/smoke detectors, Water tank Low level, DG sets, Compressors, Rim seal,DCS/ ESD PLC event & alarm, Local, Plant & power ESDs, TLF earth relay etc. to be captured. These events may be integrated with remote server through rest API calls/web services.

1.20 Complaint generation and integration with SRMS (Service request management system)

TAS software should be capable of logging complaint automatically and these complaints can be transferred to SRMS thru webservices. It is also possible to generate complaints manually by the operator via logging in TAS software. Complaints can be tracked, managed, and closed by TAS software itself in Auto/manual.

1.21 Integration with third party system

TAS Software should have capability / feature to integrate with third party software through web services for handshaking the data to central server. Specific data and functionalities need to be shared between the TAS software and the Central monitoring software. Frequency of data synchronization shall be configurable through Master management. APIs for integration within the TAS software that expose the required functionalities and data in a secure and standardized manner shall be shared by IOCL. TAS vendor have to implement the integration by using web service protocol. TAS vendor to maintain the logs along with HTML error in the log file to track the flow of data and identify any potential issues. The same need to be updated regularly and to address any changes or enhancements in either the TAS software or the central monitoring

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software. Data ownership shall lie with IOCL only. TAS software shall be capable of transferring all / configurable data to central server as decided by IOCL.

1.22 Back up philosophy

Data Based back up including configuration back up : 24 hrs a day automatically. However, there should be option to take back up manually as well.

Event : Minimum two weeks will be retained, and remaining history data will be moved to archive from current Database. At instance, minimum two weeks data should be available in current one.

Trend / Historical trend : Minimum one month will be retained and remaining history data will be moved to archive from current Database. At instance, minimum one month data should be available in current one. Sampling of data for process related should be one second & five seconds for others.

Loading transaction data : Minimum two-year data should be available.


TFMS data : Minimum one-year data should be available.

The Data retention process will be carried out only in Auto. However, there should be provision for manual backup as well. The system will start the purge process on configured due date during End of Day. Before archiving history Data, system takes full Database backup and stored it in backup directory. System will retain Data as configured and remove the history prior to that. After the completion of process system will set next due date for purging based on configured purge interval.

1.23 Interlock testing frequency


Interlocks to be tested for all equipment's as per applicable to location. Equipment covered under to be tested within defined duration provided as below -

SN	Item	Frequency
1.0	Tank Mode interlock	During tank operation
2.0	Jockey pumps start or stop pressure	Once in a week
3.0	Standby Jockey Testing	Once in a week
4.0	Earthing interlock test in TT loading/unloading gantry	Once in a week
5.0	Manual call points	Once in a month
6.0	Main fire pumps set pressure	Once in a month
7.0	Electric siren interlock test	Once in a month or along with ESD testing

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SN	Item	Frequency
8.0	ESD in pipeline transfer system	Once in a month
9.0	ESD	Once in a month
10.0	Pump Interlocks	Once in a month
11.0	Fire Engine / DG Sets (e.g. LLOP/HWT/ER/EOS etc.)	Once in a month
12.0	Main fire pump set pressure	Once in a month
13.0	BCU interlock testing (Flow related / Over/under dose, overfill etc.)	Once in a month
14.0	Header Pressure Alarm	Once in three months
15.0	Tanks Level Alarms (L/ LL/ H/ Opr-H)	Once in three months
16.0	HCD & Alarm Testing	Once in three months
17.0	Overfill sensor in Tank Truck	Once in three months
18.0	Calibration of hydrocarbon detectors	Once in six months
19.0	HH/HHH	Once in a six month or as per Proof test interval whichever is earlier
20.0	Clean agent System (if available)	Agent quantity and pressure of refillable containers shall be checked once every six months; and complete system should be inspected for proper operation once every year or as per NFPA recommended schedule
21.0	Fixed or semi fixed foam system on storage tanks	As per OISD requirement
22.0	Water spray system	As per OISD requirement
23.0	FAS / Smoke Detectors	Complete detectors to be covered in two years

***Simulation process for each facility & scenario (Location specific) to be prepared by location along with TAS vendor. Interlock testing period is indicative. Any additional equipment which are not covered here to be tested as per testing frequency recommended by OEM. In case of any inspection format / codal / statutory requirement mandates for lesser frequency defined here, same may be followed.**

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XVII. Additional Requirements:

1.1 Since all EX-MI TTs are loaded at Bitumen location, ANPR system shall be provided at following points for verifying the TT:

- TT parking entry gate
- Entry Gate
- Weigh Bridge
- Exit Gate

1.2 MOV (having provision of quick shut off) shall be provided on each delivery header before entering into TLF.


1.3 Electric heat-tracing shall be provided in for all loading arm, MFM, pipeline and other equipment in the TLF.

1.4 Differential Pressure Transmitter (DPT) shall be installed across the steam coil of each storage tank to measure pressure drop. This will assist in identifying any leak in the steam coil inside the tank.

1.5 Temperature Actuated Control Valve at the steam coils shall be installed on inlet of steam coils of the product tank for automatic control the temperature inside tank. This will assist to keep the temperature at optimum level desired for loading operations.


1.6 For packed bitumen drum loading, following methodology to be used:

- The same queueing methodology as followed for bulk TTs shall be adopted for packed truck. Based on the availability of filled drums, a loading advice will be generated at S&D to authorize the truck for loading.
- The truck entry and exit procedure shall follow the same system as bulk TTs, ensuring standardized gate control and monitoring.
- Upon entry, the truck shall report at the filled drum yard for loading of filled drums. A boom barrier with a PCR shall be provided at the filled drum yard entry and exit.
- A data entry station with PCR shall be provided at the filled drum yard, where details of the loaded drums will be entered into the system. The invoice shall be generated automatically based on the entered data.
- After completion of loading, the truck shall proceed to the counting platform for verification prior to dispatch. At the counting platform, a data entry system with PCR & ANPR shall be provided for verification in system for correct quantity of drum loaded. It shall be with two-level authentication—first by security personnel and then by the officer in charge, verifying the number of drums loaded against the invoice.
- The truck shall not be permitted to exit the premises unless both verifications are completed successfully. Once verification is complete, the system shall restrict any re-entry of the truck into the filled drum yard.
- The system shall ensure that the truck exits the premises within a specified time limit post-verification. In the event of failure to exit within the stipulated time, the exit gate shall remain locked, and the truck must undergo reverification at the counting platform before it can exit.

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	STANDARD SPECIFICATIONS	

STANDARD SPECIFICATIONS

Attached Separately

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	PROCESS PLC IO LIST	

PPLC I/O list (Indicative)

Actual I/O requirement to be worked out during on detailed Design Engineering

Sl. No.	Description	Qty	DI	DO	AI (Hart pass through)	AO	SERIAL RS 485	REMARKS
1	Pumps:	12						Nos. of pumps
	VG10	2						
	VG30	3						
	VG40	3						
	CRMB	2						
	Spare	2						
a	Start Command	1		12				From PPLC to MCC
b	Stop Command	1		12				From PPLC to MCC
c	Local / Remote	1	12					From MCC to PPLC
d	Run Feedback	1	12					From MCC to PPLC
e	Pump Tripped	1	12					From MCC to PPLC
f	Stop Push Button status	1	12					From MCC to PPLC
2	Pressure Transmitter	69						Nos. of PT
i	TLF pumps Suction	10						
ii	TLF pumps Discharge	10						
iii	Exchange Pit - Product Headers	3						
iv	Instrument Air	4						
v	Density of tanks	25						
vi	TLF Header line	6						
vii	Fire Hydrant Line	3						
viii	Steam Line	4						
ix	Product Header to Pump House	4						
a	Pressure Input				69			From PT to PPLC
3	DPT	29						Nos. of DPT
i	Across all TLF pump strainers	10						
ii	Across Steam Lines in Tanks	19						
a	DPT Input				29			From DPT to PPLC



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PROCESS PLC IO LIST

4	PCVs & TCVs						
a	As per facility Details	16				16	Analog Output to PCV/TCV
5	Barrier Gates	7					No. Of Barrier Gate
a	Open Command	1		7			From PPLC to Barrier Gate
b	Close Command	1		7			From PPLC to Barrier Gate
c	Local / Remote	1	7				From Barrier Gate Panel to PPLC
d	Open Status	1	7				From Barrier Gate Panel to PPLC
e	Close Status	1	7				From Barrier Gate Panel to PPLC
f	Power Available/Sensor Alignment/Sensor Cut	1	7				From Barrier Gate Panel to PPLC
6	Pump Demand	14					
i	Main TLF Loading Points	12					
ii	CRMB Loading Points	2					
a	Pump Demand from Batch Controller		14				From BCU to PPLC
7	Hooter and Beacons						
a	Hooter (control room)	1		1			From PPLC to Hooter
b	Lights in console	4		4			
8	Panel door	30					
a	Panel door (front and rear) open status		30				From limit switch to PPLC
9	Serial Interface						
a	MOV Master Station	2				2	From MOV Master Control Station to PPLC for MOV
b	PAGA System	1				1	From PAGA to PPLC
c	UPS	1				1	From UPS to PPLC
d	FCU/CIU	4				4	FCU/CIU to PPLC
e	Pumps	12				4	Pump feeder to PPLC
f	PMCC Panels (MFMs, Capacitor	20				4	



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	Bank, Transformer etc)						
g	Refinery Interface	1				1	From PPL to PPLC
10	MOV/TOBV/DBBV Power Distribution Board	10					
a	ON/OFF STATUS	1	10				From Power Distribution Board to PPLC
11	Tank Body MOV integration	57					
a	TANK BODY MOV open command	1		57			From PPLC to TANK BODY MOV
b	TANK BODY MOV ESD command	1		57			From PPLC to TANK BODY MOV
c	TANK BODY MOV open command from LPBS	1	57				From TANK BODY MOV LPBS to PPLC
d	TANK BODY MOV close command from LPBS	1	57				From TANK BODY MOV LPBS to PPLC
e	Local / Remote status	1	57				From TANK BODY MOV to PPLC
f	Opened Status	1	57				From TANK BODY MOV to PPLC
g	Closed Status	1	57				From TANK BODY MOV to PPLC
12	Above Ground Product Tanks Level Alarm	19					
a	Tank Level Hi Hi (Primary RTG)	1	19				From Primary RTG to PPLC
b	Tank Level Hi Hi (AOPS)	1			19		From AOPS to PPLC
13	AG Horizontal Product Tanks	6					
a	Tank Level Hi Hi (TANK RTG)	1	6				From RTG to PPLC
b	Tank Level Hi Hi (AOPS)	1			6		From AOPS to PPLC
14	ESD						
a	ESD push Buttons						
i	Plant ESD input	13	13	13			From Plant ESD PB to PPLC
ii	Local ESD input	7	7	7			From local ESD PB to PPLC
b	Process ESD						




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i	ESD output to open Barrier Gate	7		7				From PPLC to each Barrier gates
ii	ESD output to Access Control System (Single/Double Door-9, Turnstile/Flap barrier Biometrics-8)	17		17				From PPLC to Turnstile/Flap Barrier, Magnetic door latch
iv	ESD output to OWS	1		1				From PPLC to OWS PPLC
v	ESD output BCU	14		14				From PPLC to BCU
vi	ESD output to Drum Filling Plant	1		1				From PPLC to all DBBV
vii	ESD output to CRMB Plant	1		1				From PPLC to Water Draw off MOV
Viii	ESD output to Header Valve	4		4				From PPLC to header valve
ix	ESD output to Pump House incoming valve	4		4				From PPLC to Pump House Incoming valve
x	ESD output to Refinery	1		1				
c	Power ESD							
i	ESD power cut off to PMCC panel	1		1				From PPLC to PMCC Panel
iii	ESD Power cut off to UPS PDB Panel.	2		2				From PPLC to UPS PDB Panel
iv	ESD status from PMCC panel	1	1					From PPLC to PMCC Panel
15	Pressure Transmitter	3						No. of PT
a	Hydrant/Foam lines	3						
b	Pressure Input	1			3			From PT to PPLC
16	PA Paging System	1						
a	Potential Free Contact For Fire alarm activation (zone wise) & ESD	20		20				From PPLC to PA Paging panel
17	Valves at TLF	14						
a	On-OFF Valve on Loading Line	1		14				From PPLC to ON-OFF Valve
b	On-Off Valve on Air Line Valve	1		14				From PPLC to ON-OFF Valve

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18	Wailing Siren							
a	Wailing Siren	1	8	8				From PPLC to Wailing Siren
19	BCU Power Off	14						
a	BCU Power Off status	1	14					
20	Serial Interface							
a	FAS panel	1					1	FAS to PPLC
	TOTAL		475	281	126	16	18	
	Spares 30%		143	84	38	5	5	
	Grand Total		618	365	164	21	23	1191

Note:

- 1.0 The offered Process PLC must have minimum above mentioned IOs and Serial Interface module or as per actual site requirement whichever is higher for individual types of IOs (DI, DO, AI) and Serial Modules. Any additional IOs / modules required as per scope of work and tender requirement, the same to be provided at no additional cost to IOCL.
- 2.0 Even though in typical IO list, for IO calculation 30% spare IO taken for calculation purpose however vendor has to provide 30% spare module as mention in specification.
- 3.0 The offered Process PLC must have additional space to mount atleast 20% additional IO modules in future.
- 4.0 In case any of the offered instruments which are to be integrated with Process PLC are based on some other protocols like HART/FF etc, required module for the same to be provided in Process PLC at no additional cost to IOCL over and above mentioned IO list.
- 5.0 In case DG set panel or any other equipment has Serial Output, then the same to be connected to Process PLC over Serial Interface. However IOs as considered for DG set and respective equipment is also to be supplied and the same shall be kept as spare for future.
- 6.0 The above mentioned IOs do not includes System related IOs, internal panel diagnostic IOs (like fan failure, MCB fault etc) and the same to be taken into account by the vendor.
- ~~7.0 Pulse input for Turbine flow meter for DG is not considered, the same to be provided at no additional cost to IOCL. Pulse input from Blue dye dosing system not considered. To be provided at no additional cost to IOCL.~~

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FUNCTION SPECIFICATION AND SOFTWARE TESTING

This specification defines the minimum requirements of terminal Automation System designed for reliable, effective and optimum control & monitoring of a Petroleum Marketing Terminal / Terminal Operations.

1.0 GENERAL

- 1.1 The terminal automation system software shall be governed by the operating system running in a real time mode and shall be able to meet all functional requirements as specified minimum.
- 1.2 The system shall have an extensive set of self-diagnostic routines, which shall locate and identify the system failure at least up to module level including redundant components. Failure of a module in a sub-system shall appear on the Operator Consoles irrespective of the display selected.

2.0 SYSTEM EXPANDABILITY

- 2.1 The system design shall permit the on-line addition of new system/ subsystems with no disruption to either the operation or system communications for future expansion. The offered software should have in-built capability / provision to take care for future expansion to the extent of 100% additional loading bays, loading points, new product tanks / pumps & new products. Hard coding should be avoided.

3.0 UPGRADABILITY

- 3.1 The system architecture shall provide a logical planned implementation of evolving technologies and provision for up-gradation of existing equipment.

4.0 OPC COMPLIANCE:


- 4.1 The system offered shall comply with requirements of OPC foundation. The vendor shall carry out testing for confirmation of the same and the range of test include:
 - a) Interoperability tests
 - b) Load and performance tests
 - c) Stress test
 - d) White box testing
 - e) Behaviour testing and environmental testing

4.2 The undertaking for OPC compliance.

- 4.2.1 Essentially the TAS Software has to be OPC Compliant, so also the PLC, tank gauging system, field devices viz. Batch controllers etc. However, if any of the field devices are not OPC compliant, the vendor shall provide the driver for at least 3 different reputed manufacturer's products meeting our technical specification to enable vendor independence in choice of these field devices in future.

5.0 SYSTEM COMMUNICATIONS


Automation system communications shall be based on the ISO, Open system Interconnect (OSI) reference model to provide a migration path to evolving communication standards. The communication networking shall be selected with optimal loading and higher throughput. Maximum

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network loading shall not exceed 80 % of the total offered capacity as per functional specifications.

6.0 NETWORK REQUIREMENTS

- 6.1 The automation system communication shall be on the high-speed modern local area network (LAN) conforming to IEEE 802.3, token ring topology IEEE 802.5/ FDDI (Fiber distributed data interface), ANSI & ISO standards and the same is also conforming to OSI functional layer and utilize industry standard protocols with 100 MBPS speed and physical connection utilizing 100 base2, 100 base 5, 100 base FO design. FO design preferred as the speed is high upto gigabits, bandwidth is high, and resistant to electromagnetic noise is high.
- 6.2 To ensure maximum reliability, communications shall be dual redundant. The communications system shall be capable of sustaining loss of one media channel without loss of data or performance degradation.
- 6.3 Managed Ethernet Switches 100 MBPS port should be used for establishing LAN inter-connectivity in dual redundant configuration. All the STP/ UTP/Co-axial cabling within Ethernet network should have 100% redundancy or better.
- 6.4 30 % spare ports are to be provided on each of the Ethernet Switches.
- 6.5 Batch Controller shall be connected with Ethernet switch or Ethernet ports of Terminal Server through redundant communication link.
- 6.6 Type of communication cable to be used for dual LAN system
 - a. Inside control room: STP / UTP
 - b. Between Control room and S&D: Fiber optic
 - c. Between Control room and security room: Fiber optic
 - d. Between Control room and Admin building: Fiber optic
- 6.7 Communication protocol between TAS-MS and SAP shall be on TCP/IP
- 6.8 Loss of communications shall not cause loss of control at the local subsystem.
- 6.9 The communication software should employ a peer-to-peer / Master-Slave communications protocol between all sub-systems wherever applicable.
- 6.10 The automation system shall be able to integrate terminal wide network data into common Terminal Automation Software functions such as user displays, historical recording and reports.
- 6.11 Loss of a subsystem or module shall not disrupt communications to other subsystems or result in performance degradation. Loss of a subsystem or module or module channel shall generate a diagnostic message to be displayed at the operator stations and logged; identifying location / type of fault.
- 6.12 Dedicated Terminal Servers are to be offered with 100% redundancy in hardware with 30% spare ports capacity. Critical communication channels /physical links from devices such as batch controllers etc shall be connected in dual redundant configuration via TCP/ IP network to TAS.
- 6.13 Interfacing of field serial communication links directly to adapters / interface cards residing within the TAS-MS EISA/ ISA/ PCI slots & using TAS-MS CPU clock cycles shall not be acceptable. Interfacing of redundant serial links from field equipment to a single front-end terminal or communication server shall not be acceptable.

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- 6.14 The LAN connectivity between the main control room & the SAP system shall be established using dual redundant (two physical runs) 6-core armoured fiber optic cabling (2 Core x 2 for redundancy and 2C for spare) **with necessary transceivers as per specifications running in HDPE/ GI conduits.**

7.0 OPERATOR/ ENGINEER INTERFACE:

- 7.1 Access to Operator / Engineering Station functions shall be provided by a multi-level password system.

8.0 ENGINEERING FEATURES:


- 8.1 The software shall provide extensive user-friendly MMI.
- 8.2 Integration module shall provide an environment to share (e.g. read and write) data between other plant areas and the process control system.
- 8.3 An engineering functional interface shall be provided for the system configuration and set up. All the configuration changes shall be password protected. As a minimum, the engineering interface shall have the following functionality:
- A configuration function will allow the systems engineer/authorized user to configure the parameter for existing/ entering new tank, pump, TLF bay including change in product, product code to the system or to reconfigure the parameters for an existing feature.
 - The engineering software shall have capability and flexibility to take care of revision in no. of TLF bays including change in product. A system configuration function shall allow the system engineer to define the system configuration, including the engineering units for flow, volume, pressure, temperature and level.
 - A local communication gateway configuration function will allow the system engineer to define the name and input / output address of each gateway with the system.
 - If Bay, Tank, MOV, Pump, Preset added in the configuration, should be reflected in the graphical screen automatically with minimum manual intervention.

9.0 Time Synchronization

- 9.1 TAS servers deployed by vendor shall be capable of time synchronization by acting as Network Time Protocol (NTP) clients. The TAS servers to be configured to pick up time signals from a NTP server deployed within the IOCL IT network. IOCL would allow necessary traffic related to NTP to flow through the firewall separating the two networks namely, the TAS network and IOCL IT network. In addition, entire Process PLC, Safety PLC, TAS Clients, CCTV System, TFMS and other third-party devices on TAS network should also synchronise time with the TAS server.
- 9.2 Time Synchronization Server details shall be shared during execution stage.

10.0 SMS/Email system:-

TAS software shall have functionality to send the SMS based on critical events (e.g. Tank HiHiHi, Water level goes below MSL, Plant ESD, HI-HI alarm etc.). Configuration for Sending SMS on particular events, shall be configurable under password control. For sending the SMS, HO SMS gateway shall be used instead of traditionally GSM modem along with TAS packages. SMS API/SDK kit shall be provided by IOCL to call the SMS functionality thru HO SMS gateway server based on certain event. SMS APIs are used to allow web applications to easily send and receive text messages through logic

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written for standard web frameworks. Details of HO SMS gateway & API/SDK kit shall be shared with successful bidder.

TAS software shall have provision to send whatsapp message also for the events/alerts which are being sent as SMS, in line with the tender document.

TAS software shall have functionality to send the SMS/Whatsapp notification based on configuration of

- (i) Template ID
- (ii) Event Selection
- (iii) Content of SMS

upon selection of any new event other than the ones specified in the tender in the front end of the system i.e in TAS software using admin/configuration password.


- 10.1 Same gateway is also used to send the Email alerts based on the configuration of critical events as required.

11.0 SAP SYSTEM:

- 11.1 Two nos. of LAN port shall be provided by IOCL for interfacing of TAS with SAP AT Control Room. The vendor shall connect the same with Terminal Automation system for real time Data transfer for Integrated Terminal Operation.
- 11.2 The vendor shall provide all necessary application software and connectors for interface with the SAP using TCP/IP and shall supply necessary dual redundant cabling; as specified; up to the SAP in S&D Building.
- 11.3 Complete responsibility for the system integration between TAS-MS & SAP system is in the scope of the vendor.
- 11.4 Product and truck masters should be maintained in TAS-MS.
- 11.5 **FAN serial number should be generated by TAS-MS also.**
- 11.6 Provision for printing of Bill of Loading should be provided in TAS-MS.

12.0 TAS-Management System (TAS-MS):

- 12.1.1 The TAS-MS computers working in hot standby mode
- 12.2 In the hot standby mode, TAS-MS computer-1 shall be running the entire Terminal Automation System in primary mode and TAS-MS computer-2 will be hot standby to TAS-MS computer-1. The complete system database consisting of real time values, equipment status and configuration related data base files shall reside in primary computer and the same shall be dynamically updated in the stand by computer so as to take care of the entire terminal operation bumplessly on failure of primary computer. On restoration, the failed computer shall automatically become hot standby and should function in synchronized pair with complete updating of files and database automatically.
- 12.3 TAS-MS shall also be interfaced with and shall also have GUI for Fire alarm System, Hydrocarbon Vapour detection System, CCTV system, TFMS, ROSOVs, DBBV, MOV, Access control system, HVLR system, Rim seal (if applicable) monitoring system, Fire Engine, foam pump, MOVs status

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(Sprinkler, foam, hydrant, dyke drain valve, product tank water draw of line, TLF/TW header lines, pump house etc) , Bore well, Blue dye dosing system, Air compressor, product pumps, MCC system, DG system, UPS system, VRS (Vapour recovery system), Pipeline receipt mass Flow meter, OMC Receipt / Dispatch screen any other Third party Systems, etc which are part of TAS automation

13.0 SYSTEM ACCESS SECURITY:

- 13.1 The Operating system of all the PCs/ work station must be password protected. Minimum two different levels of user ids should exist - One of monitoring purpose (User) and other for configuration purpose (Administrator). The user id to be used for monitoring must not have administrative/configuration rights.
- 13.2 For accessing to TAS application software, there should not be any mandatory requirement to login into the Windows/ operating System through administrative user id and password.
- 13.3 For individual user, either separate windows/ OS login to be created or common login without administrative / configuration rights.
- 13.4 For TAS software login following level of security to be provided
Administrative level, Supervisory level and Operator level).
- 13.5 All operator commands shall be automatically checked for validity of authorization by the system.
- 13.6 Validity checks shall be automatically performed by the system to ensure that control parameters entered by the operator are within the defined limits.
- 13.7 Access to all system functions shall be protected by a multi-level password system.

14.0 NETWORK SECURITY TOWARDS CYBER THREATS:

- 14.1 Following cyber -security measures to be implemented in TAS for securing IOCL SAP Network getting affected due to exposure of our Network to cyber threat from the external world.
 - a. Restriction of access to TAS network from any network (IOC or outside) except for SAP network.
 - b. Blocking of internet access directly from TAS network through internet dongles.
 - c. White listed access (allowing only pre-defined users) to access TAS servers, through an intermediary, to provide remote diagnostic support.
 - d. Availability of logs to determine the access of the TAS network from outside network.
- 14.1.1 In order to implement the above, the following steps are to be taken:
 - a. Access level controls implemented at location gateway level (router) to allow only selected access to TAS servers. This router configuration for white listed access will be done by IOCL.
 - b. All TAS machine's internet data card access to be blocked.
 - c. All TAS machine's USB port access to be blocked.

14.2 Remote support TAS Servers:

- 14.2.1 Whenever there is a requirement to provide remote support to the automation system, the TAS vendor shall send a connection request link from licensed remote support solution (like Webex, GoToMeeting etc) to the designated IOCL officer through mail.



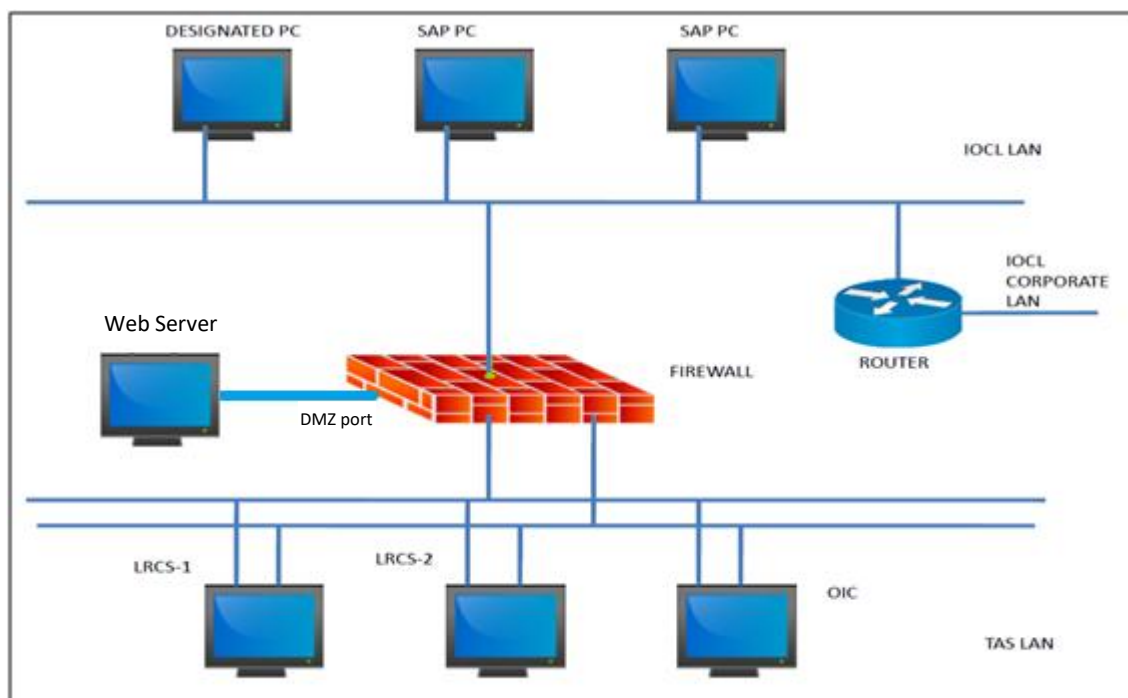
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- 14.2.2 On receipt of the mail, the officer shall open the link from the designated PC of the location. The remote support connection will be activated.
- 14.2.3 After authentication, the vendor support executive will access the desktop.
- 14.2.4 The vendor remote support executive will access the TAS-MS servers through Microsoft remote desktop (mstsc) from the above mentioned desktop.
- 14.2.5 The remote support solution must have session recording capability to record these sessions.
- 14.3 The Automation network should be kept isolated from rest of the communication network as far as possible. The TAS-MS and predefined Desktop PC earmarked by Location needs to be connected to IOCL ERP LAN/WAN through a Firewall device (Free Issue item) to minimize the risk of attack and it must be ensured that there is no direct path or communication between Corporate network and automation network. Demilitarised zones (DMZ) should be established and any data which needs to be transferred from or to the Corporate network should be from this zone only.
- 14.4 The logic programming/ configuration of firewall would be done by TA vendor based on IOCL policy guideline.
- 14.5 A typical connection scheme of Automation network with DMZ is depicted below.




Note: LRCS to be read as TAS-Management Server

- 14.6 Following points must be ensured in the configuration of FIREWALL:
- 14.6.1 Only the required and necessary ports should be opened in FIREWALL for Automation traffic.

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- 14.6.2 The FIREWALL policy must deny all permit none rule configured for all the traffic as the base rule.
- 14.6.3 Any configuration change in FIREWALL must be done after getting necessary approval from Location in-charge/ competent authority.
- 14.6.4 The FIREWALL must be configured to send SMTP alert in case of an attack / The FIREWALL must be monitored on daily basis to detect if any attack has taken place. This is to be done during Firewall configuration.
- 14.6.5 Telnet access to be disabled on FIREWALL. In case of any requirement only SSH connections/encrypted connections to be allowed.
- 14.6.6 FIREWALL logging (especially for denied traffic), audit trails should be enabled and the logs must be stored for at least 2 years as per the Government Guidelines.
- 14.6.7 No direct traffic should be allowed between corporate network and Automation network. Industrial protocols and Automation protocols must not be allowed to enter the Corporate network.
- 14.7 The following regular activities to be done on FIREWALL to ensure security:
- 14.7.1 Backup of configuration of FIREWALL needs to be taken on regular basis (Six monthly) and also whenever any configuration is changed.
- 14.7.2 OS of the FIREWALL must also be updated on regular basis.
- 14.7.3 The configuration of the FIREWALL must be audited at least twice in a year.
- 14.8 Switches and routers connecting to Automation network or used in Automation network need to follow the following security guidelines:**
- 14.8.1 Any configuration change in switches must be done with the permission from Location in-charge/ competent authority.
- 14.8.2 Disable the unnecessary services like finger, http, identd, tcp-small-servers, udp-small-servers or any other service not required.
- 14.8.3 Unused interfaces must also be disabled.
- 14.8.4 SNMP should be disabled if not in use.
- 14.8.5 Only the required services for required IP addresses should be permitted, rest of the traffic should be blocked through Access Control Lists (ACLs) during firewall configuration.
- 14.8.6 Password must not be visible in configuration and must always be encrypted.
- 14.8.7 Configure banners for the switches
- 14.8.8 Network Time Protocol (NTP) configuration must be done in switches/routers.

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14.8.9 Backup of configuration of router and switches needs to be taken by the location on regular basis (six monthly) and also whenever any configuration is changed.

14.8.10 All TAS machine's internet data card access to be blocked.

14.8.11 All TAS machine's USB port access to be blocked.

14.8.12 A designated machine with controlled internet access through IOCL internet gateway identified at each location which would act as the interface between outside world and TAS servers. Access allowed only to pre-defined users and only through Teamviewer/ Remote access software application. Auto-invoicing desktop PC at each location is to be used for this purpose.

15.0 AUTOMATION SERVERS SECURITY :

15.1 In order to ensure the uptime of Servers following guidelines need to be followed :

15.1.1 Security features provided with Automation systems should be enabled. This should be done with caution to ensure minimum downtime. Ideally system hardening should be done during the time of installation and configuration.

15.1.2 Any network services /daemons / ports not required should be stopped and disabled.

15.1.3 Remote access for vendors to Automation systems to be strictly prohibited. Vendor to be allowed in control room only after proper verification. Also any kind of pen drive / external disk should not be allowed to be used by vendor on Automation systems. If any patch upgrade needs to be done, then the same can be downloaded from Corporate LAN from the OEM website, the software checked for viruses and then deployed on Automation servers.

15.1.4 Any software upgrade / patch deployment should first be done on one server or preferably test server (in the OEM lab). After the successful deployment of patch/upgrade, the system should be under observation for few days; If no issues are observed, then only the patch should be deployed on all Automation servers.


15.1.5 Detailed and comprehensive documentation must exist for installation of Automation servers along with the original OS / Application software Images and installation keys.

15.1.6 Disaster Recovery Kit should exist containing all the necessary documents, software, configuration backups, keys, passwords for installation of Automation server.

15.1.7 Standard Operating Procedures document should exist for day to day operations like taking backups.

15.1.8 Minimum two different levels of user ids should exist - One of monitoring purpose and other for configuration purpose. The user ID used for monitoring purpose must not have administrative/configuration rights. Sharing of user IDs should not be allowed and each user should login by his/her own user id.

15.1.9 User ID and the password should never be same. The passwords should be complex consisting of minimum six alphanumeric characters in length and also allow use of special characters. The password shall be encrypted.

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15.1.10 Audit trails must be enabled for the configuration changes and logging and the same should be reviewed on regular basis.

15.1.11 Approval must be taken from the required authority before making any configuration changes in Automation servers. Log register should exist wherein detailed description for any changes done should be mentioned in the register along with the date, time and name of the employee making the change.

15.1.12 No internet access to be allowed in Automation servers. User shall only be allowed to use identified PC (Auto invoicing Desktop PC) through authorised Gateway with Firewall.

15.1.13 The logs and audit trails of the servers must be configured and stored for at least 2 years as per the Government Guidelines.

16.0 SYSTEM DIAGNOSTICS:

16.1 The system diagnostics shall support fault isolation to a specific module or channel or subsystem device, which can be subsequently removed and replaced.

16.2 The system diagnostics shall include both hardware and software diagnostics routines which upon detecting an abnormal conditions, reports this information on standard diagnostics displays on the OIC and printers.

16.3 Once a diagnostic test has detected a failure, a descriptive alarm shall be generated and bump less transfer to control to a redundant component shall be triggered wherever specified.

16.4 System should have the feature to integrate with third party software thru web services/or any other method for Automatic service request generation and integration of the system should be done with IOCL's SRMS portal. Protocol for the integration shall be shared with successful vendor.

17.0 DIAGNOSTIC DISPLAY:

17.1.1 The system status level shall be accessible by a single dedicated software key.


17.1.2 A flashing diagnostic message prompt shall be displayed and allow the user to immediately view the specific error message in a single key stroke without going through a diagnostic display hierarchy.

17.1.3 A system status display shall provide the current status of every subsystem. Subsystems with a diagnostic alarm shall be identified by flashing indicator. The system status display shall include information on the communications system including status of each of the communication modules for every subsystem.

17.1.4 The subsystem level status display should provide detail information on the subsystem itself and the status of the individual modules contained therein.

17.1.5 The I/O status display shall provide detailed information of each I/O Channel of the associated device.

17.1.6 The message level diagnostic display shall provide English text message explaining the exact nature of the diagnostic error and the time and frequency of occurrence. The users shall be

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able to go to an archive file to obtain a history of diagnostic messages for the entire system and additionally shall be able to make a backup copy to a removable media.

18.0 INTERRUPTED LOADING SEQUENCE:

18.1 During the normal loading, the loading operation may stop or interrupted in a number of ways including:

- a. Safety permissive interlock failure
- b. Batch Controller alarm condition
- c. Local stop from RIT
- d. Emergency Stop
- e. Stop command from control room operator
- f. Earthing disconnection.
- g. Change over from remote to local mode & vice versa of Batch controller.
- h. Failure of Loading Arm Interlock.

TAS software should have provision for provision of enabling/disabling of interlocks in the front end under admin/configuration password, including that of the CCTV analytics interlocks which are mentioned as an optional interlock.

19.0 HARDWARE SPECIFICATIONS

19.1 The proposed automation system shall utilize latest and proven microprocessor based device which shall be configured to perform in real-time such essential functions as:

- Data acquisition / Control
- Transaction processing
- Operator interface


19.2 The system shall be capable of protecting the system integrity and security by implementation of redundancy for both communication links and system hardware. In case of failure the switch over shall be automatic and in no way affect the control operation.

20.0 Printer Services shall be accessible by all the devices on the LAN through use of dedicated LAN Servers as per functional specifications.

21.0 The hardware (model) and system architecture (design/ standard) shall be reliable and field proven. High-grade components of proven quality, having high MTBF shall be selected to achieve the desired functionality.

22.0 SYSTEM ARCHITECTURE: -

22.1 The TAS system architecture shall be based around a modular computer network, utilizing industry standard operating systems, networks and protocol. A true Client - Server approach has to be used. Both the system should allow the distribution of system functions such as data acquisition and control and graphical user interface, etc. across the network to allow maximum flexibility and performance. The architecture should include support of various wide area networks using standard hardware and software to link nodes into a single integrated system.

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22.2 The system shall support a scalable architecture for future expansions. Additional operator interface units shall be able to be added to the TAS system without the need for additional database servers or I/O Servers. Expansions to database sizing shall be simple (such as entering a new authorization code) and not require additional database servers or I/O Servers.

23.0 SYSTEM SOFTWARE & APPLICATION SOFTWARE: -

23.1 OS environment shall be MS Windows Latest Available Version & Application software may be Open System software having RDBMS like SQL Server or Oracle. The operating system software should be modular in design & shall provide effective utilization of all system resources and facilitate future expansion.


23.2 The software application that acts as Application Program interface will connect to device such as PLC RTU or Data source or Database and translate the data into a standard based on OPC format (OLE for Process Control) which defines the methods for exchange the real time automation data and automation of the OPC standard interface makes possible interoperability between automation / control application and field system / devices and business / office application.

23.3 The System shall conform to OPC Standards.

23.4 Antivirus Protection:

23.4.1 General

- The Antivirus solution should protect the information assets like servers etc., from all the attacks originating from places inside/outside network due to virus, Malware, such as Adware, Spyware, Remote administration Trojan, Dialers, Root kits, Worms, Joke Programs, Remote Access and Hack Tools and other malicious program, and should give appropriate warning messages.
- Solution should seamlessly integrate all endpoint protection technologies (antivirus, antispayware, desktop firewall, IPS/IDS, and device control) in a single agent.
- The antivirus must protect against all kinds of viruses, Trojan horses and worms including boot sector, memory resident, file multipartite, macro, stealth and polymorphism, partition table and any other forms of exploits.
- The Antivirus should be capable of detecting and blocking communication from host that are spreading viruses/ worms to the machine running the antivirus.
- The TAS vendor must provide licensed Antivirus package which are reflecting in the “Leader Quadrant” of Gartner magic Quadrant for Endpoint securities i.e Kaspersky Lab/ Symantec (Version 12 or above)/ Sophos/ McAfee (Currently Intel Securities Version 10.1 or above)/ Trend Micro.
- It should be possible to upgrade virus definition daily as well as when required. For that purpose selected access through Firewall would be extended to the authorised user of TA Integrator.
- It should support scan for HTML, JAVA, ActiveX & VB script viruses.
- Solution should provide protection for unseen threats (i.e. Zero day Threats) includes Proactive Threat Scan, which does not rely only on signatures.
- The proposed solution should be capable of providing detailed graphical reports through centralized AV management console. Reports should contain data such as number of machines updated, the number of detected events, actions performed by the Antivirus Client etc. should have capability to save reports in spreadsheet and text format.

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- The antivirus solution must provide incremental updates rather than distribution of the full updates each time and updates should resume from the point where it was disconnected.

23.4.2 Auto Update of Antivirus virus definitions

- The automation vendor shall test antivirus updates in their lab before releasing the update for deployment in IOCL locations.
- The automation vendor shall provide the link of the virus update repository to IOCL which will be white listed in the IOCL network.

23.5 The vendor shall be fully responsible for maintaining updated antivirus throughout warranty and CAMC period at no extra cost to Indian Oil Corporation Ltd.

23.6 The application software should be GUI (i.e. Graphic User Interface) based & should have excellent features in regard to real time data acquisition, data & alarm processing, database downloading, Terminal security, access etc. The software should also meet our desired operational criterion in regard to T/T loading, scheduling, stock recording, monitoring & control of product movement.

23.7 The operator interface module shall provide centralized information to terminal operator to monitor and control the complete automated terminal operation at various locations of terminal in the fields like menu driven data entry screen through structured pull up & pull down menus, manipulation of control loops, alarm displays & annunciation, bar graphic displays & status indications, logging & trending including historical trend recording, self diagnostic messages etc. As far as operational displays are concerned, displays viz. Overview display, Group display, Loop/Point display(for tag based),Graphic display, Alarm monitoring & display, Database Management system display, Trend display shall be possible at the minimum. The offered base software shall have a copyright or registered trademark. TAS-MS software should be offered complete with standard 3 rd party interface software functional modules like ODBC, M.S. Data Exchange, to enable TAS-MS system to be integrated with existing SAP system.


23.8 The report generation module shall be capable of generating various reports and logs for all measured and computed parameters as per requirement. The system should provide scope for database generation & configuration with multilevel security access into the system. All the communication between TAS-MS and peripheral units shall be established through secured data transfers. The networking communication shall be selected keeping in view the number of peripherals & instrument connected on the network and with higher throughput. **Provision shall be available to export reports to XML, PDF, HTML, Microsoft word, Excel, ODBC databases, Lotus Notes Mail etc.**

24.0 Flexibility should be kept in software to re-designate each tank, pump for a new product, which will in turn maintain its stock accounts as per the amendment.

25.0 Vendor to incorporate and provide various software features as highlighted below as a part of their standard TAS package as a minimum

25.1 Data Acquisition and Control

25.1.1 The TAS system will provide Data Acquisition and Control facilities using device drivers. Any other device required for data acquisition and control, device driver for that shall be made available. It is desirable that all the field instruments which require drivers can be kept in the library of the system.

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25.1.2 In addition, database changes made on-line shall instantly apply system wide and shall not require a Network Operating System (e.g. NetWare, LAN Manager, Banyan Vines) based file server to achieve this.

25.1.3 Configuration: The communication drivers can be provided for any device and will be made on-line after restarting the particular driver process and not the whole TAS. If there is any particular requirement to restart the whole TAS, that to be carried out with prior intimation and approval to location preferably when there is no operation. The parameters that can be modified shall be minimum as follows:

- Device Type
- Communication Port
- Communications Timeout
- Number of Data Bits
- Number of Stop Bits

25.1.4 The system will perform checks on data integrity of all data acquired from the device. Should and invalid or timeout response be received, the data shall be ignored and the system record the transaction as an error.

25.2 System Database

25.2.1 The system should provide a comprehensive real-time database incorporating data from analog, logical or pulse inputs. The database should be configurable by the end user without the need for any programming and should be able to be modified on-line without interrupting the operation of the system. However, in case if graphical presentation is required, little programming may be necessary.

25.2.2 The system should not permit manipulation of the data in the back end.


25.2.3 The database should also provide historization of selected attributes and should be accessible by all facilities of the system including standards displays, customized displays, reports, trends, etc.

25.2.4 Configuration: All configuration of the database should be possible while the system is on-line by users with sufficient security access. Configuration should not require the need for any programming, compiling or linking and should not require shutting down or restarting of the system. However TAS / driver process may need restarting, if changes are for device driver or new device is to be incorporated or new graphical representation is required. In addition, historical data collection should not be interrupted for device attributes, not affected by configuration changes.

25.2.5 The system will maintain portions of the database requiring frequent high-speed access as memory resident information and other less frequently accessed data as disk resident data. Memory resident data shall be checked & pointed to disk every minute to minimize loss of data in the event of loss of power or other system failure.

25.2.6 Database backup shall be possible with the system on-line including backup of historical based data. The backup may be stored to either external portable storage device as available.

25.3 Historical Database

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25.3.1 Historization of selected attributes shall be available and shall be configurable for the same type of attribute. Historization for the selected attributes shall be provided for snapshots with interval ranging from 5 seconds to 24 hours.

25.3.2 Once assigned to history, attribute data shall be available through standard SQL statements. The graphical operator interfaces, trend and report generation should be able to access historical data.

25.3.3 Modifications to the history collection of an attribute data shall be possible on-line without the loss of previously collected data for the attribute being changed or any other attribute in the system currently being historized.

25.3.4 **System should have provision of taking backup of critical events/Alarms in system and uploading these to a desired location. Procedure for uploading, details of the server and critical events list shall be shared with successful bidder.**

25.4 Event Database

25.4.1 The system will necessarily maintain the following event information (but not limited to):

- Alarms
- Alarm Acknowledgements
- Return to Normal
- Operator Control Actions [i.e. Operator initiated device control actions]
- Operator Login & Security Level Changes
- On-line Database Modifications
- Communications Alarms
- System Reset Messages.


25.4.2 The Event Database shall be capable of holding up to any number of events on-line. Standard Displays shall be provided to show the current event information with the most recent event at the top of the display. Subsequent page forward actions will allow display of progressively older events. Sorting and filtering of the events shall be possible with pre-configured standard reports.

25.4.3 The Event Database entries should contain the following information:

- Time & Date Stamp
- Device Name [i.e. Device Tag]
- Event Type [i.e. Device type for the event]
- Alarm Priority
- Device Description
- New Attribute Value
- Engineering Units

25.4.4 The Event Database must also be accessible from other subsystems such as the Operator Interface and Report Generation.

25.5 User ID & Password Authentication

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25.5.1 The operator can login to the system by entering correct user ID and password. The User ID and password must be of minimum six (6) alpha-numeric characters in length and also allow use of special characters. The password shall be encrypted.

25.5.2 After a series of three (3) unsuccessful attempts to login, the operator shall be locked for a configurable period. The time-out period shall be set via system configuration displays. During operator station lockout, the other windows functions of the computer running the operator station software shall not be affected.

25.5.3 Each operator shall be assigned a password and a set of authorized areas / group. The operator may logout at any time.

25.5.4 The system shall provide a facility to allow all operators to change their password at any time.

25.5.5 When a password is changed, the system shall not permit the new password to be the same as any of the last ten (10) passwords used in the past three (3) months. All passwords stored in the system shall be encrypted. Administrator can define the user account validity and he can forcefully logout the currently logged in user. Provision for automatic timed out/ sign off from the operator station should be available.

25.5.6 **System shall not allow to copy or paste TAS login/ TAS Transaction passwords. The same has to be mandatorily typed.**

25.6 Standard system displays

25.6.1 The following displays should be included as a part of the system:

- Alarm Summary Display
- Event Summary Display
- Device Detail template Displays (for each Device in the database)
- Communications status displays
- System status displays
- Operator Scratchpad Display

25.6.2 The Alarm summary, event summary, Device Detail, Communications status, system status should not require any configuration and shall be automatically populated once the database has been defined.

25.7 Status Displays

25.7.1 System status displays shall be available on all operator stations. They shall display the following information:

- Communication failures
- Operator Stations off-line
- Standby mode of the system

25.8 Administration Displays

25.8.1 The system shall provide the following full screen displays as standard:

- Master system menu



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- Report summary
- Alarm summary
- Event summary
- Display summary
- System parameters configuration [will be available to admin user]
- Holiday assignment
- Pushbutton assignment
- Operator definition
- Operator message board
- Device attribute Detail for every configured attribute

25.9 Alarm Management

25.9.1 The system shall support comprehensive alarm detection and management facilities to allow fast and accurate notification to the operator of abnormal conditions within the process.

25.9.2 **Alarm Types:** The system will support the following alarm types:

- System
- Process

25.9.3 **Alarm Priorities:** The System should support any number of alarm priorities as follows:

- Critical
- High
- Low

25.9.4 The audible alarm should be configurable for each of the above alarm priorities. If enabled, the annunciator on the operator station will sound. The operator station shall be able to use multimedia technologies (such as wave files and sound cards) to provide realistic alarm annunciation. In the event that subsequent alarms are received, the audible alarm should once again be activated.

25.9.5 **Alarm Processing:** Assigning an alarm to the point will automatically cause the system to perform the following activities when an alarm occurs:

The alarm shall be time stamped to the nearest second and logged in the Event Database with the Device Tag, alarm type, alarm Priority, New value and Engineering Units.


The attribute value of the alarm will turn red and flash on any standard or custom display that uses the attribute.

- An Unacknowledged alarm entry shall be made in the system alarm summary for Low, High and Urgent alarms
- The audible alarm will sound (if configured)
- The alarm annunciator indicator will flash

In addition, the alarm zone of the Operator Interface must show the most recent (or optionally oldest), highest priority, unacknowledged alarm in the system.

25.9.6 **Alarm Acknowledgement:** The system will provide for efficient alarm acknowledgement in a number of ways as follows:

- Selection of the alarm summary display and pressing the dedicated acknowledge button.
- By performing a page acknowledge from the alarm summary display.

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On acknowledgement by the operator, the flashing indicator will turn steady, and the device attribute should remain red on any system or custom graphic. The acknowledgement should also be logged in the Event Database identifying the operator or station that acknowledged the alarm. Should the device/device attribute go out of alarm before being acknowledged by the operator, the alarm should be shown in alarm summary display and remain in the list until specifically acknowledged by the operator.

25.9.7 Alarm Annunciation: Alarms shall be annunciated by:

- Alarm message appearing on dedicated alarm line on operator interface
- Alarm message appearing on alarm summary display
- Audible tone
- Alarm message printed on the alarm printer

Alarm annunciation will take advantage of multimedia technology by providing realistic alarm sounds (via. Wave files)

25.9.8 Alarm Logging: As well as being logged on the printer, alarms shall be logged on an event file for future retrieval in alarm reports or archiving to removable media.

25.9.9 Alarm Filtering: The Alarm Summary shall be able to filter the alarms displayed to the operator.

The filtering criteria shall include as a minimum:

- Alarm Priorities (i.e. Urgent, High, Low)
- Unacknowledged Alarms only
- Individual areas only [i.e. device type wise]

25.9.10 Additional Alarm Information: The TAS system shall provide support for an additional message to be tagged to the alarm. This message will provide the operator with additional information on the alarm but will not clutter the alarm summary. It will appear in a separate message summary at the same time as the alarm appears in the alarm summary.

The messages can be pre configured and then simply attached to individual alarms through standard display.

25.10 Trending

25.10.1 The system should provide flexible trending, allowing real-time, historical or archived data to be trended. In addition, trend data types should be able to be combined to allow for comparisons between data, if possible e.g. current real-time data vs archived data.

25.10.2 Trend Capabilities

The system should provide trending capability with the following functions.

- Real time trending
- Historical trending
- Archived History trending
- Trend Scrolling
- Trend Zoom
- Cursor readout of trend data
- Trend comparisons between archived, real-time and historical data



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- Independent Y -axis per attribute on multi-plot style trends. It must be possible to display the Y-axis for any attribute [from selected attributes] on the trend by simply selecting the attribute of any supported device, using the mouse or keyboard copying the currently displayed trend data to the clipboard for pasting into spreadsheet or document.

25.11 Reporting

25.11.1 The system should support a flexible reporting package to allow easy generation of report data. The reports provided should include pre-configured standard reports for common requirements such as Alarm Event reports and customized report generation facilities using standard report generator tools such as Crystal Report that are configurable by the user.

25.11.2 **Standard reports:** The following pre-formatted reports should be available on the system:

- Alarm / Event Report
- Operator Trail Report
- Device Trail Report
- Alarm Duration Report
- Device Attribute Report
- Customized report
- Free format report
- TAS monitoring report
- Equipment/system downtime report

25.11.3 The following pre-formatted reports should be available on the system:

- MIS Reports or Truck Monitoring Reports**
 - Truck Movement Reports -Detailed
 - List of Trucks Loaded -Detailed
 - List of Trucks Loaded (Customer wise) -Detailed
 - List of Trucks Loaded (Product wise) -Detailed
 - List of Trucks Loaded (Bay wise) -Detailed
 - List of Trucks Loaded (Preset wise) -Detailed
 - List Of Cancelled Trucks
 - List Of Sick Trucks
 - List of Trucks Inside Terminal
- Truck Monitoring Statistical Reports**
 - Truck Movement Reports -Consolidated
 - List of Trucks Loaded -Consolidated
 - List of Trucks Loaded (Customer wise) -Consolidated
 - List of Trucks Loaded (Product wise) -Consolidated
 - List of Trucks Loaded (Bay wise)- Consolidated
 - List of Trucks Loaded (Preset wise) -Consolidated
 - List Of Cancelled Trucks -Consolidated
 - List Of Sick Trucks -Consolidated
- Alarm/Exception Reports**
 - List of Alarms - (Detailed and Consolidated)
 - List of Audits - (Detailed and Consolidated)
- Inventory Reports (Only for Current Data)**
 - Tank Inventory Report - (Detailed and Consolidated)



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- Tank Inventory Report Product Wise
- 5. **Material Dispatch/Receipt Reports (Only for Current Data)**
 - Tank Dispatch Details
 - Tank Details (All Modes I.e. Dispatch, Receipt, Dormant, Tank to tank Recirculation)
- 6. **Stock Reports (Only for Current Data)**
 - Stock Inventory Report
- 7. **Loss/Gain Reports (Only for Current Data)**
 - Loss Or Gain Report
- 8. **Meter Totalizer Report (Only for Current Data)**
 - Meter Totalizer Report
 - Additive Quantity Report
- 9. **Pipeline Product Receipt Report**
 - Product Receipt Report
- 10. **OMC Product Dispatch/ Receipt Report**
 - Product Dispatch Report
 - Product Receipt Report

25.11.4 Configuration of these reports should only require entry of the schedule information and other parameters such as Device Name/Device Tag, Filter information, time interval for search and destination printers to fully configure the report. Specifically, no programming or scripting shall be required.

25.11.5 Alarm / Event Report

A report shall be provided to produce a summary of all events of a specified type occurring in a period.

25.11.6 Operator Trail report

A report shall be provided to produce a summary of all operator actions relating to a specific operator in a specified period.

25.11.7 Device Trail Report

A report shall be provided to produce a summary of all events of a specified type occurring in a period on nominated Devices.

25.11.8 Device Attribute Report

A report shall be provided to Devices selected by one of the following attribute criteria:

- Out-of services
- Alarm suppressed
- In Manual mode

25.11.9 Customized Reports

In addition, configurable report generation facilities using standard report generator such as Crystal Report must be provided to allow custom reports to be produced. They shall be able to be configured at any time with the system ON LINE. These reports shall be able to access any data base values and have the facility for carrying out calculations in order to produce averages, summations, efficiencies or any other derived values. Results of these calculations



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shall be stored in the database or in files. The report layout shall be also user defined and shall be up to 132 columns wide of unrestricted length. The report generator should have the following capabilities:

- Access to all real-time and historical databases
- Access to user entered data.
- Arithmetic calculation capability
- Statistical calculation capability
- Report format will be provided in tender/HO/location.

25.11.10 TAS monitoring reports

A report with following parameters is to be generated at the end of each day at a fixed time to assess proper functionality and working of TAS. This report is to be saved separately in a folder with path as Year -> Month -> Date -> "TAS monitoring report". User shall have the facility to generate this report for any period of time as and when required.

Sl. No.	Description	Instances
1	Numbers of TTs with loading time > 60 mins (from TLF entry barrier gate to TLF exit barrier gate)	
2	Average TT Cycle Time from TLF Entry Barrier to TLF Exit Barrier (In mins)	
3	Numbers of TTs Loaded with overrun / underrun beyond 0.05% in a chamber	
4	Numbers of FANs Cancelled	
5	Numbers of FANS Manually Completed	
6	Numbers of FANs with validity reauthorized	
7	Numbers of Batches operated with BCU in Manual Mode / Manual FAN Slip	
8	Numbers of instances of changes made in Meter-Factor (Batch controller/MFM)	
9	Numbers of instances of override and its type like tank sequencing, pump sequencing, overfill sensor etc	
10	Numbers of TTs deleted from TT queue	
11	Numbers of ROSOV and DBBV kept in Local / Off Mode	
12	Error logs of Process PLC and Safety PLC	
13	Numbers of Barrier Gate in local mode	
14	Occurences of erratic density data (abnormal variation)	
15	%age uptime of both primary and standby TAS-MS / Process PLC / Terminal Server	
16	Numbers of exceptions of all safety equipments/systems- Fire Engines/DGs/UPS/Jockey pump/Bore well/dyke valve etc	



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Sl. No.	Description	Instances
17	Number of alarms bypassed in product and water tanks	
18	Events of ROSOV abrupt closures, if any, during PLT/Tank Wagon receipts	
19	Instances of Hydrant pressure less than 7 kg/cm ² or more than 11Kg/cm ²	
20	Instances of changes in database	
21	Instances of HCD alarms	

25.11.11 Report Activation

Reports shall be able to be activated in any of the following ways:

- Periodic activation at user specified intervals
- Operator Demanded
- Event Initiated / Application Initiated

25.12 Data Exchange

25.12.1 Interfacing to another System

Interfacing to another system can be done through OPC.

25.12.2 Data Exchange with a Relational Database

The system must be able to write data to and read data from

- Oracle
- Microsoft Access
- Microsoft SQL

25.12.3 It shall be possible to transfer data either periodically (i.e. scheduled), when an event occurs or on demand by the operator.


25.12.4 Data Exchange with Microsoft Excel, Word, XML, PDF, HTML, ODBC (thru' reports) Databases etc.

25.12.5 As a minimum the following should be supported:

- Allow retrieval of data either periodically or snapshot
- Allow retrieval of data via standard SQL statements.
- Allow retrieval of Device tag names, descriptions etc.
- Allow retrieval of historical data of configured attributes

25.13 Redundancy

This facility shall enable the system to operate in a fully redundant configuration without failure. To achieve this following functionality must be provided as a minimum

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25.13.1 Server Redundancy

The system must be capable of running a pair of similarly configured computers in a hot redundant configuration where at any point in time, one is the acting Primary and the other the acting backup. An on-line database duplication mechanism must be supported.

Simply scanning I/O [i.e. collecting data from field] on two separate systems and processing independently is not acceptable. The database duplication must be performed on a per-transaction basis for two reasons:

To ensure that the duplicated Backup database is consistent at all times with the Primary database. The change over from Primary to Secondary and vice versa should be bumpless.

To avoid unnecessary loading of field devices caused by duplicate polling.

It must be possible to remove one of the redundant systems for maintenance without interrupting operation, and upon its reinstatement, re-synchronize the databases (auto synchronization), again without interruption to system operation. A simple method of manually initiating fail over must be provided to assist with such maintenance operations.

Failure of either system must be announced audibly and visually via the alarming subsystem.

25.13.2 Communications Redundancy

The system must be capable of supporting fully duplicated communication links to field devices, which support this type of connection. Capabilities should exist to interface to devices via:

- Direct Serial Connection (or Modem)
- Direct Ethernet connection
- Serial Connection via Ethernet connected terminal servers.

The system must be able to directly communicate with the Terminal servers via Ethernet. Operator stations must be capable of switching automatically between the redundant computers in the event of fail over, and switching between two Ethernet automatically in the event of an Ethernet failure.

25.14 Services

The vendor should be capable of providing supporting services as detailed in the following sections.

25.14.1 Training


The vendor either at vendor's premises or on site should provide standard training on all aspects of the system. Vendor shall provide schedule for training.

25.14.2 Configuration Services

The vendor should be able to supply all necessary configuration services if required including controller configuration, database configuration, etc.

25.14.3 Installation Services

The vendor should be able to provide installation services for the system including validation services if necessary.

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25.14.4 Hardware maintenance

The vendor should be able to provide hardware maintenance and spare parts support if required.

25.15 Software enhancement & Software Support

The vendor should be able to provide a comprehensive software maintenance and enhancement program for on - going support of the system.

25.15.1 End of Shift Operation

At the end of each business shift (As declared by the terminal operations personnel), a number of activities occur that allow terminal personnel to reconcile current inventory value against the shift's activities. The system shall Performa end of shift.

All transactions that occur between each end of shift process shall be assigned a shift number

A number of reports shall be generated at end of shift, and trial reports shall also be generated throughout the day, defined as activity from start-of-shift until time of report generated. These reports are the following minimum.

- Product loading summary Report
- Product Loading Detail Report
- Bay Loading Summary Report
- Bay Loading Detail Report
- Tank Movement Report
- Tank Reconciliation / Loss / Gain Report
- Batch Controller Totaliser report

25.15.2 End of day operations:

At the end of each business day, a number of activities occur that allow terminal personnel to reconcile current inventory values against the day's activities. The system shall also allow the operator to start the end-of-day process, either Manually or Automatically.

At the end of the day, the TAS-MS system shall perform all the activities as intended for EOD and store the product inventory data in this memory and it shall be transmitted to SAP as and when it is demanded from SAP system.

25.15.3 End of month operation:

End of Month processing shall be similar to End-Of-Day processing, expect for several key aspects such as:

Automatic Month End is at midnight on the last day of the month. End of Month could happen at a different time of day than normal End of Day processing.

Interface with the Customer's commercial (Host) system:

APPLICATION SOFTWARE can be interfaced with various Customer's commercial (Host) system (e.g. SAP or any other ERP/ Proprietary), to exchange load information and master details.

In case of unavailability of the customer's business (Host) system, APPLICATION SOFTWARE allows entry of load information and master details.

26.0 Fault/ Down Time Reports



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26.1 Fault detection module to be kept in the TAS-MS/TAS software which will be able to provide system generated Down time calculation for individual Instruments/ equipments/ skids and sub system/ System as a whole. Also, Fault register for mechanical equipments/ instruments (fault and rectification reporting for which can be made only in off line mode) to be developed in an application software where IOCL representative can log fault and can acknowledge fault rectification after updation of fault rectification by TAS vendor's representative. Both the facility with provision for capturing "Remarks wrt fault attribution" column duly filled up and agreed by counterparts would endow with system generated downtime calculation for each Equipment/ Instrument/ Sub system. Following reports will be generated:

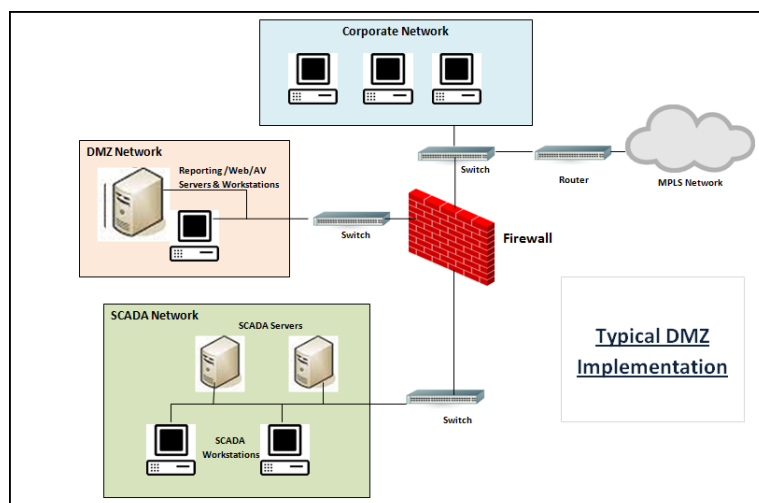
26.1.1 System/ Sub system (TLF/TFMS/TWD etc) complete Down time

26.1.2 Equipment/ Instrument wise Down Time Calculation

27.0 Web access:

27.1 A separate Web server can be setup to access the Web enabled pages. An Active Server Pages (ASP) are available to view the data over Internet browser.

27.2 The selected access to real time data/ status/ MIS to be shared through web by maintaining a Demilitarized Network system which must be kept isolated from rest of the communication network as far as possible through Firewall as per the schematic diagram shown below:




27.3 The Status sharing access would be strictly White listed and for only status/ MIS/ Critical Alarms viewing and strictly **"NOT FOR ANY CONTROL OPERATION"**.

27.4 The web server shall be interfaced with IOCL's IS network (Marketing Intranet).

27.5 The web server shall get data from TAS-Management Server and Process PLC based TAS software.

27.6 The users over intranet shall access the Web server through the IOCL's network.

27.7 The web server shall use the standard ports (http, https) for providing data to the users over intranet.

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27.8 Web servers shall be installed through Firewall and hooked up with local intranet at the location.

27.9 Important screens shall be developed by the vendor in HTML/ASP etc for remote viewing by any PC on the intranet of IOCL.

27.10 HMI pages containing current process data shall be made available on web access to Owner's existing intranet on remote PCs. Web Server shall have capability to provide real time trends of process parameters.

27.11 The web server shall be windows based.

27.12 Software for web server:

27.12.1 The supplied web server shall have license for minimum 20 concurrent users.

27.12.2 Software program shall become the property of Owner. The licenses application shall not disclose the confidential operations by owners.

27.12.3 The web server shall enable the ability to access the SCADA System provider's proposed display screens, reports, trends, etc. through the use of a web browser in a read only fashion.

27.12.4 Simplified graphic screen capturing key parameters should be available. The Web Server shall enable the ability to access the SCADA System provider's proposed display screens, reports, trends, etc. through the use of a web browser in a read-only fashion.

27.12.5 Number of HMI screens to be developed for Web Server for display on web clients is 10.

27.12.6 Active directory authentication is required.

28.0 Optional (for future expandability and upgradeability in existing software)-

28.1 Slot Booking

Powerful tool shall manage the busy Terminal. Allows Terminal Manager to define the available time slot for their customer. Customer can book his slot for filling his truck over the Internet.

28.2 Mobile phone interface:

The status of the truck should be inquired over a mobile phone using the SMS facility. Configured alarms should be sent as SMS to configured user.

29.0 OPC Support:

29.1 Application Software package should support OPC Servers/Clients. Any SCADA system can access the process data using OPC server. Configuration should be done for accessing all the parameter so that at any date handshaking can be done with other system. Details of OPC server and Tag list to be shared with handing over document by TAS vendor after SAT. All the TAG to be duplicated on OPC so that there is as and when requirement no further work is required for integration to third party system.

30.0 Graphics:

30.1 Indicative list of graphics to be prepared for:




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- Terminal Overview
- System Architecture (with real time communication status)
- Control System Configuration
- Gantry Overview (Graphical)
- Gantry Overview (Tabular)
- Bays Overview
- Single Bay Detail
- Individual loading point details
- Registered Trucks List
- Currently Filling Trucks List
- All Trucks List - Registered And Filled For The Bay
- Meters Calibration (K Factor View) - Product Details
- Tank Farm Overview - Product Wise (Including water tank, ethanol, additive, blue dye)
- Trends For Tank Farm Parameters
- FCU / PROCESS PLC Configuration Overview
- Redundancy Management
- Pump House Overview - Product Wise (including additive, ethanol, biodiesel and blue dye)
- Fire Engines (Status, Remote operation)
- DG Engines (Status)
- ~~Air compressor (Status)~~
- HVLR (Status)
- Bore well (Status and Control)
- Water tanks (Level, volume, alarms)
- MOV (Status and control for Sprinkler, foam, hydrant, dyke drain valve, water draw of line of product tanks, TLF/TW header lines, pump house etc)
- ROSOV & DBBVs (Status and Control)
- Blue dye dosing system (status and control)
- HCD (Status, alarms and % LEL values)
- UPS (Status)
- ~~Rim seal (if applicable) (Status and alarm)~~
- Pipeline Receipt (Status, parameters shared)
- OMC receipt (Status and parameters shared)
- MFM receipt/despatch/loading/TT calibration (Status, parameters as per tender requirement such as Mass, Density, temperature, Volume at ambient temperature, at 15 deg C and at 29.5 deg C etc)
- Authority System
- Process Alarm List
- Process Event List
- Control System Alarm List
- Control System Event List

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- Truck Database Management
- Historical Database Management

Note: All GUI screen must have soft ESD tab

31.0 Integration with central monitoring software:


TAS Software should have capability to send the data over webservice to central server. Specific data and functionalities need to be shared between the TAS software and the Central monitoring software. Frequency of data synchronization shall be configurable through Master configuration. APIs for integration within the TAS software that expose the required functionalities and data in a secure and standardized manner shall be shared by IOCL. TAS vendor have to Implement the integration by using the chosen web service protocol. TAS vendor to maintain the logs along with HTML error in the log file to track the flow of data and identify any potential issues. TAS vendor needs to regularly update and maintain the integration to address any changes or enhancements in either the TAS software or the central monitoring software.

32.0 Critical alarms back up at HO with Central Management System / Central Monitoring software: -


Terminal Automation system including Tank farm management system shall be integrated with software for back up at remote location with provision of all critical events in the system. Back up data shall be retained for a minimum period of 30days. TAS Software should have capability to send the data over webservice to central server. APIs for integration within the TAS software that expose the required functionalities and data in a secure and standardized manner shall be shared by IOCL. It shall be also possible to generate CSV files of such events for last 30 days in LRC automatically for last 30 days.

The typical data points as Critical Alarms and events for which back up data will be kept in HO data Centre are as below however these details shall be finalized before SAT:-

1. HIHI Alarms
2. HIHIHI Alarms
3. Process ESD
4. Power ESD
5. Local ESD
6. Compressor Low Pressure if available
7. Low Water Stock Level
8. RIM Seal Alarms if available
9. Hydrocarbon Detector Alarms


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10. PROCESS PLC Diagnostic events and alarms
11. Safety PLC Diagnostic Events and Alarms
12. Servers Diagnostic status, Events and Alarms (LRCS, TFMS, CCTV, ACS server Considered)
13. MCP and Smoke Detectors Events
14. DG & FE Events
15. TFMS Data (Radar gauge readings like Oil / Water Dips of tanks, Density & Temperature)
16. Dyke Valve Events
17. UPS Alarms & Events
18. TLF Earth Relay Fault Alarms
19. Fire Hydrant Pressure Exceed Upper Limit
20. Fire Hydrant Pressure Exceed Lower Limit
21. Product or Jockey Pump Fail to Start Event
- 33.0 TAS Software should have capability to interface with third party system as per IOCL requirement over webservices. TAS software need to be interface with such system as per IOCL requirement at no cost to IOCL till CAMC period.

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	GUIDELINES FOR SAP-TAS INTEGRATION	


GUIDELINES FOR SAP-TAS INTEGRATION

- 1.0 The TAS-MS software should be implemented using RDBMS on well-known platforms like Windows Server 2016 std or latest Server version.
- 2.0 TAS-MS server should be on Dual Ethernet LAN and there should be a backup TAS-MS server as Hot Standby using a certified clustering solution.
- 3.0 There should not be any hard coding of Bays, Products, Trucks, Customer, Destination, Tanks, IP Address etc. TAS-MS software should be flexible enough for any future expansion. Users should be able to add / maintain all masters without any modifications to the source code.
- 4.0 The TAS-MS should generate its own FAN number.
- 5.0 It should be able to cater to multiple requests at a time from multiple users.
- 6.0 There should be three levels of security - Database, Application and Operating System.
- 7.0 There should be three levels of authorization - user, officer, location-in-charge.
- 8.0 There should be an Audit trail of the operations.
- 9.0 Batch-controller wise data for truck filling should be matched with TAS data.
- 10.0 Cancellation of truck from TAS-MS should be with authorization of Officer.
- 11.0 Changes to database should be logged - exception report required.
- 12.0 Remarks and user-id should be printed on FAN. Reprint of FAN should also carry Remarks.
- 13.0 Truck should not get registered again if it is already inside.
- 14.0 Truck number should not be split / transposed. It should be kept as char (14) in TAS-MS.
- 15.0 Truck should get re-authorized in TAS in case of time-out.
- 16.0 "Blue Dyed SKO" caption should be printed for SKO for PDS.
- 17.0 Time, volume, density fields should be prefixed with zeroes and with assumed decimal - load-completion-data & reconcile-inventory.
- 18.0 Return data for load-completion should come for all compartments.
- 19.0 User menus should exist in the TAS software for configuring the bays and products.
- 20.0 Mapping of bays to products should be provided in TAS software.

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	GUIDELINES FOR SAP-TAS INTEGRATION	

- 21.0 Product master should be maintained in TAS. Addition of new products should be allowed.
- 22.0 Grouping of products in one product group should be allowed. SKO Hill and SKO PDS should be grouped under one common code for SKO i.e. 40. This will ensure that the filling proceeds unhindered even when new products are added having different codes but stored and filled from the same physical tank.
- 23.0 Number of compartments should be returned properly in mixed-load / split-load.
- 24.0 Vendors should maintain database for their own FAN numbers.
- 25.0 The FAN should be as per OP36 format. All entries including Customer, destination codes should be printed.
- 26.0 Response of Socket server should be good - for forward and return data.
- 27.0 TAS should be able to accept FAN no > 60000.
- 28.0 TAS should be able to accept FAN numbers in random sequence.
- 29.0 Each FAN number for the day shall be unique irrespective of the fact whether FAN is generated based on shipment received from SAP or manually through TTES. Invoice should not get generated in the system, unless TT has been fully loaded.
- 30.0 Part-loaded truck should get authorized in TAS if Part-filled flag is “Y” for hill-supplies.
- 31.0 Open New Day should not be allowed if trucks are inside.
- 32.0 Tank Farm Management System (TFMS) should be integrated with TAS. The TAS should be expandable so as to add new products and new tanks with their calibration charts in future. The menu / screens should be able to accommodate such new products and new tanks which have been added. Also the same tank should be configurable for new products.
- 33.0 Tank numbers should be maintained as T001, T002, T003 (4 chars).
- 34.0 Reconcile-inventory data should not have decimals - only assumed decimal point should be there.
- 35.0 It should not be possible to change TT compartment capacity in TAS and should remain same as received from SAP even with authorisation.

ALL THE ABOVE GUIDELINES SHOULD BE STRICTLY COMPLIED WITH FOR NECESSARY “OK” CERTIFICATION DURING FACTORY ACCEPTANCE TEST (FAT) AND SITE ACCEPTANCE TEST (SAT).


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CALIBRATION

- ✓ Mass flow meter is used to measure the volume of product received or dispatched in our storage locations.
- ✓ These flowmeters must be calibrated from time to time to prevent having inaccurate readings. This periodic calibration is also to ensure that operations proceed in a safe and timely manner.
- ✓ Mass flow meters are calibrated by comparing and adjusting their metering to correspond with a predefined standard. Mass flow meter manufacturers typically calibrate their products in-house after production.
- ✓ Flow meter calibration involves calibration of a flow meter which is already in use. Periodic calibration is essential as flow meter readings will often go 'out of phase' over time due to variable conditions involved in the processes.
- ✓ Calibration is done after the flow meter has been in operation for a while.
- ✓ Two methods of calibration are used, depending on the requirement in our locations:
 - Volumetric (using the meter prover)
 - Comparison (using reference meters)
- ✓ In IOCL Marketing locations, mass flow meters are being provided at custody transfer points and also in TLF for loading of products in tank trucks.
- ✓ At present, we are providing the mass flow meters installed in a horizontal skid as per latest Functional design requirements for loading tank trucks in TLF.
- ✓ Each metering skid supplied is having meter proving manifold for in-situ online calibration of the mass flow meters (Main and Blend product) at respective loading points.
- ✓ Trolley mounted Mobile Master Meter Skid comprising of Master MFM, Master temperature transmitter, RTD, thermo well and other accessories for online calibration of main and blend product MFMs and Temperature transmitters is also being supplied as per latest FDR of TAS. Master Temperature transmitter is connected to the Master MFM.
- ✓ Skid mounted mobile Prover tank along with accessories for calibration of main and blend product meters is also being supplied as part of the terminal automation system.

Calibration requirements and features in MFM supplied at IOCL locations:

- ✓ Mass flow meter supplied are having the ability of in situ check of the flow and density calibrations and maintain Integrity of the system and the data is transmitted to host system.
- ✓ Mass flow meter also have the capability to alert user if out of Factory calibration so that the calibration process can be scheduled and executed from Meter or Host system.
- ✓ In our locations, we are using the volumetric and comparison methods of calibration of mass flowmeters.
- ✓ Master MFM is to be calibrated at FCRI, Palakkad at an interval of 3 years and stamping of the Master MFMs/slave MFMs at location by Dept of Legal Metrology shall be done every year.
- ✓ All other MFMs are calibrated at respective OEM's laboratory or at any NABL accredited Laboratory or at FCRI Palakkad before despatch in addition to proving and W&M stamping at site.
- ✓ All Mass Flow Meters are calibrated for minimum 2-point density along with flow calibration to verify accuracy of the meter.

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Calibration of mobile prover tank:

1. Respective tank of the mobile prover tank (2 KL or 1 KL) is filled upto the level calibrated with water.
2. Water filled in the tank is drained and measured using calibrated W&M stamped 20 L jar available in the location.
3. Difference if any in the volume measured using the 20 L jar and prover tank is adjusted using the provision for adjustment given in the prover tank.
4. Above procedure is repeated till three consecutive readings are within $\pm 0.025\%$ of the prover tank volume and volume measured using the 20 L jar.


Initial calibration of MFMs to be carried out at four different flow rates set in the batch controller (240, 960, 1680 and 2400 LPM) and the below procedure to be carried out for calibration of MFMs till three times consecutive accuracy of the MFM readings are within $\pm 0.1\%$ of the master MFM. Suitable adjustment of K-factors to be done for achieving the desired level of accuracy.

Calibration of MFM using mobile prover tank:

1. In the loading bay in the TLF in which the mass flow meter is to be calibrated, the mobile prover tank to be positioned.
2. Loading arm to be connected to the tank truck or mobile prover tank in the 2 KL tank for main product and 1 KL tank for the blend product.
3. Prover tank to be earthed using the earthing relay in the respective bay in which calibration is being done.
4. Once the connections are verified, the calibration procedure is to be started by remote or local preset of quantity in the batch controller of the respective bay MFM to be calibrated.
5. Compare the readings of the flow meter under test after the mobile prover tank loading is completed.
6. Calibrate the flowmeter under test to conform with the mobile prover tank calibration by adjusting the K-factor using the administrator password.


Calibration of MFM using Master MFM:

1. Place the master mass flow meter in series with the mass flow meter under test by connecting the master mass flow meter skid in the online proving manifold of the meter under test.
2. FLP socket on each metering skid to be used for connecting Master MFM to Control room for both main and blend product. FLP Plug provided in Master MFM to be used to connect it to the FLP socket for signal interface.
3. In the loading bay in the TLF in which the mass flow meter is to be calibrated, the tank truck or mobile prover tank to be positioned.
4. Loading arm to be connected to the tank truck or mobile prover tank in the 2 KL tank for main product and 1 KL tank for the blend product.
5. Prover tank or tank truck to be earthed using the earthing relay in the respective bay in which calibration is being done.


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6. Once the connections are verified, the calibration procedure is to be started by selecting the option (i.e. main or blend product MFM) required in the separate GUI provided in OIC for calibration.
7. Based on the calibration procedure selected in OIC (i.e main or blend product), the batch controller is set with the required volume to be filled in the mobile prover tank.
8. The output of Master MFM provided on mobile skid is transmitted to Control room so that Master MFM readings are available in OIC during calibration.
9. Compare the readings of the master flow meter and flow meter under test.
10. Calibrate the flowmeter under test to conform with the master flow meter calibration by adjusting the K-factor using the administrator password.

Thus the mass flow meter calibration compares the measurements of a flow meter under test to that of a calibrated flow meter or 'master' flow meter operating at the desired flow standard and calibration to be adjusted accordingly

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PIPELINE PLC INTERFACE

- 1.0** At pipeline receipt locations where product are received through Pipe Lines, then following signals / parameters are to be shared between Marketing and Pipeline Divisions. Required cabling (OFC along with OFC components, Control cable) for interfacing of PLCs of Pipeline Division with PROCESS PLC of Marketing Division shall be done by Pipelines division, if the two control rooms are not in the same building. In case there is a common control room, cabling from Marketing PROCESS PLC to PPL Division PLC panel are to be done by TAS vendor. Required converter and accessories for transmission of serial data (if required) is in the scope of TAS vendor at Marketing Control Room

2.0 Signal Interface -

2.1 From Marketing to Pipeline Control System

2.1.1 Through MODBUS communication on serial interface/ MODBUS TCP(IP)

- Product tank Level
- Tank Alarms-HiHi & HiHiHi
- Open & Close status of RO SOV in inlet line of tanks
- Open & Close status of MOV/DBBV in inlet line of tanks
- Plant ESD
- UPS Failure Alarm

2.1.2 Hardwired ESD Output to PPL PLC

2.2 From Pipeline to Marketing Control System


2.2.1 Through MODBUS communication on serial interface / MODBUS TCP(IP)

- Open and Close Status of Station Inlet Valves.
- Open & Close Status from Pipeline-end exchange pit valves.
- Alarms (When MFM reading equals or crosses the Safe Ullage of receipt tank)
- Mass Flow Meter readings.

2.2.2 Hardwired ESD input from PPL PLC to Marketing PROCESS PLC.

- 3.0** TAS vendor is required to terminate the interface cables at Marketing Division PROCESS PLC/TAS end and share the register details for above mentioned parameters (**as stated under '2.1'**) to IOCL Marketing Division, for necessary interfacing to be done by Pipeline Division in their PLC system. Similarly register details of above mentioned parameters (**as stated under '2.2'**) shall be shared with TAS vendor for necessary interface in TAS PROCESS PLC, GUI, interlocks developments as per FDR and tender documents.

Since there is common Mass Flow Meter installed at Pipeline Division for all the products, provision shall be there in TAS to bifurcate the quantity of respective product receipt at Marketing Terminal either through the status of pipeline exchange pit valves (opened or closed position) if available or over Serial communication (if provided) or provision to be made in TAS GUI for start and stop of batch of respective products manually as per direction of Engineer-in-charge.

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INTEGRATION OF MASS FLOW METERS FOR OMC TRANSFER AND RECEIPT

The mass flow meters installed at OMC receipt / despatch pipeline are to be integrated with TAS.

1.0 When MFM is installed at IOCL's premises:

1.1 Mass flow meters installed at respective product pipelines of OMC Transfer/Receipt are to be integrated with TAS and following parameters to be made available in TAS either directly through MFM readings or through flow computer using suitable ASTM/ API table.

- Product name
- Name of the Transaction Companies
- Meter Factor (functionality of date and time stamp of calibration)
- Volume in KL at Ambient temperature
- Volume in KL at 15 deg C and 29.5 deg C
- Quantity transferred in kg
- Weighted Average Density Kg/m³ of the product transferred
- Weighted Average Temperature in deg C for the product transferred
- Initial and final Totalizer readings in KL
- Flow rate in KL/hr & Flow rate in Tonnes/hr

1.2 The above mentioned MFM data/parameter along with below mentioned ESD signals are to be shared with OMC through OFC link over MODBUS serial / MODBUS TCP(IP) protocol.

- ESD signal of IOCL to OMC
- ESD signal of OMC to IOCL

1.3 TAS vendor is required to share the register details for above mentioned parameters to IOCL, for necessary interfacing to be done by OMC in their PLC system. Similarly register details of OMC's PLC shall be shared with TAS vendor for interfacing and interlock development.


1.4 Required cabling (OFC along with OFC components, JB, converter etc) from IOCL control room (TAS PROCESS PLC) to exchange pit for sharing of above mentioned data is in the scope of TAS vendor.

2.0 When MFM is installed at OMC's premises

2.1 Mass flow meters installed at respective product Receipt/Dispatch pipelines at OMC's premises shall be integrated by OMC in their Automation system. OMC shall lay the communication cable/OFC from their control room to exchange pit. TAS vendor is required to lay the subsequent cabling (OFC along with OFC components, JB, converter etc) from exchange pit to our TAS DCS/PROCESS PLC and integrate all the above mentioned parameters into TAS over MODBUS serial / MODBUS TCP (IP) protocol.

2.2 TAS vendor is required to share the register details for ESD signal to IOCL, for necessary interfacing to be done by OMC in their PLC system. Similarly register details of OMC's PLC for above mentioned parameters under '1.1' shall be shared with TAS vendor for interfacing and interlock development.

3.0 Interlocks to be provided:

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- In case IOCL being dispatch location, ESD actuation at receiving location should stop the corresponding OMC transfer product pump and closes the DBBV/ MOV at exchange pit (if available)
- In case IOCL being receiving location, audio visual alarm to be generated in TAS incase ESD is activated at OMC end.
- At locations where product is being sucked by the receiving location, on activation of ESD either at the dispatching or receiving location, receiving locations shall stop the corresponding OMC receipt product pump and dispatching location shall close the DBBV/ MOV at their exchange pit.

4.0 Required Graphical User Interface to be developed in TAS showing all the above-mentioned parameters along with provision for Start and Stop of batches by the operator for accounting purpose.

5.0 Accordingly, report to be generated indicating the transaction details.

6.0 SAP- Interface


Development of interface in TAS for posting of MFM data so received/ dispatched, to SAP for generation of Receipt/Dispatch Out turn and same to be accounted for generation of AC-2A and other product accounting documents. Required protocol document shall be shared with successful bidder for interface development.

Note:

1. OMCs shall finalize the PLT quantity among themselves; this shall be the preset quantity which will be fed in TAS before the start of PLT.
2. During PLT, TAS of dispatching OMC shall monitor product transfer against the preset quantity and shall automatically stop the PLT pumps when the preset quantity is reached.
3. If the supplying location does not have dedicated pumps for PLT, TAS shall raise alarm in control room for stoppage of PLT pumps.
4. In case, the PLT gets stopped before the delivery of intended quantity, immediate corrective action to be taken. Similarly, if the delivery exceeds preset quantity, TAS shall raise an alarm (if pumps are not dedicated) or the pumps shall trip (if dedicated).

MFM report generated shall include:


1. Volume Transferred/Received @Natural Temp in KL
2. Product temperature
3. Density @ Nat. Temp.
4. Volume Transferred/Received @15 Deg. Cent. in KL
5. Volume Transferred/Received @29.5 Deg. Cent. in KL

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6. Mass Transferred/Received in MT
7. Water Quantity assessed to have been received along with the product, if any
8. OMCs shall share ESD data among themselves for safe PLT operations.
9. TAS shall assign a unique number to each PLT and MFM data connected with this PLT shall be stored with this number for retrieval at later stage if required.
10. The MFM loading data shall be shared by the operating division / company with other stake holders (If feasible, electronically).

MFM report shall be generated including:

1. TW number
2. Product
3. CTCC Volume @ Nat. Temp.
4. CTCC Dip in cm.
5. MFM Vol @ Nat. Temp. in liter
6. Product Temp.
7. Density @Nat. Temp. in KG/M3
8. Density @15 Deg Temp. in KG/M3
9. Volume @29.5 Deg. Cent. in KL
10. Mass in MT
11. In addition, wherever MFMs are available at jetty end volume transfer (loading / unloading) to / from the ship shall also be reconciled with tank dips also through TAS every 5 minutes.
12. In case the variation of volume transacted through MFM and shore tank crosses predefined limit the TAS shall raise an alarm. The variation limits for each scenario shall be decided at location level and shall be part of the location specific SOP. (E.g. Limit can be in absolute volume OR a percentage, say 0.3%, of volume transacted, OR a combination of both)

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AIR COMPRESSOR INTEGRATION

- 1.0** The air compressor for pneumatic ROSOV is to be integrated with TAS and following feedbacks to be made available in the system along with GUI.

	Air Compressor
Feedback	Running/Stop Status
	Fault/ Trip
	Pressure

- 2.0** In addition to above, pressure transmitter to be installed at furthest point in pneumatic line and to be integrated with TAS for pressure reading.
- 3.0** In case pressure of pneumatic line goes below threshold/ preset value, an audio visual alarm is to be generated to alert the operator.
- 4.0** Normal operating pressure of ROSOV is 4 to 6 Kg/Cm².
- 5.0** The low pressure alarms received either from PT installed at furthest point or through air compressor panel are to be sent to pipeline division as stated in corresponding section of pipeline integration.
- 6.0** Required cabling for integration of the air compressor and PTs are to be done by TAS vendor as per communication protocol of respective equipment or through hardwired.

Note: Not applicable to green field/grass root projects.

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MOTOR OPERATED VALVE (DBBV/ MOV) INTEGRATION

1.0 General:


- 1.1 MOV and DBBV along with actuators and Master Control Station shall be free issued to successful bidder for integration with TAS if not specifically mentioned in BOQ.
- 1.2 In case of free issue materials, installation of MOV & DBBV along with its 3-phase power cabling shall be done by IOCL. Required signal and control cables for its integration with TAS are to be supplied & laid by the successful bidder.
- 1.3 For Master Control Station, installation, configuration, testing and commissioning including UPS power cabling is to be done by the successful bidder.

2.0 Communication Topology:

- 2.1 All field actuators are to be connected to Master Control Station over two wire communication link in LOOP/Redundant line Topology. MCS status (Primary/Secondary) and communication with MCS status to be captured in system. Communication with field actuator should happen thru MCS either of serial card not working in PLC or any of MCS is not available/not working.
- 2.2 In case of Loop topology both ends of the loop to be connected to MCS/PROCESS PLC and in case Redundant LINE topology each actuator shall be multi dropped and connected to MCS/PROCESS PLC such that in both the cases failure/power Off of any actuator/single cable fault shall not cause any loss of control or communication with all the other actuators except those which are powered OFF/ in between actuators if multiple cable cut occurs.
- 2.3 The cable topology so adopted must ensure smooth and fast communication of field units with MCS/PROCESS PLC as per OEM's of actuators recommendations for smooth operation.
- 2.4 Supply, installation, powering and commissioning of signal repeater (if required) as per adopted cabling philosophy for establishing communication between actuators and MCS/PROCESS PLC is in the scope of successful bidder.

3.0 Nos of Actuators per Loop:

- 3.1 The free issued Master Control Station shall have 60 Channels for DBBV and 120 channels for MOV per loop. Accordingly looping of electrical Actuators are to be done taking into account of 15- 20 percent spare capacity for future use.
- 3.2 There can be a possibility where multiple make of actuators & Master Control Stations are free issued and the same is to be integrated with TAS. Hence vendor to ensure that dedicated loop for each make of actuators are considered while Design Engineering and the loop is to be terminated at respective make of Master Control Station in Control Room.
- 3.3 ~~In addition to above, separate loop to be maintained for integration of DBBVs, MOVs installed at Fire Hydrant, Water & Foam Network and MOVs installed at product line, Dyke Drain & water draw-off lines of product tanks.~~
- 4.0 ~~Separate looping to be done for all the actuators installed on valves at Fire Hydrant, Water & Foam Network. These actuators should not be linked with ESD and can be operated remotely as well as locally even in ESD conditions. In case the actuator has inbuilt feature to bypass ESD bit, then the same to be configured in these actuators.~~

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5.0 Vetting of communication topology so followed through Actuator OEM:

- 5.1 Vendor should get the cable topology vetted by respective actuator's OEM (site specific) prior to commencement of work. In case the performance and response of the actuators during commissioning are not found satisfactory and job has not been carried out as per OEM's vetted cabling drawing, IOCL may ask the vendor to redo the entire cabling and termination works as per OEM's recommendations (site specific recommendations) at no additional cost to IOCL.

6.0 Control & Feedback:

- 6.1 The free issued MOV & DBBV shall have following feedback and control features over two wire communication Network and the same to be interfaced with TAS over along with required GUI development for status and control of each actuator.

Feedback:

- Valve opened
- Valve closed
- Actuator fault
- Cable fault
- Continuous Valve Position
- Monitor Relay Trip
- Thermostat trip
- Local stop selected
- Local Control selected
- Valve obstructed
- Valve jammed
- Internal battery low (if provided)
- Diagnostic display


Control:

- Open fully
- Close fully
- Emergency Shut Down.
- Partial Stroke Test (Momentary opening and closing of the Valve (5% or as per OEM Standard) to check the healthiness of the valve).It should be integral/inbuilt feature of the actuator

- 6.2 In addition to above, following auxiliary contacts shall be available on each actuator:

Feedback:

- Common status contact (Monitors Relay trip feedback)
 - Loss of one or more power supply phases
 - Loss of Control Circuit supply
 - Thermostat trip due to internal temperature rise of motor
 - Selector switch set to OFF
- Local/ Remote selector switch positions
- Valve opened (Open limit contact)
- Valve Closed (Close limit contact)

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- Internal battery low (if provided)

Control:

- Valve Open command
- Valve Close Command
- ESD
- Partial Stroke Test


7.0 Partial Stroke Test:

7.1 All MOVs and DBBVs which are in open conditions for a continuous period of 2 weeks, system shall automatically issue partial stroke test command to respective MOV and DBBV.

7.2 All MOVs and DBBVs which are in close conditions for a continuous period of 2 weeks, system shall automatically generate active list of such MOVs and DBBVs which are due for partial stroke test with a provision to manually issue partial stroke test command to respective MOV and DBBV in GUI with password protection.

8.0 Cabling, termination and Commissioning:

- 8.1 Vendor to ensure that all the actuators are properly sealed and proper cable termination is done as per termination drawing mentioned on the actuators. The termination drawings shall be provided to successful bidder.
- 8.2 In case during commissioning or at later date if any actuator (free issue or vendor's supply) is found faulty due to water ingress or in correct termination or glanding then the same to be rectified by the vendor at no additional cost to IOCL during commissioning, warranty & CAMC period.
- 8.3 The master Control Station has to be integrated with TAS over redundant communication link as per communication protocol of the MCS.
- 8.4 All the actuators shall be configured and tested for status and control both from field and from Control room as per functional design requirements.
- 8.5 Feedback and Control of valves as stated in the specification of the actuators shall be available in TAS.
- 8.6 The supervisory system shall be capable of displaying the status and Tag number of every connected field unit (actuator) or other device associated with the field unit, the system settings, the host protocol messages, the loop performance, any alarms present on the system and the status of any host standby partner. It shall provide a graphical interface to the valves and plant using mimic diagrams to show plant layout.
- 8.7 The system shall permit viewing any or all of the system data, including present parameters in each field unit. It shall also allow the connected actuators or other devices to be operated. A security system shall be included to prevent access to control and setting of parameters.
- 8.8 Real time clock sync with TAS system shall be included for alarm event, time/ data marking and it shall be possible to connect a serial event printer from Master station.

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TANK BODY VALVE ACTUATOR INTEGRATIONS

1.0 General:

- 1.1 ~~Electro-hydraulic ROSOV (Remote Operated Shut-Off Valve)~~ minimum ~~SIL 2~~ compliant Tank Body Valve Actuator shall be free issued to successful bidder for integration with TAS if not specifically mentioned in BOQ.
- 1.2 In case of free issue materials, installation of Tank Body Valve Actuator along with its 3 phase power cabling shall be done by IOCL. Required signal and control cablings for its integration with TAS shall be in the scope of the successful bidder.

2.0 Cabling Philosophy:

- 2.1 Following minimum Terminals shall be available on each actuator ~~of the ROSOVs~~ for remote feedback and control of the ACTUATOR through Terminal Automation System and FLP push button Station to be placed outside Dyke Wall. All the ACTUATORS are to be hard wired to Process PLC for following feedback and Commands:


Feedback:

- Common status contact (Monitors Relay trip feedback)
 - Loss of one or more power supply phases
 - Loss of Control Circuit supply
 - Thermal cut out fault alarm for Actuator motor
 - Excess Internal hydraulic pressure fault alarm
 - Any other local fault/ abnormal condition.
- Local/ Remote selector switch positions
- Valve opened (Open limit switch)
- Valve Closed (Close limit switch)
- Internal battery low (if actuator is provided with battery backup)

Note: Additional contacts with 24V DC or as per OEM's standard shall be provided on each actuator for drawing power to LED indication lamps of local push button station to be mounted outside tank dyke wall based on Opened/Closed Status of the valve.

Control:

- Valve Open command
 - Valve Close Command
 - ESD
 - **Partial Stroke Test.** (Momentary opening and closing of the ROSOV (5% or as per OEM Standard) to check the healthiness of the valve). It should be integral and built in feature of the actuator.
- 2.2 All the above-mentioned terminals of the ACTUATOR along with open & close command form FLP push button Station outside dyke wall are to be hardwired to Process PLC for its integration with TAS.
 - 2.3 Following Feedback and Control for each ACTUATOR must be available in Process PLC along with required GUI & Interlock development:

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From/To Process PLC	ACTUATOR & LPBS
Feedback	ACTUATOR open command from LPBS
	ACTUATOR close command from LPBS
	Opened Status indication on LPBS
	Closed Status Indication on LPBS
	Monitor Relay Status to Control room
	Local / Remote status
	Opened Status
	Closed Status
Commands	ACTUATOR Close Command (From LPBS and control room)
	ACTUATOR open command (From LPBS)
	ESD Close command (From Control Room) - 24V DC or 230V AC as per OEM standard.
	Partial Stroke Test from Control room (Automatic at specified periodicity)

2.4 All control and signal cables from Control Room to respective ROSOV and from ROSOV to FLP local push button outside dyke wall shall be fire survival (FS) armoured Copper cable and shall be in the scope of the TAS vendor.

2.5 ROSOV shall be provided with FLP double compression glands of standard size. However any hardware like barriers, FLP cable gland reducers/ adaptor to suit the cable entry to ROSOV, FLP junction boxes etc if required for integration of the ROSOV are to be provided by the vendor and shall be part of vendor's scope of work.

3.0 FLP Local Push Button Station (LPBS) outside Dyke Wall:


3.1 One number separate FLP push button station per ACTUATOR is to be provided outside Dyke wall for operation of the ACTUATOR from outside Dyke wall. These push buttons shall be hardwired with the respective ROSOV and Process PLC for OPEN, CLOSE command and status indication. Close operation from the push button station shall be irrespective of mode (Local/ Remote) selected.

4.0 Operation Philosophy:

4.1 The Control Philosophy for operation of ACTUATOR and Local Push Button Station install outside dyke wall shall be in line with the Functional Design Requirements and relevant clause of the tender document.

5.0 Partial Stroke Test:

5.1 All ACTUATOR which are in open conditions for a continuous period of 2 weeks, system shall automatically issue partial stroke test command to respective ACTUATOR.

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5.2 All ACTUATORs which are in close conditions for a continuous period of 2 weeks, system shall automatically generate active list of such ACTUATORs which are due for partial stroke test with a provision to manually issue partial stroke test command to respective ROSOV in GUI with password protection.

6.0 Cabling, termination, and Commissioning:

6.1 Vendor to ensure that all the actuators of ACTUATORs are properly sealed and proper cable termination is done as per termination drawing mentioned on the actuators. The termination drawings shall be provided to successful bidder.

6.2 In case during commissioning or at later date if any actuator is found faulty due to water ingress or in correct termination or glanding, then the same to be rectified by the vendor at no additional cost to IOCL during commissioning, warranty & CAMC period.

6.3 All the ACTUATORs shall be configured and tested for status and control both from field and from Control room as per functional design requirements.

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PUMP INTEGRATION

- 1.0** All the product pumps (TLF, TW loading, OMC dispatch, TW unloading, ethanol, bio-diesel, additive (XG & XP), blue dye etc), bore well, makeup water pump/ fire water sump pump, static water pump, jockey pump, foam pump etc. are to be integrated with TAS for following feedback and control (if available in system).

S. No.	Items	Type
1	Winding Temperature High	Feedbacks
2	Motor Overload	
3	Single Phase	
4	Earth Leakage	
5	Under Voltage	
6	RPM	
7	Ampere	
8	Local / Remote	
9	Run Feedback	
10	Pump Tripped	
11	Power Loss	
12	Stop Push Button Status	
13	Pump failed to start	
14	Start Command	Command
15	Stop Command	
16	ESD command	

- 2.0** Provision shall be there to Start/ Stop of respective pumps from field (when local mode is selected), through OIC (when Remote manual mode is selected) and from PROCESS PLC (when Remote Auto mode is selected)
- 3.0** Sequence selection, Mode selection, interlocks, status indication, etc shall be as per functional design requirement (FDR) and relevant clauses of tender document.
- 4.0** Summary of interlocks for Auto Start & Stop of pumps when Remote Auto has been selected in TAS and to be read in conjunction with tender document:

SL	Pumps	Auto Start & Stop interlock
1	TLF loading, TW loading, Ethanol Blending, Additive Dosing	Based on pump demand received from Batch Controller to TAS with provision to automatically stop respective pumps in case of alarm conditions like overrun beyond threshold limit, overfill, local ESD, Plant ESD etc as specified in the tender document.
2	Borewell	Based on fire water tanks/ make up water sump tank/ Service water Sump tanks and other connected tank's level interlocks

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3	Jockey pumps	Based on pressure setting interlock of the fire hydrant Network/ header line pressure
4	Make up water sump pump	Based on fire water tanks level interlocks
5	Foam pumps	Based on level interlocks of daughter foam tanks, System generated command to Start foam pump on activation of operation of Fixed Foam System where Inline balance Pressure Proportioner (ILBP) is used for Fixed Foam System, other interlocks as per tender. Foam pump once started shall not stop automatically. It shall stop either when Stop command is received from push button from field or through OIC when pump is kept in Remote Manual Mode.
6	Other pumps	As per site requirements and tender document.

5.0 All product pumps shall stop in case of ESD as defined in the tender document. Other pumps whose power is fed from Emergency panel shall continue to run as per interlocks specified in the tender document.

6.0 All required control & Signal cables from respective batch controller unit, MCC panel, pumps starter panel etc to Control room along with interlock & GUI development shall be provided by the vendor.

7.0 All the Pumps which have soft starter or DOL starter are to be integrated with TAS over soft signal through RS 485 serial/TCP IP interface for following feedback:

(Hardwired Feedback)

S. No.	Items	Type
1	Start	Command
2	Stop	
3	ESD	
1	Local / Remote selection (L/R switch located in LCS and wired to MCC)	Feedback
2	Emergency Stop Operated (located in LCS and wired to MCC)	
3	Feeder On / OFF / Trip	
4	Feeder ready to start	
5	Running feedback	
7	Feeder Power Off	

Minimum feedback over Modbus Serial/TCP-IP to be captured as per availability :-

S. No.	Items	Type
1	Ampere	Feedbacks
2	Power loss	
3	Motor overload	
4	Single Phase	




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S. No.	Items	Type
5	Earth leakage	
6	Under voltage	
7	RPM	
8	Winding Temperature high	
9	Line currents	
10	Ground current	
11	Average current	
12	Phase current imbalance	
13	Frequency	
14	Phase to phase voltage	
15	Phase voltage imbalance	
16	Average voltage	
17	Active power	
18	Reactive power	
19	Power factor	
20	Active energy	
21	Reactive energy	

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PMCC INTEGRATION


All the MFMs (Multi-Function Meters) of the Panels, Transformer parameters and Capacitor Bank parameters are to be integrated with TAS over soft signal through RS 485 serial/TCP IP interface for following feedback:

1. MFMs (Multi-Function Meters) of the Panels monitoring in the control room

S. No.	Items	Type
1	Current (Average)	Feedbacks
2	Current Phase-1	
3	Current Phase-2	
4	Current Phase-3	
5	Voltage (LL) Average	
6	Voltage (LL) Phase 1-2	
7	Voltage (LL) Phase 2-3	
8	Voltage (LL) Phase 3-1	
9	Voltage (LN) Average	
10	Voltage (LN) Phase 1	
11	Voltage (LN) Phase 2	
12	Voltage (LN) Phase 3	
13	Frequency	
14	Active Power	
15	Active Power, Phase 1	
16	Active Power, Phase 2	
17	Active Power, Phase 3	
18	Power Factors	
19	Power Factor, Phase 1	
20	Power Factor, Phase 2	
21	Power Factor, Phase 3	
22	Average Load Percentage	
23	Percentage of Phase-1 Load	
24	Percentage of Phase-2 Load	
25	Percentage of Phase-3 Load	

2. Transformer monitoring parameter in control room


- Transformer oil level,
- Current,

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- Voltage,
- Lug temperature,
- Winding temperature,
- Oil temperature
- Tap Status
- Transformer OFF or ON status
- Transformer is overloaded or balanced
- Power status: transformer is running at optimized power or is consuming more or less than the set threshold value.
- OLTC Auto/Manual status

3. Capacitor Bank Monitoring in control room

- Power Factor
- Capacitor health status
- Capacitor on/off
- Control Alarm
- Hunting Alarm
- Value of capacitor in use
- Average Saving

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FIRE FIGHTING SYSTEM GUI AND INTERLOCKS

Dedicated OIC is provided for Fire fighting System with interlocks and dedicated Graphical User Interface (GUI) related to fire fighting equipments as stated below to be provided.

The GUI shall be user friendly and shall contain following minimum screens.

- Overview
- ~~Fire Engine & Jockey pump~~
- ~~Centralised Foam Feeding System~~
- ~~Sprinkler System~~
- ~~Fixed Foam Pourer System~~
- ~~Water tanks, bore well & make up water pump~~
- Alarms

1.0 Overview Screen: In overview screen, it shall display the entire fire hydrant and foam network. Status of all the connected MOVs/SOVs (Opened / Closed) shall be displayed (Green color valve for opened and Red color valve for closed conditions) and Running/ Stop status of respective fire engines, foam pump & bore wells to be displayed graphically.

In case any MOV in the above mentioned fire hydrant line and foam line is in local mode then the respective MOV should blink with color code as per the current (opened/closed) status of the valve.

In case any Fire Engine/ Foam Pump/ Jockey pump is in local mode then the respective Fire Engine/ Foam pump/ Jockey pump should blink with color code as per the current (Running/Stop) status of the respective Fire Engine/ Foam pump/ Jockey pump.

~~**2.0 Fire Engine & Jockey Pump:** It shall display the status of all the Fire Engines and Jockey pumps as stated under integration scheme and provision shall be there for remote Start of respective fire Engine, Start/Stop of Jockey pumps when kept in remote mode.~~


~~**3.0 Centralised Foam Feeding System:** It shall display the status of entire foam Feeding system along with separate GUI for Foam mother tank, Foam daughter tanks, Foam pumps, PTs etc as stated under Central foam feeding system section.~~

~~**4.0 Sprinkler System:** It shall display overall sprinkler system with status of MOVs, Tanks etc as stated in Sprinkler system section.~~

~~**5.0 Foam Pourer System:** It shall display overall Foam pourer system with status of MOVs, Tanks etc as stated in Foam pourer system section.~~

~~**6.0 Water tanks, borewell & make up water pump:** It shall display the water level and Volume of water in each Fire water tank. It shall also display the status of bore well pumps & make up water pumps / Fire water sump pump (Run/Stop, Trip/Alarm & Local/Remote) and provision shall be there for remote start and stop of the pump when kept in remote mode.~~


7.0 Alarms: It shall display all the active alarms related to fire fighting system (water and foam line) like MOV kept in local mode, MOV failed to open/ close, Alarms related to Fire Engines, foam pumps, Bore well, make up water pump/ fire water sump pump, Jockey pumps, Fire water tank level alarms, Minimum Stock level alarms etc.

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PRESSURE/DIFFERENTIAL PRESSURE/TEMPERATURE TRANSMITTER INTEGRATION

- 1.0** Pressure/Differential pressure/Temperature transmitter to be integrated with Process PLC system for their continuous monitoring in the system.
- 2.0** Trends are to be created for monitoring of historic data at later date.
- 3.0** Configurable Alarm limits to be maintained in Process PLC for generation of Alarms and alerting user. Any interlock required as per user requirement same needs to be implemented.
- 4.0** Following Diagnostics to be made available in the Process PLC system in a graphical, task-based interface the provides single-click access to critical process/device information and descriptive graphical trouble shooting for above mentioned devices:-

S. No.	Diagnostics
1	Remote Ranging and Monitoring functions
2	On line communication
3	Pressure/temperature input outside Range
4	Excessive ambient temperature
5	Incorrect Span
6	Degraded electrical loop integrity e.g. Water in terminal compartment, improper grounding, Unstable power supplies

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SYSTEM INSIGHTS

Visibility Screen dashboard to be developed by the vendor as per details mentioned below:

1.0 Minimum Following facility operation's INTERLOCK status to be displayed on GUI (As applicable): -

1. TLF Interlock Status - (Earthing Relay, Rack Monitor, Strainer Choke etc.)
2. Pump House Interlock Status - (Pumps etc.)
3. ~~FE Pump House Interlock Status - (FE, Jockey Pump, Foam Pumps, Borewell)~~
4. TFMS Interlock Mode wise i.e., Dispatch, Receipt, ITT mode etc. (ROSOV, DBBV, MOV, Pumps etc.)
5. Barrier Gate Interlock Status (After Invoice Generation)


2.0 Minimum Following facility operation's AVAILABILITY/COMMUNICATION HEALTH status to be displayed on GUI (As applicable): -

1. TLF System - (BCU, MFM, Earthing Relay, Rack Monitor etc.)
2. TFMS System - (Tank Gauges, MST, Density Probe, AOPS etc.)
3. Main/Security Gate - (Turnstiles, ANPR Camera, BQD, Card Reader etc.)
4. TT Parking - (BQD, Card Reader, ANPR Camera etc.)
5. Tank Farm Valves - (ROSOV, DBBV etc.)
6. Fire Fighting System - (Fire Engine, Jockey Pumps etc.)
7. HCD - (PTD, OPD, FLP Hooter etc.)
8. FAS - (Main Panel, Repeater Panel, Heat Detectors, MCP etc.)
9. Pump House - (Pumps, Strainer, PT, DPT etc.)
10. Security Building - (Printers, Video Wall etc.)
11. Admin Building - (Flap barrier, Video Wall etc.)
12. Invoice Room - (Printers, 55" Display etc.)
13. Control Room - (Servers, Workstation, Printers, Video Wall etc.)

3.0 Minimum Following facility operation's UTILIZATION status displayed on GUI (As applicable): -

1. Pump utilization –Product wise
2. Loading point utilization –Product wise
3. ~~DG set utilization~~
4. ~~Fire engine utilization~~
5. ~~Jockey Pump utilization~~
6. ~~Foam pump and foam filling pump utilization~~
7. TLF barrier gate IN and gate OUT utilization
8. Maintenance Mode ~~(Fire Engine, Foam Pump, Jockey Pump, Product Pump, DG etc.)~~
9. Alarm Status (Total Active Alarm, Critical Alarm)
10. MOS Status (Local ESD, Plant ESD, Primary Radar, Secondary Radar, AOPS)

Typical format for the visibility screen dashboard is attached with the Tender Document. Final list shall be finalized along with successful TAS vendor.

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ANALYTICS

The primary objective is for implementing an analytics solution and provide capabilities for alert generation for users, report generation and real time dashboards. Cost of the same is included in the software package. The proposed analytics framework shall be a multi-level role-based access system. It can be integral /external part of Process PLC package. If it is separate system than login credential of the Process PLC authentication framework shall be passed on to analytics framework.


After login, the users should be able to generate reports and access dashboard with required information. User should be able to customizable dashboard; add or remove the analytics information the user would like to access such as:

- All information available on the dashboard relevant login
- Task based interface
- Relevant summary reports
- Analytics against various attributes
- All this information must be available in reportable and shareable format

System shall provide typical industry established standard KPIs for performance, maintenance and reliability. The solution shall perform statistical analysis to predict the future probability of any machinery failing, alert generation based on the same. System should have possibility to integrate with SAP system seamlessly; protocol for the same shall be shared with successful vendor. A complete analysis must be done and to be used as feedback loop for machine learning model. It is possible to generate preconfigured alerts based on data analysis and relevant associated data for likely maintenance incidents. It is possible from the system for risk identification and calculation of an index to rank criticality of assets.

The analytics framework shall consist of the following:


- a) Data Cleansing: Data cleansing shall be a critical component of the framework. It shall be performed on the historical data and shall also be an ongoing activity throughout the assignment in order to maintain the data sanity of the data sources.
- b) Data Visualization: Data visualization would consist of the data representation activities that would need to be performed by the selected bidder.
 - a. Following activities are envisaged under this component:
 - i. Dynamic charts and graphs related to all active field devices and mentioned in Tender, average down time, utilization of facility, idling of assets, interlock status, asset performance, maintenance required, service alarm, automatic logging of complaints, resolutions thereof, push & pull actionable to SAP etc. shall be developed by the selected bidder. These charts shall be prepared based on the inputs provided by the user.
 - ii. Standard reporting templates and customized one. This shall be static reports that would need to be generated periodically through the system. The frequency in which these reports shall be generated is customized one.
- c) Predictive Analytics: A framework for predictive analytics shall need to be put in place by the selected bidder.
- d) Semantic Analytics: The selected bidder shall be required to conduct analysis of plain text information in order to extract meaningful insights.

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	INTEGRATION WITH TAS	

Following minimum (indicative) is envisaged for development. However quarterly requirement is clubbed after handing over the system during CAMC and TAS vendor to provide the solution without additional cost to IOCL within justify time before next quarter completion.

System should have the capability to suggest the To-Do list as per configuration in the system to alert the user in advance.

- 1.0 Product Pumps (>40 KW), ~~Jockey pumps, Foam Pumps and DG sets~~ electrical footprints/signature needs to be captured in Process PLC. Electrical Signature Analysis (ESA) is to be done for motor and pump condition monitoring through the analysis of electrical signals such as current and voltage, power factor, power consumption etc. Analytics needs to be developed based on these inputs for altering user for any deviations from normal performance of equipment as part of prediction algorithm. Expected results are downtime reduction, increase in machine availability, maintenance cost, better management and planning of maintenance etc. Software package should have the capability of remote monitoring, reducing the human exposure to risks; detect mechanical failures in the motor and load (pumps), problems related to misalignment or pump, electrical failures in the stator and problems in the mains, etc.
- 2.0 Earth pit monitoring system shall be made available at site. TAS vendor need to integrate it to DCS/Process PLC system. Process PLC system need to be generate alert and suggest the predictive maintenance requirements for the same.
- 3.0 EH actuator to be integrated on HART with DCS/Process PLC system including hard wire with safety PLC system. Electrical signature of Electrical hydraulic actuator need to be captured in AMS (part of Process PLC) system. Diagnostics available in actuators need to be captured in HOST system e.g. logical trending and histogram, sensor related data, operation data - Operation time, operation profile, etc. System should also capture data like failures/faults (e.g. valve, actuator, External), function check, out of specification. System also generates the alert for maintenance or service required for the particular actuator.
- 4.0 Pressure transmitter/Temperature transmitter/ Differential pressure transmitter should have capture the data and provide alert to user such as On line communication, Pressure/temperature input outside Range, Excessive ambient temperature, Incorrect Span, Degraded electrical loop integrity e.g. Water in terminal compartment, improper grounding, Unstable power supplies etc.
- 5.0 Hydrocarbon detection system's following minimum indicative Diagnostics shall be available in Host System/ Process PLC e.g. Sensor Power fault, IR Source fault, Sensor life expired, Zero Cal fault/ Span Cal fault, IR Low, IR detector fault, Electronics fault, Sensor missing, Sensor over range, alignment etc.
- 6.0 Batch controller's following minimum indicative Diagnostics shall be available in Host System/ Process PLC e.g. are Valve fault, individual Card health status, Communication port status, Solenoid Actuation Count, Add-Pak Diagnostics, Network diagnostics, Power etc are to be made available in Process PLC. Any changes in batch controller K-factor or Meter Factor of main/blend/additive product, Analysis to be done for such requirement during seasons etc.

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7.0 Alarm overspill protection's (AOPS) following minimum indicative Diagnostics shall be available in Host System/ Process PLC e.g. are electronic and mechanical health, Fork conditions, coated or blocked, and extreme corrosion, critical alarm duties etc.

8.0 Diagnostic related to Radar gauges & CIU should be available in the system.

9.0 Golden Rule diagnostics/analytics: -

9.1 Fire Engine is in maintenance more than a month

9.2 Fire engine is not run for two times in a week for 30 minutes continuously.

9.3 Fire engine is not run for four hours continuously in a year.

9.4 Hydrant system was not in Auto for Day.

9.5 Fire water tank not topped up.

10.0 TLF/Loading related diagnostics/analytics: -

10.1 TTs loading in particular timing (configurable time duration).

10.2 TTs/LPs Loading Performance

10.3 TTs loading time analysis

10.4 TTs assigned to particular customer.

10.5 TTs assigned to specific bays

10.6 TTs having frequent failure of interlocks (e.g., earthing, overspill, low flow etc.).

10.7 TTs reporting time analysis

10.8 TTs going late after invoice generation.

10.9 TTs manually completed.

10.10 TTs Speed Analysis

10.11 Loading pattern in TLF e.g., utilization of TLF during day.

10.12 ~~Pre-Invoice generation analysis.~~

10.13 TTs loading deviation analysis. (Batch controller totalizer vs preset vs MFM totalizers)

10.14 TTs cycle time analysis

10.15 Bay utilization analysis

10.16 Bay not communicating for particular duration (Configurable).

11.0 TFMS System related diagnostics/analytics: -

11.1 Valves operation (Open/Close) Analysis.

11.2 Tank sequencing failure.

11.3 Optimum Tank utilization for loading

11.4 Optimum Tank utilization for receipt.

11.5 ESD not tested in a month.

11.6 AOPS not tested as per their PTI interval. (Configurable PTI (**proof test interval**)).

11.7 Performance Analysis of Tanks Radar Gauges.

11.8 Performance Analysis of AOPS.

11.9 Performance Analysis of MSTW.

11.10 Primary and Secondary Radar level difference analysis.

11.11 Valve Communication Analysis (MOV/DBBVs/ROSOV not communicating to Process PLC /Safety PLC).

11.12 ~~Foam tank level analysis.~~


11.13 ~~HCD Performance Analysis (OPD/PTD etc).~~

11.14 Tank dyke valve position Analysis (Dyke valve open position).

11.15 Tank Water draining operation analysis.

11.16 ~~Tank Sprinkler and Foam facility testing analysis.~~ (Frequency to be made configurable).


12.0 System related diagnostics/analytics

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12.1 Network Health Analysis -

- a.) Active devices not communicating. Communication status of SCADA not available at any time: - MCS, Process PLC, Safety PLC, CIU, UPS, PMCC, FAS, BQD, Card reader except reader connected to BCU.
- b.) Partner not available at any day: - LRC, Process PLC, Safety PLC, CIU, TFMS server, CCTV server, Analytic server, Terminal server, Ethernet switches, MCS etc.
- c.) Master and standby switchover (%) - During a (week/month/Quarter):- LRC, Process PLC, Safety PLC, CIU, TFMS server, CCTV server, Analytic server, Terminal server, Ethernet switches, MCS etc.
- d.) MCS Loop communication analysis - (1. Frequent failure of loop communication, 2. Frequent failure of FCUs in actuators)
- e.) FAS health analysis - (Detectors/MCP/Hooter etc frequently giving alarm)

Over and above this, Analytics & diagnostics shall be discovered with successful bidder.

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	REPORTING & CO-ORDINATION	

REPORTING & CO-ORDINATION

CONTRACTOR shall submit the following reports on regular basis for IOCL / EPMC's information / review.

1.0 MONTHLY PROGRESS REPORT

The report shall be submitted on monthly basis within 5 calendar days from cut-off date covering overall scenario of the project.

2.0 WEEKLY PROGRESS REPORT - OVERALL

This report shall be prepared by CONTRACTOR and issued on weekly basis to EPMC / IOCL at site. The report shall include the following as a minimum.

- Executive Summary
- Project highlights with dates of achievements
- Project exception (work programmed but not achieved with reasons for Non achievement) and work programmed for next week
- Critical areas
- Actions taken / to be taken for slippages
- Progress statistics

This shall cover both for CONTRACTOR's Home/Design office activities and construction activities at site.

3.0 WEEKLY PROGRESS REPORT-CONSTRUCTION


This report shall be prepared by CONTRACTOR and submitted on weekly basis within 1 Calendar day from cut-off date. The report shall cover following items, as a minimum.

- Progress statistics
- Work item wise quantity completed against programme for the week including reasons for shortfall.
- Programme for next week
- Work Front available
- Constraints, if any
- Resources deployed against planned with reasons for shortfall in resource deployed
- List of equipment/materials received at site during the week

4.0 EXPEDITING REPORT


Contractor shall submit fortnightly expediting report based on his representative's visit to vendor's work for orders where delivery of materials is critical to project completion. A list of such critical items/vendors shall be specified by OWNER/PMC during the kick-off meeting or at a later date.

In addition to the above, OWENR/PMC may request expediting report based on visit of CONTRACTOR's representative in case of orders which were though not critical at the time of order placement however become subsequently critical during project execution due to any reason.

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	REPORTING & CO-ORDINATION	

5.0 HINDRANCE REGISTER:

For any hinderance in front availability, Register to be prepared and signed jointly by IOCL site in charge and vendor on monthly basis. Even if there is no hinderance, register has to be jointly signed on monthly basis.

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	LIST OF SPARES	

LIST OF SPARES


MINIMUM LIST OF SPARES TO BE SUPPLIED DURING WARRANTY & COMPREHENSIVE ANNUAL MAINTENANCE PERIOD

All Mandatory spares are to be supplied as per list below. Spares indicated below are minimum for which payment shall be made on one time basis under the respective line item in SOR.


Any additional items required during the warranty and CAMC period, the same shall be maintained at site by TAS vendors. The spares shall be replaced as and when it is consumed. Additional quantity may be kept at the terminal by the Vendor based on OEM recommendation. **Tenderer to specifically indicate the spares / items which are not applicable to the equipment offered by them in technical bid document.**

5% of the annual CAMC cost shall be towards maintenance of these mandatory spares and shall be paid on basis joint sign off spares inventory during quarterly visits of CAMC. Pro Rata recovery may be done based on IOCL discretion if not maintained as per requirement.


SN	ITEM	DESCRIPTION	QTY
1	1	BATCH CONTROLLER	
2	1.1	CPU BOARD	2
3	1.2	DIGITAL INPUT CARD	2
4	1.3	DIGITAL OUTPUT CARD	2
5	1.4	ANALOG INPUT CARD	2
6	1.5	POWER SUPPLY CARD	2
7	1.6	DISPLAY BOARD/CARD	2
8	1.7	ADDITIVE CARD (IF SEPARATE FROM INPUT CARD)	1
9	1.8	ETHANOL BLENDING CARD (IF SEPARATE FROM INPUT CARD)	1
10	1.9	METER PULSE CARD (IF SEPARATE FROM INPUT CARD)	1
11	1.1	COMUNICATION/INTERFACE CARD	1
12	1.11	KEYPAD	1
13	2	REMOTE INTERACTION TERMINAL (IF APPLICABLE)	
14	2.1	INDICATION LAMP WITH COVER - RED, GREEN & AMBER	4
15	2.2	PUSH BUTTON - YELLOW, GREEN, RED	4

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	LIST OF SPARES	


16	3	DIGITAL CONTROL VALVE - PISTON TYPE (2"/3"/4")	FOR EACH SIZE
17	3.1	NO SOLENOID	2
18	3.2	NC SOLENOID	2
19	3.3	COMPLETE SEAL KIT	2
20	3.4	O-RING SET*	2
21	3.5	PISTON SPRING*	2
22	3.6	* COMPLETE CYLINDER ASSEMBLY INSTEAD OF O-RING SET AND PISTON SPRING (OPTIONAL)	2
23	3.7	NEEDLE VALVE (IF APPLICABLE)	2
24	3.8	AUTO-TUNING VALVE (IF APPLICABLE)	2
25	4	ACCESS CONTROL SYSTEM	
26	4.1	FACE & FINGERPRINT & CARD READER	1
27	4.2	FINGERPRINT & CARD READER	1
28	4.3	TTES CARD READER (FLAMEPROOF)	1
29	5	CONTROL ROOM HARDWARE (for equipment supplied by TAS Vendor)	
30	5.1	ETHERNET INTERFACE CARD FOR LRC SERVER	1
31	5.2	SMPS FOR LRC SERVER	1
32	5.3	ETHERNET INTERFACE CARD FOR SERVERS	1
33	5.4	SMPS FOR SERVERS	1
34	5.5	TERMINAL SERVER (16 PORT)	1
35	5.6	LAYER 2 ETHERNET SWITCH (8 CU + 2 OFC PORTS)	2
36	6	EARTHING RELAY	
37	6.1	EARTHING RELAY BOARD	1
38	6.2	EARTHING CLAMPS WITH CORD 5 MTR. LENGTH	4
39	6.3	LAMP RED/GREEN	4
40	7	RACK MONITOR	
41	7.1	PILOT LIGHT ASSEMBLY (RED & GREEN)	2

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42	7.2	COMPLETE INTERNAL CARD SET / PCB MODULE	1
43	7.3	10 PIN GANTRY PLUG WITH CABLE	2
44	8	TLF HEADER INSTRUMENTS	
45	8.1	PRESSURE TRANSMITTER	2
46	9	TLF	
47	9.1	RTD ALONG WITH THERMOWELL	1
48	9.2	TEMPERATURE TRANSMITTER	1
49	10	BARRIER GATE	
50	10.1	MAIN PCB BOARD BARRIER GATE PEDSATAL	1 NO
51	10.2	POWER SUPPLY UNIT	1 NO
52	10.3	SHORT BOOM PROFILE	1 NO
53	10.4	LIMIT SWITCH(IF APPLICABLE)	1 NO
54	10.5	INFRA-RED SENSOR SET	1 SET
55	11	PROCESS PLC	
56	11.1	POWER SUPPLY MODULE	1 NO
57	11.2	ETHERNET MODULE	1 NO
58	11.3	COMMUNICATION MODULE I/O RACK	1 NO
59	11.4	POWER SUPPLY MODULE (NODE)	1 NO
60	11.5	DIGITAL INPUT CARD	1 NO
61	11.6	DIGITAL OUTPUT CARD	1 NO
62	11.7	ANALOG INPUT MODULE	1 NO
63	11.8	ANALOG OUTPUT MODULE (IF APPLICABLE)	1 NO
64	11.9	DI RELAY BOARD	1 NO
65	11.1	DO INPUT BOARD	1 NO
66	11.12	RELAY 24V DC/240 AC (EACH TYPE)	1 NO
67	11.13	CONFIGURATION CABLE	1 NO
68	11.14	BULK POWER SUPPLY	1 NO
69	11.15	DI BARRIER	1 NO
70	11.16	DO BARRIER	1 NO
71	11.17	AI BARRIER	1 NO

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72	11.18	AO BARRIER (IF APPLICABLE)	1 NO
73	12	TFMS SUBSYSTEM	
74	12.1	ZENER BARRIER (IF APPLICABLE)	3 NOS
75	12.2	COMMUNICATION CARD FOR RADAR GAUGE/DENSITY PROBE/MSTW	1 NO EACH
76	12.3	TERMINAL BLOCK FOR RADAR GAUGE DENSITY PROBE/MSTW	1 NO EACH
77	12.4	MAIN PCB/ELECTRONIC MODULE FOR RADAR GAUGE/DENSITY PROBE/MSTW	1 NO EACH
78	12.5	POWER SUPPLY CARD FOR RADAR GAUGE DENSITY PROBE/MSTW	1 NO EACH
79	12.6	DENSITY PROBE SENSOR	1 NO
80	12.7	MAX LENGTH AOPS	1 NO
81	13	MOV PUSH BUTTON	
82	13.1	LAPMS	4
83	13.2	PUSH BUTTON OF ALL TYPES	4
84	14	UPS	
85	14.1	THYRISTOR (FOR CHARGER)	1 NO
86	14.2	THYRISTOR (STATIC SWITCH)	1 NO
87	14.3	POWER TRANSISTOR / IGBT	1 NO
88	14.4	FREE WHEELING DIODE (CHARGER)	2 NO
89	14.5	CHARGER CONTROL CARD	1 NO
90	14.6	SYSTEM MANAGER CARD	1 NO
91	14.7	POWER SUPPLY CARD	1 NO
92	14.8	SET OF FUSES	2 SET OF EACH TYPE
93	15	BQD	
94	15.1	COMMUNICATION CARD	1 NO
95	15.2	DRIVER CARD	1 NO
96	15.3	POWER CARD/SMPS	1 NO
97	15.4	LINE INTERFACE CARD	1 NO
98	15.5	LINE CPU CARD	1 NO
99	16	CCTV	

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	LIST OF SPARES	

100	16.1	FIXED DOME CAMERA	1 NO
101	16.2	PTZ CAMERA	1 NO
102	16.3	FIXED BULLET	1 NO
103	16.4	FIXED BOX	NA
104	16.5	FLP FIXED CAMERA	NA
105	16.6	4 PORT INDUSTRIAL GRADE LAYER 2 MANAGED ETHERNET SWITCH	1 NO
106	16.7	INDUSTRIAL GRADE POWER SUPPLY UNIT	1 NO
107	17	MASS FLOW METER	
108	17.1	COMPLETE SENSOR	1 NO
109	17.2	CORE PROCESSOR	1 NO
110	17.3	TRANSMITTER ELECTRONICS	1 NO
111	18	FIRE ALARM SYSTEM	
112	18.1	COMBINATION/MULTI SENSOR DETECTOR	5 NOS
113	18.2	RATE OF RISE HEAT DETECTOR	1 NOS
114	18.3	IS DETECTOR	1 NOS
115	18.4	HYDROGEN DETECTOR	1 NO
116	18.5	EX- PROOF MCP	2 NOS
117	18.6	WEATHER PROOF MCP	2 NOS
118	18.7	WEATHER PROOF HOOTER	1 NO
119	19	WEIGHBRIDGE SYSTEM	
120	19.1	LOAD CELLS	4 NOS
121	19.2	POWER SUPPLY UNIT	1 NO
122	21	POWER DISRIBUTION PANEL	
123	21.1	MCB	2 NOS OF EACH RATING
124	22	BALL VALVE IN PROVING MANIFOLD	2 NOS OF EACH SIZE

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	TRIAL AND OBSERVATION PERIOD CHECKLIST	


TRIAL AND OBSERVATION PERIOD CHECKLIST (SAT Format)

GENERAL:


Trial and observation period check list as stated below is only indicative and the same to be read and customized in line with Tender scope of work, Technical Specification, Functional Specification and Software Requirement, Functional Design Requirement, Special Terms and conditions of the Contract, drawings, BOQ etc which are forming part of the tender document. Final SAT checklist format shall be shared with successful bidder.

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Sl. No.	DESCRIPTION
1	Verification
1.1	Verification of Bill of Material
1.2	Verification of Test Certificate/Dispatch clearance
1.3	Verification of punch points
2	TLF Gantry
2.1	GENERAL
2.2	Mass Flow meter
2.3	Strainer cum Air Eliminator
2.4	DCV
2.5	ON-OFF valve
2.6	Top Loading Arm
2.7	Bottom Loading Arm
2.8	Rack Monitor
2.9	Earthing Relay/Grounding Unit
2.10	ESD Push button
2.11	Local and Plant ESD Push button
2.12	Batch Controller
2.13	TLF Loading
2.14	Ethanol blending system
2.15	MFA dosing Sub system (ADSS)
2.16	Header line Instruments
3	Tank Truck Parking Area & Access Control System
3.1	PCR system for TT registration
3.2	Queue Display Board
3.3	Barrier Gate


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Sl. No.	DESCRIPTION
4	Tank farm Area
4.1	GENERAL
4.2	Radar Gauges
4.3	AOPS
4.4	MSTW
4.5	Pressure transmitter (Density)
4.6	Tank Modes Selection and its interlocks
4.7	Tank Alarms set Points and its control Functions
4.8	Dyke Drain Valve position indicators
4.9	Blue Dye dosing sub system
4.10	Fire Water tank (Gauging System)
4.11	Make up Water Tank Integration
4.12	Borewell Pump
5	CCTV System
6	Fire Alarm System
7	Access Control System
8	ESD system
9	Pipeline Interface
10	Cable laying
11	Earth pit
12	Integration with third party system
12.1	MCC / Pump operation
12.2	Air compressor (In case of pneumatic ROSOV)
12.3	Hydrocarbon Vapours Detection System
12.4	Rim seal (if applicable) Fire Protection System
12.5	PA Paging system
12.6	Fire Engine and Jockey pump
12.7	DG set
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12.10	ROSOV & DBBV


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Sl. No.	DESCRIPTION
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12.12	Wailing Siren
13	CONTROL ROOM, S&D, Security Room, TM room, PPL CR
13.1	General
13.2	UPS
13.3	Process PLC
13.4	Safety PLC
13.5	SIL Verification & Validation
13.6	HO Gateway for SMS/Mail alerts
13.7	LED display screen for critical alarm
13.8	LED display screen for fire fighting
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f	Reports
g	SAP - TAS interface
h	Database Back-up and retrieval
i	Training
j	Readiness for SAT
k	Documentation


Sl. No.	Description of work	(Yes/No/NA)	Remarks
1	Verification		
1.1	Whether list of all equipment supplied along with make, model and quantity		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	based on original/ Revised BOQ of the work order has been verified? Vendor to submit the excel sheet listing all the equipments, qty as per BOQ, Qty supplied, Make, Model and Serial No for all the billable line items including cables, cable trays, JB, structural steel etc which are on Lump sum basis.		
1.2	Whether Test Certificate/ Dispatch clearance of all the equipment supplied as per BOQ has been submitted and is meeting the Tender specifications? Vendor to submit all the required Test Certificate/ Dispatch clearance, PESO approvals and other related documents as stated in the tender for individual equipment along with excel sheet stating document reference nos and date wherever applicable.		
1.3	Whether all the points mentioned in the MOM during FAT or during execution stage which are part of the scope of the main / amended work order has been complied? Vendor to maintain record of all such MOMs/ Emails etc with date and submit the compliance report as per tender scope of work starting from Kick off Meeting date till completion of the project and submit the summary of all such documents.		
2	TLF Gantry		
2.1	GENERAL		
a	Whether the flow metering system has been installed properly as per GA drawing comprising of strainer cum air eliminator, ON-OFF valve, MFM, RTD, Tap off point for proving system, DCV, TRV across DCV, isolation valve & loading arm, metering skid as per scope defined in the work order?		
b	Whether all cables in gantry are laid through Cable trays, dressed properly and positioned using Aluminium clamps?		
c	Whether proper glanding and termination including plugging of unused opening with Exd. blind plug, cable tagging using Aluminium strap, tightening of all the screws, body earthing of Batch controller,		

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	TRIAL AND OBSERVATION PERIOD CHECKLIST	


Sl. No.	Description of work	(Yes/No/NA)	Remarks
	card reader, ESD PB, JB's, earthing relay etc done as per OEM recommendations?		
d	Whether body earthing of all electrical equipments are done as per OEM's recommendations using insulated earthing cable and connected to instrument earthing grid/pit?		
e	Whether Jumper/bonding provided across all flange joints in metering assembly line?		
f	Whether Signal, control and power cables are terminated in separate JB's and correct tagging done? Vendor to ensure that atleast 20% spare core of all types of main cables coming from control room to main JB's should be available and respective spare core to be marked inside the JB and shown in the cable layout and termination drawings.		
g	Whether color band of respective product code has been done on respective loading arm?		
h	Whether provision has been made to isolate power supply for individual Loading point/bay for maintenance purpose? Vendor to ensure that at least one no. of FLP switches is provided for individual loading point/bay (as per scope of work/BOQ) so that maintenance activities can be done at respective loading point/bay by cutting power supply to all the equipment of respective Loading point/bay without affecting other bays operation.		
2.2	Mass Flow meter		
a	Whether all the display parameters as specified in the tender document has been configured and the same is available in their local display unit?		
b	Whether all gantry MFMs has been interfaced with respective batch controllers (pulses and digital/analog input/output) as well as with TAS (Serial/TCP IP communication) and all the parameters as per tender document including diagnostic features/alarms are		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	available in TAS and configured accordingly?		
c	Whether all MFMs have been calibrated at FCRI Palakkad / as per tender document prior to dispatch at site?		
d	Whether W&M stamping done for MFM and overall batch accuracy are within permissible limit of +/-0.05% when re-verified through standard/ Master MFM?		
2.3	Strainer cum Air Eliminator		
a	Whether all strainer cum Air Eliminator in the metering assembly are functioning properly and minimum 100 Mesh size basket (depending upon product requirement) has been provided? The vent valve shall always be kept in open condition and there is no leakage of product except trapped air/vapour.		
b	Whether DPT installed across the Strainer cum air eliminator has been interfaced with Batch Controller/ TAS and interlock has been provided to stop loading of respective loading point in case choking across strainer exceed 50% based on differential pressure transmitter readings? Vendor to configure the DPT reading in line with % choking across the strainer. DPT reading shall also be available in TAS GUI in case the respective BCU has provision to transmit the pressure value to TAS over serial communication.		
c	Whether blind flange has been provided after drain valve and strainer has been installed as per flow direction indicated on the body of the strainer?		
2.4	DCV		
a	Whether all DCVs are installed properly and no passage of product observed when system is in idle conditions? Vendor to ensure that DCV shall open/close based on command received from the respective BCU as per tender document and proper interlocks to be		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	maintained to prevent overruns, overflow, low flow etc.		
b	Whether DCV has been tuned properly and Loading should stop at preset qty. (Maximum variation in loaded qty should not exceed +/- 2 Ltrs. from the preset qty).		
c	Whether proper secured locking arrangement as per tender document has been provided across the needle valves of the DCV and the same has been configured to avoid any manual throttling without unlocking the needle valve?		
d	Whether TRV has been provided across DCV and pressure has been set at 8 kg/cm ² ?		
2.5	ON-OFF valve		
a	Whether On-Off valve has been provided in the metering assembly and is hardwired to safety PLC? The valve shall normally be in open condition and shall close in case of : ESD is active Overfill alarm from BCU/TAS Overrun alarm from BCU/TAS Close command from TAS BCU Power failure		
b	Whether On-Off valve closes in the event of following and re-open once the system normalizes and the alarm has been RESET in TAS : ESD is active Overfill alarm from BCU/TAS Overrun alarm from BCU/TAS Close command from TAS BCU Power failure alarm clearance from control room Vendor to ensure that provision is made in TAS for remote opening and closing of these valves for testing purpose.		
2.6	Top Loading Arm		
a	Whether loading arm has been properly installed and is vertically aligned and loading arm locking arrangement has been provided at loading position and parking position?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
b	Whether all the flange joints have been tightened and no leakages are observed during loading/ idle conditions and jumper/bonding has been provided across all the flange joints?		
c	Whether loading arm has been provided with vacuum breaker along with manual valve and all the product drains out from the arm within 10-15 sec after corresponding batch completion?		
d	Whether Vapour recovery arm is provided for MS loading points with proper sealing arrangement so that no significant MS vapour leaks out during loading operation and the vapour arm is connected back to vapour recovery unit?		
e	Whether in case of Top loading arm, the size of drop tube is same as that of loading arm and goes upto bottom of the TT compartment?		
2.7	Bottom Loading Arm & Vapor Recovery arm		
a	Whether loading arm has been properly installed and can be operated easily?		
b	Whether dummy API coupler along with position sensors (interlocked with BCU) has been provided at parking position of the loading arm?		
c	Whether there are no leakages from any joints of the loading arm?		
d	Whether thermal Relief valve has been provided after DCV and outlet of TRV is connected back to upstream line before DCV?		
2.8	Rack Monitor		
a	Whether Rack monitor along with gantry plug installed properly and interfaced with batch controller for overfill alarm and interlock?		
b	Whether LED indication provided showing nos. of connected healthy overfill probe installed in TT?		
c	Whether loading stops on activation/ failure of any one of the connected overfill sensor?		
d	Whether Rack Monitor has been integrated with TAS using serial		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	communication and status is available in TAS GUI?		
e	Whether system does not allow to start loading incase when the total nos. of active overfill sensors connected to TT is less than total nos of compartment of the respective TT as per details received by TAS from SAP?		
f	Whether Truck tester and Rack Tester have been provided as per tender for testing the status of the overfill sensor of empty TT and rack monitor?		
2.9	Grounding unit		
a	Whether the Grounding units are Resistance capacitive type?		
b	Whether Earthing relay feedback to Batch Controller is healthy only when it is properly connected to TT Earth pit and Resistance is within permissible limit? Whether TT earthing connectivity is through bolt and socket assembly?		
c	Whether the grounding units are connected to separate earth pit not connected to TLF structure earth pit for TT static earth discharge using 50 X 6 GI strips or 25 / 16 mm ² Insulated Copper Conductor earthing cable as per tender specification? In case GI strip is used then electrical isolators to be used to prevent direct contact of GI strip to Gantry Structure.		
2.10	ESD Push Button Station		
a	Whether ESD Push button station has been installed properly for all the loading points and all push buttons, indication lamps and interlocks are as per FDR?		
2.11	Local and Plant ESD Push button		
a	Whether Plant ESD push button has been provided at Control room Each battery of TLF Cabin of Location-in-charge Each cluster of TW Gantry One number for each tank dyke TLF Pump house TWG Pump house Security cabin		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	Man entry/exit to Tank wagon unloading area and connected to Safety PLC along with safety interlocks, activation of wailing Siren, auto announcement on PA paging system as per FDR?		
b	Whether Local ESD push button has been provided at Each battery of TLF Each Cluster of TW Gantry (at an interval for 4 BTPN/BTPFLN wagons) TW unloading area (at an interval for 4 BTPN/BTPFLN wagons) TW unloading pump house TLF Pump house and connected to Safety PLC along with interlocks and audio visual alarm as per FDR?		
c	Whether Plant ESD/ Local ESD signboard is provided near respective ESD Push button station.		
2.12	Batch Controller		
a	Whether all the interlocks are configured in the batch controller and loading stops in following events? TT earthing failure Overfill alarm Overfill sensor failure/ sensor not sensed Over run alarm Bottom Loading arm inside Dummy adaptor ESD (local & Plant) Low flow No flow Stop from RIT, BCU and CR DPT - Strainer choked by 50%		
b	Whether meter factors have been set at minimum four different flow rates (if required)?		
c	Whether in case of low flow (either due to power failure or throttling of manual ball valves), batch controller gives stop command for closure of DCV and corresponding alarm in TAS?		
D	Whether loading continues in case of communication break from TAS till the current batch loading is completed?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
E	Whether there is separate password for configuration of the parameters and changing the mode of the batch controller (Local/ Remote)?		
F	Whether all the loading details which were loaded in local modes are transferred to TAS once the same is put in remote mode and communication with TAS is established and accordingly reports are updated?		
G	Whether BCU are connected to TAS using OFC cables and over Ethernet & Serial or dual Ethernet communication protocol as per tender? Whether primary communication is over Ethernet or not and in case primary communication fails, the system switch over to redundant communication as per tender?		
H	Whether Batch Controller Communication redundancy is checked and status update in OIC?		
i	Whether below generated alarms can be cleared from Control room Overspill Power failure Unable to shut/close valve Unauthorized flow K factor Change alarm DVC actuation over MTBF W&M switch status change Overrun alarm except for some critical alarms which requires manual intervention like overflow alarm, overrun alarm, DCV / ON-OFF valve failure alarm etc ?		
J	Whether BCU display has proper illumination and display messages are as per FDR? (Show card, Connect ground, move to bay no. , Vehicle no, preset qty, Qty loaded, flow rate etc)		
K	Whether over run alarm of all batch controllers has been configured? (if total flow exceed threshold valve set in the BCU)- Random check		
L	Whether the batch controller has been configured for main, blend as well as for additive (whichever applicable) and		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	proper % blending/dosing has been configured as per scope of the work order?		
M	Whether in case of power failure of BCU, ESD command is sent to BCU and ON-OFF valve? Only upon acknowledgement from control room, loading activity resumes?		
2.13	TLF Loading (To be as per FDR/ Addendum to FDR)		
A	Whether permanent card has been assigned to all TTs plying at the location / as per list provided by user group?		
B	Whether Temporary cards can be issued to TT and after load completion and exit of the TT, the temporary cards linked to the TT gets de-linked and permanent card which was assigned to the TT gets attached with that TT for next load?		
C	Whether FAN gets generated automatically on receipt of shipment from SAP at FAN printer located at Security room?		
D	Whether feature to ADD/Delete/Modify proximity card available in the system and working?		
E	Whether average density & temperature of product loaded in TT is posted in SAP as per the protocol including multiple product and ethanol.		
F	Whether batches are downloaded only when valid card has been shown on the card reader at TLF Gantry?		
G	In case of invalid card or wrong bay selection or card not shown at entry barrier gate card reader etc, whether Batch Controller display correct instruction messages as per FDR?		
H	On showing valid card on the card reader, whether correct batches are downloaded?		
I	Whether loading commences only after all the interlocks are in place as per FDR?		
J	Whether invoices are generated automatically on completion of load without manual intervention of showing any card to card reader? Vendor to ensure that BCU sends load completion status once the batch assigned for any particular TT is completed without waiting for officer to		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	show any card in the respective card reader.		
k	Total number of TT (loaded, under-loading and to be loaded) inside hazardous area should not be more than 2.5 times the no of bays		
L	Whether TT queue size per bay does not exceeds the TT queue size configured in the TAS software (default 1+1)?		
M	Whether in case of locations with only mixed bays for a particular product, bay allocation to be done for as per their FIFO sequence for that product.		
N	Whether Mixed load TT are Automatically assigned to Mixed load bay only?		
O	Whether in case of full MS TTs, Mono MS bays availability are checked first and after that it is allocated to mixed bay as per their FIFO sequence?		
P	Whether Mono (HSD) product TTs get allocated on mixed bays in case total nos. of TT under loading + inside loading area at mixed bay + FAN generated for Mixed load/ full MS and not reported at security Gate + Total nos. of shipment for Mixed load/ Full MS available is less than total nos. of Mixed load TTs that can be loaded at Mixed Bay in 1+1 logic?		
Q	Whether TTs with branded fuels indent can get allocated to the bays with branded fuels provision only. However, in the bays with Branded fuels provision, other TTs can get allocated only incase total nos. of TTs with branded fuels under loading + inside loading area at Branded fuels bay + FAN generated for Branded fuels and not reported at security Gate + Total nos. of shipment for Branded fuels available in TTES is less than total nos. of Branded fuels TTs that can be loaded at Branded fuels bays in 1+1 logic.		
R	Whether record of TT loaded through MFM and its variation from the calibration		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	chart is maintained atleast for a period of 2-3 weeks till the system stabilizes. Vendor to keep the record of at least 2 TT per loading point per day to check the performance of the metering equipments.		
S	Whether Bay reallocation, Part load, Cancellation of TT before start of operation, Abort, sick etc is as per WO features checked?		
T	Whether FAN can be generated to TTES without SAP interface and corresponding loading operation in remote mode checked?		
U	Whether local load can be generated through TTES?		
V	Whether feature for entry/exit of non filling truck available?		
W	Whether FAN generation is limited to 1+1 logic and bay allocation is at license area Entry Gate when proximity card is presented to PCR for entry permission to license area?		
X	Whether bay can be re-allocated manually?		
Y	Whether provision has been made (Configured) to take printing of FAN on any other printer connected to LAN incase main FAN printer fails?		
Z	Whether the display unit installed near Invoice Room/ Lock Shed displays the list of TTs (scrolling text) whose invoice has been generated and TT is still within license area?		
AA	Whether addition/deletion/ Modification of proximity cards, TT, User, Product, loading points, Bay Queue size etc can be done and is not hard coded?		
2.14	Ethanol/ Biodiesel blending system		
A	Whether metered quantity of Ethanol/Biodiesel is injected in the main product pipeline after DCV of main product?		
B	Whether Ethanol/Biodiesel is blended uniformly during starting 80% of the loading or in between 10% to 90% of main product flow?		
C	Whether % age blending is configurable under Admin/ Configuration Password?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
D	Whether there is provision to isolate MS/HSD delivery line during calibration of ethanol blending system?		
E	Whether Ethanol/Biodiesel pump Starts/ Stop Automatically on pump demand?		
F	Whether calibration done using prover tanks and demonstrated to IOCL and W&M stamping done?		
G	Whether all possible combination of loading (MS, XP, Ethanol, HSD,XG,Biodiesel) can be done through BCU depending upon load generation?		
G	Whether Ethanol/Biodiesel storage tank level measurement is through radar gauges interfaced with TFMS and SAP?		
H	Whether MST and density probe installed in ethanol/Biodiesel tanks are as per scope of the work and is working satisfactorily?		
2.15	MFA dosing Sub system (ADSS)		
A	Whether the additive injection panel/ block have been installed properly and additive is injected before Mass Flow meter?		
B	Whether % age dosing in PPM is configurable under Admin Password?		
C	Whether additive pump Starts/Stops Automatically on demand?		
D	Whether by pass line is present in injection panel for manual calibration?		
E	Whether correct amount of additive is dispensed at all times on line in predefined ratio (set in the batch controller) to the main product throughout the load cycle at a given TLF bay?		
F	Whether back pressure valve is installed near the additive tank for limiting pressure build up (i.e. prevent overpressure)?		
2.16	Header line Instruments		
A	Whether PT, Bulk Air eliminator along with TRV installed in main product header line and PT at blending product header line has been installed properly?		
B	Whether PT reading is available in the GUI as well as in local display unit and the same has been interlock with respective		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	product pump so that in the event of excess pressure built up in the header line, PLC should trip the respective product pump?		
3	Tank Truck Parking Area/ Security Gate		
3.1	PCR system for TT registration		
A	Whether proximity card readers along with LED display units (Minimum 2 sets, canopy if not installed in shade) have been provided near security gate/ TT parking entry for registering TT reporting data?		
B	Whether TT no. of the concerned proximity card (valid card) appears on the display unit installed near the card reader at security gate/ TT parking entry?		
C	Whether TT reported list is created in TAS after validations, when Proximity Card is shown at the security/TT parking gate PCR? Whether this is recorded in TAS with time stamp for TT Queue generation?		
D	Whether TT queue generated is posted to SAP automatically as per the protocol?		
E	Whether there is a provision in the TAS system for manual posting of TT arrival data to SAP incase Card reader/ communication between SAP & TAS-MS fails during data posting?		
F	Whether message displayed in LED display unit is as per FDR?		
3.2	Queue Display Board		
A	Whether 15 lines scrolling BQD (TEXT on the top of display board mentioning TRUCK NO. along with its STATUS as per FDR) has been installed properly near TT parking area and Driver's rest room along with canopy for outdoor unit?		
B	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing as per OEM recommendations done?		
C	Whether the TT status are displayed and announced as per methodology explained in FDR?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
D	Whether auto announcement is made in Hindi and Local Language for authorized TT to proceed for loading?		
E	Whether Audio system - 1 no. amplifier, 1 no mike, minimum 6 nos. horn speakers & 2 box speakers provided over entire parking area and the announcement is audible for entire TT parking area? Vendor to provide additional speakers incase the announcement is not audible throughout the parking area without any additional cost to IOCL as per tender.		
F	Whether TT status is disappeared when TT identifies itself at the security gate on way to loading area?		
G	Whether the proximity cards of respective TT who fails to report at entry gate within 20 - 45 min (configurable under administrative password of FAN generation becomes invalid and the FAN shall get automatically cancelled?		
H	Whether there is provision to display any user defined message on BQD?		
I	Whether Bay allocation is done at license area entry gate and correct message is displayed on the display board as per FDR?		
3.3	Barrier Gate		
A	Whether barrier gate along with respective Card Readers, traffic lamp, local control panel has been installed properly at Entry/ Exit Gate? (main Entry/Exit and License Area Entry/Exit as per tender)		
B	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing as per OEM recommendations done?		
C	Whether card reader has been installed on right side of the Entry/ Exit barrier gate and at proper height for easy accessibility of the truck driver? Note : License area Entry Gate boom barrier to have redundant PCR along with redundant colored LED display. LED display shall be configured to display		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	allocated bay no. to the truck driver etc as per FDR.		
D	Whether coloured bilingual display board for displaying allocated bay is functioning as per FDR?		
E	Whether barrier gates are functioning properly both in local and Remote mode?		
F	Whether in remote mode, barrier gate opens only when valid card is shown and closes only after TT passes completely with beeping sound? It should also open during emergency and closes when emergency condition is reset. Vendor to note that in case during closing if any obstruction is made along the line of sight of the sensor, barrier gate should stop closing and should re-open.		
G	Whether traffic lamps have been installed properly and respective lamps glows as per FDR?		
H	Whether barrier gates have infrared sensors to ensure the boom barrier does not close until the TT has completely passed ?		
I	Whether TAS integrates with IOCL TT Crew Portal using the REST API provided by IOCL?		
J	Whether TAS periodically fetches TT Crew data from the IOCL TT Crew Portal?		
K	Whether TAS displays TT Crew details in the handheld data entry terminal (DET) connected to TAS at the security gate?		
L	Whether the system allows scanning of TT Crew Pass QR Code by terminal security as an alternative validation and identification method?		
M	Whether the system has a provision to bypass the requirement of TT Crew data in case of connectivity issues or non-availability of the data?		
4	Tank farm Area		
4.1	GENERAL		
A	Whether all cable entry to tank dyke are from the top of the dyke and the entry point is sealed properly to make dyke impervious?		
B	Whether all above ground cables inside dyke wall are laid over cable tray beneath		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	Catwalk if available else on the Dyke wall/ fire wall with proper support and underground cables (if required) is laid through class B GI pipe/ HDPE pipe and the trenches are closed properly with PCC?		
C	Whether all cable entry to JB/actuators etc in field (where shed not provided) are either from the side or bottom? (Top entry to be avoided)		
D	Whether all cables inside tank farm area are Fire survival (as per scope defined in the work order)?		
E	Whether all electrical fittings inside dyke except for Pressure transmitter, HC detector, actuator for ROSOV & MOV (if installed) are above dyke wall height?		
F	Whether installation of Radar Gauges, AOPS, MSTW, density probe, TSI, FLP JBs etc are done properly? Also ensure bonding of flanges.		
G	Whether density probe has been installed properly and giving the desired parameters along with its accuracy?		
H	Whether jumper is provided across the flanges of all instruments and nozzle/pipes?		
I	Whether MOVs for water draw off line is available as per FDR?		
J	Whether proper glanding and termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing as per OEM recommendations done?		
K	Whether tanks are grouped/ multidropped considering maximum 8 tanks per loop with 20% spare capability for future addition of tank in same loop?		
L	Whether Primary & Secondary Radar Gauges are connected in different loops?		
M	Whether all equipments (Radar Gauges, MSTW, Density probe, TSI, AOPS) are earthed as per OEM recommendations?		
N	Whether maintenance mode is provided for Primary & Secondary Radar gauges in OIC along with logic and interlocks as per FDR?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
O	In the event of failure of Primary gauge whether all the interlocks linked with primary gauge can get transferred to secondary gauge and vice versa as per tender document?		
P	Whether CIU/ FCU operates in hot stand-by / Parallel redundant mode and switch over is bumpless?		
Q	Whether the TFMS readings at TSI and OIC are same?		
4.2	Radar Gauges		
A	Whether the reference height of tanks and that entered in the system are same and the 'g' value (gauge reference height) has been calculated and entered correctly?		
B	Whether all the alarm set points Hi, Operator's Hi, Hi Hi, Low, Low Low has been set as per FDR along with its interlock?		
C	Whether activation of alarm annunciation in LED alarm display unit and in OIC is happening?		
D	Whether the system calculated volume of water and product is matching with manually calculated through calibration chart considering the reading of Radar gauge and water bottom sensor as reference reading?		
E	Whether TSI is installed outside the Dyke wall? In case the same is inside dyke, it should be above dyke wall height.		
F	Whether cable laid between MSTW & respective Radar gauges over the tanks are done properly over cable tray?		
G	Whether joint reading of atleast all the operating tanks are maintained on daily basis for TFMS parameters like product & water level, Average Temperature, product density at ambient and at 15 deg C and on completion of cycles, individual tanks are fine tuned so that the variation in reading is within the permissible range? Level reading of both primary and Secondary Radar Gauges also needs to be monitored.		
H	Whether the variation (Physical Vs System) in product level, Water Level,		

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	Temperature & density is within permissible level as per tender for all the tanks? (Note for comparison of variation in density, converted density at 15 deg to be considered)		
I	Whether SAP-TFMS interface done and has been activated? TFMS data to be posted to SAP automatically at fixed time without human intervention.		
J	Whether in case primary gauge fail, secondary gauge data is used for SAP-TFMS posting on declaration of primary gauge in maintenance?		
K	Whether SIL relay output of both Radar gauges for HH level is connected to safety PLC?		
L	Whether multi point density probe and MSTW are installed at central hatch in CR tanks and water sensor is up to the edge of the central sump?		
M	Whether reading of both primary & Secondary Radar gauges appearing on OICs?		
N	Whether alarms are generated in case the level difference between primary & Secondary Radar gauges exceed a predefined value (+/- 4 mm)?		
O	Whether alarms and corresponding interlocks checked with the product level at HH height? Do the proof testing by temporary changing the set points of HH to a height less than or equal to the existing product level.		
4.3	AOPS		
A	Whether the length of AOPS along with spool piece is so selected that AOPS gets activated once HHH level is reached as per FDR? Size of the spool piece shall be at least 500/750 mm to take care of future variation in safe filling height.		
B	Whether the output of AOPS is connected to Safety PLC through SIL barrier/ Nivotester?		
C	Whether proof testing as per OEM recommendations to check its healthiness and its interlocks are done and event is available in OIC screen as per FDR?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
D	Whether Audio Visual Alarm Pops up with Tank No & Product in OICs and alarm Display LED Screen, in case of activation of AOPS?		
4.4	MSTW		
A	Whether MSTW has been installed in Central hatch of the Storage tank and has minimum 8 elements at an interval specified in the specifications?		
B	Whether reading of individual elements is available in TSI / TMFS PC?		
C	Whether averaging of temperature are done based on averaging of temperature of only those elements which are submerged inside the product?		
D	Whether MSTW is connected to Primary Radar Gauge?		
E	Whether offset between datum plate and water bottom sensor provided correctly so that the water level reading from WBS matches with manual reading?		
F	Whether length of the water probe is minimum 0.5 m of sensing length and the same has been configured in the system?		
G	In case water level is more than 500 mm (sensing length), then whether the system shows error or atleast 500 mm?		
H	Whether anchor weight (if required) has been provided? if so whether the same is installed in between MST & WBS (As per OEM recommendation)		
4.5	Density Measurement		
A	Whether the above ground tank has been provided with Pressure Transmitter (PT) calibrated for density measurement based on pressure reading of PT and level reading of respective Primary Radar Gauge?		
B	Whether the density probe has been installed properly for each underground tank and its reading is available in OIC? It must provide top, middle and bottom density apart from average density. It should be installed in central hatch.		
C	Whether the average density calculated by system and manual density is within the permissible limit? For cross checking converted density at 15 deg C to be taken.		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
D	Whether tank density out of range configured for alarm generation? Out of range limit product wise to be obtained from the user.		
4.6	Tank Modes Selection and its interlocks		
A	Whether following tank modes features are available along with its interlocks as per FDR?		
i	Dormant Mode		
ii	Receipt Mode		
iii	Delivery Mode		
iv	Recirculation mode		
v	Maintenance mode		
vi	Receipt Sequence Mode		
vii	Dispatch Sequence Mode		
viii	Inter-tank transfer mode (Receipt mode)		
viii	Inter-tank transfer mode (Dispatch mode)		
4.7	Tank Alarms set Points and its control Functions		
A	Whether product/water level alarm set points along with corresponding interlock is as per FDR?		
I	Hi		
li	Operator Hi		
lii	Hi-Hi		
lv	Hi-Hi-Hi		
V	Lo		
Vi	Lo-Lo		
B	Whether Fire Water Low & High alarm sets as per User set-points?		
C	Whether Fire water alarm (Low & High Level) control functions checked for all tanks? Same can be tested by temporarily changing the set points.		
4.8	Dyke Drain MOV & Product tank Water Draw Off MOVs & its interlocks		
A	Whether Audio-visual alarm is generated in control room when MOV provided in Dyke drain Valve and Product tank water draw off line is not in closed position ?		
4.9	Blue dye dosing system		
A	Whether the blue dye dosing system have been installed properly and provision is available for diluting blue dye with SKO and injection of diluted blue dye into SKO line?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
B	Whether % age dosing in PPM is configurable under Admin Password?		
C	Whether blue dye dosing pump Starts/Stops Automatically as per FDR?		
D	Whether system generated alarm if the variation in actual blue dye dosing with respect to preset quantity at the end of shift operation is more than +/- 5%?		
4.10	Fire Water tank (Gauging System)		
A	Whether Radar Gauges & TSI has been installed properly?		
B	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing as per OEM recommendations done?		
C	Whether audio visual alarm gets generated on low level?		
D	Whether radar Gauges is integrated with TAS and readings are available in OICs?		
E	Whether installed accuracy is within defined limit as per WO?		
F	Whether Sump water pump/ bore well starts and stops automatically based on water level of the tank as per FDR and tender document?		
G	Whether SMS go to location in-charge and State Operations Head when water level goes below MSL?		
4.11	Make up water tank integration		
A	Whether level switch is provided for low level indication?		
B	Whether interlock is provided for auto start of Makeup water pump when tank low level is reached?		
C	Whether Make up water pump is integrated with TAS as per tender document?		
4.12	Bore well pump		
A	Whether bore well pump starts automatically/ can be operated from control room and corresponding interlocks and status in TAS as per tender has been provided?		
B	Whether bore well pumps are sequenced based on run time?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
5	CCTV System		
A	Is CCTV poles foundation vetting done considering the load of cameras, LED lights and electrical fixtures in extreme windy conditions as per site data to avoid any camera shake?		
B	Whether the PTZ /Fixed /Bullet /Box /Dome cameras as per approved CCTV layout are installed and commissioned? Details to be submitted as per Annexure-2 along with list of non-functioning cameras with reasons.		
C	CCTV surveillance video display unit /video wall provided in Control room, Security cabin, Location-in-charge cabin configured and functional?		(Mention list of non-functioning Display unit/video wall with reasons, in case if any)
D	Whether Server and client are commissioned in all areas as per WO?		
E	Whether cameras if provided inside TLF gantry & Pump house are with flameproof enclosure?		
F	Is the sequence of surveillance coverage through multiple monitor's independent to cover entire perimeter at a glance is configured?		
5.1	OPERATIONAL AREA SURVEILLANCE		
A	Are cameras installed and configured in the tank farm area, TLF, Railway siding (Loading/Unloading), Product Pump house and manifold, Exchange manifold-OMC/PLR, OWS, Oil Jetty, Control room, Fire Engine Pump house, PMCC, TT Parking area, TT crew rest room, Security cabin as applicable		(Mention the reason, in case these areas are not covered)
5.2	PERIMETER INTRUSION DETECTION SYSTEM (PIDS)		
A	Whether Fixed/PTZ cameras provided in the perimeter are as per approved CCTV layout?		
B	Whether all the areas are covered and there is no black spot?		
C	Whether the PTZ / Fixed cameras in perimeter of the location are installed and commissioned as per approved CCTV layout? Mention list of non-functioning cameras with reasons.		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
D	Whether the maximum inter distance between the cameras provided for perimeter surveillance is 65 meters?		
E	Whether all the cameras provided for perimeter surveillance is positioned unidirectionally and not facing each other?		
F	Whether intrusion is configured in all the cameras provided for perimeter surveillance?		Mention list of cameras with reasons for non-configuration. Location should ensure proper tree pruning along the perimeter so as to have clear visibility.
G	Whether the cameras with intrusion configuration is generating intrusion alarm? Print out of video feed from all the cameras provided for perimeter surveillance showing the size of intrusion window configured to be annexed as Annexure.		
H	Whether the intrusion video pop-ups on detection by a fixed camera in Security cabin, LIC cabin, control room CCTV client display unit?		
I	Is one PTZ camera provided in the same pole of the fixed camera in auto mode and auto tracks upon a trigger of perimeter intrusion detected by fixed camera?		
J	Is it possible to use the PTZ camera provided in the same pole of the fixed camera in manual mode to track the intrusion detected by fixed camera?		
K	Is the system not generating false alarm for movement of tree branches, movement of birds/ insects, movement of vehicles on the road along the perimeter?		(Average number of intrusion generated in last 10 days are to be recorded).
L	Illumination of minimum 7 lux on either side of the perimeter boundary wall is available?		Self-Certification report to be submitted by vendor and random verification if required shall be done by IOCL.
M	Audio alarm is available in Security Room, Control Room and location - incharge Upon intrusion detection, and the audio alarm shall continue till the same has been acknowledged in the system.		
5.3	MAIN GATE SURVEILLANCE		
A			

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	Are cameras installed and configured at cross angles before the main entry gate for effective surveillance of movement of vehicles outside on the public road outside the main entry gate?		
B	Are Cameras installed and configured at cross angles after/facing the main entry gate for effective surveillance of the movement of vehicles inside while entry/exit?		
C	Is camera installed and configured in the checking and frisking path?		
5.4	BACKUP AND STORAGE		
A	Whether provision is there to take back up on external storage devices?		
B	Whether the capacity of NVR/VMS is as per storage requirement of 90 days at the highest possible resolution for the camera and should be expandable?		
C	Whether video management system support retrieval of the playback information, i.e. from which iSCSI storages to retrieve the video, audio and meta-data, either from the Video Recording Manager or directly from the IP encoder or camera?		
5.5	VERIFICATION OF ANALYTICS		
A	Is the analytics configured in the cameras as per the analytics configuration requirement matrix shared by IOCL? List of cameras along with details of below analytics configured in the respective camera to be submitted as Annexure.		
I	Vehicle Moving		
II	Vehicle Parking		
III	Vehicles Starting to Move		
IV	People Moving		
V	Camera obstructed/ out of focus		
VI	Cord cut		
VII	Object left Behind		
VIII	Object removed		
6	Fire Alarm System		
A	Whether all the detectors, MCP as per work order has been installed and mapped		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	correctly in Main and Repeater panel/ TAS system GUI so that correct location from where the detector has been activated can be determined ?		
B	Whether dedicated graphics in TAS system is based on architectural plan for buildings & plot plan for MCP location and all fire alarms, warnings, and ground faults, sensor faults, module faults are available and shown on OIC graphics?		
C	Whether repeater panel is installed in fire pump house, security cabin, and pipeline control room in case where Pipeline control room is in same premise as per tender?		
D	Whether audio visual alarm appear in main control panel indicating fire zone and detector address?		
E	Whether fire audio alarm is different from fault audio alarm?		
F	Whether automatic wailing of siren occurs on activation of MCP, BGU, fire detection or ESD?		
G	Whether FAS has been interfaced with PA paging system (directly or via PLC) for Auto Announcement as per FDR?		
7	Access Control System		
A	Whether Access Control System installed properly as per scope of the work order and intrusion area has been blocked?		
B	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing as per OEM recommendations done?		
C	Whether all the card readers, tripod turnstile, Flap barrier, vehicle barrier, door frame metal detector etc as per scope of the work order are functioning properly?		
D	Whether all the transactions are recorded in ACS software and every transaction includes the entrants name, date, time, and location and transaction type?		
E	Whether the data base for employees as applicable has been updated in the system?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
F	Whether proximity cards, finger prints of all the employees as per list provided have been configured in ACS and necessary interlocks checked		
G	Whether visitor management module along with provision of printing of Gate pass with photo provided and working satisfactory?		
H	Whether ACS has been integrated with TAS and the system get delatched on activation of ESD?		
I	Whether all reports as per WO are generated with time stamp and all the fields are updated correctly?		
J	Whether all the reports as generated can be exported to different formats as per WO?		
K	Whether provision of different level password protection for different users configured?		
L	Whether any modification/ configuration/ addition/deletion in system are logged in the system?		
M	Whether the bio-metric access control System provided at Control Room is integrated with TAS and the same gets delatched on ESD activation?		
8	ESD system		
A	Whether Plant/Local ESD push buttons has been installed/ provided as per FDR?		
B	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing as per OEM recommendations done?		
C	Whether display signboard "ESD/ Local ESD" has been provided at all the push button stations?		
D	Whether interlocks and action taken by system on activation of ESD/ Local ESD as per FDR has been checked by physically pressing all the ESD/ Local ESD PB one at a time and also on activation of soft ESD from OICs/ TTES/EWS/ system generated etc?		
E	Whether PTZ cameras of CCTV moved to preset position?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
F	Whether provision is available in the system for ESD override for pre-fined period and password protection as per FDR?		
9	Pipeline Interface		
A	Whether following signal of Marketing Division has been interface with PPL Divisions through MODBUS communication on serial interface as per tender document?		
	Product Level reading		
	Product level Alarms (Hi-Hi & Hi-Hi-Hi)		
	Open & closed status of Inlet ROSOV/DBBV/MOV of tanks		
	ESD signal		
	Automation UPS failure		
	Low air pressure to ROSOV (If available)		
B	Whether following signal of PPL Division has been interface with Marketing Divisions through MODBUS communication on serial interface		
	Open and Close Status of Station Inlet Valves		
	Open & Close Status from Pipeline-end exchange pit valves.		
	Alarms (When MFM reading equals or crosses the Safe Ullage of receipt tank)		
	Mass Flow Meter readings both Ambient temperature and at 15 degC / 29.5 deg C.		
C	Whether Hardwired ESD signals are interfaced between Marketing Div and PPL div?		
D	Whether separate screen is available in OICs for pipeline transfer (both receipt & dispatch) with details as mentioned in tender?		
10	Cable laying		
A	Whether cable tagging is done at regular interval during long runs, at entry and exit point of building and at termination points?		
	Whether Perimeter wall used for cabling / junction boxes or anything else which could be used a scaling device to breach the perimeter?		
B	Whether cable entering control room, admin building, S&D/invoice room and		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	security room is through Multi Cable Transit (MCT) Blocks?		
C	Whether cable under road cross is laid with hume pipe/ Cable bridge/ RCC cable trenches?		
D	Whether all above ground cable and inside RCC trenches is laid through cable trays with proper supports?		
E	Whether Al clamping of cables within cable trays at regular interval is done?		
F	Whether Power, Signal, communication cables inside tank Dyke if laid underground, the same is laid through HDPE pipes buried underground with min spacing as specified in the tender?		
G	Whether all underground cables on driveway if laid are through RCC trenches/ hume pipes as applicable?		
H	Whether Shielding / Screening for signal cable is earthed only at Control room side? The same to be insulated to avoid grounding at Field Side within Junction box or equipment enclosure.		
I	Whether cable looping of main cables at Control room and near field JB is maintained?		
11	Earth pit		
A	Whether Earth pit is as per IS code 3043 and tender specification?		
B	Whether Earth pit resistance certificate provided & the value with date is written on pit cover?		
C	Whether Earth electrode is placed in a galvanized steel pipe for a depth of 4 m to shield the electrode from surface earth stray currents?		
D	Whether Instrument earth and power earth are separate and not interconnected?		
E	Whether the shield of the shielded cable are earthed with electronic earth at one end only i.e. at control room end?		
F	Whether all metallic housing of electronic equipment/junction box/panel/armours of armoured cables are connected to the earth?		
G	Whether separate earth pits has been provided for a) Electronic earth pit -		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	control room side for signal earthing (shield), B) Protective earth pit for earthing power and Enclosure/Panel Housing both in field and control room side (shall be connected to existing plant grid) C) Earth pit for static discharge at TLF gantry		
H	Whether proper distance is maintained between various earth pits as per standard and site conditions?		
I	Whether earth-pit head is covered properly and identification tags are clearly visible?		
J	Whether brackets have been provided within the pit for interconnection to next earth as per standard and direction of EIC?		
12	Integration with third party system		
12.1	MCC / Pump operation		
A	Whether all the product pumps (TLF, TW loading, OMC dispatch, unloading pump, additive pump, blue dye pump etc), bore well, makeup water pump etc. are to be integrated with TAS with following feedback and controls: Feedback: Run/Stop, Trip, Local/ Remote. Control: Start, Stop. All the logic developed as per FDR and tender document?		
B	Whether pump run hours is displayed and pump sequence is changed accordingly?		
C	Whether Separate GUI is available?		
D	Whether proper cable terminations in line with wiring diagram, ferruling etc done at MCC feeder/ pump starter end?		
E	In case of overfill/overrun alarm gets activated and loading still continues even after predefined threshold qty (Failure of DCV & ON-OFF valve) then whether the corresponding product pump stops and header line MOV/DBBV of that product closes?		
G	Whether feature to reset of Pump run hour using Admin password are available and can be done?		
12.2	Air compressor	NA	
A	Whether air compressor integrated with TAS for feedback status as per Tender?	NA	

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
B	Whether air compressor Starts/ Stop automatically within predefined pressure Limits? i.e. Auto start of air compressor when pressure is less than 5.5 Kg/cm ² and stop when pressure exceed 7 kg/cm ² depending upon site requirement(IOCL)	NA	
C	Whether PORO kit has been activated? (IOCL)	NA	
D	Whether PT has been provided on air compressor header line and alarm is generated in case of low header line pressure from PT or from air compressor panel whichever comes first?	NA	
12.3	Hydrocarbon Vapours Detection System		
A	Whether Hydrocarbon vapour detectors have been installed after undertaking fire and Vapour mapping study (Dispersion modelling study)?		
B	Whether HCD are integrated with TAS and percentage LEL value appearing in OIC?		
C	Whether audio-visual alarms gets generated on exceeding set LEL both at local Beacon cum hooter and Control room OIC? Two levels of alarms to be set in OIC. Values are 20% LEL and 40% LEL.		
D	Whether HCD have been installed as per dispersion modeling study for positioning of HCD which is part of QRA (Quantitative Risk Assessment) study and detectors is not installed at a height of more than 0.3 Meter from ground level?		
E	Whether the functionality of HCD system has been assured by creating actual simulation in field?		
F	Whether Hooter beacon is mapped with field HCDs and activated upon alarm?		
12.4	Rim seal (if applicable) Fire Protection System (if applicable)	NA	
A	Whether Rim seal (if applicable) protection system (if available) integrated with TAS and its status (system fault, tank on fire alarm) is available in OIC?	NA	
B	Whether audio-visual alarms and ESD gets generated on actuation of "tank on fire" alarms from Rim seal (if applicable) Fire protection system?	NA	
12.5	PA Paging system		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
A	Whenever ESD / BGU are actuated, whether automatically announcement of the location from where it is pressed/ Broken takes place as per FDR?		
12.6	Fire Engine, Foam Engine and Jockey pump		
A	Whether all the Fire Engines, Foam pumps and Jockey pumps are integrated with TAS and status along with provision for remote start and stop (as applicable) are available in TAS as per tender document?		
B	Whether Pressure transmitter (for continuous monitoring of hydrant line pressure) are provided on the fire hydrant line and integrated with TAS for Auto Start and Stop (as applicable) of fire engine, Foam pump, jockey pump when the system is kept in Remote as per tender document?		
C	Whether provision is there to manually start and stop (as applicable) Fire Engine, Foam pump and Jockey pump from control room when it is in remote mode?		
D	Whether provision is available to select the sequence of operation of Engine on OIC?		
E	Whether provision is available in the system to put Engine under maintenance mode so that system should not attempt to give it a 'Start' / 'Stop' command. Whether such events are logged on to the system with a time stamp so that downtime for the equipment can be known in the form of report?		
F	In case any of the Engine fails to start in spite of the command from the control room, whether alarm is generated and next Engine in the sequence or standby Engine starts?		
G	Whether a separate OIC is provided for operation of Fire Fighting Equipments and GUI developed as per tender document?		
12.7	DG set Integration		
A	Whether all the DG sets are integrated by TAS for following feedbacks if available in the panel? Running Status of each DG Sets		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	Low Lube Oil pressure, high water temperature alarms of each DG sets Output Voltage and Frequency RPM and Ampere Fuel Level of DG sets Required GUI shall be there in OIC		
12.8	HVLR integration		
A	Whether all the HVLR are integrated with TAS for following feedbacks? System fault MOV opened/closed Status		
12.9	Mass Flow Meters for OMC transfer	NA	
A	When MFM is installed at IOCL's premises	NA	
I	Whether MFMs are integrated with TAS and following readings are available in TAS (GUI)	NA	
	Product name Name of the Transaction Companies K-Factor (functionality of date and time stamp of calibration) Volume in KL at Ambient temperature Volume in KL at 150 C Quantity transferred in kg Weighted Average Density Kg/m3 of the product transferred Weighted Average Temperature in deg C for the product transferred Initial and final Totalizer readings in KL Flow rate in KL/hr & Flow rate in Tonnes/hr	NA	
II	Whether above mentioned parameters along with ESD signals between two companies is shared with OMC over serial interface (PLC to PLC)?	NA	
III	Whether the OMC transfer pumps stops and the DBBV/ MOV at exchange pit gets closed in case of ESD activation at OMC end?	NA	
B	When MFM is installed at OMC's premises	NA	
I	Whether all the above mentioned parameters of MFM installed at OMC's premises is available in TAS PLC/ OIC through Serial interface of our PLC with OMC's PLC?	NA	

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II	Whether audio visual alarm is generated in TAS incase ESD is activated at OMC end?	NA	
C	Whether at locations where product is being sucked by the receiving location, on activation of ESD either at the dispatching or receiving location, receiving locations shall stop all the connected pumps and dispatching location shall close DBBV at the exchange pit.	NA	
12.10	ROSOV & DBBV		
A	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing as per OEM recommendations done?		
B	ROSOV Operation		
I	LCS - Open/ Close from LCS if actuator in local mode		
II	LPBS - Open from LPBS if the actuator is in Remote mode and Close irrespective of actuator in local or remote mode.		
III	Control room - Only close from control room in remote mode		
IV	Close from control room thru logic interlocks in case of ESD and TFMS alarms irrespective of actuator in local or remote mode		
V	Whether Manual RESET solenoid valve if provided in ROSOV are continuously powered ON through UPS even in ESD condition?		
VI	Whether Close command of ROSOV from Safety PLC is through SIL Relays?		
C	DBBV operation		
I	LCS - Open/ Close from LCS if actuator in local mode		
II	LPBS - Open from LPBS if the actuator is in Remote mode and Close irrespective of actuator in local or remote mode.	NA	
III	Control room - Open/close from control room in remote mode		
IV	Close and open from control room thru logic interlocks in case actuator is in Remote mode as per FDR		

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	TRIAL AND OBSERVATION PERIOD CHECKLIST	


Sl. No.	Description of work	(Yes/No/NA)	Remarks
V	Close in case of ESD and critical TFMS level alarms irrespective of whether actuator is in local or remote mode?		
D	Whether valve status (opened/ closed/ Fault in case of DBBV) are updating in OICs?		
E	Whether indication lamp of Push Button Station (ROSOV/DBBV/ MOV) glowing as per valve positions?		
F	Whether power isolation of individual/ tank wise ROSOV/ DBBV can be done?		
G	Whether display board indicating tank no, Inlet/ Outlet, ROSOV/DBBV on LPBS outside dyke provided?		
H	Whether repeaters are provided wherever required as per design Engineering?		
I	Whether communication redundancy is provided in DBBV/ MOV in case cable being cut through bi-directional communication with host/ PLC.		
J	In case MCS is provided, whether all Valves can be opened/closed from MCS and whether Valve current Status, percentage opening and alarms are available in the system?		
12.11	MOVs (dyke drain valve, water draw off line of product tanks, sprinkler and foam pourer line, hydrant line, TLF header line, pump house manifold, Exchange pit etc)		
A	Whether all the MOVs installed in dyke drain valve, water draw off line of product tanks, sprinkler and foam pourer line, hydrant line, TLF header line, pump house manifold, Exchange pit etc are integrated with TAS?		Mention list of MOVs with reasons for non-integration.
B	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing as per OEM recommendations done?		
C	Whether remote operation of MOVs (open/close command) is available in OIC?		
D	Whether valve status (opened/ closed/ Fault/Local/Remote etc as per tender document) are updating in OICs?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
E	Whether MOV closes on ESD except those MOVs installed in sprinkler , foam pourer line and fire hydrant line.		
F	In case MCS is provided, whether all Valves can be opened/closed from MCS and whether Valve current Status, percentage opening and alarms are available in the system?		
12.12	Wailing Siren		
A	Whether wailing siren is provided and integrated with TAS?		
B	Whether proper siren code is followed in case of Fire Activation, Test, Disaster?		
C	Whether provision is there for local as well as Remote operation of wailing siren?		
13	CONTROL ROOM, S&D/INVOICE ROOM, SECURITY ROOM, TM ROOM, PPL CR		
13.1	General		
A	Whether all cable entries to Control Room, S&D/invoice room, Admin building, MCC room etc are through MCT block (in case the same is in scope of vendor) or whether all the entry points are sealed properly?		
B	Whether all cables are dressed properly?		
C	Whether proper tagging & ferruling done?		
D	Whether unused cable entries of panels plugged?		
E	Whether LAN cables are dressed properly, along with tag and stacked together with Nylon tie?		
F	Whether extra cables are coiled and stacked properly?		
G	Whether all panels are earthed properly?		
H	Whether wiring/ termination drawings are kept/pasted on the door (inside) of the panel?		
I	Whether Biometric card reader provided for panels? (As per scope of the WO)		
J	Whether license copy submitted for OS (Server + Work station), Oracle license, MS Office (if provided), ACS software, LRC/OIC software, Antivirus license for Server & Work stations, TFMS software, RFID readers, CCTV and other software?		
K	Whether licensed Antivirus protection is for all servers, work station etc and		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	maintaining updated antivirus throughout warranty period / AMC as per tender?		
L	Whether SAP connectivity available in Control room?		
M	Whether Firewall is provided and configured as per tender document.		
13.2	UPS		
A	Whether parallel redundancy of UPS system is verified?		
B	In case of both UPS failure, whether load is transferred to bypass supply without interruption?		
C	Whether auxiliary parameters of CCTV UPS system are available in OIC (either on modbus or hardwired) as per tender is available? Running status/ UPS Failure Load on Bypass Incomer Fail alarm Overload Battery low Spike/surge voltage beyond range- if available on UPS Output frequency beyond range- if available on UPS		
D	Whether UPS power distribution system is provided with suitable isolators/switch for each UPS fed equipment?		
E	Whether UPS power distribution network is designed in such way that a single power fault in any sub distribution system does not cause a trip of the entire system?		
F	Whether Surge protection devices are installed in input and output of the UPS system?		
G	Whether Individual Power cable is laid to each of the parallel redundant UPS and Bypass unit is through separate feeder?		
H	Whether battery backup is available for minimum half an hour at full load for battery bank?		
I	Whether automatic charging takes place in both float and boost mode?		Selector switch operation for flat and boost mode to be done and auto charging of batteries without manual intervention to be demonstrated in both modes.

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	TRIAL AND OBSERVATION PERIOD CHECKLIST	


Sl. No.	Description of work	(Yes/No/NA)	Remarks
J	Whether during battery maintenance, inverter continues to operate taking power from the rectifier?		By disconnecting the battery from UPS vendor has to demonstrate the working.
13.3	Process PLC		
A	Whether Process PLC is interfaced with TAS through Dual redundant TCP/IP communication link?		
B	Whether Process PLC panel is properly installed with proper glanding at cable entry, proper electrical wiring, termination and ferruling of marshalling panels? All unused opening to be plugged.		
C	Whether proper earthing of Process PLC system is done?		
D	Whether Intrinsically safe barriers are installed for IS DI/AI field instruments?		
E	Whether active type safety barriers/ relay are installed for galvanic isolation?		
F	Whether redundancy of Process PLC processor, Rack Power supply, communication link of processor with IO cards is checked?		
G	Whether minimum 30% spare modules with complete wiring for each type of IO modules along with 20% useable spare slots for future addition of modules available?		
H	Whether online replacement of any module is possible without de-energizing the system and there is no effect on the operation while replacement?		
I	Whether license for Process PLC Programming Software, Human Machine Interface Software, Interface software, if any has been supplied with PLC?		
J	Whether all digital output/ terminal blocks/ relay board output is fused type with LED indication?		
K	Whether proper space is available for maintenance inside cabinet, TB numbering is proper and all MCBs are functioning properly?		
L	Whether cabinet lightning is non ups?		
13.4	Safety PLC		
A	Whether PLC panel is properly installed with proper glanding at cable entry, proper electrical wiring, termination and		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	ferruling of marshalling panels? All unused opening to be plugged.		
B	Whether proper earthing of safety PLC system is done?		
C	Whether Intrinsically safe barriers/isolator is installed for intrinsic safe DI/AI field instruments?		
D	Whether minimum active type SIL2 safety barriers, relay are installed for galvanic isolation?		
E	Whether online replacement of any module is possible without de-energizing the system and there is no effect on the operation while replacement?		
F	Whether all digital output terminal blocks / Relay board is fused type with LED indication?		
G	Whether proper space is available for maintenance inside cabinet, TB numbering is proper and all MCBs are functioning properly?		
H	Whether cabinet lightning & Fan is not through UPS?		
I	Whether minimum 30% spare modules with complete wiring for each type of IO modules along with 20% useable spare slots for future addition of modules available?		
J	Whether PLC are interfaced with TAS through Dual redundant communication link?		
K	Whether redundancy of PLC processor, Rack Power supply, IO cards, communication link of processor with IO cards is checked?		
L	Whether all digital output/ terminal blocks/ relay board output is fused type with LED indication?		
M	Whether failure in Safety PLC de-energizes the relevant system components causing actuators to move to tripped (safe) position?		
N	Whether license for PLC Programming Software, Human Machine Interface Software, and Interface software, if any has been supplied with PLC and installed in EWS for both process and safety PLC?		
13.5	SIL verification & Validation		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
A	Whether SIL verification of all TFMS safety loops from third party agencies has been carried out? (For SIFs as per SIL Assessment study report/detail engg).		
B	Whether Validation of entire Safety System (SIS) for SIFs (for e.g. AOPS -SIF) has been carried out from third party agency prior to trial period?		
C	Whether witnessing of Safety Instrumented System testing were carried out in presence of safety, operation and engg. Team?		
13.6	HO Gateway for SMS/Mail alerts		
A	Whether SMS/E-mail alerts are shared to IOCL users as per configuration done in the system?		
B	Check whether following SMS are being sent:		
I	On ESD activation		
	When ESD is activated & drill selected in OIC screen - SMS text " Routine Emergency Drill at IOCL _____ (Location name)" is sent to all the contact in the contact list for sending the SMS regards the drill		
	When ESD activated & Emergency selected in OIC screen - SMS text "Emergency at IOCL _____ (Location name). YOUR HELP IS REQUESTED IMMEDIATELY " is sent to all the contact in the contact list for sending the SMS regards the Emergency		
II	Product tank Level Alarms		
	When Tank Level HHH for product tank (from AOPS) - SMS text "Tank level HHH for tank no XX (MS/HSD/SKO..) at IOCL _____ (Location name). " is sent to location in-charge and State Operations Head		
	When Tank Level HH for product tank (from Secondary Radar) - SMS text "Tank level HH for tank no XX (MS/HSD/SKO) at IOCL _____ (Location name). " to location in charge (Optional)		
III	Water tank Level Alarms		
	When fire water tank level goes below MSL - SMS text "Fire Water Tank level below MSL at IOCL _____ (Location		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	name)." is sent to location in-charge and State Operations Head		
C	Option for updating Contact no's and email ID of IOCL officers to whom SMS and email ID to be sent is available in the front end of the system along with provision for mapping of events?		
13.7	Led display screen for critical alarms		
A	Whether LED Display screen for all critical alarms displayed prominently to attract attention as per FDR? The list of critical alarms are as below: ROSOV failed to open / close. DBBV/MOV failed to open / close. Pump failed to start / stop excluding power failure case. Tank level alarms. ESD Dyke Valve MOV and product tank water draw off line MOV open alarm. Actuation of Rim seal (if applicable) Fire Protection System. Alarm from Hydrocarbon Detector Water stock below MSL Any other		
B	Whether hooter is provided in Control for critical alarms as stated above?		
C	Whether all the alarms as stated above are being configured and only active alarms are being displayed? Active alarm should blink if not Ack, Steady if acknowledged and alarm conditions persists and Auto clear if Alarm condition is cleared?		
13.8	IT Equipments		
A	Whether number of LRCS/TFMS Server, OICs, EWS, TTES/TFMS PC, CCTV server/ ACS server, etc & Printers are provided as per FDR / tender requirement?		
B	Whether all the equipments are connected as per System Architecture?		
C	Whether the clock for all the LRCS/TFMS Server, OICs, TTES/TFMS PC, CCTV Server/ ACS Server, TTES, EWS connected to LAN are synchronized with LRCS and are showing same date and time?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
D	Whether all LRCS/TFMS Server, OICs, TTES/TFMS PC, CCTV Server/ ACS Server, TTES, EWS has been configured and communications are healthy on both LAN?		
E	Whether consoles & furnitures as per scope of the work order has been supplied and installed properly as applicable?		
F	Whether spare ports (30%) as per tender available in each Ethernet switches and Terminal Servers?		
G	Whether LRCS/ TFMS servers, CCTV servers, CIUs, NAS/SAN are positioned into lockable enclosure in the control panel with smart card reader and shall be used by authorized person and details to be logged in TAS/ACS.		
13.10	Redundancy Checks		
A	Whether redundancy of following Communication Links checked?		
I	Batch controller to Terminal Server		
II	Terminal Server to Network Switch		
III	LRCS to SAP		
IV	OIC to LRCS		
V	Process PLC processor to Process PLC I/O racks		
VI	Safety PLC processor to PLC I/O racks		
B	Whether the following hardwares which are in redundant mode have been checked for the said functionality as per scope of the WO?		
I	LRCS/ TFMS Server/ ACS Server/TTES		
II	CCTV Server		
III	Terminal Server		
IV	TFMS Communication Interface Unit		
V	Network Switch		
VI	Process PLC controller		
VII	Safety PLC controller		
VIII	Safety PLC IO modules		
IX	UPS		
X	Master Control Station		
13.11	Softwares & Interlocks		
A	General		
I	Whether fault recording software is operational and is matching physical register maintained to record faults on Real time basis?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	Note: System generated report to be attached with quarterly CAMC bill.		
II	Whether TAS software is fulfilling analytics requirements i.e. capabilities for alert generation for users, exception reporting and real time dashboards for monitoring as per FDR?		
B	Login		
I	Whether listed users can log on to the TAS Server based on the defined user names, passwords and access levels?		
II	Whether the same user cannot login on different system at the same time?		
III	Whether the user can log off from TAS automatically after a predefined idle period?		
IV	Whether password is valid for a fixed period & shall be automatically locked after the expiry of period?		
V	Whether passwords can be changed by individual user & manager at any time?		
VI	Whether validation period of passwords is configurable? i.e. after three wrong entries of password user ID is locked for the user.		
VII	Whether different levels of security for individual user are configured for that location as per FDR - Administrative level, Supervisory level & Operator level?		
VIII	Whether Authorisation for different level has been configured as per FDR?		
IX	Whether administrator is able to define access to various Graphic User Interface for different level of users depending on the job profile?		
C	GUI		
I	Whether GUI has been provided for Fire detection System, Hydrocarbon Vapour detection System, CCTV system, Dyke valve status, TFMS, ROSOV Status, DBBV status, MOV status, Access control system, HVLr system, Rim seal (if applicable) monitoring system, MCC system, DG system, UPS system, Pipeline receipt Flow meter, cause & Effect diagram real time during ESD, any other Third party Systems which is part of TAS automation as per tender document?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
II	Whether all the readings/ status shown in the GUI are correct and in line with actual reading, engg. unit / current status?		
III	Whether correct location name and other details are appearing on GUI?		
D	Alarms and Events		
I	Whether all the alarms in case any parameter exceed the set points of all connected devices to TAS including failure of communications or commands if initiates are generated and are logged to reports at end of shift/ day?		
II	Whether all the events are logged with time strap, device name, device type, alarm priority, devise description etc for following events		
	Alarms		
	Alarm Acknowledgements		
	Return to Normal		
	Operator Control Actions [i.e. Operator initiated device control actions]		
	Operator Login & Security Level Changes		
	On-line Database Modifications		
	Communications Alarms		
	System Reset Messages		
III	Whether most recent event is at the top of the display?		
IV	Whether facility for Sorting and filtering of the events is available?		
E	Trending		
I	Whether trending for Real time, historical data etc (TFMS data, PT, TT, DT, MFM etc) available and cursor read out for trend data?		
F	Reports		
I	Whether all the reports as per tender verified for its correctness of data and can be exported in different format like PDF, Microsoft Excel etc?		
II	Whether reports can be exported to PDF, Microsoft Excel etc?		
G	SAP - TAS interface		
I	Whether the guidelines for SAP-TAS integration as per tender document verified and implemented?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
II	Whether SAP-TAS interface including posting of TT queue data in SAP done as per the current interface protocol done?		
III	Whether SAP-TFMS interface tested and activated and out run are generated in SAP satisfactorily?		
H	Database Back-up and retrieval		
I	Whether database backup of TAS system to external device/ hard disk procedure for taking backup and retrieval handed over and tested?		
II	Whether database backup of TAS system is configured as per FDR?		
I	Fault Recording Software		
I	Whether fault recording software is operational and is matching physical register maintained to record faults on real time basis.		
II	Whether TAS software is capable of logging complaint automatically through fault detection module?		
III	Whether these complaints are transferred to SRMS portal thru webservice?		
IV	Whether it is also possible to generate complaints manually by the operator via logging in TAS software?		
V	Whether complaints can be tracked, managed, and closed by TAS software itself in Auto/manual? System generated report to be attached with quarterly CAMC bill.		
J	Training		
I	Whether training has been provided for IOC officers, staff nominated from operation as per areas specified in the work order?		
II	Whether record of person to whom training has been provided are available including date and topic covered?		
K	Readiness for SAT		


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Sl. No.	Description of work	(Yes/No/NA)	Remarks
I	Whether all the job as per work order and front availability has been completed and checked by vendor for its compliance?		
L	Documentation		
I	Whether the design Engineering and documentations as per tender ready in soft form? Final copy to be submitted during SAT and its punch point compliances		

Note: Conducting SAT does not mean acceptance of the system and Auto start of warranty.

Warranty starts only when SAT has been accepted without observations. IOCL to clearly spell out on joint statement of acceptance or rejection of SAT.


Vendor shall use the above SAT checklist after getting confirmation from IOCL, for changes if any.

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	CAMC CHECKLIST	


CAMC CHECKLIST

GENERAL:


CAMC Checklist as stated below is only indicative and the same to be read and customized in line with Tender scope of work, Technical Specification, Functional Specification and Software Requirement, Functional Design Requirement, Special Terms and conditions of the Contract, drawings, BOQ etc which are forming part of the tender document. Final CAMC checklist format shall be shared with successful bidder.

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
1	TLF Gantry		
1.1	GENERAL		
A	Whether the flow metering system comprising of strainer cum air eliminator, ON-OFF valve, MFM, RTD, Tap off point for proving system, DCV, TRV across DCV, isolation valve & loading arm, metering skid are working properly?		
B	Whether all cables in gantry laid through Cable trays are in tact?		
C	Whether proper glanding and termination including plugging of unused opening with Exd. blind plug, cable tagging using Aluminium strap, tightening of all the screws, body earthing of Batch controller, card reader, RIT, end of bay lamp, JB's, earthing relay etc is in tact?		
D	Whether body earthing of all electrical equipments using insulated earthing cable and connected to instrument earthing grid/pit is in tact?		
E	Whether Jumper/bonding provided across all flange joints in metering assembly line is in tact?		
1.2	Mass Flow meter		
A	Whether all gantry MFMs interfaced with respective batch controllers (pulses and digital/analog input/output) as well as with TAS (Serial/TCP IP communication) is working properly?		
B	Whether overall batch accuracy is within permissible limit of +/-0.05% when re-verified through standard/ Master MFM?		
1.3	Strainer cum Air Eliminator		
A	Whether all strainer cum Air Eliminator in the metering assembly are functioning properly?		
B	Whether DPT installed across the Strainer cum air eliminator interfaced with Batch Controller/ TAS is working properly?		
1.4	DCV		
A	Whether no passage of product observed when system is in idle conditions?		
B	Whether DCV has been tuned properly and Loading stopping at preset qty. (Maximum		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	variation in loaded qty should not exceed +/- 2 Ltrs. from the preset qty).		
C	Whether TRV provided across DCV and pressure has been set at 8 kg/cm ² and working properly?		
1.5	ON-OFF valve		
A	Whether On-Off valve provided in the metering assembly hardwired to safety PLC is working properly? i.e. the valve is normally be in open condition and shall close as per FDR?		
B	Whether On-Off valve closes in the event of following and re-open once the system normalizes and the alarm has been RESET in TAS as per FDR?		
1.6	Bottom Loading Arm & Vapor Recovery arm		
A	Whether there are no leakages from any joints of the loading arm?		
1.7	Rack Monitor		
A	Whether rack monitor provided in TLF is working?		
1.8	Grounding unit		
A	Whether Earthing relay provided is working?		
1.9	RIT and Driver Ack Push Button Station		
A	Whether RIT in all the loading points and all push buttons, indication lamps and interlocks are working?		
B	Whether Driver Acknowledgment push button at respective bays and all push buttons, indication lamps and interlocks are working?		
1.10	Local and Plant ESD Push button		
A	Whether Plant ESD push button provided and connected to Safety PLC along with safety interlocks, activation of wailing Siren, auto announcement on PA paging system are working?		
B	Whether Local ESD push button provided and connected to Safety PLC along with interlocks and audio visual alarm are working?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
1.11	Batch Controller		
A	Whether all the below configured interlocks are working in the batch controller and loading stops in following events? TT earthing failure Overfill alarm Overfill sensor failure/ sensor not sensed Over run alarm Bottom Loading arm inside Dummy adaptor ESD (local & Plant) Low flow No flow Stop from RIT, BCU and CR DPT - Strainer choked by 50%		
B	Whether meter factor and k-factor change of BCU is recorded in TAS?		
C	Whether batch controller giving stop command for closure of DCV in case of events defined as per FDR is working properly?		
D	Whether Communication redundancy of batch controller is working properly?		
1.12	TLF Loading (To be as per FDR/ Addendum to FDR)		
A	Whether loading through batch controller commences only after all the interlocks are in place as per FDR?		
B	Whether auto invoicing for loaded TT is working after loading completion? Record the % of auto invoicing?		
C	Whether bay allocation logic is working as per FDR?		
1.13	Ethanol/Bio diesel blending system		
A	Whether ethanol/Biodiesel blending system is working properly?		
B	Whether uniform blending of Ethanol is happening depending on the flow rate?		
C	Whether auto start/stop of pump for blending is working properly as per pump demand?		
1.14	MFA dosing Sub system (ADSS)		
A	Whether the additive injection system is working properly?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
B	Whether auto start/stop of additive pump is working properly on demand?		
C	Whether correct amount of additive is dispensed at all times on line in predefined ratio (set in the batch controller) to the main product throughout the load cycle at a given TLF bay?		
1.15	Header line Instruments		
A	Whether PT installed in main product header line and PT at blending product header line is working properly?		
B	Whether the tripping of product pump in case of excess pressure built up in the header line is working properly?		
2	Tank Truck Parking Area/ Security Gate		
2.1	PCR system for TT registration		
A	Whether proximity card readers along with LED display units provided near security gate for registering TT reporting data is working properly?		
B	Whether auto TT Queue generation and reporting to SAP as per protocol is working properly?		
2.2	Queue Display Board		
A	Whether 15 lines scrolling BQD (TEXT on the top of display board mentioning TRUCK NO. along with its STATUS as per FDR) installed near TT parking area and Driver's rest room along with canopy for outdoor unit is working properly?		
B	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing is in tact?		
C	Whether the announcement system is working as per FDR?		
D	Whether the FAN getting automatically cancelled is working in case of TT timeout based on configuration?		
E	Whether Bay allocation at license area entry gate is working properly?		
2.3	Barrier Gate		

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	CAMC CHECKLIST	


Sl. No.	Description of work	(Yes/No/NA)	Remarks
A	Whether barrier gate along with respective Card Readers, traffic lamp, local control panel is working properly at Entry/ Exit Gate?		
B	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing is in tact?		
C	Whether card reader installed on right side of the Entry/ Exit barrier gate and at proper height for easy accessibility of the truck driver is working properly?		
D	Whether coloured (green and red) bilingual display board for displaying allocated bay is functioning as per FDR?		
E	Whether barrier gates are functioning properly both in local and Remote mode?		
3	Tank farm Area		
3.1	GENERAL		
A	Whether installation of Radar Gauges, AOPS, MSTW, PT, density probe, TSI, FLP JB's etc done including bonding of flanges is intact?		
B	Whether pressure transmitter calibrated for density measurement has been installed properly and giving the desired parameters along with its accuracy as per FDR?		
C	Whether density probe has been installed properly and giving the desired parameters along with its accuracy as per PDR ?		
D	Whether jumper is provided across the flanges of all instruments and nozzle/pipes?		
E	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing is in tact?		
F	Whether earthing of all instruments (Radar Gauges, MSTW, PT, Density probe, TSI, AOPS) done is in tact?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
G	Whether maintenance mode provided for Primary & Secondary Radar gauges in OIC is working properly along with logic and interlocks as per FDR?		
H	Whether CIU/ FCU operates in hot stand-by / Parallel redundant mode and switch over is bumpless?		
I	Whether the TFMS readings at TSI and OIC are same?		
3.2	Radar Gauges		
A	Whether the interlocks for the alarm set points Hi, Operator's Hi, Hi Hi, Low, Low Low is working as per FDR?		
B	Whether the system calculated volume of water and product is matching with manually calculated through calibration chart considering the reading of Radar gauge and water bottom sensor as reference reading?		
C	Whether joint reading of atleast all the operating tanks are maintained on daily basis for TFMS parameters like product & water level, Average Temperature, product density at ambient and at 15 deg C and on completion of cycles, individual tanks are fine tuned so that the variation in reading is within the permissible range? Level reading of both primary and Secondary Radar Gauges also needs to be monitored.		
E	Whether the variation (Physical Vs System) in product level, Water Level, Temperature & density is within permissible level for all the tanks? (Note for comparison of variation in density, converted density at 15 deg to be considered)		
F	Whether SAP-TFMS interface done is working? TFMS data to be posted to SAP automatically at fixed time without human intervention and % of auto dip posting to be recorded.		
G	Whether SIL relay output of both Radar gauges for HH level connected to safety PLC is working as per FDR?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
H	Whether alarms are generated in case the level difference between primary & Secondary Radar gauges exceed a predefined value (+/- 4mm)?		
I	Whether alarms and corresponding interlocks checked with the product level at HH height? Do the proof testing by temporary changing the set points of HH to a height less than or equal to the existing product level.		
3.3	AOPS		
A	Whether the output of AOPS connected to Safety PLC is working properly?		
B	Whether proof testing as per OEM recommendations to check its healthiness and its interlocks are done and event is available in OIC screen as per FDR?		
C	Whether Audio Visual Alarm with Tank No & Product in OICs and alarm Display LED Screen, in case of activation of AOPS is working properly?		
3.4	MSTW		
A	Whether MSTW provided in tanks is working properly?		
B	Whether offset between datum plate and water bottom sensor provided correctly so that the water level reading from WBS matches with manual reading?		
C	Whether length of the water probe is minimum 0.5 m of sensing length and the same has been configured in the system?		
D	In case water level is more than 500 mm (sensing length), then whether the system shows error or atleast 500 mm?		
3.5	Density measurement using PT		
A	Whether the pressure transmitter calibrated for density measurement installed is working properly?		
B	Whether the average density calculated by system and manual density is within the permissible limit? For cross checking converted density at 15 deg C to be taken.		
C	Whether tank density out of range configured for alarm generation is		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	working? Out of range limit product wise to be obtained from the user.		
3.6	Density measurement using Density Probe		
A	Whether the Multi point Density probe installed is working properly?		
B	Whether the average density calculated by system and manual density is within the permissible limit? For cross checking converted density at 15 deg C to be taken.		
C	Whether tank density out of range configured for alarm generation is working? Out of range limit product wise to be obtained from the user.		
3.7	Tank Modes Selection and its interlocks		
A	Whether following tank modes features along with its interlocks are working as per FDR?		
i	Dormant Mode		
ii	Receipt Mode		
iii	Delivery Mode		
iv	Recirculation mode		
V	Maintenance mode		
vi	Receipt Sequence Mode		
vii	Dispatch Sequence Mode		
viii	Inter-tank transfer mode (Receipt mode)		
viii	Inter-tank transfer mode (Dispatch mode)		
3.8	Tank Alarms set Points and its control Functions		
A	Whether product/water level alarm set points along with corresponding interlock is as per FDR?		
I	Hi		
Ii	Operator Hi		
iii	Hi-Hi		
Iv	Hi-Hi-Hi		
V	Lo		
vi	Lo-Lo		
B	Whether Fire Water Low & High alarm sets as per User set-points?		
C	Whether Fire water alarm (Low & High Level) control functions are working for all tanks? Same can be tested by temporarily changing the set points.		
3.9	Dyke Drain MOV & Product tank Water Draw Off MOVs & its interlocks		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
A	Whether Audio-visual alarm generated in control room when MOV provided in Dyke drain Valve and Product tank water draw offline is not in closed position is working properly?		
3.10	Fire Water tank (Gauging System)		
A	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing is intact?		
B	Whether audio visual alarm generation on low level is working?		
C	Whether installed accuracy of radar gauges is within defined limit?		
D	Whether automatic bore well integration done as per FDR is working properly?		
E	Whether SMS alerts configured as per FDR for water level below MSL and working properly?		
3.11	Make up water tank integration		
A	Whether Make up water pump along with interlocks integrated with TAS is working?		
3.12	Bore well pump		
A	Whether bore well pump along with corresponding interlocks is working as per FDR?		
4	CCTV System		
A	Whether all PTZ/Fixed/Bullet/Box/Dome cameras installed and commissioned are free of cobwebs?		
B	Whether all PTZ/Fixed cameras installed and commissioned are functioning? Non-functioning cameras with reasons.		
C	Whether all the areas are covered and there is no blind spot?		
D	Whether Analytics have been configured for all the Fixed cameras and are working properly. Mention list of cameras with reasons for non-configuration. Location should ensure proper tree pruning along the perimeter so as to have clear visibility.		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
E	Whether CCTV display at Control Room, TM room and Security room is working properly?		
F	Whether the integrity of flameproof enclosure of cameras, JB's inside hazardous area is maintained?		
G	Whether the data recording of past 90 days is available?		
H	Whether Provided Antivirus in the system has been updated?		
I	Whether SMS is sent to IOCL officials as per configuration done in the system upon generation of intrusion alarm in system?		
J	Whether mail is sent to IOCL officials as per configuration done in the system upon generation of intrusion alarm in system?		
	PIDS and Analytics		
K	Whether intrusion configured in all the cameras in perimeter is functional? Non-functioning cameras with reasons.		
L	Whether analytics configured in all the cameras is functional? Non-functioning cameras with reasons.		
5	Fire Alarm System		
A	Whether all the detectors, MCP is working properly ?		
B	Whether repeater panel installed is working?		
C	Whether audio visual alarm in main control panel indicating fire zone and detector address is working?		
D	Whether automatic wailing of siren occurs on activation of MCP, BGU, fire detection or ESD is working?		
E	Whether FAS interfaced with PA paging system (directly or via PLC) for Auto Announcement as per FDR is working?		
6	Access Control System		
A	Whether Access Control System installed is working and intrusion area has been blocked?		
B	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
	Aluminium strap, tightening of all the screws, body earthing is intact?		
C	Whether all the card readers, tripod turnstile, Flap barrier, vehicle barrier, door frame metal detector etc are functioning properly?		
D	Whether the visitor management system with provision of printing of Gate pass is working properly?		
E	Whether the TAS integration for posting of attendance data of employees to IOCL server is working?		
F	Whether ACS integrated with TAS is working properly on activation of ESD?		
G	Whether all reports as per WO are generated with time stamp and all the fields are updated correctly?		
H	Whether all the reports as generated can be exported to different formats?		
I	Whether security access policy for different users is configured and working?		
J	Whether the bio-metric access control System provided at Control Room integrated with TAS is working properly?		
7	ESD system		
B	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing is intact?		
C	Whether interlocks and action taken by system on activation of Plant ESD/ Local ESD as per FDR has been checked by simulation/feedback from location regarding all the ESD/ Local ESD PB one at a time and also on activation of soft ESD from OICs/ TTES/EWS/ system generated etc?		
D	Whether CCTV system integration done with TAS is working properly? (Auto preset of PTZ cameras upon mapped events in TAS)		
E	Whether ESD override is working as per FDR?		
8	Pipeline Interface		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
A	Whether interface of signals of Marketing Division interfaced with PPL Divisions is working properly?		
B	Whether interface of signals of PPL Division interfaced with Marketing Division is working properly?		
C	Whether Hardwired ESD signals interfaced between Marketing Div and PPL div is working properly?		
8	Earth pit		
A	Whether Earth pit resistance certificate provided & the value with date is written on pit cover?		
9	Integration with third party system		
9.1	MCC / Pump operation		
A	Whether all the product pumps (TLF, TW loading, OMC dispatch, unloading pump, additive pump, blue dye pump etc), bore well, makeup water pump etc. integrated with TAS are working properly?		
B	In case of overfill/overrun alarm stopping of corresponding product pump stops and header line MOV/DBBV of the product is working properly?		
9.2	Air compressor		
A	Whether air compressor integrated with TAS for feedback status is working?		
9.3	Hydrocarbon Vapours Detection System		
A	Whether HCD integrated with TAS is working properly?		
B	Whether audio-visual alarms generated on exceeding set LEL (20% and 40%) both at local Beacon cum hooter and Control room OIC is working properly?		
9.4	Rim seal (if applicable) Fire Protection System (if applicable)		
A	Whether Rim seal (if applicable) protection system (if available) integrated with TAS is working?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
B	Whether audio-visual alarms and ESD generation on actuation of “tank on fire” alarms from Rim seal (if applicable) Fire protection system is working properly?		
9.5	PA Paging system		
A	Whenever announcement of the location upon ESD / BGU actuation is working as per FDR?		
9.6	Fire Engine, Foam Engine and Jockey pump		
A	Whether Auto Start and Stop (as applicable) of all the fire engine, Foam pump, jockey pump integrated with TAS when the system is kept in Remote is working ?		
9.7	DG set Integration		
A	Whether all the DG sets are integrated with TAS is working?		
9.8	HVLR integration		
A	Whether all the HVLR integrated with TAS is working?		
9.9	Mass Flow Meters for OMC transfer		
A	Whether MFMs integrated with TAS is working properly?		
B	When MFM is installed at OMC’s premises		
C	Whether integration of MFM installed at OMC’s premises is working properly?		
D	Whether audio visual alarm generation in TAS incase ESD is activated at OMC end is working?		
9.10	ROSOV & DBBV		
A	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing is intact?		
B	ROSOV Operation		
I	Whether all the ROSOVs integrated with TAS is working (from LPBS and from control room) as per FDR?		
C	DBBV operation		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
I	Whether all the DBBVs integrated with TAS is working (from LPBS and from control room) as per FDR?		
9.11	MOVs (dyke drain valve, water draw offline of product tanks, sprinkler and foam pourer line, hydrant line, TLF header line, pump house manifold, Exchange pit etc)		
A	Whether all the MOVs installed in dyke drain valve, water draw offline of product tanks, sprinkler and foam pourer line, hydrant line, TLF header line, pump house manifold, Exchange pit etc are integrated with TAS and working?		
B	Whether proper glanding and Termination including plugging of unused opening of JB, equipment, cable tagging using Aluminium strap, tightening of all the screws, body earthing is intact?		
C	Whether operation logic for MOVs installed in sprinkler, foam pourer line and fire hydrant line as per FDR is working?		
9.12	Wailing Siren		
A	Whether wailing siren integrated with TAS is working?		
10	CONTROL ROOM, S&D, Security Room, TM room, PPL CR		
10.1	General		
A	Whether smart card reader provided for network and LRC panel is working?		
B	Whether licensed Antivirus protection for all servers, work station etc is being maintained with updated antivirus?		
C	Whether Firewall provided and configured is working.		
10.2	UPS		
A	Whether parallel redundancy of UPS is intact?		
B	Whether Surge protection devices installed in input of the UPS system are intact?		
C	Whether battery backup is available for minimum half an hour at connected load for battery bank?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
D	Whether during battery maintenance, inverter continues to operate taking power from the rectifier?		By disconnecting the battery from UPS, vendor has to check the working.
10.3	DCS		
A	Whether DCS panel installed with proper glanding at cable entry, proper electrical wiring, termination and ferruling of marshalling panels with plugging of all unused opening is in tact?		
B	Whether proper earthing of DCS system is intact?		
C	Whether Intrinsically safe barriers installed for IS DI/AI field instruments are intact?		
D	Whether active type safety barriers/ relay installed for galvanic isolation are intact?		
E	Whether non UPS cabinet lightning is working?		
10.4	Safety PLC		
A	Whether PLC panel installed with proper glanding at cable entry, proper electrical wiring, termination and ferruling of marshalling panels with plugging of unused opening is in tact?		
B	Whether proper earthing of safety PLC system is intact?		
C	Whether intrinsically safe barriers/isolator installed for intrinsic safe DI/AI field instruments is intact?		
D	Whether active type SIL3 safety barriers, relay installed for galvanic isolation is intact?		
E	Whether non-UPS power to cabinet lightning & Fan is working?		
10.5	SMS provision from TAS		
A	Whether SMS provision configured is working?		
B	Whether SMS are sent to respective person as per FDR?		
10.6	Led display screen for critical alarms		
A	Whether LED Display screen for all critical alarms is displayed as per FDR?		

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Sl. No.	Description of work	(Yes/No/NA)	Remarks
B	Whether hooter provided in Control room for critical alarms is working?		
10.7	IT Equipments		
A	Whether the clock for all the LRCS/TFMS Server, OICs, TTES/TFMS PC, CCTV Server/ ACS Server, TTES, EWS connected to LAN are synchronized with LRCS and are showing same date and time?		
10.8	Redundancy Checks		
A	Whether redundancy of following Communication Links checked?		
I	Batch controller to Terminal Server		
II	Terminal Server to Network Switch		
III	LRCS to SAP		
IV	OIC to LRCS		
V	DCS/Process PLC processor to DCS/ Process PLC I/O racks		
VI	Safety PLC processor to PLC I/O racks		
B	Whether the following hardwares which are in redundant mode have been checked for the said functionality as per scope of the WO?		
I	LRCS/ TFMS Server/ ACS Server/TTES		
II	CCTV Server		
III	Terminal Server		
IV	TFMS Communication Interface Unit		
V	Network Switch		
VI	DCS/Process PLC controller		
VII	Safety PLC controller		
VIII	Safety PLC IO modules		
IX	UPS		
X	Master Control Station		

Note: The above checklist given is tentative and the final list shall be shared by IOCL before commencement of CAMC.



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LIST OF DRAWINGS

LIST OF DRAWINGS (INDICATIVE)

Sl.No.	Document description
	Part I
1.	System Architecture
2.	TFMS Architecture
3.	Typical Tank Truck Loading System
4.	Control Room Layout
5.	Control Room _Elevation & Section
6.	Hydrocarbon Detection System Layout
7.	Access Control System
8.	Fire Alarm System Layout
9.	CCTV Layout
10.	PA system Layout
11.	IP based EPABX system Layout
12.	Sub Station layout
13.	Overall Cable Route Layout
14.	Earthing Layout
15.	TLF PH Layout
16.	TLF layout
17.	Piping Layout
18.	Invoice room layout
19.	Security room layout
20.	TT crew rest room layout
21.	QC lab layout
	Part II
1.	P &IDs
	Part III
1.	Key Single Line Diagram
2.	TLF Bay shed structure Drawing
3.	GA Drawing for Bitumen Tanks