

2.11.2 The Analyser shall be microprocessor based with state-of-the-art technology and shall be capable of being configured from analyzer front panel locally using built-in keyboard.

2.11.3 Analyser shall meet the following performance characteristics

Repeatability :  $\pm 1\%$  of full scale.

Response time : 3-5 minutes for 90% response

#### 2.12 Wobbe Index Analyser

2.12.1 Unless otherwise specified, principle of Wobbe Index analyser shall be Airflow type or Residual Oxygen type.

2.12.2 Analyser shall provide 4-20 mA DC isolated linear with Stoichiometric Air/Fuel Gas ratio. Specific gravity cell along with Wobbe meter shall also be provided for giving 4 to 20mA output for molecular weight. Additionally common analyser malfunction alarm (potential free contact) shall also be provided.

2.12.3 The analyser shall have integral electronics with built in LCD/LED display.

2.12.3 It shall be possible to make configuration changes by an inbuilt keypad or through external configurator.

2.12.4 Wobbe Index analyzer shall meet the following performance characteristics:

Repeatability :  $\pm 0.5\%$  of measured value

Response time :  $\leq 5$  seconds for full response.

### 3.0 NAMEPLATE

3.1 Each analyser and its accessory shall have a stainless steel nameplate firmly attached to it at a visible place, furnishing the following information as applicable:

- a) Tag number as per purchaser's data sheets.
- b) Manufacturer's serial number and model number.
- c) Manufacturer's name/trade mark.
- d) Component being analysed and its range.
- e) Area classification in which the equipment can be used.
- f) Power supply requirements.
- g) Analyser Outputs

### 4.0 INSPECTION AND TESTING

Purchaser reserves the right to inspect and witness testing of all the items at vendor's works as per Inspection Test Plan and approved quality documents for Process Stream Analysers.

Detailed Inspection Test Plan in line with the Standard Inspection Test Plan attached with Purchaser's specification, incorporating job-specific requirements to be submitted for Purchaser review prior to manufacturing.

All these tests shall be completed by the vendor and test reports shall be submitted to Purchaser for scrutiny.

**5.0 SHIPPING**

- 5.1 All threaded and flanged openings shall be suitably covered to prevent entry of foreign material.
- 5.2 Each major part shall be sealed in thick plastic bag. Suitable moisture absorbent shall be provided for electronic components.

एनालाइजर शेल्टर  
के लिए  
निरीक्षण व परीक्षण योजना

INSPECTION AND TEST PLAN  
FOR  
ANALYSER SHELTER

Rev. No.	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	Standards Bureau Chairman
0	16.06.2020	Issued for implementation	NP	RS	RKS	SKS

### Abbreviations

ATEX	: Atmosphère Explosibles	Lab.	: Third Party Laboratory
ASTM	: American Society for Testing and Materials	LCIE	: Laboratorie Central Des Industries Electriques
BASEEFA	: British Approval Service for Electrical Equipment in Flammable Atmospheres	LEL	: Lower Explosion Limit
BIS	: Bureau of Indian Standards	LIU	: Light Interfacing Unit
BOM	: Bill of Material	MCT	: Multi Cable Transit.
CIMFR	: Central Institute of Mining & Fuel Research	Mfr.	: Manufacturer
COC	: Certificate of Conformance	NDT	: Non Destructive Testing
CSA	: Canadian Standards Association	No.	: Number
DGMS	: Directorate General of Mines Safety	OFC	: Optical Fibre Cables.
DPT/LPT	: Dye Penetrant Testing /Liquid Penetrant Testing	PESQ	: Petroleum and Explosives Safety Organisation
EIL	: Engineers India limited.	PLC	: Programmable Logic Control
EPC	: Engineering Procurement Construction	PO	: Purchase Order
ERTL	: Electronics Regional Test Laboratory	PQR	: Procedure Qualification Record
FAT	: Factory Acceptance Test	PR	: Purchase Requisition
FLP	: Flame Proof	PTB	: Physikalisch-Technische Bundesanstalt
FM	: Factory Mutual	PWHT	: Post Weld Heat Treatment
FRP	: Fibre-reinforced plastic	P&ID	: Piping and Instrumentation Diagram
GI	: Galvanized Iron/Steel	RT	: Radiography Test
HC	: Hydrocarbon	SCADA	: Supervisory Control And Data Acquisition
HMI	: Human Machine Interface	SHS	: Sample Handling Systems.
HRFR	: Heat Resistance Flame Retardant	TC	: Test Certificate
HVAC	: Heating , Ventilation and Air conditioning	TPI or TPIA	: Third Party Inspection Agency
IC/ IRN	: Inspection Certification / Inspection Release Note	UL	: Underwriter's Laboratories
IT	: Information Technology	VDR	: Vendor Data Requirement
ITP	: Inspection and Test Plan	WP	: Weather Proof
JB	: Junction Box	WPQ	: Welders Performance Qualification
		WPS	: Welding Procedure Specification

### Inspection Standards Committee

**Convenor** : Mr. R.K. Singh

**Members** : Mr. Rajesh Sinha

Mr. R. Muthuramalingam

Mr. Arupjyoti Saikia(Engg.)

Mr. Himangshu Pal

Mr. Avdhesh Agrawal

Mr. Chandrashekhar

Mr. Mahendra Mittal

### 1.0 SCOPE

This Inspection and Test Plan covers the minimum inspection and testing requirements of Analyser Shelter.

### 2.0 REFERENCE DOCUMENTS

PO/PR / Standards referred there in /Job specifications / Approved documents.

### 3.0 INSPECTION AND TEST REQUIREMENTS

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	<b>Procedures</b>						
1.1	WPS, PQR, WPQ, PWHT procedure(as applicable)	Documented Procedure for Welding.	100%	Procedure Documents	--	H	W (New) R (Existing)
2.0	<b>Material Inspection</b>						
2.1	a. Shelter Structure & Covering Materials (Plates, Beams, Base Frames, Channels etc), Glass wool Insulation materials, Duct material etc. (as applicable) b. Piping Materials such as Pipes, Flanges, Fittings, Valves etc. for Cooling Water, Air Headers, Drain & Vent Headers, Steam Pipings, Process Pipings etc. (as applicable)	a. Chemical and Mechanical Properties for Pipes, Plates and other structure materials. b. Tests for Characteristic parameters of Insulation Materials c. Manufacturer's Internal Test reports for bought out items such as Flanges, Fittings, Valves, Sample Pumps etc.	100%	Material TC (Note-4)/ Lab. TC / Mfr's TC	H	R	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
2.2	<u>HVAC System:</u> Motor, Compressors, Blowers, Dampers, Air Filters, Fresh Air stack, Chemical filters, HVAC Control Unit etc.	a. Visual, Dimensional check . b. Checks & Tests for bought out components as applicable.	100%	Material TC / Mfr.'s TC	H	R	R
2.3	<u>Electrical &amp; Instrumentation Items:</u> a. Power /Control/Signal/ Alarm JB's/Panels, b. Logic(PLC) unit with components/Accessories. c. Cables (Power, Control, Signal, OFC etc. ) d. Purging system for Purged Analyser cabinets, e. Pressure/Temperature Instruments/transmitters, Hygrometer, Oxygen deficiency Detector, Smoke/ Fire/ LEL(HC) Gas Detector etc. as applicable. f. FLP Plugs/Switches/ Sockets, Lighting Fixtures, Hooters & Beacons g. Cable Trays(GI / FRP). h. MCT Blocks (if specified). i. Electrical Heat Tracers & Accessories	a. Verification of Make, Model , Dimensions & Functional check on FLP/WP JB, Plug, Sockets Lighting Fixtures, Hooters , Beacons, etc:	100%	Witness Inspection reports / Mfr's TC	H	RW	R
		b. Tests and witness for Make, Model, Verification and Functional check of Detectors by the Supplier	100%	Supplier's Internal TC	-	H	R
		c. Panels, Panel Purging System, Transmitters, other instruments, Electrical Heat Tracers & Accessories , Cable Trays & Cables(Routine tests) , MCT Blocks and PLC Hardware etc.	100%	Mfr.'s TC / Mfr.'s COC for PLC hardware	H	R	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
2.4	<p>a. SCADA System /HMI Unit / Central Data Storage Unit/ Operator Station / Engineering Station etc.( as specified in PR ) with associated IT hardware (Desktop Computer /Server/ Laptop/ Monitors ) etc. and Software &amp; Firmware etc. as applicable.</p> <p>b. <u>Communication Components</u>: Network Cards (installed &amp; spares), Network Switch, Gateways, Media Converter, Firewalls, Ethernet Cables &amp; accessories, LIU &amp; Optical Communication accessories etc. as applicable,</p>	<p>a. Verification of Make, Model, Serial No, Configuration, Type, Size, Quantity etc. (as applicable).</p> <p>b. Verification of Software/Firmware (Versions, License details ) etc. (as applicable).</p>	100%	Supplier's Internal TC.	-	H	R
2.5	<p><u>Components for Sample Handing Systems(SHS)</u>: Shall be as per approved documents/Drawings/ P&amp;ID for SHS.</p>	Visual, BOM & Dimensional verification.	100%	Supplier's TC	H	H	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
3.0	<b>In process Inspection</b>						
3.1	<p>a. Fabrication &amp; Assembly of Shelter/Racks/Cabinets/ Panels.</p> <p>b. Fabrication of Headers (Drain/ Vent / Instrument Air),</p> <p>c. Fabrication Steam /Process Piping etc. if specified in PR .</p> <p>d. Assembly sample handling system(SHS).</p> <p>e. Assembly of HVAC.</p>	<p>a. Visual &amp; Dimensional Check.</p> <p>b. NDT (RT, DPT/LPT) on Weld joints of Headers.</p> <p>c. Hydrotests on all Headers.</p> <p>d. NDT(RT, DPT/LPT) , PWHT &amp; Hardness Test on Weld Joints of Process Piping (as applicable).</p> <p>e. Hydrotest on fabricated Process Piping (if applicable) .</p> <p>f. Functional Check on HVAC.</p> <p>g. Certification by IBR in case of the steam piping falling under IBR regulations (as applicable).</p>	100%	NDT Reports / PWHT Chart / Hardness TC / Supplier's TC/ IBR Certificates	H	H	R
3.2	Assembly and Wiring of Electrical/Instrumentation Components	<p>a. Visual Check,</p> <p>b. Bill Of Material Verification</p> <p>c. Lug Type &amp; Size, Wire Type(minimum HRFR, unless otherwise mentioned ) &amp; Size, Wire colour codes, Continuity etc.</p> <p>d. High Voltage &amp; Insulation Resistance check (as applicable).</p> <p>e. Cable Tagging &amp; Routing</p> <p>f. Wiring Segregation.</p> <p>g. Functional Check as per the approved Schemes.</p>	100%	Supplier's TC	H	H	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.0	<b>Final Inspection</b>						
4.1	Factory Acceptance Tests (Final Inspection) : On the ordered Shelter Integrated with HVAC, SHS, all sub-systems, Components & Accessories	<p>FAT procedure to be generated by the Supplier detailing the applicable tests from the list as under and additional tests ( if any) as per the requirements of PR / Job Specification/ Approved Documents, to be covered.</p> <p>a. Visual Check and BOM Verification of Shelter with all associated Systems , Sub-systems and all spares (as specified).</p> <p>b. Bill of Material Verification.</p> <p>c. Dimensional Verification.</p> <p>d. Functional Check (Note-5):</p> <p>i. Operation of Shelter Integrated with HVACs and other Sub-Systems, Maintaining the required Pressure, Temperature, Humidity and Air quality inside the Shelter under Normal running conditions.</p> <p>ii. Manual Change Over and Automatic Change Over (as per timer logic) of HVAC during normal operation.</p> <p>iii. Automatic Change- Over sequences for HVACs &amp; Tripping of HVAC/ Shelter for abnormal conditions (by simulations) as applicable such as:</p> <ul style="list-style-type: none"> <li>• Failure of Ventilation/Pressurization.</li> <li>• Overloading of Motor/ Blowers.</li> </ul>	100 %	Inspection records (FAT report)	-	H	H

**INSPECTION AND TEST PLAN  
FOR  
ANALYSER SHELTER**

STANDARD SPECIFICATION NO.

6-81-2087 Rev. 0

Page 8 of 11

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
		<ul style="list-style-type: none"> <li>• Oxygen Deficiency,</li> <li>• LEL Gas Detection,</li> <li>• Fault in LEL Gas Detectors,</li> <li>• Fire / Smoke Detection(as specified).</li> <li>• Shelter inside Temperature rise beyond tolerance.</li> <li>• Any other condition as specified in PR.</li> </ul> <p>iv. Checking for the availability of the Analog, Alarm, Trip signals in the respective Signal JB's for upper level communication during normal operation and abnormal conditions.</p> <p>v. Check for Visual Alarm &amp; Trip status on the warning panels and audio-visual annunciations (as applicable).</p> <p>vi. Check for Temperature rise inside the shelter in case of failure of Air conditioner as per PR.</p> <p>vii. Inspection of Analysers : Supplier to comply the requirement as per the ITP for the Analysers enclosed with the PR. In case ITP is not a part of PR, Supplier to generate the same and take approval from concerned authority before starting any manufacturing activity.</p>					

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
		<p>viii. SCADA/HMI/ Central Data Storage Unit (CDSU) etc. (as applicable) : Inspection including Configuration of Hardware, Firmware and Software, Data-acquisition from Analysers, Data Analysis, Calibration of Analysers (if specified), Analysis of System diagnostics, Storing &amp; Retrieving of Data, Communication with various Levels and Authorities etc. as applicable in line with PR .</p> <p>e. Redundancy check of various Modules of Logic(PLC) Unit (as specified).</p> <p>f. Pneumatic Leakage testing on Tubing &amp; Piping as per PR/Specifications.</p> <p>g. Functional check on SHS.</p> <p>h. Function of Automatic sample shut off and blow back facility ( if specified).</p> <p>i. Illumination (LUX) level on the floor inside the Shelter.</p> <p>j. Door panic bar operation check.</p> <p>h. High Voltage &amp; Insulation Resistance check (as applicable).</p>					

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.2	Submission of Certificates / Documents (as applicable)	a. For Electrically Hazardous Area : i. Indigenous Items: Certificate from CIMFR/ Karandikar Lab. / ERTL etc. and valid BIS License & Corresponding valid PESO Certificate for the requisite Hazardous Area Classification. ii. Imported items: Certificates from testing agency like BASEEFA, FM, LCIE, UL PTB, CSA etc. for compliance to ATEX or equivalent recognized standards & corresponding Valid PESO Certificate for the requisite Hazardous Area Classification. iii. For projects related to mining, approval from DGMS-India required. b. Degree of protection (IP) for Instruments / Electrical Enclosures, Cabinets, Panels etc. (as applicable).	Prototype for each model	Statutory Approval Certificates / Type Test Certificates	-	H	R
		c. Chemical Filters : Test Certificates (ASTM etc.) vetted / reviewed by a reputed TPI as per relevant Standard	100%	Test Certificates	H	R	R
5.0	Painting & Packing						
5.1	Painting (As applicable)	<ul style="list-style-type: none"> <li>Pre-treatment, Primer application and Final Painting.</li> <li>Paint Shade &amp; Thickness .</li> </ul>	100%	Mfr's / Records	H	H	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
5.2	Packing	<ul style="list-style-type: none"> <li>Packing of Analysers and Shelter with Sub-systems &amp; Accessories as per PR Instructions or Supplier's recommendations wherever packing instructions not available in PR.</li> <li>Site Storage Instructions for the Analysers, Shelter and Associated Systems, Subsystems, Accessories, Spares etc.</li> </ul>	100%	Packing List / Site Storage Instructions	-	H	-
<b>6.0</b>	<b>Documentation</b>						
6.1	Documentation and IC/IRN	<ul style="list-style-type: none"> <li>Review of Internal Test Reports, Lab. TC, Material TC, Mfr.'s TC, Statutory Certification etc.</li> <li>Issuance of IC/IRN.</li> </ul>	100%	Supplier's Test Records / IC / IRN	-	H	H
6.2	Final Document submission	Compilation of Inspection reports, Drawings, etc as per VDR / PR	100%	Final data folder / Completeness certificate	-	H	H

Legends: H- Hold (Do not proceed without approval), R-Review, RW-Random witness (As specified or 10 % - Samples must include minimum 1 No. of each type), W- Witness (Give due notice, work may proceed after scheduled date).

**NOTES :**

- This document describes the generic test requirements. Any additional test or inspection scope if specified in contract documents shall also be applicable. (Unless otherwise agreed upon).
- Acceptance Norms for all the activities shall be as per PO/PR/ Standards referred there in/ Job specifications /Approved documents.
- For EPC Jobs, Scope of Inspection shall be under TPIA only, unless specified otherwise.
- Material test certificate as per Clause 3.1 of EN 10204 for flanges, fittings and sheet steel.
- Functional/ Operation checks to be carried out as per the Interlock/ Control Logic defined in PR / EIL Engineering approved Cause & Effect table.

# प्रोसेस प्रवाह विश्लेषक के लिए निरीक्षण व परीक्षण योजना

## INSPECTION AND TEST PLAN FOR PROCESS STREAM ANALYSERS

4	22.05.20	Revised and Reissued	NP	RS	RKS	SKS
3	21.11.13	Revised and Reissued	MJ	RS	SCG	SC
2	22.03.12	Revised and Reissued	MJ	GS	AKC	DM
1	09.05.08	Revised and Reissued	RB	SKD	SKP	VC
0	03.03.02	Issued for implementation	RG	AKC	AKB	GRR
Rev. No.	Date	Purpose	Prepared by	Checked By	Standards Committee Convenor	Standards Bureau Chairman
					Approved by	

**Abbreviations**

ATEX	: Atmosphere Explosibles	Mfr	: Manufacturer
BASEEFA	: British Approval Service for Electrical Equipment in Flammable Atmospheres	MTC	: Material Test Certificates
CEIL	: Certification Engineers International Limited	No.	: Number
CIMFR	: Central Institute of Mining & Fuel Research	PESO	: Petroleum and Explosives Safety Organisation
CSA	: Canadian Standards Association	PMI	: Positive Material Identification
DGMS	: Directorate General of Mines Safety	PO	: Purchase Order
DP/DPT	: Dye Penetrant Testing	PQR	: Procedure Qualification Record
EPC	: Engineering Procurement Construction	PR	: Purchase Requisition
ERTL	: Electronics Regional Test Laboratory	PTB	: Physikalisch-Technische Bundesanstalt
FM	: Factory Mutual	QC	: Quality Control
IC	: Inspection Certification	SCADA	: Supervisory control and data acquisition
IEC	: International Electrotechnical Commission	SHS	: Sample Handling System
IP	: Ingress Protection	TC	: Test Certificate
IRN	: Inspection Release Note	TDLS	: Tunable Diode Laser Spectrometer
IT	: Information Technology	TPI or TPIA	: Third Party Inspection Agency
ITP	: Inspection and Test Plan	UL	: Underwriter's Laboratories
Lab.	: Third Party Laboratory	UV	: Ultra Violet
LCIE	: Laboratorie Central Des Industries Electriques	VDR	: Vendor Data Requirement
IR	: Infra-Red	WPS	: Welding Procedure Specification
LPT	: Liquid Penetrant Testing	WPQ	: Welders Performance Qualification

**Inspection Standards Committee**

**Convenor** : Mr. R.K. Singh

**Members** : Mr. Rajesh Sinha  
Mr. R. Muthuramalingam  
Mr. Arupjyoti Saikia(Engg.)

Mr. Himangshu Pal  
Mr. Avdhesh Agrawal

Mr. Chandrashekhar  
Mr. Mahendra Mittal

### 1.0 SCOPE

This Inspection and Test Plan covers the minimum inspection and testing requirements for Process Stream Analysers.

### 2.0 REFERENCE DOCUMENTS

PO/PR / Standards referred there in /Job specifications / Approved documents.

### 3.0 INSPECTION AND TEST REQUIREMENTS

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	Procedures	--	--	--	--	--	--
1.1	WPS/PQR/WPQ (for SHS)	Welding procedure Qualification for welds, overlays as applicable	100%	WPS PQR WPQ	--	H	W (New) R (Existing)
2.0	Material Inspection (As applicable)						
2.1	1. Incoming Material for Panels, Sample Handling System including sample probes, pressure reducers, safety relief valves, Gas Cylinders, moisture separators, flow regulators, pressure gauges, Isolation valves, flanges, fittings, pipes & tubing	Chemical and Mechanical Properties	100%	Lab.TC/ Mfr's TC	H	H	R
	2. Other Major Bought outs / Accessories: Air Conditioner, Coolers, Chemical Filters, Sample Pumps, Filters, Purging systems , Safety Relief Valves, Temperature/ Pressure Gauges, Valves, Gas	Make/Model/Calibration/Functional Checks		Lab.TC/ Mfr's TC	H	R	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
	Cylinders, Power Distribution Boards, Junction Boxes, Cables, Restriction Orifice, Manifolds, Flow Indicators, flow regulators, Transmitters, Solenoid valves, Heat tracers etc., as applicable						
<b>3.0</b>	<b>In process Inspection</b>						
3.1	Fabrication & Assembly of Racks/Cabinets/Panels, Drain/Inst. Air Piping and Assembly sample handling system(SHS)	<ul style="list-style-type: none"> <li>• Visual, Dimensional verification, functional</li> <li>• Hydro / Pneumatic test on Assembled SHS</li> </ul>	100%	Supplier's Test Records	H	H	R
<b>4.0</b>	<b>Final Inspection</b>						
4.1	Final Inspection	<ul style="list-style-type: none"> <li>• Visual Check, Dimensional Verification</li> <li>• Complete Bill Of Material Check (including spares) of each Analyser, Sample Handling System, IT / SCADA hardware / Software, Calibration Gas Cylinders etc – Make / Model / Specifications of all items</li> <li>• Power Supply Variation check</li> <li>• Leak test for complete Analyser system, including Sample Handling System</li> <li>• Check for retractable Probe mechanism, if applicable</li> <li>• Check Analysers for various system</li> </ul>	100%	Inspection records	-	H	H

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
		<p>functions, diagnostics &amp; interlocks , auto calibration, stream switching etc. as per PR Datasheets</p> <ul style="list-style-type: none"> <li>• Following Checks on Shelter / Panels, as applicable:               <ol style="list-style-type: none"> <li>a. Visual/Dimensional</li> <li>b. Operation of Air Conditioners / Vortex Cooler, Redundancy, Shut Down/Restart Interlock as per requirement</li> <li>c. Functionality of all Instruments like LEL Detector, Beacon, Hooter etc.</li> <li>d. Wiring - Check for Analog, Digital, Serial Signals &amp; Power Supply Distribution, as specified</li> <li>e. Grounding Check</li> <li>f. Operation of Purged panel (if applicable) in line with Type of Purging required</li> </ol> </li> <li>• Analysers Performance Test (as applicable):               <ol style="list-style-type: none"> <li>a. <u>IR/ UV Analysers:</u> <ul style="list-style-type: none"> <li>▪ Response Time,</li> <li>▪ Repeatability</li> <li>▪ Zero drift per 8 hours</li> </ul> </li> </ol> </li> </ul>					

**INSPECTION AND TEST PLAN  
FOR  
PROCESS STREAM ANALYSERS**

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
		b. <u>Thermal Conductivity Analyser</u> <ul style="list-style-type: none"> <li>▪ Response Time</li> <li>▪ Repeatability for 8 hrs</li> <li>▪ Accuracy (at least at 3 points of the range)</li> </ul> c. <u>Moisture / Dew Point Analyser</u> <ul style="list-style-type: none"> <li>▪ Accuracy (at least at 3 points of the range)</li> <li>▪ Repeatability</li> <li>▪ Response Time</li> </ul> d. <u>Oxygen Analysers</u> <ul style="list-style-type: none"> <li>▪ Accuracy (at least at 3 points of the range)</li> <li>▪ Repeatability</li> <li>▪ Response time</li> </ul> e. <u>TDLS Analyser</u> <ul style="list-style-type: none"> <li>▪ Accuracy (atleast at 3 points of the range)</li> <li>▪ Repeatability</li> <li>▪ Response time</li> <li>▪ Linearity</li> </ul>					

**INSPECTION AND TEST PLAN  
FOR  
PROCESS STREAM ANALYSERS**

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.2	Submission of certificates / Documents	<ul style="list-style-type: none"> <li>• For Electrically Hazardous Area :               <ul style="list-style-type: none"> <li>a. Indigenous Items: Certificate from CIMFR/ Karandikar Lab. / ERTL and valid BIS License &amp; corresponding valid PESO Certificate for the requisite Hazardous Area Classification</li> <li>b. Imported items: Certificates from testing agency like LCIE, BASEEFA, FM, UL, PTB, CSA etc. for compliance to ATEX or equivalent recognized standards &amp; corresponding Valid PESO Certificate for the requisite Hazardous Area Classification</li> <li>c. For projects related to mining, approval from DGMS-India required.</li> </ul> </li> <li>• Degree of protection certificate (IP) for instrument housing, Panel, as applicable</li> <li>• Certificate for electromagnetic compatibility as per IEC 61000-4</li> </ul>	Prototype for each model	Statutory Approval Certificates / Type Test Certificates	-	H	R
		<ul style="list-style-type: none"> <li>• 24hrs Zero Drift test for IR/UV Analysers &amp; 24 hrs Repeatability Test for Thermal Conductivity Analysers</li> </ul>	100%	Test Records/Results	-	H	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
5.0	<b>Painting</b>						
5.1	Painting and Packing (Analyser system)	<ul style="list-style-type: none"> <li>Special cleaning and packing for oxygen and chlorine services</li> <li>Pre treatment, primer and final paint, shade, thickness.</li> </ul>	100%	Packing list / Supplier's Records	-	H	-
6.0	<b>Documentation</b>						
6.1	Documentation and IC/IRN	<ul style="list-style-type: none"> <li>Review of Internal Test Reports, MTC</li> <li>Issuance of IC/IRN.</li> </ul>	Prototype for each model	Supplier's Test Records / IC/IRN	-	H	H
6.2	Final Document submission (if applicable)	Compilation of Inspection reports , drawings, etc as per VDR / PR	100%	Final data folder / Completeness certificate	-	H	H



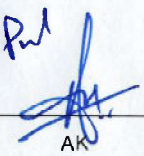
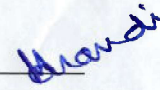
Legends: H- Hold (Do not proceed without approval), R-Review, RW-Random witness (As specified or 10 % - Samples must include minimum 1No. of each type), W-Witness (Give due notice, work may proceed after scheduled date).

**NOTES :-**

- Performance of All Analysers to be witnessed (RW) by EIL/TPIA as part of final inspection. In case of non availability of test facilities, Analysers to be offered for TPIA (H) witness testing at OEM works prior to despatch.
- Wherever included in the PR, Inspection Test Plan for Shelter to be referred and complied
- This document describes the generic test requirements. Any additional test or inspection scope if specified in contract documents shall also be applicable. (Unless otherwise agreed upon).
- Acceptance Norms for all the activities shall be as per PO/PR/ Standards referred there in/ Job specifications /Approved documents
- For EPC jobs, Scope of Inspection shall be under TPIA only, unless specified otherwise.

बोलीकर्ता / आपूर्तिकर्ताओं / ठेकेदारों से गुणवत्ता प्रबंधन  
प्रणाली अपेक्षाओं हेतु विनिर्देश

## SPECIFICATION FOR QUALITY MANAGEMENT SYSTEM REQUIREMENTS FROM BIDDERS / SUPPLIERS / CONTRACTORS

3	29-09-2025	General Revision	 QMS Standards Committee	 QMS Standards Committee	 AK	 MN
2	12-06-2020	General Revision	QMS Standards Committee	QMS Standards Committee	SKB	SKS
1	12-03-2015	General Revision	QMS Standards Committee	QMS Standards Committee	MPJ	SC
0	04-06-2009	Issued as Standard Specification	QMS Standards Committee	QMS Standards Committee	SCT	ND
Rev. No.	Date	Purpose	Prepared by	Checked by	Standards Committee Convener	Standards Bureau Chairman
Approved by						

---

## Abbreviations:

EIL	Engineers India Limited
ISO	International Organization for Standardization
MR	Material Requisition
PO	Purchase Order
PR	Purchase Requisition
QMS	Quality Management System

## QMS Standards Committee

**Convener:** Mr. Anil Kumar

**Members:** Mr. Himangshu Pal (SCM-Inspection)  
Mr. Ravindra Kumar (Const.)  
Mr. Vinod Kumar (CQA)  
Mr. Swapnil Vaishnav (Projects)  
Mr. Vijay Kumar Garg (SCM)  
Mr. Raju Kumar Pandey (Equipment Division)

---

## CONTENTS

Clause	Title	Page No.
1.0	SCOPE.....	4
2.0	DEFINITIONS .....	4
3.0	REFERENCE DOCUMENTS .....	4
4.0	QUALITY MANAGEMENT SYSTEM – GENERAL .....	4
5.0	QUALITY SYSTEM REQUIREMENTS.....	4
6.0	AUDITS .....	6
7.0	DOCUMENTATION REQUIREMENTS .....	7

## 1.0 SCOPE

This specification establishes the Quality Management System requirements to be met by BIDDER for following purpose:

- QMS requirements to be met by suppliers/contractors after award of work/during contract execution.

## 2.0 DEFINITIONS

### 2.1 Bidder

For the purpose of this specification, the word “BIDDER” means the person(s), firm, company or organization who is under the process of being contracted by EIL / Owner for delivery of some products (including service). The word “Bidder” is considered synonymous to supplier, contractor or vendor.

### 2.2 Project Quality Plan (PQP)

Document tailored from Standard Quality Management System Manual of BIDDER, specifying how the quality requirements of the project will be met.

### 2.3 Owner

Owner means the owner of the project for which services / products are being purchased and includes their representatives, successors and assignees.

## 3.0 REFERENCE DOCUMENTS

- Specification for Documentation Requirements from Contractors (Doc. No. 6-78-0002)
- Specification for Documentation Requirements from Suppliers (Doc. No. 6-78-0003)

## 4.0 QUALITY MANAGEMENT SYSTEM – GENERAL

Unless otherwise agreed with EIL / Owner, the BIDDER proposed quality system shall fully satisfy all relevant requirements of ISO 9001 “Quality Management Systems – Requirements.” Evidence of compliance shall be current certificate of quality system registration to ISO 9001 or a recent compliance audit recommending registration from a certification agency. The quality system shall provide the planned and systematic control of all quality related activities for execution of contract. Implementation of the system shall be in accordance with BIDDER’S Quality Manual and PROJECT specific Quality Plan.

## 5.0 QUALITY SYSTEM REQUIREMENTS

5.1 BIDDER shall prepare and submit for review / record, Project Quality Plan / Quality Assurance Plan for contracted scope / job. The BIDDER’S Quality Plan shall address all of the applicable elements of ISO 9001, identify responsible parties within BIDDER’S organization, for the implementation / control of each area, reference the applicable procedures used to control / assure each area, and verify the documents produced for each area. The Project Quality Plan shall necessarily define control or make reference to the relevant procedures, for design and engineering, purchase, documentation, record control, bid evaluation, inspection, production/manufacturing, preservation, packaging and storage, quality control at construction site, pre-commissioning, commissioning and handing over (as applicable) in line with contract requirement and scope of work.

- 5.2 BIDDER shall identify all specified or implied statutory and regulatory requirements and communicate the same to all concerned in his organization and his sub contractor's organization for compliance.
- 5.3 BIDDER shall deploy competent and trained personnel for various activities for fulfilment of PO / contract. BIDDER shall arrange adequate infrastructure and work environment to ensure that the specification and quality of the deliverable are maintained.
- 5.4 BIDDER shall do the quality planning for all activities involved in delivery of order. The quality planning shall cover as minimum the following:
- Resources
  - Product / deliverable characteristics to be controlled.
  - Process characteristics to ensure the identified product characteristics are realized
  - Identification of any measurement requirements, acceptance criteria
  - Records to be generated
  - Need for any documented procedure
- The quality planning shall result into the quality assurance plan, inspection and test plans (ITPs) and job procedures for the project activities in the scope of bidder. These documents shall be submitted to EIL/Owner for review/approval, before commencement of work.
- 5.5 Requirements for sub-ordering of outsourced items /sub-contracting / purchasing of services specified in MR/ contract / tender shall be adhered to. In general all outsourced items will be from approved vendors of EIL. Wherever requirements are not specified, or approved sub vendors do not exist, the sub-contractor shall establish and maintain a system for purchasing / sub-contracting to ensure that purchased product / service conforms to specified requirements in concurrence with EIL / Owner. Criteria for selection of sub-contractor, evaluation, re-evaluation, maintenance of purchasing data and verification of purchased product (sub-contractor services), constitute important components of this requirement.
- 5.6 BIDDER shall plan and carry production and service provision under controlled conditions. Controlled conditions shall include, as applicable
- a) the availability of information that describes the characteristics of the product
  - b) the availability of work instructions
  - c) the use of suitable equipment
  - d) the availability and use of monitoring and measuring devices
  - e) the implementation of monitoring and measurement
  - f) the implementation of release, delivery and post-delivery activities
- 5.7 BIDDER shall validate any processes for production and service provision where resulting output cannot be verified by subsequent monitoring and measurement. This includes any process where deficiencies become apparent only after the product is in use or service has been delivered.
- 5.8 BIDDER shall establish a system for identification and traceability of product / deliverable throughout product realization. Product status with respect to inspection and testing requirements shall be identified.
- 5.9 BIDDER shall identify, verify, protect and safeguard EIL / Owner property (material / document) provided for use or incorporation into the product. If any Owner / EIL property is lost, damaged or otherwise found to be unsuitable for use, this shall be reported to the EIL / Owner.

BIDDER shall ensure the conformity of product / deliverable during internal processing and delivery to the intended destination. Requirements mentioned in the MR/ tender shall be adhered to.

- 5.10 BIDDER shall establish system to ensure that inspection and testing activities are carried out in line with requirements. Where necessary, measuring equipment shall be calibrated at specified frequency, against national or international measurement standards; where no such standard exists, the basis used for calibration shall be recorded. The measuring equipment shall be protected from damage during handling, maintenance and storage.
- 5.11 BIDDER shall ensure effective monitoring, using suitable methods, of the processes involved in production and other related processes for delivery of the scope of contract.
- 5.12 BIDDER shall monitor and measure the characteristics of the product/deliverable to verify that product requirement has been met. The inspection (stage as well as final) by BIDDER and EIL / Owner personnel shall be carried out strictly as per the approved ITPs or ITPs forming part of the contract. Product release or service delivery shall not proceed until the planned arrangements have been satisfactorily completed, unless otherwise approved by relevant authority and where applicable by Owner / EIL.
- 5.13 BIDDER shall establish and maintain a documented procedure to ensure that the product which does not conform to requirements is identified and controlled to prevent its unintended use or delivery
- 5.14 All non-conformities (NCs) / deficiencies found by the BIDDER'S inspection / surveillance staff shall be duly recorded, including their disposal action shall be recorded and resolved suitably. Effective corrective actions shall be implemented by the BIDDER so that similar NCs including deficiencies do not recur. The BIDDER shall take appropriate actions to address the Risks and Opportunities in the project.
- 5.15 All deficiencies noticed and reported by EIL / Owner shall be analysed by the BIDDER and appropriate corrective actions shall be implemented. BIDDER shall intimate EIL / Owner of all such corrective action implemented by him.
- 5.16 BIDDER should follow the standards, specifications and approved drawings. Concessions/Deviations shall be allowed only in case of unavoidable circumstances. In such situations Concession/deviation request must be made by the BIDDER through online system of EIL vendor portal for document exchange. URL of EIL vendor portal for document exchange is <http://edocx.eil.co.in/vportal>. BIDDER shall have documented procedure for control of documents.
- 5.17 All project records shall be carefully kept, maintained and protected for any damage or loss until the project completion, then handed over to EIL / Owner as per contract requirement (Refer Specification Nos. 6-78-0002 - Specification for Documentation Requirements from Contractors and 6-78-0003 - Specification for Documentation Requirements from Suppliers), or disposed as per relevant project procedure.

## 6.0 AUDITS

BIDDER shall plan and carry out the QMS audit for the job. Quality audit program shall cover design, procurement, construction management and commissioning as applicable including activities carried out by sub-vendors and sub-contractors. This shall be additional to the certification body surveillance audits carried out under BIDDER'S own ISO 9001 certification scheme.

The audit programs and audit reports shall be available with bidder for scrutiny by EIL / Owner. EIL or Owner's representative reserves the right to attend, as a witness, any audit conducted during the execution of the WORKS.

In addition to above, EIL, Owner and third party appointed by EIL/Owner may also perform Quality and Technical compliance audits. BIDDER shall provide assistance and access to their systems and sub-contractor / vendor systems as required for this purpose. Any deficiencies noted shall be immediately rectified by BIDDER.

## 7.0 DOCUMENTATION REQUIREMENTS

BIDDER shall submit following QMS documents immediately after award of work (Within one week) for record / review by EIL / Owner/ TPIA(Third Party Inspection Agency), as applicable:

- Organization chart (for complete organization structure and for the project)
- Project Quality Plan/Quality Assurance Plan
- Job specific Inspection Test Plans, if not attached with PR
- Job Procedures
- Inspection/Test Formats

In addition to above QMS documents, following documentation shall be maintained by the BIDDER for submission to EIL / Owner on demand at any point of time during execution of the project:

- Quality Manual
- Certificate of approval for compliance to ISO9001 standard
- Procedure for Control of Non-conforming Product
- Procedure for Control of Documents
- Sample audit report of the QMS internal and external audits conducted during last one year
- Customer satisfaction reports from at least 2 customers
- Project QMS audit report
- Technical audit reports for the project
- Corrective action report on the audits

Documents as specified above are minimum requirements. BIDDER shall submit any other document/data required for completion of the job as per EIL/Owner instructions.

आपूर्तिकर्ताओं से प्रलेखन  
अपेक्षाओं हेतु विनिर्देश

## SPECIFICATION FOR DOCUMENTATION REQUIREMENTS FROM SUPPLIERS

3	29-09-2025	General Revision	QMS Standards Committee	QMS Standards Committee	AK	MN
2	01-06-2020	General Revision	QMS Standards Committee	QMS Standards Committee	SKB	SKS
1	12-03-2015	General Revision	QMS Standards Committee	QMS Standards Committee	MPJ	SC
0	04-06-2009	Issued as Standard Specification	QMS Standards Committee	QMS Standards Committee	SCT	ND
<b>Rev. No.</b>	<b>Date</b>	<b>Purpose</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Standards Committee Convener</b>	<b>Standards Bureau Chairman</b>
<b>Approved by</b>						

---

### Abbreviations:

DCI	Document Control Index
EIL	Engineers India Limited
EPS	Electronic Procurement System
FOA	Fax of Acceptance
IC	Inspection Certificate
IRN	Inspection Release Note
ITP	Inspection and Test Plan
LOA	Letter of Acceptance
LR	Lorry Receipt
MR	Material Requisition
ODC	Over Dimension Consignment
PO	Purchase Order
PR	Purchase Requisition
PVC	Polyvinyl Chloride
QAP	Quality Assurance Plan
QMS	Quality Management System
RPO	Regional Procurement Office
TPIA	Third Party Inspection Agency
URL	Universal Resource Locator
V-Portal	Vendor Portal

### QMS Standards Committee

**Convener:** Mr. Anil Kumar

**Members:** Mr. Himangshu Pal (SCM-Inspection)  
Mr. Ravindra Kumar (Const.)  
Mr. Vinod Kumar (CQA)  
Mr. Swapnil Vaishnav (Projects)  
Mr. Vijay Kumar Garg (SCM)  
Mr. Raju Kumar Pandey (Equipment Division)





4.2.4 Documents as specified in PO/PR/MR are minimum requirements. Supplier shall submit any other document/data required for completion of the job as per EIL/Owner instructions.

#### 4.3 Style and Formatting

4.3.1 All Documents shall be in ENGLISH language and in M.K.S(Meter-Kilogram-Second) System of units.

4.3.2 Before forwarding the drawings and documents, contractor shall obtain the title block from EIL and ensure that the following information are properly mentioned in each drawing:

- Purchase Requisition Number
- Name of Equipment / Package
- Equipment / Package Tag No.
- Name of Project
- Client
- Drawing / Document Title
- Drawing / Document No.
- Drawing / Document Revision No. and Date

#### 4.4 Review and Approval of Documents by Supplier

4.4.1 All, the Drawing/Documents shall be reviewed, checked, approved and duly signed/stamped by supplier before submission. Revision number shall be changed during submission of the revised supplier documents and all revisions shall be highlighted by clouds. Whenever the supplier requires any sub-supplier drawings to be reviewed by EIL, the same shall be submitted by the supplier duly reviewed, approved and stamped by the supplier. Direct submission of sub-supplier's drawings without contractor's / suppliers' approval shall not be entertained.

#### 4.5 Document Category

Following review codes shall be used for review of supplier Drawings/Documents:

- |               |   |   |
|---------------|---|---|
| <b>Code 1</b> | - | No comments. Proceed with Manufacture / Fabrication / Construction as per the document.                         |
| <b>Code 2</b> | - | Proceed with Manufacture / Fabrication / Construction as per commented document. Revised document required.     |
| <b>Code 3</b> | - | Document does not conform to basic requirements as marked. Resubmit for review.                                 |
| <b>Code R</b> | - | Document is retained for Records. Proceed with Manufacturing / fabrication as per Tender/ Contract Requirement. |
| <b>Code V</b> | - | Void, Document is returned as invalid.  |

Document is marked as Void under following conditions:

- a) Wrong item drawing uploaded.
- b) Superseded or obsolete submission.
- c) Duplicate submission.
- d) Out of sequence submission.
- e) Mismatch in document name and title under which document uploaded.
- f) Document not legible.
- g) For PMC projects, document not signed and stamped by contractor and DEC

## 4.6 Methodology for Submission of Documents to EIL/Owner

### 4.6.1 Document Control Index (DCI)

Supplier shall create and submit Document Control Index (DCI) for review based on PO/PR/MR along with schedule date of submission of each drawing/document on EIL Vendor Portal. The DCI shall be specific with regard to drawing/document no. and the exact title. Proper sequencing of the drawings/documents should be ensured in schedule date of submission.

### 4.6.2 Submission of Drawings/Documents / Data

Drawings/documents, data and DCI shall be uploaded on the EIL Vendor Portal as per approved DCI. The detailed guidelines for uploading documents on EIL Vendor Portal are available on URL: <http://edocx.eil.co.in/vportal>

### 4.6.3 Statutory Approvals

Wherever approval by any statutory body is required to be taken by Supplier, the Supplier shall submit copy of approval by the authority to EIL.

### 4.6.4 Manufacturing Schedule

Supplier shall prepare milestone based (milestones such as document submission, sub ordering, manufacturing, Inspection, dispatches, etc.) manufacturing schedule for the order, to meet delivery as per FOA/PO terms. Supplier shall submit manufacturing schedule to concerned Regional Procurement Office (RPO) of EIL, with a copy to Head office monitoring team/Owner for review within 7 days from date of FOA/PO. Same shall be uploaded in the EPS portal of EIL i.e., <https://www6.eil.co.in/epsinspection/supp>

### 4.6.5 Schedule and Progress Reporting

Supplier shall submit Monthly Progress Report (MPR) on or before the 9<sup>th</sup> of every month indicating following milestone-based progress details as minimum:

- Drawing submission and approval status and schedule for submission of revised drawing / fresh Drawing requiring approval as per approved DCI
- Sub-ordering plan/details for all major items indicating item description, sub-order number, Date of sub-ordering, sub-vendor name, Location, contractual delivery data and expected delivery dates at main vendor's shop and other critical details requiring timely receipt of sub-ordered items at shop.
- Shop manufacturing progress indicating major milestone progress, in case of missing any milestone date, catch up plan for the same and expected dispatch date from shop and expected delivery date at site.
- Area requiring special attention/concern and proposed action plan to resolve the same.

First Monthly Progress Report (MPR) shall be submitted within 2 weeks from FOA/LOA. In case of exigencies, EIL/Owner can ask for report submission as required on weekly/fortnightly/ad-hoc basis depending upon supply status and supplier shall furnish such reports promptly without any price implication. Format for progress report shall be submitted by the Supplier during kick off meeting or within 2 weeks of receiving FOA/LOA, whichever is earlier.





Final Documentation shall be bound in Hard board Plastic folder(s) of size 265 mm x 315 mm (10½-inch x 12½-inch) and shall not be more than 75 mm thick. It may be of several volumes and each volume shall have a volume number, index of volumes and index of contents of that particular volume. Where number of volumes are more, 90mm thickness can be used. Each volume shall have top PVC sheet of minimum 0.15 mm thick duly fixed and pressed on folder cover and will have 2 lever clips. In case of imported items documents, 4 lever clip shall also be accepted. All four corners of folders shall be properly metal clamped. Indexing of contents with page numbering must be incorporated by supplier. Spiral/Spico bound documents shall not be acceptable. As mentioned above, books should be in hard board plastic folders with sheets punched and having 2/4 lever clips arrangement.

Each volume shall contain on cover a Title Block indicating package Equipment Tag No. & Name, PO/Purchase Requisition No., Name of Project and Name of Customer. Each volume will have hard front cover and a reinforced spine to fit thickness of book. These spines will also have the title printed on them. Title shall include also volume number (say 11 of 15) etc.

#### 4.11.4 Submission of Soft Copies

Supplier shall submit to EIL, the scanned images files as well as the native files of drawings/documents, along with proper index.

In addition to hard copies, Supplier shall submit soft copies of all the final drawings and documents in pen drive or any other specified medium with proper identification tag, all text documents prepared on computer, scanned images of all important documents (not available as soft files), all relevant catalogues, manuals available as soft files (editable copies of drawings/text documents, while for catalogues/manuals/proprietary information and data, PDF files can be furnished). All soft files shall be appropriately named, systematically indexed, and duly bookmarked in PDF format to facilitate ease of reference and access.

All the above documents shall also be uploaded on the EIL Vendor Portal and if applicable on Client Server also.

#### 4.11.5 Completeness of Final Documentation

Supplier shall get the completeness of final documentation verified by EIL/TPIA, as applicable, and attach the Format for Completeness of Final Documentation (Format No. 3-78-0004) duly signed by EIL Inspector or TPIA as applicable to the final document folder.

**COMPLETENESS OF FINAL DOCUMENTATION**

Name of Supplier/Contractor :  
 Customer :  
 Project :  
 EIL's Job No. :  
 Purchase Order No./ Contract No. :  
 Purchase Requisition No./ Tender No. : Rev. No.:  
 Name of the Work/ Equipment :  
 Tag. No. :  
 Supplier's/ Contractor's Works Order No. :

Certified that the Engineering Documents/ Manufacturing & Test Certificates submitted by the supplier (as per Index sheet mentioned in Annexure-1) are complete in accordance with the Vendor Data Requirements of Purchase Requisition / Tender.

Signature	: .....	Signature	: .....
Date	: .....	Date	: .....
Name	: .....	Name	: .....
Designation	: .....	Designation	: .....
Department	: .....	Department	: .....

Supplier/Contractor

EIL/TPIA



निर्माण स्थल पर स्वास्थ्य, सुरक्षा एवं  
पर्यावरण प्रबंधन हेतु मानक विनिर्देश

STANDARD SPECIFICATION FOR  
HEALTH, SAFETY & ENVIRONMENTAL  
MANAGEMENT AT  
CONSTRUCTION SITES

2	18/04/2023	REVISED & UPDATED	BT	RK	JPV	SM
1	07/06/2022	REVISED & UPDATED	BT	RK	JPV	SM
0	23/12/2020	REVISED & UPDATED	BT	RK	AKK	S Mazumdar
Rev. No.	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	Standards Bureau Chairman
Approved by						

**Abbreviations:**

AERB	:	Atomic Energy Regulatory Board
ANSI	:	American National Standards Institute
BARC	:	Bhabha Atomic Research Centre
BS	:	British Standard
BOCW	:	Building and other construction workers
BOO/BOOT	:	Build, Own, Operate/Build, Own, Operate, Transfer
EIL	:	Engineers India Limited
EIC	:	Engineer In charge
ELCB	:	Earth Leakage Circuit Breaker
EPC	:	Engineering, Procurement and Construction
EPCC	:	Engineering, Procurement, Construction and Commissioning
ESI	:	Employee State Insurance
GCC	:	General Conditions of Contract
GM	:	General Manager
GTAW	:	Gas Tungsten Arc Welding
HOD	:	Head of Department
HSE	:	Health, Safety & Environment
HIRAC	:	Hazard, Identification Risk Assessment & Control
HMV	:	Heavy Motor Vehicle
HV	:	High Voltage
IS	:	Indian Standard
ISO	:	International Organization for Standardization
IE	:	Indian Electricity
LTI	:	Lost Time Injuries
LMV	:	Light Motor Vehicle
LOTO	:	Lock Out & Tag Out
LPG	:	Liquefied Petroleum Gas
LSTK	:	Lump Sum Turn Key
MV	:	Medium Voltage
OH&S	:	Occupational Health and Safety
OISD	:	Oil Industry Safety Directorate
PPE	:	Personal Protective Equipment
PUC	:	Pollution Under Control
RC	:	Registration Certificate
RCCB	:	Residual Current Circuit Breaker
RCM	:	Resident Construction Manager or Site-in-Charge, as applicable
SCC	:	Special Conditions of Contract
SLI	:	Safe Load Indicator
SWL	:	Safe Working Load
TPI	:	Third Party Inspection
TBT	:	Tool Box Talks

**Construction Standards Committee**

**Convenor:** Sh John Paul V, ED(Construction)

**Members:** Sh.Janak Kishore, ED (Projects)  
Sh.Biswajit Mandal, CGM (SCM)  
Sh. Udayan Chakravarty, Sr.GM (Piping)  
Sh.Ravindra Kumar, Sr.GM (Construction)  
Sh.Debasish Ghosal, GM(Construction)  
Sh. Pankaj Kumar Rai, DGM (Construction)

CONTENTS

CLAUSE	TITLE	PAGE NO.
1.0	SCOPE .....	5
2.0	REFERENCES .....	5
3.0	REQUIREMENT OF HEALTH, SAFETY AND ENVIRONMENTAL (HSE) MANAGEMENT SYSTEM TO BE COMPLIED BY BIDDERS .....	5
3.1	Management Responsibility .....	5
3.1.1	HSE Policy & Objective .....	5
3.1.2	Management System .....	5
3.1.3	Indemnification .....	5
3.1.4	Deployment & Qualification of Safety Personnel .....	6
3.1.5	Implementation, Inspection & Monitoring .....	8
3.1.6	Behavior Based Safety .....	9
3.1.7	Awareness .....	9
3.1.8	Fire Prevention & First-Aid .....	10
3.1.9	Documentation .....	10
3.1.10	Audit .....	10
3.1.11	Meetings .....	11
3.1.12	Intoxicating Drinks & Drugs and Smoking .....	12
3.1.13	Penalty .....	12
3.1.14	Accident/Incident Investigation .....	15
3.2	House Keeping .....	15
3.3	HSE Measures .....	16
3.3.1	Construction Hazards .....	16
3.3.2	Accessibility .....	17
3.3.3	Personal Protective Equipments (PPEs) .....	17
3.3.4	Working at Height .....	18
3.3.5	Scaffoldings .....	19
3.3.6	Electrical Installations .....	20
3.3.7	Welding/Gas Cutting .....	23
3.3.8	Ergonomics and Tools & Tackles .....	23
3.3.9	Occupational Health .....	25
3.3.10	Hazardous Substances .....	26
3.3.11	Slips, Trips & Falls .....	26
3.3.12	Radiation Exposure .....	26
3.3.13	Explosives/Blasting Operations .....	26
3.3.14	Demolition/Dismantling .....	27
3.3.15	Road Safety .....	27
3.3.16	Welfare Measures .....	28
3.3.17	Environment Protection .....	28
3.3.18	Rules & Regulations .....	29
3.3.19	Weather Protection .....	29
3.3.20	Communication .....	29
3.3.21	Confined Space Entry .....	30
3.3.22	Heavy Lifts .....	30
3.3.23	Key Performance Indicators .....	31
3.3.24	Unsuitable Land Conditions .....	31
3.3.25	Under Water Inspection .....	31
3.3.26	Excavation .....	32

3.4	Tool Box Talks .....	32
3.5	Training & Induction Programme .....	33
3.6	Additional Safety Requirements for Working Inside a Running Plant .....	34
3.7	Self-Assessment and Enhancement .....	35
3.8	HSE Promotion .....	35
3.9	LOTO for Isolation of Energy Source .....	35
4.0	DETAILS OF HSE MANAGEMENT SYSTEM BY CONTRACTOR .....	36
4.1	On Award of Contract .....	36
4.2	During Job Execution .....	36
4.3	During Short Listing of the Sub-Contractors .....	38
5.0	RECORDS .....	38
<b>Appendices</b>		
1.	Standards/Codes on HSE .....	Appendix-A
2.	Details of First AID Box .....	Appendix-B
3.	Types of Fire Extinguishers & their Application .....	Appendix-C
4.	List of statutory Acts & Rules Relating to HSE.....	Appendix-D
5.	Construction Hazards, their effects & Preventive Measures....	Appendix-E
6.	Training Subjects / Topics .....	Appendix-F
7.	Construction Power Board (typ.) .....	Appendix-G
8.	List of HSE Procedures .....	Appendix-H
9.	Life Saving Rules.....	Appendix-I
<b>Attachments (Reporting Formats)</b>		
I	Safety Walk through Report .....	HSE-1 Rev.1
II	Accident/Incident Report .....	HSE-2 Rev.0
III	Suppl. Accident/Incident Investigation Report .....	HSE-3 Rev.0
IV	Near Miss Incident Report/Dangerous Occurrence .....	HSE-4 Rev.0
V	Monthly HSE Report .....	HSE-5 Rev.0
VI	Permit for Working at Height .....	HSE-6 Rev.1
VII	Permit for Working in Confined Space .....	HSE-7 Rev.1
VIII	Permit for Radiation work .....	HSE-8 Rev.0
IX.	Permit for Demolishing/ Dismantling .....	HSE-9 Rev.1
X	Daily Safety Checklist .....	HSE-10 Rev.0
XI	Housekeeping Assessment & Compliance .....	HSE-11 Rev.0
XII	Inspection of Temporary Electrical Booth/ Installation .....	HSE-12 Rev.0
XIII	Inspection for Scaffolding .....	HSE-13 Rev.0
XIV	Permit for Erection / Modification & Dismantling of Scaffolding .....	HSE-14 Rev.1
XV	Permit for Heavy Lift/Critical Erection .....	HSE-15 Rev.1
XVI	Permit Energy Isolation & De-Isolation .....	HSE-16 Rev 1
XVII	Permit for Excavation .....	HSE-17 Rev 1
XVIII	Environmental Aspect Impact Register .....	HSE-18 Rev 0
XIX	HIRAC Register .....	HSE-19 Rev 0
XX	Checklist for Tower Crane .....	HSE-20 Rev 0
XXI	Crane Inspection Checklist .....	HSE-21 Rev 0
XXII	Hydraulic Mobile Crane Inspection Checklist .....	HSE-22 Rev 0
XXIII	Hydraulic Rig Inspection Checklist .....	HSE-23 Rev 0
XXIV	Boom Lift Inspection Checklist .....	HSE-24 Rev 0

## 1.0 SCOPE

This specification establishes the Health, Safety and Environment (HSE) management requirement to be complied by Contractors/Vendors including their sub-contractors/sub vendors during construction.

This specification is not intended to replace the necessary professional judgment needed to design & implement an effective HSE system for construction activities and the contractor is expected to fulfill HSE requirements in this specification as a minimum. It is expected that contractor shall implement best HSE practices beyond whatever are mentioned in this specification.

Requirements stipulated in this specification shall supplement the requirements of HSE Management given in relevant Act(s)/ Legislations, General Conditions of Contract (GCC), Special Conditions of Contract (SCC) and Job (Technical) Specifications. Where different documents stipulate different requirements, the most stringent shall apply.

## 2.0 REFERENCES

The document should be read in conjunction with following:

- General Conditions of Contract (GCC)
- Special Conditions of Contract (SCC)
- Building and other construction workers Act, (Refer Appendix-D)
- Indian Factories Act,(Refer Appendix-D)
- Job (Technical) specifications
- Relevant International/ National Codes (refer Appendix-A for standards/codes on HSE)
- Relevant State & National Statutory requirements.
- Operating Manuals Recommendation of Manufacturer of various construction Machineries
- Occupation Health and Safety Management System (OHSAS 18001:2007/ISO 45001) and Environmental Management System (ISO 14001:2015)

## 3.0 REQUIREMENTS OF HEALTH, SAFETY & ENVIRONMENTAL (HSE) MANAGEMENT SYSTEM TO BE COMPLIED BY BIDDERS

### 3.1 Management Responsibility

#### 3.1.1 HSE Policy & Objectives

The Contractor should have a documented and duly approved HSE policy & objectives to demonstrate commitment of their organization to ensure health, safety and environmental aspects in their line of operations.

The Contractor's senior management shall provide strong visible leadership and continuously demonstrate commitment to develop, operate and maintain, review and continually improve a HSE culture at site which empowers individuals to take responsibility for their safety and embrace and accept nothing but responsible HSE behaviour.

Contractor shall refer in clause No. 3.3.23 for Key Performance Indicator (KPI).

#### 3.1.2 Management System

The HSE management system of the Contractor shall cover the HSE requirements & commitments to fulfill them, including but not limited to what have been specified under clauses 1.0 and 2.0 above. The Contractor shall obtain the approval of its site specific HSE Plan from EIL/ Owner prior to commencement of any site works. Corporate as well as Site management of the Contractor shall ensure compliance of their HSE Plan at work sites in its entirety in true spirit.

#### 3.1.3 Indemnification

Contractor shall indemnify & hold harmless, Owner/EIL & their representatives, free from any and all liabilities arising out of non-fulfillment of HSE requirements or its consequences.

### 3.1.4 Deployment & Qualifications of Safety Personnel

The Contractor shall designate/deploy various categories of HSE personnel at site as indicated below insufficient number. In no case, deployment of safety Supervisor / Safety Steward shall substitute deployment of Safety Officer / Safety Engineer what is indicated in relevant statute of BOCW Act i.e. deployment of safety officer/Safety Engineer is compulsory at project site. The Safety supervisors, Safety stewards/Observer etc. would facilitate the HSE tasks at grass root level for construction sites and shall assist Safety Officer /Engineers.

Contractor shall appoint safety personnel as given below for every work shift:

- (i) Safety Observer/Steward: Contractor shall depute one Safety Observer/Steward for every 100 workers or part thereof
- (ii) Safety Supervisor: In addition to above(i), contractor shall depute one Safety Supervisor for every 250 workers or part thereof
- (iii) Safety Engineer: In addition to above (i&ii), one safety engineer/ officer for every 1000 workers or part thereof.

Contractor shall intimate/obtain prior permission from EIC before demobilizing any safety personnel. The Contractor shall mobilize suitable safety personnel as replacement.

a) Safety Steward/Observer

As a minimum, he shall possess class XII pass certificate and trained in fire-fighting as well as in safety/occupational health related subjects, with minimum two year of practical experience in construction work environment and should have adequate knowledge of the local language spoken by majority of the workers at the construction site.

b) Safety Supervisor

As a minimum, he shall possess a recognized graduation Degree in Science (with Physics & Chemistry) or a Diploma in Engg. Or Tech. with minimum Two years of practical experience in construction work environment and should possess requisite skills to deal with construction safety & fire related day-to-day issues.

c) Safety Officer / Safety Engineer

Safety Officer/Engineer should possess following qualification & experience:

- (i) Recognized degree in any branch of Engg. or Tech. or Architecture with practical experience of working in a building or other construction work in supervisory capacity for a period of not less than two years, **or** possessing recognized diploma in any branch of Engg. or Tech with practical experience of working in a building or other construction work in supervisory capacity for a period of not less than five years.
- (ii) Recognized degree or one year diploma in Industrial safety (from any Indian Institutes recognized by AICTE or State Council of Tech. Education of any Indian State/Union territory) with at least one paper in construction safety (as an elective subject).
- (iii) Preferably have adequate knowledge of the language spoken by majority of the workers at the construction site.

Alternately

- (i) Person possessing Graduation Degree in Science with Physics **or** Chemistry and degree or one year diploma in Industrial Safety (from any Indian institutes recognized by AICTE or State Council of Tech. Education of any Indian State/ Union Territory) with practical experience of working in a building, plant or other construction works (as Safety Officer, in line with Indian Factories Act, 1948) for a period of not less than five years, may be considered as Safety Officer.

d) HSE In-Charge

In case there is more than one Safety Officer at any project construction site, one of them, who is senior most by experience (in HSE discipline), may be designated as HSE In-Charge. Duties & responsibilities of such person shall be commensurate with that of relevant statute and primarily to coordinate with top management of EIL/Client and contractors.

In case the statutory requirements i.e. State or Central Acts and / or Rules as applicable like the Building and Other Construction Workers' Regulation of Employment and Conditions of Service- Act, 1996 or State Rules (wherever notified), the Factories Act, 1948 or Rules (wherever notified), etc. are more stringent than above clarifications, the same shall be followed.

Contractors shall ensure physical availability of safety personnel at the place of specific work location, where Hot Work Permit is required/granted. No work shall be started at any of the project sites until above safety personnel & concerned Site Engineer of Contractor are physically deployed at site. The Contractor shall submit a HSE Organogram clearly indicating the lines of responsibility and reporting system and elaborate the responsibilities of safety personnel in their HSE Plan.

Upon fulfilling the basic requirement of qualification and relevant experiences, the performance of contractor HSE personnel's is to be monitored.

The good performing contractor's HSE personnel at site shall be rewarded upon assessment of performance by EIL/Owner. The non-performing HSE personnel shall be counselled by EIL/Owner & suitable action may be taken for suspension from site for 3-6 days. Contractor shall arrange training for non performing HSE personnel.

HSE In-Charge of the contractor shall be given the status at par with the other heads of department and shall report to Head of Project.

The Contractor shall verify & authenticate credentials of such safety personnel and furnish Bio-Data/Resume/Curriculum Vitae of the safety personnel as above for EIL/Owner's approval, at least 1 month before the mobilization. The Contractor, whenever required, shall arrange submission of original testimonials/certificates of their Safety personnel, to EIL/Owner (for verification/scrutiny, etc.)

Imposition/ Realization of penalty shall not absolve the Contractor from his/her responsibility of deploying competent safety officer at site.

Adequate planning and deployment of safety personnel shall be ensured by the Contractor so that field activities do not get affected because of non-deployment of competent & qualified safety personnel in appropriate numbers.

### 3.1.5 Implementation, Inspection/Monitoring

- a) The Contractor shall be fully responsible for planning, reporting, implementing and monitoring all HSE requirements and compliance of all laws & statutory requirements.
- b) The Contractor shall also ensure that the HSE requirements are clearly understood & implemented conscientiously by their site personnel at all levels at site.
- c) The Contractor shall ensure physical presence of their field engineers / supervisors, during the continuation of their contract works / site activities including all material transportation activities. Physical absence of experienced field engineers / supervisors of Contractor at critical work spot during the course of work may invite halting / stoppage of work.
- d) The Contractor shall regularly review inspection report internally and implement all practical steps / actions for improving the status continuously.
- e) Contractor skilled workmen like riggers, scaffold erectors, welders, crane operators etc. should have sufficient past experience and skill on the relevant job.
- f) The Contractor shall ensure important safety checks right from beginning of works at every work site locations and to this effect format No. HSE-10 "Daily Safety Check List" shall be prepared by field engineer & duly checked by safety personnel for conformance.
- g) The Contractor shall carry out inspection to identify various unsafe conditions of work sites/machinery/equipment's as well as unsafe acts on the part of workmen/supervisor/engineer while carrying out different project related works.
- h) Adequate records for all inspections shall be maintained by the Contractor and the same shall be furnished to EIL/Owner, whenever sought.
- i) To demonstrate involvement/commitment of site management of Contractor, at least one Monthly Safety Walk through in a month shall be carried out by Contractor's head of site (along with his area manager/field engineers) and a report shall be furnished to EIL/Owner as per format No: HSE-1" Safety walk through report" followed by compliance for unsatisfactory remarks.
- j) As a general practice lifting tools/tackles, machinery, accessories etc. shall be inspected, tested and examined by competent person (approved by concerned State authorities) before being used at site and also at periodical interval (e.g. during replacement, extension, modification, elongation/reduction of machine/parts, etc.) as per relevant statutes: Hydraulic Mobile Crane, cranes, lifting machinery, mobile equipment's/ machinery/ vehicles, etc. shall be inspected regularly by only competent / experienced personnel at site and requisite records for such inspections shall be maintained by contractor. Contractor shall also maintain records of maintenance of all other site machinery (e.g. generators, rectifiers, compressors, cutters, etc.) & portable tools/equipment's being used at project related works (e.g. drills, abrasive wheels, punches, chisels, spanners, etc.). The Contractor shall not make use of arbitrarily fabricated 'derricks' at project site for lifting/ lowering of construction materials.
- k) Site facilities /temporary. installations, e.g. batching plant, cement godown, DG-room, temporary electrical panels/distribution boards, shot-blasting booth, fabrication yards, etc. and site welfare facilities, like labour colonies, canteen/pantry, rest-shelters, motor cycle/bicycle-shed, First-aid centers, urinals/toilets, etc. should be periodically inspected by Contractor (preferably utilizing HR/Admin. personnel to inspect site welfare facilities) and records to be maintained.

### 3.1.6 Behaviour Based Safety

- a) The contractor shall develop a system to implement Behavior-Based Safety (BBS) through which work groups can identify, measure and change the behaviors of employees and workers towards construction safety aspects.
- b) The BBS process shall include the following:
  - Identify the behaviors critical to achieve required safety performance.
  - Communicate the behaviors and how they are performed correctly by all
  - Observe the work force and record safe/at risk behaviors. Intervene with workers to give positive reinforcement when unsafe behaviors are observed. Provide coaching/correction when at risk behaviors are observed
  - Collect and record observation data
  - Summarize and analyze observation data
  - Communicate observation data and analysis results to all employees
  - Provide recognition or celebrate when safe behavior improvements occur
  - Change behaviors to be observed or change activators or change consequences as appropriate.
  - Communicate any changes to workforce
- c) Contractor through its own HSE committee shall implement the above process.
- d) The necessary procedures and Monthly reporting formats shall be developed by the contractor for approval by EIL/Owner.
- e) The HSE committee of contractor shall observe individual's behavior for safe practices adapted for utilization/execution of work for followings a minimum:-
  - PPE
  - Tools & equipment's
  - Hazard Identification & control
  - House keeping
  - Confined space entry
  - Hot works
  - Excavation
  - Loading & unloading
  - Work at height
  - Stacking & storage
  - Ergonomics
- f) EIL/Owner and Contractor's site staff at all levels shall monitor the behavior of contractor employees that create and/or contribute to the unsafe situations at work place.
- g) Contractor shall arrange Behavior Based safety (BBS) training of their employees at site on yearly basis.

### 3.1.7 Awareness and Motivation

- a) The Contractor shall promote and develop awareness on Health, Safety and Environmental protection among all personnel working for the Contractor.
- b) The contractor shall display safety statistics board at all prominent location. Also shall provide dedicated notice board for displaying of safety alerts or any other safety related notices for awareness site workforces.
- c) Regular awareness programs and fabrication shop/work site meetings at least on monthly basis shall be arranged on HSE activities to cover hazards/risks involved in various operations during construction.
- d) Contractor's workmen & supervisory staff shall participate in common Tool Box Meeting as & when organized/required at site to avoid any incident/accident or occupational disease arising out of multidisciplinary jobs/activities being performed by various contracting agencies in the same location at different elevation.

- e) Contractor to motivate & encourage the workmen & supervisory staff by issuing/ awarding them with tokens/ gifts/ mementos/ monetary incentives/ certificates etc. The motivational program shall be organized on regular basis.
- f) Contractor shall assess & recognize the behavioral change of its site engineers / supervisors periodically and constantly motivate / encourage them to implement HSE practices at project works
- g) Life Saving Rules (refer Appendix-I for details) are to be displayed at prominent location of site.

### 3.1.8 Fire Prevention & First-Aid

The Contractor shall deploy First aider & suitable First-aid measures such as First Aid Box (Refer Appendix-B for details), stand-by Emergency Vehicle. Additionally separate ambulance with trained personnel/male or female nurse to administer First Aid shall be provided by the Contractor beyond deployment of 500 workmen during day/night working hours.

- a) The Contractor shall arrange installation of fire protection measures such as adequate number of steel buckets with sand & water and adequate number of appropriate portable fire extinguishers (Refer Appendix-C for details) to the satisfaction of EIL/Owner.
- b) The Contractor shall arrange EMERGENCY MOCK DRILL like fire, bomb threat, gas leakage, earth quake, etc. at each site at least once in three months, involving site workmen and site supervisory personnel & engineers. The Contractor shall maintain record of such mock drills at project site.
- c) The contractor shall require to tie-up with the hospitals located in the neighborhood for attending medical emergency.

### 3.1.9 Documentation

The Contractor shall evolve a comprehensive, planned and documented system covering the following as a minimum for implementation and monitoring of the HSE requirements and the same shall be submitted for approval by owner/EIL.

- HSE Organogram
- Site specific HSE Plan
- Safety Procedures, forms and Checklist. Indicative list of HSE procedures is attached as Appendix :H
- Inspections and Test Plan
- Risk Assessment & HIRAC for critical works.
- HIRAC Register as per Format no: HSE-19 to identify, assess, analyze & mitigate the construction hazards& incorporate relevant control measures before actually executing site works.
- Environmental Aspect Impact Register as per Format no: HSE-18 (identify, assess, analyze & mitigate the environmental impact & incorporate relevant control measures).
- Legal Register to identify and comply to all applicable HSE related legal requirements.

The monitoring for implementation shall be done by regular inspections and compliance of the observations thereof. The Contractor shall get similar HSE requirements implemented at his sub-contractor(s) work site/office, if applicable. However, compliance of HSE requirements shall be the responsibility of the Contractor. Any review/approval by EIL/Owner shall not absolve contractor of his responsibility/liability in relation to fulfilling all HSE requirements.

### 3.1.10 Audit

Safety Audit shall be conducted at initial stage by EIL/Owner to understand the readiness to start the job after mobilization of contractor's RCM at site& Suitable action shall be taken by contractor to comply the audit observation(s).

The Contractor shall submit an Audit Plan to EIL/Owner indicating the type of audits covering following as minimum:

- a) Internal HSE audits regularly on six monthly basis by engaging internal qualified auditors (viz. safety officers/Construction personnel having 5years experience in construction safety and Lead Auditor Course: OHSAS 18001/ISO 45001 certification).However, minimum two internal HSE audit will have to be conducted irrespective of time period of the contract.
- b) External HSE audits regularly on yearly basis by engaging authorized auditing agencies (viz. National Safety Council etc.)or qualified external auditors (viz safety officers/Construction personnel having 10years experience in construction safety and Lead Auditor Course: OHSAS 18001/ISO 45001certification). However, minimum one external HSE audit will have to be conducted irrespective of time period of the contract.
- c) EIL/Owner may participate in Opening and closing meeting of external audits and provide inputs to the external auditor. Outcome of external audit shall be discussed during HSE Meeting with EIL/Owner.

All HSE shortfalls/ non-conformances on HSE matters brought out during review/audit, shall be resolved forthwith(generally within a week) by Contractor& compliance report shall be submitted to EIL/Owner.

In addition to above audits by contractor, the contractor's work shall be subjected to HSE audit by EIL/Owner at any point of time during the pendency of contract. The Contractor shall take all actions required to comply with the findings of the Audit Report and issue regular Compliance Reports for the same to OWNER/ EIL till all the findings of the Audit Report are fully complied.

Failure to carry-out HSE Audits& its compliance (internal & external) by Contractor, shall invite penalization.

### 3.1.11 Meetings

- i. The Contractor shall ensure participation of his top most executive at site (viz. Resident Construction Manager / Resident Engineer/ Project Manager / Site-in-Charge) along with safety officer in Safety Committee/HSE Committee meetings arranged by EIL/Owner usually on monthly basis or as and when called for. In case Contractor's top most executive at site is not in a position to attend such meeting, he shall inform EIL/Owner in writing before the commencement of such meeting indicating reasons of his absence and nominate his representative – failure to do so may invite very stringent penalization against the specific Contractor, as deemed fit as per Contract. The obligation of compliance of any observations during the meeting shall be always time bound. The Contractor shall always assist EIL/Owner to achieve the targets set by them on HSE management during the project implementation.
- ii. In addition, the Contractor shall also arrange internal HSE meetings chaired by his top most executive at site on fortnightly basis and maintain records. Such internal HSE meetings shall essentially be attended by field engineers / supervisors including safety personnel of the Contractor and its associates. Records of such internal HSE meetings shall be maintained by the Contractor for review by EIL/Owner or for any HSE Audits.
- iii. Agenda of internal HSE meeting should broadly cover: -
  - a) Confirmation of record notes /minutes of previous meeting
  - b) Discussion on outstanding subjects of previous points / subjects, if any
  - c) Incidents / Accidents (of all types) at project site, if any
  - d) Current topics related to site activities / subjects of discussion
  - e) House keeping
  - f) Behavioral Safety
  - g) Information / views / deliberations of members / site sub-contractors
  - h) Report from Owner / Client
  - i) Status of Safety awareness, Induction programs & Training programsThe time frame for such HSE meeting shall be religiously maintained by one and all.

### 3.1.12 Intoxicating drinks & drugs and smoking

- The Contractor shall ensure that his staff members & workers (permanent as well casual) shall not be in a state of intoxication during working hours and shall abide by any law relating to consumption & possession of intoxicating drinks or drugs in force.
- The Contractor shall not allow any workman to commence any work at any locations of project activity who is/are influenced / effected with the intake of alcohol, drugs or any other intoxicating items being consumed prior to start of work or working day.
- Awareness about local laws on this issue shall form part of the Induction Training and compulsory work-site discipline.
- The Contractor shall ensure that all personnel working for him comply with "No-Smoking" requirements of the Owner as notified from time to time. Cigarettes, lighters, auto ignition tools or appliances as well as intoxicating drugs, dry tobacco powder, etc. shall not be allowed inside the project / plant complex.
- Smoking shall be permitted only inside smoking booths, if any, exclusively designated & authorized by the Owner/EIL.

### 3.1.13 Penalty

The Contractor shall adhere consistently to all provisions of HSE requirements. In case of non-compliances and also for repeated failure in implementation of any of the HSE provisions, EIL/Owner may impose stoppage of work without any cost & time implication to the Owner and/or impose a suitable penalty.

The amount of penalty to be levied against defaulted Contractor shall be up to a cumulative limit of

2.0% (Two percent) of the contract value for Item Rate or Composite contracts with an overall ceiling of 1,00,00,000(Rupees One Crore).

0.5% (Zero decimal five percent) of the contract value for LSTK, OBE, EPC,BOO/BOOT, EPCC or Package contracts with an overall ceiling of 10,00,00,000(Rupees Ten Crores.)

This penalty shall be in addition to all other penalties specified elsewhere in the contract. The decision of imposing stop-work-instruction and imposition of penalty shall rest with EIL/Owner. The same shall be binding on the Contractor. Imposition of penalty does not make the Contractor eligible to continue the work in unsafe manner.

The amount of penalty applicable for the Contractor on different types of HSE violations is specified below:

Sl. No.	Violation of HSE Norms	Penalty Amount
1.	For not using personal protective equipment like Helmet, Safety Shoes, and other safety gadgets as applicable as per nature of work.	Rs.500/- per day/Item / Person
2.	Working without Work Permit/Clearance	Rs.20,000/- per occasion
3	Execution of work without deployment of requisite field engineer / supervisor at work spot	Rs.5,000/- per violation per day
4.	Unsafe electrical practices (not installing ELCB, using poor joints of cables, using naked wire without top plug into socket, laying wire/cables on the roads, electrical jobs by incompetent person, etc.)	Rs.10,000/- per item per day

Sl. No.	Violation of HSE Norms	Penalty Amount
5.	Working at height without full body harness, using non-standard/ rejected scaffolding and not arranging fall protection arrangement as required, like hand-rails, life-lines, Safety Nets etc.	Rs.10,000/- per case per day
6.	Unsafe handling of compressed gas cylinders (No trolley, jubilee clips double gauge regulator, and not keeping cylinders vertical during storage/handling, not using safety cap of cylinder).	Rs.1,000/- per item per day
7.	Use of domestic LPG for cutting purpose / not using flash back arresters on both the hoses/tubes on both ends.	Rs.5,000/-per occasion
8.	No fencing/barricading of excavated areas / trenches.	Rs.5,000/- per occasion
9.	Not providing shoring/strutting/proper slope and not keeping the excavated earth at least 1.5M away from excavated area.	Rs.5,000/-per occasion
10.	Non display of scaffold tags, caution boards on erected scaffolds.	Rs.1,000/- per occasion per day
11.	Traffic rules violations like over speeding of vehicles, rash driving, talking on mobile phones during vehicle driving, wrong parking, not using seat belts, vehicles not fitted with reverse horn / warning alarms / flicker lamps during foggy weather.	Rs.3,000/-per occasion per day
12.	Absence of Contractor's RCM/SIC or his nominated representative (prior approval must be taken for each meeting for nomination) from site HSE meetings whenever called by EIL/Owner& failure to nominate his immediate deputy for such HSE meetings.	Rs.10,000/- per meeting
13.	Failure to maintain HSE records by Contractor Safety personnel, in line with approved HSE Plan/Procedures/Contract specifications.	Rs.10,000/- per month
14.	Failure to conduct daily site safety inspection (by Contractor's Site Engineer & safety officer), internal HSE meeting, internal HSE Awareness/Motivation Program and Site HSE Training at predefined frequencies (as approved in HSE Plan).	Rs.10,000/- per occasion
15.	Failure to fill online/submit the monthly HSE report by 5 <sup>th</sup> of subsequent month to Engineer-in-Charge/ Owner	Rs10,000/-per occasion and Rs.1,000/-per day of further delay
16.	Poor House Keeping	Rs.5,000 /- per occasion per subject
17.	Failure to report & follow-up accident (including Near Miss) reporting system within specific time-frame.	Rs.20,000/- per occasion
18.	Degradation of environment (not confining toxic spills, spilling oil/lubricants onto ground)	Rs.10,000/- per occasion

Sl. No.	Violation of HSE Norms	Penalty Amount
19.	Not medically examining the workers before allowing them to work at height / to work in confined space / to work in shot-blasting / to work for painting / to work in bitumen or asphalt works, not providing ear muffs while allowing them to work in noise polluted areas, made them to work in air polluted areas without respiratory protective devices, etc.	Rs.5,000/- per occasion per worker
20.	Violation of any other safety condition as per job HSE plan / work permit and HSE conditions of contract (e.g.using crowbar on cable trenches, improper welding booth, not keeping fire extinguisher ready at hot work site, unsafe rigging practices, non-availability of First-Aid box at site, not providing dead man handle switch for blasting, whiplash arrestor for the compressor line, not using hood with respiratory devices by blaster for shot//grit blasting, etc.)	Rs.5,000/- per occasion
21.	Penalty for non-deployment of ambulance in case of man-power more than 500 or not providing dedicated emergency vehicle in case of man-power less than 500.	Rs.3,000 per day
22.	Failure to carry-out Safety audit in time (internal & external),close-out of identified shortfalls of Observations of Safety Aspects(OSA),etc.	Rs.20,000/- per occasion (for internal audit &OSA). Rs.30,000/-per occasion for external audit
23.	Carrying out sand blasting instead of grit/shot blasting	Rs.50,000/- per day
24.	Failure to deploy adequately qualified and competent Safety Officer	Rs.10,000/- per day per Officer
25.	Utilization of Hydraulic Mobile Crane /back-hoe loader for material shifting or any other unauthorized /unsafe lifting works	Rs.25,000/- per occasion
26.	Any Fatal Accident	Rs.10,00,000/-per fatality
27.	Any violation not covered above	To be decided by EIL/Owner.

Note: Penalty amount deducted from the contractor shall be utilized by owner/EIC for the promotion of the safety during the currency of the project.

The Contractor shall make his field engineers/supervisors fully aware of the fact that they keep track with the site workmen for their behavior and compliance of various HSE requirements. Safety lapses / defects of project construction site shall be attributable to the concerned job supervisor / engineer of the Contractor, (who remains directly responsible for safely executing field works). For repeated HSE violations, concerned job supervisor / engineer shall be reprimanded or appropriate action, as deemed fit, shall be initiated (with information to EIL & Owner) by the concerned Contractor.

Contractor shall initiate verbal warning shall be given to the worker/employee during his first HSE violation. A written warning shall be issued on second violation and specific training shall be arranged / provided by the Contractor to enhance HSE awareness/skill including feedback on the mistakes/ flaws. Any further violation of HSE stipulations by the erring individuals shall call

for his forthright debar from the specific construction site. A record of warnings for each worker/employee shall be maintained by the Contractor, like by punching their cards / Gate passes or by displaying their names at the Project entry gate. Warnings, penalizations, appreciations etc. shall be discussed in HSE Committee meetings by site Head of the Contractor.

#### 3.1.14 Accident/ Incident investigation

All accidents/incidents shall be informed to EIL/Owner at least telephonically by Contractor immediately and in writing within 24 hours on Format No. HSE-2 as applicable, by Contractor. Thereafter, a Supplementary Accident/Incident investigation Report on Format No. HSE-3 shall be submitted to EIL/Owner within 72 hours. Near Miss incident(s), Dangerous accidents/incident shall also be reported on Format No. HSE-4 within 24 hours. The accident/incident shall be investigated by a team of Contractor's senior Site personnel (involving Site-in-Charge or at least by his deputy) for establishing root-cause and recommending corrective & preventive actions. Findings shall be documented and suitable actions taken to avoid recurrences shall be communicated to EIL/Owner. Owner/EIL shall have the liberty to independently investigate such occurrences and the Contractor shall extend all necessary help and cooperation in this regard. EIL/Owner shall have the right to share the content of this report with the outside world.

### 3.2 House Keeping

The Contractor shall ensure that a high degree of housekeeping is maintained and shall ensure inter-alia; the followings:

- a) All surplus earth and debris are removed/disposed-off from the working areas to designated location(s).
- b) Unused/surplus cables, steel items and steel scrap lying scattered at different places within the working areas are removed to identify location(s).
- c) All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from work place to identified location(s).
- d) Roads shall be kept clear and materials like pipes, steel, sand, boulders, concrete, chips and bricks etc. shall not be allowed on the roads to obstruct free movement of men & machineries.
- e) Fabricated steel structural, pipes & piping materials shall be stacked properly.
- f) Water logging on roads shall not be allowed.
- g) No parking of trucks/trolleys, cranes and trailers etc. shall be allowed on roads, which may obstruct the traffic movement.
- h) Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas.
- i) Protective measures to be ensured with projected rebar by suitable means.
- j) Trucks carrying sand, earth and pulverized materials etc. shall be covered while moving within the plant area/ or these materials shall be transported with top surface wet.
- k) The contractor shall ensure that the atmosphere in plant area and on roads is free from particulate matter like dust, sand, etc. by keeping the top surface wet for ease in breathing.
- l) At least two exits for any unit area shall be assured at all times – same arrangement is preferable for digging pits/ trench excavation/ elevated work platforms/ confined spaces etc.
- m) Welding cables and the power cable must be segregated and properly stored and used. The same shall be laid away from the area of movement and shall be free from obstruction.
- n) Upkeep/cleaning of site to be carried out on regular basis by the contractor. Contractor shall earmark the area for waste/scrap disposal and ensure that all waste/scrap arising out of the day's work is properly disposed to the earmarked area.
- o) Hazardous waste shall be segregated and shall be kept separately at designated place.
- p) Contractor shall present the status of housekeeping in HSE meeting.

The Contractor shall carry-out regular checks (minimum one per fortnight) as per format No. HSE-11 for maintaining high standard of housekeeping and maintain records for the same. The Contractor shall provide supervisor for housekeeping exclusively for management of day-to-day housekeeping activities.

### 3.3 HSE Measures

#### 3.3.1 Construction Hazards

The Contractor shall ensure identification of all Occupational Health, Safety & Environmental hazards in the type of work he is going to undertake and enlist mitigation measures. Contractor shall carry out HIRAC specifically for high risk jobs/critical jobs like

- a) Working at height (+2.0 Mts height) for cold (incl. colour washing, painting, insulation etc.) & hot works.
- b) Work in confined space,
- c) Deep excavations & trench cutting (depth > 2.0 mts.)
- d) Operation & Maintenance of Batching Plant.
- e) Shuttering / concreting (in single or multiple pour) for columns, parapets & roofs.
- f) Erection & maintenance of Tower Crane.
- g) Erection of structural steel members / roof-trusses / pipes at height more than 2.0 Mts. with or without crane.
- h) Erection of pipes (full length or fabricated) at height more than 2.0 Mts. height with Crane of 100T capacity.
- i) All lifts using 100T Crane plus mechanical pulling.
- j) All lifts using two cranes in unison (Tandem Lifting).
- k) Any lift exceeding 80% capacity of the lifting equipment's (Hydraulic Mobile Crane, crane etc.).
- l) Laying of pipes (isolated or fabricated) in deep narrow trenches – manually or mechanically.
- m) Maintenance of crane / extension or reduction of crane-boom on roads or in yards.
- n) Erection of any item at >2.0 Mts. height using 100T crane or of higher capacity
- o) Hydrostatic test of pipes, vessels & columns and water-flushing.
- p) Radiography jobs (in-plant & open field)
- q) Work in Live Electrical installations / circuits
- r) Handling of explosives & Blasting operations
- s) Demolishing/ dismantling activities
- t) Welding/ gas cutting jobs at height (+2.0 Mts.)
- u) Lifting/placing roof-girders at height(+2.0 Mts.)
- v) Lifting & laying of metallic / non-metallic sheet over roof/structures.
- w) Lifting of pipes, gratings, equipment's/vessels at heights (+2.0 Mts.) with & without using cranes
- x) Calibration of equipment, instruments and functional tests at yards / work-sites.
- y) Operability test of Pump, Motors (after coupling) & Compressors.
- z) Cold or Hot works inside Confined Space.
- aa) Transportation & shifting of ODC consignments into project areas.
- bb) Working in "Charged/Live" elect. Panels
- cc) Stress Relieving works (Electrically or by Gas-burners).
- dd) Pneumatic Tests
- ee) Card board blasting
- ff) Grit Blasting activity
- gg) Catalyst loading/unloading
- hh) Erection/dismantling of scaffolding
- ii) Chemical cleaning

The necessary HSE measures devised shall be put in place, prior to start of an activity & also shall be maintained during the course of works, by the Contractor. Copies of such HIRAC shall be kept available at work sites by the Contractor to enable all concerned carrying out checks / verification.

A list of typical construction hazards along with their effects & preventive measures is given in **Appendix-E**.

### 3.3.2 Accessibility

- h) The Contractor shall provide safe means of access (in sufficient numbers) & efficient exit to any working place including provisions of suitable and sufficient scaffolding at various stages during all operations of the work for the safety of his workmen and EIL/Owner.
- i) The Contractor shall implement use of all measures including use of "life line", "fall-arresters", "retractable fall arresters", "safety nets" etc. during the course of using all safe accesses & exits, so that in no case any individual remains at risk of slip & fall during their travel.
- j) A ladder or step-ladder must have a level and firm footing, in case of use of fixed ladders, sufficient foot hold and hand hold to be provided.
- k) The access to operating plant / project complex shall be strictly regulated. Any person or vehicle entering such complex shall undergo identification check, as per the procedures in force / requirement of EIL/Owner.
- l) Accessibility to 'confined space' shall be governed by specific system / regulation, as established at project site.

### 3.3.3 Personal Protective Equipment (PPEs)

- a) The Contractor workmen shall be permitted entry inside the project premises only with proper PPEs.
- b) The Contractor shall ensure that all their staff, workers and visitors including their sub-contractor(s) have been issued (records to be kept) & wear appropriate PPEs like nape strap type safety helmets preferably with head & sweat band with ¾" cotton chin strap (made of industrial HDPE), High ankle safety shoes with steel toe cap and antiskid sole, Coverall, full body harness (CC marked and conforming to EN361), protective goggles, gloves, ear muffs, respiratory protective devices, etc. All these gadgets shall conform to applicable IS Specifications/CE or other applicable international standards. The Contractor shall implement a regular regime of inspecting physical conditions of the PPEs being issued / used by the workmen of their own & also its sub-agencies and the damaged / unserviceable PPEs shall be replaced forthwith.
- c) Owner/EIL may issue a comprehensive color scheme for helmets to be used by various agencies. The Contractor shall follow the scheme issued by the owner/EIL and shall choose colour other than white (for Owner) or blue (for EIL). All HSE personnel shall preferably wear dark green band on their helmet or green color safety helmet so that workmen can approach them for guidance during emergencies. HSE personnel shall preferably wear such dresses with fluorescent stripes, which are noticeable during night, when light falls on them.
- d) Florescent jackets with respective company logo to be worn by the contractor workmen with different color coding for categories like supervisor and workmen.
- e) Workers required using or handling alkalies, acid or other similar corrosive substance at site shall be provided with appropriate protective equipment, in accordance with MSDS.
- f) For shot blasting, the usage of protective face shield and helmets, gauntlet and protective clothing is mandatory. Such protective clothing should conform relevant IS Specification.
- g) For off-shore jobs/contracts, contractor shall provide PPEs (new) of all types to EIL & Owner's personnel, at his (contractor's) cost. All personnel shall wear life jacket at all time.
- h) An indicative list of HSE standards/codes is given under **Appendix-A**.

- i) Contractor shall ensure procurement & usage of following safety equipment's/ accessories (conforming to applicable IS mark / CE standard) by their staff, workmen & visitors including their subcontractors all through the span of project construction / pre-commissioning/ Commissioning:-
- i. PPEs (Helmet with company name/logo, Safety Goggles, Coverall, Ear-muff, Face Shield, Hand Gloves, High Ankle Safety Shoes, Gum Boot etc.)
  - ii. Barricading tape / warning signs
  - iii. Rechargeable Safety torch (flame-proof)
  - iv. Safety nets (with tie-chords)
  - v. Fall arresters
  - vi. Emergency Man-basket/rescue kit for height works
  - vii. Portable ladders (varying lengths)
  - viii. Life-lines (steel wire-rope, dia. not less than 8.0 mm)
  - ix. Full body double lanyard Safety harness with Rebar/ladder hook or scaffolding hook.
  - x. Lanyard
  - xi. Karabiner
  - xii. Retractable fall arresters (various length)
  - xiii. Portable fire extinguishers (DCP type) – 5 kg&10 kg capacity
  - xiv. Portable Multi Gas detector
  - xv. Sound level meter
  - xvi. Digital lux meter
  - xvii. Fire hoses & flow nozzles
  - xviii. Fire blankets/ Fire retardant cloth (with eyelets)
  - xix. Flame retardant/Flame resistant coverall-based on hazard identification & risk assessment, if required.

#### 3.3.4 Working at height

- a) The Contractor shall issue permit for working (PFW) at height after verifying and certifying the checkpoints as specified in the attached permit (Format No. HSE-6). He shall also undertake to ensure compliance to the conditions of the permit during the currency of the permit including adherence of personal protective equipment's. Contractor's Safety Officer shall verify compliance status of the items of permit document after implementation of action is completed by Contractor's execution / field engineers at work site. HIRAC for specific works at height duly commented by EIL/Owner, shall be kept attached with particular Permit for Work (PFW) at site for ready reference & follow-up.
- b) Such PFW shall be initially issued for one single shift or expected duration of normal work and extended further for balance duration, if required. EIL/Owner can devise block-permit system at any specific area, in consultation with project specific HSE Committee to specify the time-period of validity of such PFW or its renewal. This permit shall be applicable in areas where specific clearance from Owner's operation Deptt./Safety Deptt. is not required. EIL / Owner's field Engineers/Safety Officers/Area Coordinators may verify and counter sign this permit (as an evidence of verification) during the execution of the job.
- c) All personnel shall be medically examined & certified by registered doctor, confirming their 'medical fitness (Vertigo or epilepsy must be covered under test report) for working at height. Contractor shall develop the model for conducting vertigo test. The fitness examination shall be done once in six months. Sticker for "PASS FOR HEIGHT WORK" shall be pasted on the safety helmet of the site personnel.
- d) In case work is undertaken without taking sufficient precautions as given in the permit, EIL/Owner Engineers may exercise their authority to cancel such permit and stop the work till satisfactory compliance/rectification is arranged made. Contractors are expected to maintain a register for issuance of permit and extensions thereof including preserving the

- used permits for verification during audits etc.
- e) The Contractor shall arrange (at his cost) and ensure use of Fall Arrester Systems by his workers. Fall arresters are to be used while climbing/descending tall structures or vessels / columns etc. These arresters should lock automatically against the anchorage line, restricting free fall of the user. The device is to be provided with a double security opening system to ensure safe attachment or release of the user at any point of rope. In order to avoid shock, the system should be capable of keeping the person in vertical position in case of a fall. All the fall arrest systems should be cleaned after use and stored in a clean & dry area. Defective Safety Harness, lanyards & life line must be discarded from workplace and record to be maintained.
  - f) The Contractor shall ensure that Full body harnesses with double lanyards conforming EN361 and having authorized CC marking is used by all personnel while working at height. The lanyards and life lines should have enough tensile strength to take the load of the worker in case of a fall. One end of the lanyard shall be firmly tied with the harnesses and the other end with life line. The harness should be capable of keeping the workman vertical in case of a fall, enabling him to rescue himself.
  - g) The Contractor shall provide Roof Top Walk Ladders for carrying out activities on sloping roofs in order to reduce the chances of slippages and falls.
  - h) The Contractor shall ensure that a proper Safety Net System is used wherever the hazard of fall from height is present. The safety net, preferably a knotted one with mesh ropes conforming to IS 5175/ ISO 1140 shall have a border rope & tie cord of minimum 12mm dia. The Safety Net shall be located not more than 6.0 meters below the working surface extending on either side upto. sufficient margin to arrest fall of persons working at different heights.
  - i) In case of accidental fall of person on such Safety Net, the bottom most portion of Safety Net should not touch any structure, object or ground.
  - j) Grade separators shall be provided in Pipe-rack/Tech-structures to arrest falling objects like welding spatters, welding rods, nuts, bolts, tools etc. and to facilitate U/G and A/G works simultaneously.
  - k) Beam Clamps may be used for construction of localized temporary working platforms sheds for welding booths etc. at height in all types of steel structure due to faster installation and requirement of less scaffolding materials.
  - l) Hanging Platform, manufactured by Standard HSE equipment vendors must be encouraged for painting of Buildings etc.
  - m) All the tools used at height (like spanner, screw driver etc.) shall be provided with securing arrangement like back-pack/waist pouch to prevent accidental slippage from worker hand.
  - n) The Contractor shall install temporary lightening arrester in tall structures during construction to save human life and to avoid damage to equipment's & machineries. During the possibility of a thunderstorm, all the work at height where a person can be exposed to lightning shall be stopped.
  - o) To the extent possible use Roller arrangement to shift overhead pipes from one end to other in Pipe Racks Area.
  - p) Providing of steel scaffold stair tower system with landings at regular intervals as and when required for height work.
  - q) The Contractor shall ensure positive isolation while working at different levels like in the pipe rack areas. The working platforms with toe boards & hand rails shall be sufficiently strong & shall have sufficient space to hold the workmen and tools & tackles including the equipment's required for executing the job. Such working platforms shall have mid-rails, to enable people work safely in sitting posture.

### 3.3.5 Scaffoldings & Barricading

- a) Suitable steel scaffoldings only shall be provided to workmen for all works that cannot be safely done from the ground or from solid construction except such short period work that

can be safely done using ladders or certified (by 3<sup>rd</sup> party competent person) man-basket. When a ladder is used, an extra workman shall always be engaged for holding the ladder. The ladder shall be inspected before use for cracked or split stiles, missing, broken, loose or damaged rungs & splinters. The ladder shall be of adequate length to enable it to extend to at least 1.0m above the landing place or working point. Metallic ladders shall be only used as access.

- b) The Contractor shall ensure that the scaffolds used during construction activities shall be strong enough to take the designed load. Main Contractor shall always furnish duly approved construction-design details of scaffold & SWL (from competent designers) free of charge, before they are being installed/ constructed at site. Owner/EIL reserves the right to ask the Contractor to submit certification and or design calculations from his Head Office/ Design/Engineering expert regarding load carrying capacity of the scaffoldings. All steel tubing, couplers and fittings used for scaffolding shall conform to IS 3696 or an acceptable equivalent. Only metallic scaffold boards shall be allowed to use. Steel tubes shall be free from cracks, splits. Surface flaws & other defects. All couplers & fittings shall be properly oiled and maintained. Nuts shall have a free running fit on their bolts. Bolts with worn or damaged thread shall be replaced.
- c) All scaffolds shall be inspected by a competent Scaffolding Inspector (person with scaffolding related experience in construction field and having a training of scaffolding supervisor from a institute/agency like National Safety Council etc.). He shall paste a GREEN tag (duly signed by competent Scaffolding Inspector) on each scaffold found safe and a RED tag (duly signed by competent Scaffolding Inspector) on each scaffold found unsafe. Scaffolds with GREEN tag only shall be permitted to be used and Scaffolds with RED ones shall immediately be made inaccessible. Work being found continuing on scaffolds with RED tag shall be considered unauthorized work by Contractor and may invite penalization from EIL/Owner. For every 120-125 m<sup>2</sup> /m<sup>3</sup> area / volume or its parts thereof minimum one TAG shall be provided.
- d) The Contractor shall ensure positive barricading (indicative as well as protective) of the excavated, radiography, heavy lift, high pressure hydrostatic & pneumatic testing and other such areas. Sufficient warning signs shall be displayed along the barricading areas.
- e) Scaffolding shall be constructed using foot seals or base plates only. Base plates shall be used below each standard on surface. Sole plate of timber shall be used beneath the base plate to achieve greater load distribution.

### 3.3.6 Electrical installations

- a) All electrical installations/ connections shall be carried out as per the provisions of latest revision of following codes/standards, in addition to the requirements of Statutory Authorities and IE/applicable international rules& regulations:
- OISD STD 173 : Fire prevention & protection system for electrical installations
  - SP 30 (BIS) : National Electric Code
- b) All electrical installations shall be approved by the concerned statutory authorities.
- c) All temporary electrical installations / facilities shall be regularly checked by the licensed/competent electricians of the Contractor and appropriate records shall be maintained in format no: HSE-12" Inspection of temporary electrical booth/installation at project construction site". Such inspection records are to be made available to EIL/Owner, whenever asked for.

3.3.6.1 The Contractor shall meet the following requirements:

- a. Shall make Single Line Diagram (SLD) for providing connection to each equipment's & machinery and the same (duly approved by EIL/Owner) shall be pasted on the front face of DBs (distribution boards) or JBs (Junction boxes) at every site. (A typical Switch Board Sketch is attached as Appendix -G)
- b. Ensure that electrical systems and equipment including tools & tackles used during construction phase are properly selected, installed, used and maintained as per provisions of the latest revision of the Indian Electrical/ applicable international regulations.
- c. Shall deploy qualified & licensed electricians for proper & safe installation and for regular inspection of construction power distribution system/points including their earthing. A copy of the license shall be submitted to EIL / Owner for records. Availability of at least one competent (ITI qualified) / licensed electrician (by State Elec. authorities) shall be ensured at site round the clock to attend to the normal/emergency jobs.
- d. All switchboards / welding machines shall be kept in well-ventilated & covered shed/ with rain shed protection. The shed shall be elevated from the existing ground level to avoid water logging inside the shed. Installation of electrical switch board must be done taking care of the prevention of shock and safety of machine.
- e. No flammable materials shall be used for constructing the shed. Also flammable materials shall not be stored in and around electrical equipment / switchboard. Adequate clearances and operational space shall be provided around the equipment.
- f. Fire extinguishers and insulating mats shall be provided in all power distribution centers.
- g. Temporary electrical equipment shall not be employed in hazardous area without obtaining safety permit.
- h. Proper housekeeping shall be done around the electrical installations.
- i. All temporary installations shall be tested before energizing, to ensure proper earthing, bonding, suitability of protection system, adequacy of feeders/cables etc.
- j. All welders shall use hand gloves irrespective of holder voltage.
- k. Multilingual (Hindi, English and local language) caution boards, shock treatment charts and instruction plate containing location of isolation point for incoming supply, name & telephone No. of contact person in emergency shall be provided in substations and near all distribution boards / local panels.
- l. ELCB tester /test meter shall be used for testing the ELCBs operation. ELCBs testing shall be carried out by using ELCB tester on monthly basis but in specific cases like heavy rain as decided by owner/EIC. Record of the testing shall be maintained.
- m. Regular inspection of all installations at least once in a month. (Ref. Format HSE-12).

3.3.6.2 The following features shall also be ensured for all electrical installations during construction phase by the contractor:

- a. Each installation shall have a main switch with a protective device, installed in an enclosure adjacent to the metering point. The operating height of the main switch shall not exceed 1.5 M. The main switch shall be connected to the point of supply by means of armoured cable.

- b. The outgoing feeders shall be double or triple pole switches with fuses / MCBs. Loads in a three phase circuit shall be balanced as far as possible and load on neutral should not exceed 20% of load in the phase.
- c. The installation shall be adequately protected against overload, short circuit and earth leakage by the use of suitable protective devices. Fuses wherever used shall be HRC type. Use of rewirable fuses shall be strictly prohibited. ELCB/RCCB (Residual Current Circuit Breaker) must be fitted with all Electrical installation. The earth leakage devices shall have an operating current not exceeding 30 mA.
- d. All connections to the hand tools / welding receptacles shall be taken through proper switches, sockets and plugs.
- e. All single phase sockets shall be minimum 3 pin type only. All unused sockets shall be provided with socket caps.
- f. Only 3 core (P+N+E) overall sheathed flexible cables with minimum conductor size of 1.5 mm<sup>2</sup> copper shall be used for all single phase hand tools.
- g. Only metallic distribution boxes with double earthing shall be used at site. No wooden boxes shall be used.
- h. All power cables shall be terminated with compression type cable glands. Tinned copper lugs shall be used for multi-strand wires / cables.
- i. Cables shall be free from any insulation damage.
- j. Minimum depth of cable trench shall be 750 mm for MV & control cables and 900 mm for HV cables. These cables shall be laid over a sand layer and covered with sand, brick & soil for ensuring mechanical protection. Cables shall not be laid in waterlogged area as far as practicable. Cable route markers shall be provided at every 25 M of buried trench route.
- When laid above ground, cables shall be properly cleated or supported on rigid poles of atleast 2.1 M high. Minimum head clearance of 6 meters shall be provided at road crossings.
- k. Underground road crossings for cables shall be avoided to the extent feasible. In any case no underground power cable shall be allowed to cross the roads without pipe sleeve.
- l. All cable joints shall be done with proper jointing kit. No taped/temporary joints shall be used.
- m. An independent earthing facility should preferably be established within the temporary installation premises. All appliances and equipment shall be adequately earthed. In case of armored cables, the armour shall be bonded to the earthing system. IS: 3043 Code for earthing practices shall be followed at project site.
- n. All cables(green colour) and wire rope used for earth connections shall be terminated through tinned copper lugs.
- o. In case of local earthing, earth electrodes shall be buried near the supply point and earth continuity wire shall be connected to local earth plate for further distribution to various appliances. All insulated wires for earth connection shall have insulation of green colour. Periodical check tests of all electrodes should be carried out and record shall be maintained of such checks.

- p. Separate core shall be provided for neutral. Earth / Structures shall not be used as a neutral in any case.
- q. ON/OFF position of all switches shall be clearly designated / painted for easy isolation in emergency.

### 3.3.7 Welding/ Grinding/Gas cutting

- a) Contractor shall ensure that flash back arrestors conforming to BS:6158 or equivalent are installed on all gas cylinders as well as at the torch end of the gas hose, while in use.
- b) All cylinders shall be mounted on trolleys and provided with a closing key. Empty & filled-up gas cylinders shall be stored separately with TAG, protecting them from direct sun or rain. Minimum 2 nos. of Portable DCP type fire extinguishers (10 kg) shall be maintained at the gas cylinder stores. Stacking & storing of compressed gas cylinders shall be arranged away from DG set, hot works, Elect. Panels / Elec. boards, etc.
- c) The burner and the hose placed downstream of pressure reducer shall be equipped with Flash Back Arrester/Non Return Valve device.
- d) The hoses for acetylene and oxygen cylinders must be of different colours. Their connections to cylinders and burners shall be made with a safety collar.
- e) At end of work, the cylinders in use shall be closed and hoses depressurized.
- f) Cutting of metals using gases, other than oxygen & acetylene, shall require written concurrence from Owner.
- g) Grinding activity shall not be carried out in confined spaces without a valid work permit.
- h) All grinding/cutting machines shall be guarded and fitted with Dead-Man switch and this shall not be bypassed any time.
- i) All welding/grinding machines shall have effective earthing at least at distinctly isolated two points.
- j) In order to help maintain good housekeeping, and to reduce fire hazard, live electrode bits shall be contained safely and shall not be thrown directly on the ground.
- k) The hoses of Acetylene and Oxygen shall be kept free from entanglement & away from common pathways / walkways and preferably be hanged overhead in such a manner which can avoid contact with cranes, Hydraulic Mobile Crane or other mobile construction machinery.
- l) Hot spatters shall be contained / restricted appropriately (by making use of effective fire-retardant cloth/fabric) and their flying-off as well as chance of contact with near-by flammable materials shall be stopped. The Fire retardant blanket shall be woven from ceramic yarn with eyelets.
- m) The Contractor shall arrange adequate systems & practices for accumulation / collection of metal & other scraps and remnant electrodes and their safe disposal at regular interval so as to maintain the fabrication and other areas satisfactorily clean & tidy.
- n) All gas cylinders must have a cylinder cap on at all times when not in use.

### 3.3.8 Ergonomics and tools & tackles

- a) The Contractor shall assign to his workmen, tasks commensurate with their qualification, experience and state of health. Competency of the crane operator to be thoroughly checked prior to engaging in crane operation.
- b) All lifting tools, tackles, equipment, trailers, trucks/dumpers, accessories including cranes shall be tested periodically by statutory/competent authority for their condition and load carrying capacity. Valid test & fitness certificates from the applicable authority shall be submitted to Owner/EIL for their review/acceptance before the lifting tools, tackles,

- equipment, trailers, trucks/dumpers, accessories and cranes are used. Third party inspection certificate is mandatory for all lifting tools & tackles before put into use.
- c) Load testing of Cranes by competent person must be made mandatory after each modification/alteration of crane configuration/change in boom length. All heavy equipment's including cranes must be maintained in good condition & record of such maintenance shall be maintained. Routine preventive maintenance of the crane to be carried out & record to be maintained for such preventive maintenance. Healthiness of the crane to be checked by Crane Expert on regular basis as per manufacturer guidelines.
  - d) HIRAC/JSA for assembly/dismantling activity of the crane to be submitted for approval of EIC.
  - e) No one should stand/work below the mast & boom of the crane. Mast of the crane should not be used for unintended lifts.
  - f) Mast of the crane to be kept in right position during dismantling activity of the crane.
  - g) Log book of all crane to be maintained.
  - h) Only authorized person shall be allowed to give signal to the operator.
  - i) Lifting/Loading/Unloading activities shall be carried out by the trained riggers under supervision of rigging Foreman.
  - j) Prior to marching/movement of the crane, obstructions free access/route to be ensured.
  - k) Skilled Technician to be engaged for AC gas checking and refilling of refrigerant and should follow the safe operating procedure for cranes.
  - l) Manufacturer's instructions to be followed without any deviation.
  - m) The contractor shall not be allowed to use defective equipment or tools not adhering to safety norms.
  - n) Adequate capacity of Chain pulley blocks with valid TPI certificate to be used for lifting/lowering/dragging/erection of piping material .
  - o) Colour coding system for lifting tools & tackles shall be followed on quarterly basis for a particular colour as mentioned below:

Period	Colour Code
January, February, March	Blue
April, May, June	Yellow
July, August, September	Green
October, November, December	Orange
For Quarantine (Unsafe Tools & Tackles)	Red

Contractor shall arrange non-sparking tools for project construction works in operating plant areas / hydrocarbon prone areas.

- i. Wherever required the Contractor shall make use of Elevated Work Platforms (EWP) or Aerial Work Platforms (mobile or stationary) to avoid ergonomical risks and workmen shall be debarred to board such elevated platform during the course of their shifting / transportation.
- ii. Contractor shall ensure installation of Safe Load Indicator (SLI) on all cranes (while in use) to minimize overloading risk. SLI shall have capability to continuously monitor and display the load on the hook, and automatically compare it with the rated crane capacity at the operating condition of the crane. The system shall also provide visual and audible warnings at set capacity levels to alert the operator in case of violations.
- iii. The contractor shall be responsible for safe operations of different equipments mobilized and used by him at the workplace like transport vehicles, Tower Crane, engines, cranes, mobile ladders, scaffolding, work tools, etc. Strictly avoid standing close to Hydraulic Mobile Crane/vehicles tyres during operation.
- iv. The contractor shall deploy cranes in good working condition of maximum allowable years of service from the year of manufacture as specified below: -  
20 years for cranes of 50 MT & below capacity, 25 years for 51 MT to 100 MT, 30 years for cranes above 101 MT.



- v. In general Man basket shall not be lifted by Hydraulic Mobile Crane. Generally Crane shall be used for lifting the man basket.
- vi. Tower Crane, Crane, Hydraulic Mobile Crane or equivalent, Hydraulic Rig & Boom Lift shall be inspected on fortnightly basis as per Format No. HSE-20, HSE-21, HSE-22, HSE-23 & HSE-24.
- vii. The Contractor shall arrange periodical training for the operators of Hydraulic Mobile Crane, crane, excavator, mobile machinery, Tower Crane, etc. at site by utilizing services from renowned manufacturers.
- viii. Hydraulic Mobile Crane or equivalent having steering control mechanism shall be permitted at construction site only for the purpose of loading/unloading. However, continuous rigger availability during marching of hydraulic crane at site shall be ensured by contractor.

### 3.3.9 Occupational Health

- a) The contractor shall identify all operations that can adversely affect the health of its workers and issue & implement mitigation measures.
- b) For surface cleaning operations, sand blasting shall not be permitted even if not explicitly stated elsewhere in the contract.
- c) To eliminate radiation hazard, Tungsten electrodes used for Gas Tungsten Arc Welding shall not contain Thorium.
- d) Appropriate respiratory protective devices (hood with respiratory devices) shall be used to protect workmen from inhalation of air borne contaminants like silica, asbestos, gases, fumes, etc.
- e) Workmen shall be made aware of correct methods for lifting, carrying, pushing & pulling of heavy loads. Wherever possible, manual handling shall be replaced by mechanical lifting equipment's.
- f) Fuelling of construction equipments/Diesel Generator set shall be carried out by hand operated pump.
- g) In view of the congested working environment and associated hazards, deployment of manpower/machineries shall be in staggered manner keeping adequate safe distance between two adjacent work spot.
- h) For jobs like drilling/demolishing/dismantling/steam blowing/cardboard blasting etc. where noise pollution exceeds the specified limit of 85decibels, ear muffs shall be provided to the workers. The Noise level monitoring record shall be maintained.
- i) To avoid work related upper limb disorders (WRULD) and backaches, Display Screen Equipments' workplace stations shall be carefully designed & used with proper sitting postures. Power driven hand-held tools shall be maintained in good working condition to minimize their vibrating effects and personnel using these tools shall be taught how to operate them safely & how to maintain good blood circulation in hands.
- j) The Contractor shall arrange health check-up (by registered medical practitioner) for all the workers at the time of induction. Health check may have to be repeated if the nature of duty assigned to him is changed necessitating health check or doubt arises about his wellness. EIL/Owner reserves the right to ask the contractor to submit medical test reports. Regular health check-ups are mandatory for the workers assigned with Welding, Radiography, Blasting, Painting, Heavy Lift and Height (>2m) jobs. All the health check-ups shall be conducted by registered Medical practitioner and records are to be maintained by the Contractor.
- k) The Contractor shall arrange Medical Camps at regular intervals at work sites and labor colonies to assess health condition of workers.

- l) The Contractor shall ensure vaccination of all the workers including their families, during the course of entire project span.

### 3.3.10 Hazardous substances

- a) Hazardous, inflammable and/or toxic materials such as solvent coating, thinners, anti-termite solutions, water proofing materials shall be stored in appropriate containers preferably with lids having spillage catchment trays and shall be stored in a good ventilated area. These containers shall be labeled with the name of the materials highlighting the hazards associated with its use and necessary precautions to be taken. Respective MSDS (Material Safety Data Sheet) shall be made available at site & may be referred whenever problem arises.
- b) Where contact or exposure of hazardous materials are likely to exceed the specified limit or otherwise have harmful effects, appropriate personal protective Equipment's such as gloves, goggles/face-shields, aprons, chemical resistant clothing, respirator, etc. shall be used.
- c) The work place shall be checked prior to start of activities to identify the location, type and condition of any asbestos materials which could be disturbed during the work. In case asbestos material is detected, usage of appropriate PPEs by all personnel shall be ensured and the matter shall be reported immediately to EIL/ Owner.

### 3.3.11 Slips, trips & falls

- a) The contractor shall establish a regular cleaning and basic housekeeping programme that covers all aspects of the workplace to help minimize the risk of slips, trips & falls. The contractor shall take positive measures like keeping the work area tidy, storing waste in suitable containers & harmful items separately, keeping passages, stairways, entrances & exits especially emergency ones clear, cleaning up spillages immediately and replacing damaged carpet/ floor tiles, mats & rugs at once to avoid slips, trips & falls.
- b) Grating removal permit system should be implemented during construction phase. So that after permanent gratings are installed on platforms and tech structure floors; removal of any gratings for whatever purpose (including for lifting piping material etc.) is required to be sanctioned by signed permit by HSE officers of both contractor and Engineer-in-charge. The spot where gratings are removed shall be hard-barricaded during course of work. The removed gratings shall be re-installed immediately after completion of work or at the time of cessation of work every day whichever is earlier and the permit shall be closed on daily basis. A register shall be maintained for recording all the grating removal permits and their closure shall be monitored on daily basis.

### 3.3.12 Radiation exposure

- a) All personnel exposed to physical agents such as ionizing & non-ionizing radiation, including ultraviolet rays or similar other physical agents shall be provided with adequate shielding or protection commensurate with the type of exposure involved.
- b) For Open Field Radiography works, requirements of Bhabha Atomic Research Centre (BARC)/ Atomic Energy Regulatory Board (AERB) shall be followed.
- c) The Contractor shall implement an effective system of control (as described in the AERB regulations) at site for handling radiography-sources & for avoiding its misuse & theft.
- d) The contractor shall generate the Format No: HSE-8 "Permit for radiation work" before start of work.
- e) In case the radiography work has to be carried out at day time, suitable methodology to be used so that other works, people are not affected.

### 3.3.13 Explosives/Blasting operations

- a) Blasting operations shall be carried out as per latest Explosive Rules (Indian/ International) with prior permission. The Contractor shall obtain license from Chief Controller of Explosives (CCoE) for collection, transportation, storage of explosives as well as for carrying out blasting operations.
- b) The Contractor shall prepare exclusive method statement (in cognizance with statutory requirements) for rock blasting works & diffusing unfired explosives, if any, at project site before carrying out actual task. Nowhere blasting shall be carried out by the Contractor or its agency without the involvement of competent supervisor and licensed blaster.

#### 3.3.14 Demolition/ Dismantling

- a) The contractor shall adhere to safe demolishing/ dismantling practices at all stages of work to guard against unsafe working practices.
- b) The contractor shall disconnect service lines (power, gas supply, water, etc.)/ make alternate arrangements prior to start of work and restore them, if required as directed by EIL/ Owner at no extra cost.
- c) Before carrying out any demolition/dismantling work, the contractor shall take prior approval of EIL/Owner and generate the Format No.HSE-9. For revamp jobs in operating plants where location of underground utilities is not known with certainty, the contractor shall depute an experienced engineer for supervision and shall make adequate arrangements for Fire-fighting & First-Aid during the execution of these activities.
- d) The Contractor shall arrange approved HIRAC/ Method Statement for the specific demolition / dismantling task and corresponding action plan commensurate with hazards / risks associated therein. In no case any activity related to demolition / dismantling shall be carried out by the Contractor without engaging own supervision / field engineer.

#### 3.3.15 Road Safety

- a) The Contractor shall ensure adequately planned road transport safety management system.
- b) The vehicles shall be fitted with reverse warning alarms & flashing lights / fog-lights and usage of seat belts shall be ensured.
- c) The Contractor shall also ensure a separate pedestrian route for safety of the workers and comply with all traffic rules & regulations, including maintaining speed limit of 20 KMPH or indicated by owner for all types of vehicles / mobile machinery. The maximum allowable speed shall be adhered to.
- d) In case of an alert or emergency, the Contractor must arrange clearance of all the routes, roads, access. The Contractor shall deploy sufficient number of traffic controllers at project site routes / roads/ accesses, to alert reversing movement of vehicles & machinery as well as pedestrians. Experienced drivers/operators with valid driving license (LMV/HMV) shall be allowed to drive/operate the vehicles/equipment's. The Contractor shall maintain copy of PUC, RC and Insurance etc. for all the vehicles/equipment's.
- e) Dumpers, Tippers, etc. shall not be allowed to carry workers within the plant area and also to & from the labour colony to & from project sites.
- f) Hydraulic Mobile Crane or equivalent shall only be allowed for handling (loading/unloading) the materials at fabrication/ storage yards and in no case shall be allowed to transport the materials over project / plant roads.
- g) The Contractor shall not deploy any such mobile machinery / Equipment's, which do not have competent operator and / or experienced banks-man/signal-man. Such machinery/equipment's shall have effective limit-switches, reverse-alarm, front & rear-end lights etc. and shall be maintained in good working order.
- h) The Contractor shall not carry-out maintenance of vehicles / mobile machinery occupying space on project / plant roads and shall always arrange close supervision for such works.

- i) For pipeline jobs, the contractor shall submit a comprehensive plan covering transportation, loading / unloading of pipes, movement of side booms, movement of vehicles on the ROW, etc.
- j) Height barrier/Restriction to be provided on both side of the HT lines, if required.
- k) Contractor's shall arrange /install visible road signs, diversion boards, caution boards, etc. on project roads for safe movement of men and machinery.

### 3.3.16 Welfare measures

Contractor shall, at the minimum, ensure the following facilities at work sites:

- a) A crèche at site where 10 or more female workers are having children below the age of 6 years.
- b) Adequately ventilated / illuminated rooms at labour camps & its hygienic up-keeping.
- c) Reasonable canteen facilities at site and in labour camps at appropriate location depending upon site conditions. Contractor shall make use of "industrial" variety of LPG cylinder & satisfactory illumination at the canteens. Necessary arrangement for efficient disposal of wastes from canteens & urinals /toilets shall also be made and regular review shall be made to maintain the ambience satisfactorily hygienic & shall also comply with all applicable statutory requirements.
- d) Adequately lighted & ventilated Rest rooms at site (separate for male workers and female workers).
- e) Provision for suitable mobile toilets to be made available by Contractor for remote/scattered job locations.
- f) Urinals, Toilets, drinking water, washing facilities, adequate lighting at site and labour camps, commensurate with applicable Laws/ Legislation.
- g) The contractor shall ensure the test report of drinking water.
- h) The contractor at periodic interval shall arrange to prevent mosquito breeding by fumigation/spraying of insecticides at workplace/fabrication yard.

### 3.3.17 Environment Protection

Contractor shall ensure proper storage and utilization methodology of materials that are detrimental to the environment. Where required, Contractor shall ensure that only the environment friendly materials are selected and emphasize on recycling of waste materials, such as metals, plastics, glass, paper, oil & solvents. The waste that cannot be minimized, reused or recovered shall be stored and disposed of safely. In no way, toxic spills shall be allowed to percolate into the ground. The contractor shall not use the empty areas for dumping the wastes.

The contractor shall ensure availability of stack emission test report of DG set. Monitoring of air quality emission of DG stack shall be carried out on yearly basis. However, air quality emission shall be monitored first time on commissioning of DG Set.

Contractor to submit Environmental Aspect Impact Register detailing the list of activities in his scope, the respective environmental impact and the actions taken to minimize the impact. Environmental Aspect Impact Register to be prepared as per Format HSE-18 and to be updated and maintained till job completion. Environmental Aspect Impact Register of the contractor shall be reviewed by EIL/Owner on half-yearly basis.

The contractor shall strive to conserve energy and water wherever feasible.

The contractor shall ensure dust free environment at workplace by sprinkling water on the ground at frequent intervals. The air quality parameters for dust, poisonous gases, toxic releases,

harmful radiations, etc. shall be checked by the contractor on daily basis and whenever need arises.

The contractor shall not be allowed to discharge chemicals, oil, silt, sewage, sullage and other waste materials directly into the controlled waters like surface drains, streams, rivers, ponds. A discharge plan suggesting the methods of treating the waste before discharging shall be submitted to EIL/Owner for approval.

For pipeline jobs, top soil shall be stacked separately while making ROW through fields. This fertile soil shall be placed back on top after backfilling.

For offshore construction barges, arrangements shall be made for safe disposal of human, food & other wastes and applicable laws in this regard shall be followed.

### 3.3.18 Rules & Regulations

All persons deployed at site shall be knowledgeable of and comply with the environmental laws, rules & regulations relating to the hazardous materials, substances and wastes. Contractor shall not dump, release or otherwise discharge or dispose off any such materials without the express authorization of EIL/Owner. An indicative list of Statutory Acts & Rules relating to HSE is given under Appendix-D.

### 3.3.19 Weather Protection

Contractor shall take appropriate measures to protect workers from severe storms, rain, solar radiations, poisonous gases, dust, etc. by ensuring proper usage of PPEs like Sun glasses, Sun screen lotions, respirators, dust masks, etc. and rearranging/ planning the construction activities to suit the weather conditions. Effective arrangement (without creating inconvenience to project facilities & permanent installations) for protecting workmen from hailstorm, drizzle in the form of temporary shelter shall be made at site.

### 3.3.20 Communication

All persons deployed at the work site shall have access to effective means of communication so that any untoward incident can be reported immediately and assistance sought by them.

All health & safety information shall be communicated in a simple & clear language easily understood by the local workforce.

For information to all, typical subjects that should be communicated are: -

Inside the company (Top to down)

- a. Quality Policy
- b. HSE Policy contents
- c. Environment Policy
- d. HSE Objectives
- e. Safety Cardinal Rules
- f. HSE Target – reached or missed
- g. Praises & Warnings to personnel for HSE Management
- h. Safety Walk Through Reports and safety defects / shortfalls (by management)
- i. HSE Audit results
- j. Revised Statutory Health & Safety provisions, if any
- k. H & S publicity
- l. Suggestions

Inside the Company (Bottom to up)