SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
		• Configuration and diagnostic checks through universal Communicator / Hart configurator. • Zero flow test for flowmeter,if Applicable.					
4.2	**Wet/Gas calibration test**	• Flowmeter Calibration checks including accuracy at OEM place / Any recognized 3rd party lab like CEESI/TRANS CANADA, FCRI/NABL accredited etc. (As applicable) • Calibration should be 5-point calibration covering complete flow-range per datasheet. • Hysteresis, Linearity & repeatability checks for flow-meter.	100%	Inspection test records	-	H	R/W
5.0	Submission of Certificates/document	• Certificates from statutory labs like ATEX/ Baseefa IEC Ex/ KLPL/ CIMFR/ ERTL etc. for accessories. • BIS Approval for explosion proof items manufactured in India. • Statutory approval certificate from PESO for instruments used in hazardous area. • Degree of Protection certificate (IP) for instrument housing.	Prototype for each model	Statutory approval certificate/Type test reports	-	H	R

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SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
6.0	**Packing**	• Cleaning for oxygen and chlorine services. • Suitable protection for entry of foreign materials. • Proper moisture removal of flow-cell body after Hydro testing.	100%	Packing list and Supplier's test records	-	H	-
6.0	**Documentation and IC**						
6.1	Documentation and IC	• Review of Routine, Acceptance, Type test reports. • IC issuance/Dispatch Clearance	100% Supplier's Test	Records / Inspection Certificate	-	**H**	H/R

Legends: H- Hold (Do not proceed without approval), Random 10% , R-Review, RW-Random witness, W- Witness (Give due notice, work may proceed after scheduled date).

NOTES (As applicable):

1. Wherever W/R or H/W is indicated, Inspection Engineer shall decide the option to be exercised for the particular stage and supplier.
2. This document describes generally the requirements pertaining to all types of the item. Requirements specific to PO and the item are only applicable.
3. Acceptance Norms for all the activities shall be as per PO/PR/ Standards referred therein/ Job specifications /Approved documents.
4. For EPC jobs, Scope of Inspection shall be under TPIA only, unless specified otherwise.
5. 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.
6. $ - "Pipe/Spool", "Thermowells" shall be procured under Third Party Inspection appointed by Main Supplier.

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निर्माण स्थलों पर सकारात्मक सामग्री पहचान के लिए मानक विनिर्देश

STANDARD SPECIFICATION FOR POSITIVE MATERIAL IDENTIFICATION AT CONSTRUCTION SITES

Rev. No	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	Standards Bureau Chairman
					Approved by	
5	10/08/2023	Revised and updated	DK	DG	RKS	SM
4	23/07/2018	Revised and updated	SKG	AP	AKK	RKT
3	12/10/2015	Revised and updated	DJ	SNB	TKS	SC
2	14/11/2011	Revised and updated	SM	SM	MKG	DM
1	02/01/2007	Revised and updated	AS	MPJ	VNP	VC
0	22/07/2002	Issued as Standard Specification	MPJ	MPJ	RSG	GRR

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Abbreviations:

API	:	American Petroleum Institute
ASM	:	American Society for Metals
ASME	:	American Society of Mechanical Engineers
ASTM	:	American Society for Testing and Materials
AS	:	Alloy Steel
CS	:	Carbon Steel
EIL	:	Engineers India Limited
ITP	:	Inspection Test Plan
PMI	:	Positive Material Identification
RTJ	:	Ring Type Joint
SS	:	Stainless Steel
TPI/ TPIA	:	Third Party Inspection/Third Party Inspection Agency

Construction Standards Committee

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1.0 SCOPE

1.1 This specification applies to metallic alloy materials as well as carbon steel materials as defined in this document used in piping, heater coils, storage tanks, vessels etc. at construction sites. Positive Material Identification (PMI) is to be carried out on Owner supplied material as well on materials purchased by the contractor after installation (before testing). PMI may be carried out at the ware house also for identification / segregation of materials as per instruction of Engineer in Charge

1.2 Any deviation from this specification must be approved by Owner/ EIL in the prescribed format.

2.0 DEFINITIONS

2.1 Positive Material Identification (PMI)

The term Positive Material Identification (PMI) refers primarily for determination/ verification of alloy type or its composition using portable or mobile spectrometer/ alloy analyzer. For the purpose of this specification, some carbon steel materials as defined in clause no 3.1.11 in this document are also included for PMI checking to avoid mix up with Alloy steel during installation.

Chemical spot checking, resistivity testing, eddy current testing, electromagnetic alloy sorting, thermoelectric testing shall not be considered as PMI for the purpose of this specification.

3.0 SPECIFIC APPLICABILITY

3.1 The following items (AS/SS from clause 3.1.1 up to 3.1.10 and CS at clause 3.1.11) require PMI unless specifically exempted through a Concession/ Deviation permit by Owner/ EIL.

3.1.1 All pressure containing piping components including, thermowells instrument manifolds, RTJ gaskets, fasteners etc. All valves installed on line.

3.1.2 Tubular products used in the fabrication of heaters.

3.1.3 Pressure - containing instrument housings (e.g. gauge glass housings, orifice meter tubes).

3.1.4 Internal metallic linings/cladding, and weld overlay, done at site, used for protection against corrosive environments. Weather protection jacket (cladding) materials, securement bands /wires, screws, rivets, 'S' & 'J' – clips etc used for insulation works.

3.1.5 Tubing

3.1.6 Stud, bolts and nuts

3.1.7 Plates

3.1.8 All pressure containing welds.

3.1.9 Pipe supports (welded/ bolted) such as pads, saddles, dummy pipes etc.

3.1.10 Any other components or materials specifically designated for PMI on the purchase order/ contract.

3.1.11 a) Pressure containing CS piping components of rating 900# and above
b) Pressure containing CS steel piping items under H_2 service.

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c) Pressure Containing CS Piping NACE MR0103 is applicable as per PMS.

3.2 Exclusions

The following items are exempted unless specifically designated for PMI in the purchase order/contract:

3.2.1 Gaskets (spiral wound or carbon steel only).

3.2.2 Internal instrument parts.

3.2.3 Internal machinery parts.

3.2.4 Internal non pressure - containing baffles, trays, tray clips, supports, pall-rings, support rings, etc.

3.2.5 Electrical components.

3.2.6 Internal valve components.

3.2.7 Compression-type ferrules and fittings for use with 3/4 inch (19mm) outside diameter and smaller tubing.

3.2.8 All carbon steel piping components (including carbon steel pipe supports) other than those specified at 3.1.11.

3.2.9 All carbon steel Studs/ bolts/ nuts.

3.2.10 Carbon Steel Plates.

4.0 REFERENCES

American Society of Mechanical Engineers (ASME) BPV Code Section-II Part A, B and C.

ASME B 31.3

American Society for Testing and Materials (ASTM): As applicable

Material Verification Program for New and Existing Alloy Piping Systems: API RP 578

Any other material specification referenced by the Purchase Order/Contract.

IS 1239, IS 3589 and other relevant BIS codes.

5.0 GENERAL REQUIREMENTS

5.1 The test methods outlined in this specification are intended to identify the nominal composition of alloy/ Stainless steel materials. These test methods are not intended to establish the conformance of a material to a particular specification.

5.2 PMI shall not be considered as a substitute for required mill test reports listing chemical composition. In addition, mill test reports shall not be considered as confirming alloy/ composition verification.

5.3 The PMI activity shall be included in the overall quality plan and Inspection & Test Plan for fabrication/ erection. The contractor shall submit to EIL/ Owner, a procedure for PMI to

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comply with the requirements of this specification. Approval of PMI procedure shall be obtained from Owner/ EIL prior to commencement of fabrication/ erection as the case may be.

5.4 Contractor shall engage reputed TPIA specified in the contract to witness inspection at site and accordingly submit ITP for review of owner/ EIL. In case list of approved TPIA is not available in contract, prior approval shall be taken before engagement of TPIA.

5.5 A copy of PMI records duly verified by TPIA shall be submitted to Owner/ EIL.

5.6 After installation, but prior to hydrostatic testing/ painting/ insulation, the contractor shall examine all components requiring PMI for proper compliance to this specification. A record of this final check duly endorsed by TPIA, as specified below, shall be submitted to EIL/ Owner and made part of the permanent inspection records.

5.6.1 Owner Supplied Material

Records signed by contractor and duly verified by TPIA (engaged by contractor)/ and reviewed by EIL/ Owner shall be generated as part of the receiving inspection at warehouse.

5.6.2 Contractor Supplied Material

Records signed by contractor and certified by an approved third party inspection agency.

5.7 After acceptance, all components shall be marked with a suitable and readily visible paint mark. These markings are in addition to markings / colour coding required by other codes/ specifications/ Technical Notes.

5.8 Controls shall be established to keep the non conforming items identified till proper resolution of non conformity.

5.9 EIL/ Owner shall have the right to witness the performance of any PMI test.

6.0 EXTENT OF PMI

PMI shall be done on each component (100 percent PMI inspection) including welds (Except carbon steel Piping welds), unless specifically exempted by Owner/ EIL.

PMI shall be done on pipe supports (welded/ bolted) such as pads, saddles, dummy pipes etc. (100 percent PMI inspection) in all piping systems of alloy material

PMI shall be done on all bolts and nuts (100 percent PMI inspection) of flange joints in all piping systems of alloy material.

7.0 PMI OF PIPING AND HEATER COIL COMPONENTS

PMI testing (irrespective of PMI done at earlier stages) shall be carried out when piping loops/ heater coils have been cleared for hydrostatic testing by EIL/ Owner. Hydrostatic Testing shall be carried out only when non conforming components have been replaced with conforming components and subsequent Non Destructive Testing, Post Weld Heat-Treatment, Hardness checking and re verification by PMI etc., as required by specifications have been completed. PMI records shall form a part of piping/ heater inspection records. Contractor shall demonstrate to EIL that each & every component of the piping system and heater coils has been subjected to PMI by providing line wise records of PMI duly endorsed by TPIA .

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8.0 TESTING METHODOLOGY

8.1 The method used for PMI examination shall provide a quantitative determination of the alloying elements like chromium, nickel, molybdenum or vanadium in alloy steel items for the characteristic elements specified in clause 9.0

8.2 Instruments or methods used for PMI examination shall be able to provide quantitative, recordable, elemental composition results for positive identification of elements.

8.3 The acceptable instruments for alloy analyzer shall be either "portable X-ray Fluorescence" or "optical Emission type each capable of verifying the percentage of elements within specified range .The instruments must have the printout facility and sensitivity to detect the elements in the specified range.

8.4 Chemical spot testing, magnets, alloy sorters and other methods using eddy current or triboelectric testing methods are not acceptable for PMI examination.

8.5 All PMI instruments shall have been serviced within a 6 month period of the time of use to verify the suitability of batteries, sources,etc, and the date of the last service shall be stated on the PMI report form.

8.6 The surfaces to be examined shall be prepared and cleaned by suitable means before PMI so that surface be free from grease, oil, paint or oxides. Testing shall be done after proper surface cleaning and other requirements as outlined by the manufacturer of the portable alloy analyzer. Modification, if any, of these procedures must be approved by Owner/ EIL.

8.7 Ring type joint gaskets shall be inspected by using portable X-ray fluorescence instrument.

9.0 CHARACTERISTIC ELEMENTS

Material Specification		Characteristic Elements
ASTM A 335	Gr P11	Cr, Mo
	Gr P5	
	Gr P22	
	Gr P9	
	Gr P91	Cr, Mo, V
ASTM A 312	Type 304	Cr, Ni
	Type 316	Cr, Ni, Mo
	Type 321	Cr, Ni, Ti
	Type 347	Cr. Ni, Columbium, Tantalum

9.1 Carbon Steel materials under clause no 3.1.11 shall be checked to confirm that no mix up has taken place with alloy steel components.

9.2 Characteristic elements for materials not listed above shall be proposed by the contractor for approval of the Owner/ EIL

10.0 CALIBRATION

10.1 Instruments used for PMI shall have the sensitivity to detect the alloying elements in the specified ranges. Instruments or methods used for examination shall be of the type that will provide quantitative, recordable, elemental composition results for positive identification of the alloy elements present.

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10.2 Each alloy analyzer shall be calibrated using known alloy standards for intended materials to be checked by PMI. A calibration certification from the Manufacturer or his authorized agency shall be submitted to EIL/ Owner for records.

10.3 EIL/ Owner shall review the procedure and qualification and witness sample alloy/ carbon steel materials verification tests to confirm that the procedures, equipment and personnel are capable of providing consistent and accurate results. Certified samples, with full traceability, of a known alloy materials/ carbon steel materials shall be available for use as a random spot checking on instrument calibration.

11.0 SITE VERIFICATION OF ANALYZER

Verification using Standard samples supplied by institutes such as ASM (American Society of Metals) for the intended materials type and grade shall be performed each day before using the analyzer. Such verification shall be done again if PMI test is to be performed on different grade or type of material.

12.0 PERSONNEL QUALIFICATION

The persons performing the PMI test should be knowledgeable about properties of material, all aspects of operation of PMI equipment including the method of testing. Qualification/ experience documents of the person performing the PMI test including his training and experience shall be submitted to EIL/ Owner for review and approval.

13.0 ACCEPTANCE CRITERIA

13.1 Base Metal

PMI test results showing presence of characteristic elements upto 10% less than the minimum specified value in the material specification and upto 10% more than the maximum specified value in the material specification shall be acceptable.

13.2 Deposited Weld Metal

For deposited weld metal between base metals of the same specification using matching consumables, the recorded presence of characteristic elements upto 12.5% less than the minimum specified value in the welding consumables specification and upto 12.5% more than the maximum specified value in the welding consumable specification shall be acceptable.

14.0 REJECTION CRITERIA

14.1 If the PMI test results fall outside the acceptable range as given in 13.0 above, the contractor shall obtain a quantitative check analysis performed by a laboratory acceptable to EIL/ Owner for a complete chemical analysis. Results of this analysis shall be submitted to EIL/ Owner, with contractor's recommendation, for final decision.

Decision of EIL/ Owner shall be final in this regard.

14.2 If any material component or weld is found unacceptable, all other represented materials (e.g. in case of fasteners, supports) or welds shall be considered suspect. In such cases, the contractor has the following options:

14.2.1 Scrapping all those represented materials or components and replacing with new components or welds.

14.2.2 Performing 100% examination of the remainder of the represented materials/ components and replacing each item that fails the PMI check.

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14.2.3 If the performance of any verification activity is unacceptable to EIL/ Owner or if any material has been incorrectly identified, all further tests shall be subject to EIL/ Owner approval until the problem is corrected.

15.0 DOCUMENTATION

15.1 Print out from alloy analyzer, in original, duly verified by the TPIA engaged by contractor, Contractor and PMI agency.

15.2 PMI report as per format No. 6-82-0002-F1

15.3 Basis and action for resolving and documenting PMI non conformances.

15.4 Contractor shall demonstrate to EIL/ Owner that all components requiring PMI have been subjected to PMI testing and accepted.

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POSITIVE MATERIAL IDENTIFICATION TEST REPORT

REPORT NO: _____

Contractor _____ Date of PMI _____

Project _____ Inspection Agency _____

Location _____ PMI Agency _____

Job No. _____ PMI Equipment Model _____

Line No./ ISO Drg. No./ Make & Serial No. _____

Heater No./ Drawing No. _____ Last Service date _____

Sr. No.	Part Identification	Material As per Drg./ Spec.	Material as per PMI	Result (Accepted/ Rejected/ Retest)

_____ _____ _____

(PMI AGENCY) **(CONTRACTOR)** **(TPI AGENCY)**

(EIL/ OWNER *)

*Sample verification

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पैकेज इकाइयों के लिए साइट निष्पादन गारंटी अपेक्षाएँ तैयार करने हेतु विक्रेता को अनुदेश

INSTRUCTIONS TO VENDOR FOR SITE PERFORMANCE GUARANTEE REQUIREMENTS FOR PACKAGE UNITS

Rev. No	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	Standards Bureau Chairman
					Approved by	
2	30.03.2019	Reaffirmed & Reissued	RRS	PPP	RP	RKT
1	30.05.2008	Revised & Reissued	SMA	PKR	AA	VC
0	10.11.2003	ISSUED AS STANDARD	PKR	PM	VC	SKG

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Abbreviations:

LSTK	:	Lumpsum Turnkey
PG	:	Performance Guarantee

General Engg. Standards Committee

Convenor : Ms R Priyamvada (Convenor)

Members :
Mr BR Bhogal (Elect.)
Mr Rajan Srivastava (Strl.)
Mr RB Bhutda (EWS)
Mr Amrendra Kumar (Piping)
Ms NP Guha (Projects)
Mr Amit Prakash (FEM)
Mr KJ Harinarayanan (SME)
Mr VK Tonger (Process-1)
Mr Satyabrata Biswas (Process-2)

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1.0 INTRODUCTION

As a part of engineering services, EIL procures different types of Package Units for various Projects, for and on behalf of the Owner/Purchaser. The vendor is required to design, engineer, manufacture/ procure, inspect, test and supply to site, and also in many cases construct/erect, commission and Performance test the Package Units before handing over the same to Owner/Purchaser, based on Process and Technical requirements defined in the Inquiry/Order document.

2.0 PURPOSE

This document provides instructions to Vendor for Site Performance Guarantee (PG) Requirements for Package Units and shall form a part of the contract, wherever site performance guarantee test is specified in the Inquiry/Order document. The aim is to provide clarity to the Vendor as well as the Commissioning team on site performance guarantee parameters, their measurements during PG Test, and the acceptance of the Package Unit by the Owner/Purchaser after the successful PG Test.

3.0 SCOPE

The requirements of this standard are applicable for all Package Units including LSTK Bid Packages, which require Performance Guarantee Test, after installation and commissioning of the unit at site.

4.0 DEFINITIONS

4.1 "Vendor" means the person(s), company, organization from whom EIL procures products/services as a part of services rendered to the Owner/Purchaser. "Contractor", "Supplier" are considered synonymous to "Vendor".

4.2 "Owner" means the person(s), company, organization to whom EIL is rendering services for the Project.

4.3 "Purchaser" means the person(s), company, organization which awards order for the Package Unit on the Vendor.

5.0 PERFORMANCE GUARANTEE TESTING AT SITE

5.1 General

5.1.1 The overall performance testing of the completely assembled/erected Package unit as a whole shall be carried out at site to establish the performance guarantee parameters specified in Inquiry/Order document. In addition, certain critical equipment/sub-packages may also be performance tested at site if so specified in Inquiry/Order document. The duration of site performance guarantee run shall be as defined in the Inquiry/order document.

The measured parameters, where necessary, shall be adjusted to account for the variation in ambient/operating conditions actually prevailing at site during performance testing, before comparing it with the guaranteed value.

5.1.2 Performance test shall be carried out as per relevant Codes, Standards and Specifications. The Vendor shall submit the following during detail engineering and the same shall be subject to Owner/Purchaser's approval:

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- Detailed Test procedure including measurement tolerances, if applicable, calculations/ correction curves for changes in ambient/ operating conditions, and complete test layout, etc.

- Site Performance Guarantee Test Proforma completed in line with enclosed format 7-76-0103-F1.

- Vendor shall list out parameters to be measured and corresponding installed instrument type and tag no. to be used for measurements. Any instrument/measurement device, (required for testing) not installed at site, shall be arranged by vendor. Vendor shall furnish list of such instruments alongwith instrument details.

- Log sheets indicating all parameters that are to be recorded.

- Method of computation of test results including interpretation of test results.

5.2 Test Instruments

All necessary test instruments required for measuring the performance guarantee parameters shall be arranged by the vendor free of charge. These instruments shall be tested & calibrated from reputed test houses like National Physical Laboratories (NPL), Institute for Design of Electrical Measuring Instruments (IDEMI), Electronics Regional Test Laboratories (ERTL) or any other test house approved by the Owner. All test instruments shall have valid calibration reports. The Vendor shall furnish calibration certificates before putting them to use and also, wherever applicable, after completion of the PG test.

5.3 Performance Guarantee Parameters

Guarantee performance parameters shall be as defined in the Process/Mechanical data sheets, Specification, etc. included in the Inquiry/Order document.

5.4 Repair/Rectification/Modification

5.4.1 In case the unit fails to meet the guaranteed parameters, the Vendor shall carryout, necessary repair, rectification and modification within the time frame defined in the contract or as mutually agreed with the Owner/Purchaser, at his own risk and cost to establish the guaranteed parameters in the final performance test. All costs involved for above activities i.e. supply of manpower, materials, consumables and machines etc. shall be to Vendor's account.

5.4.2 Inspite of repair/rectification, incase the guaranteed performance parameters are not met, penalty/rejection as defined in the contract document for shortfall from guaranteed performance parameters shall be applied.

6.0 SITE PERFORMANCE GUARANTEE TEST PROFORMA

Typical Proforma shown in enclosed Format 7-76-0103-F1, shall be used for assessment of Performance guarantee parameters during site PG test.

7.0 ATTACHMENTS

Format No. 7-76-0103-F1	:	SITE PERFORMANCE GUARANTEE TEST PROFORMA.

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SITE PERFORMANCE GUARANTEE TEST PROFORMA

Client : *
Package Unit/System: *

Project/Location : *
Order No. : *

EIL Job No. : *
Vendor : *

1. **PACKAGE OPERATING CONDITION (FOR GUARANTEE):**

Operating Parameter	Values as per Inquiry/Order	Value (Actual at site)
*	*	

2. **PERFORMANCE :**

SITE PERFORMANCE TEST PROCEDURE DOC. NO: *

TEST PERIOD:

Parameter (1) *	Measuring Unit (2) *	Guaranteed Value (3) *	Permissible Tolerance (4) *	Measured Value at site (5)	Value after correction for site conditions (6)	Deviation (6) w.r.t.- (3)	Remarks (Acceptable-Y/N) (7)
a)							
b)							
c)							
d)							
e)							

Vendor's Representative
Date

Owner's Commissioning Incharge
Date

Owner
Date

* TO BE FILLED-UP AND/OR DEVELOPED BY VENDOR & SUBMITTED ALONGWITH PERFORMANCE TEST PROCEDURE.

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3. OBSERVATIONS:

4. CONCLUSIONS :

Vendor's Representative	**Owner's Commissioning Incharge**	**Owner**
Date	Date	Date

Copy : Engineer-In-Charge.

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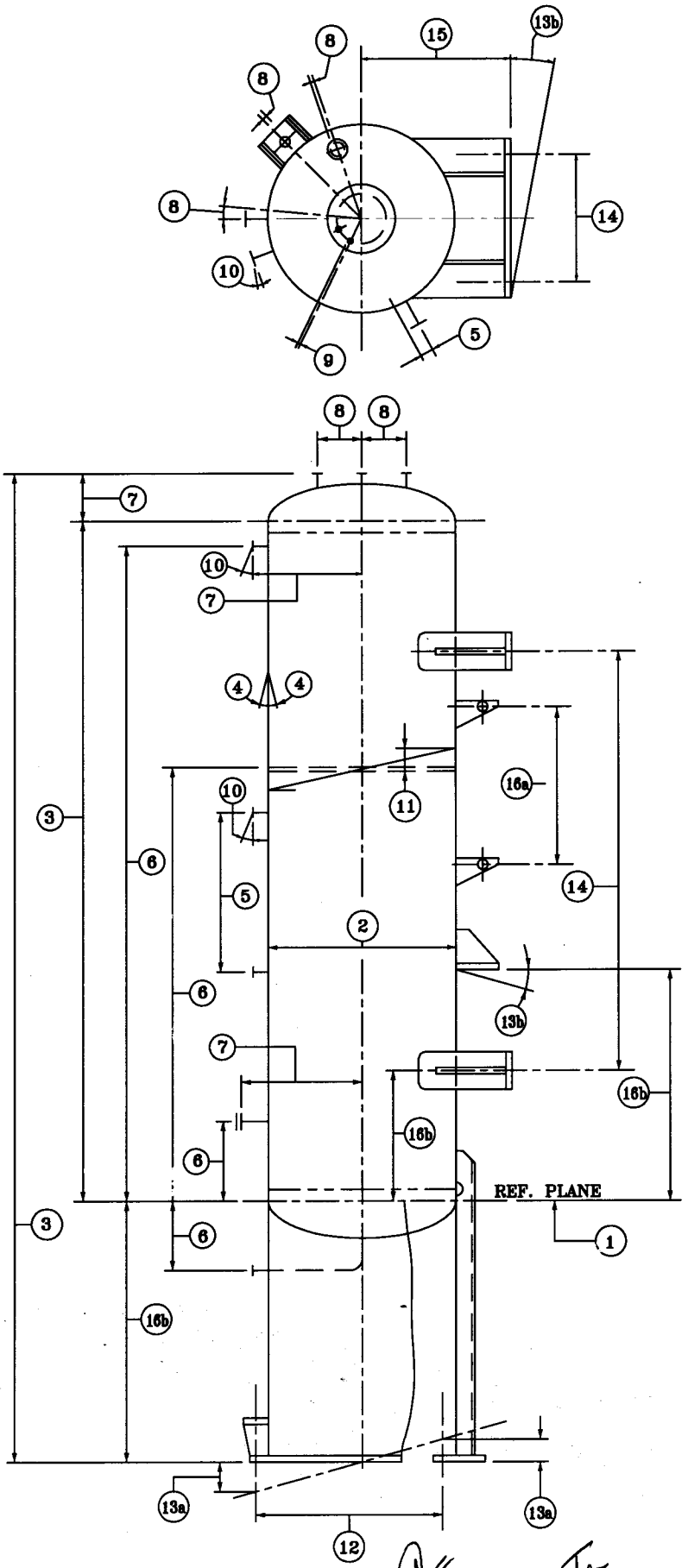

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	UNIKHIL		NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

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NOTES

1. REFERENCE LINES SHALL BE LIGHTLY PUNCH-MARKED INSIDE AND OUTSIDE AROUND THE CIRCUMFERENCE OF THE SHELL PLATE ON THE TANGENT LINES OF THE VESSEL.
2. a) OUT OF ROUNDNESS (OVALITY) SHALL BE AS PER APPLICABLE CODE.
   b) OUTSIDE CIRCUMFERENCE OF SHELL SHALL BE WITHIN THE FOLLOWING LIMITS.
   ± 10 mm FOR NOMINAL DIAMETER 1200 mm AND UNDER.
   ± 12 mm FOR NOMINAL DIAMETER 1201 mm THROUGH 2400 mm.
   ± 20 mm FOR NOMINAL DIAMETER ABOVE 2400 mm.
   c) FOLLOWING TOLERANCES ON DIAMETER SHALL APPLY THROUGHOUT ITS LENGTH FOR VESSELS WITH TRAYS AND / OR PACKING. (FOR CARTRIDGE TYPE TRAY REFER SPECIAL NOTE-E).

VESSEL NOM. DIA.	TOLERANCE ON NOM. DIA.
2000 mm AND UNDER	± 0.5%
2001 mm TO 4000 mm	GREATER OF ± 10 mm OR ± 0.35%
4001 mm TO 8000 mm	GREATER OF ± 14 mm OR ± 0.25%
ABOVE 8000 mm	TO BE SPECIFIED ON VESSEL DRAWING.

3. TOLERANCE FOR LENGTH ± 5 mm PER 3000 mm, MAXIMUM 15 mm.
4. OUTSIDE SURFACE OF CYLINDER MAY BE OUT OF ALIGNMENT / STRAIGHTNESS NOT MORE THAN 6 mm PER 6000 mm STRAIGHT LENGHT, BUT NOT MORE THAN 20 mm FOR ANY LENGTH.
5. TOLERANCE FOR CENTRE TO CENTRE DISTANCE BETWEEN ANY PAIR OF INSTRUMENT CONNECTIONS TO BE AS FOLLOWS:-
   DISTANCE BETWEEN NOZZLES : ± 1 mm
   ORIENTATION : ± 1 mm
   NOZZLE FACE INCLINATION : ± 1/4°
6. ELEVATIONS FROM REFERENCE PLANE MAY VARY AS FOLLOWS:-
   MANHOLE: ± 12 mm, NOZZLE ± 6 mm, INTERNAL SUPPORTS: ± 3 mm, EXCEPT THAT LOCATIONS OF MANHOLES AND NOZZLES NEAR THE TRAY SHALL NOT VARY MORE THAN ± 3 mm FROM THE TRAY.
7. PROJECTION OF FLANGE FACE FROM SHELL CENTRAL LINE / TANGENT LINE MAY VARY ± 5 mm FOR NOZZLES AND ± 12 mm FOR MANHOLES.
8. CIRCUMFERENTIAL AND RADIAL DEVIATION OF NOZZLES, MANHOLES AND SUPPORTS FROM THE TRUE POSITION SHALL NOT VARY MORE THAN ± 3 mm.
9. BOLT HOLE ORIENTATION OF NOZZLES MAY VARY ± 2 mm AT BOLT CIRCLE.
10. VERTICAL AND HORIZONTAL DEFLECTION OF NOZZLE FLANGE FACES FROM PLANES NORMAL TO NOZZLE CENTRE LINES OR PARALLEL TO VESSEL CENTRE LINE SHALL NOT BE MORE THAN ± 1/2°
11. ALL TOLERANCES OF TRAY SUPPORTS TO BE AS PER TRAY SPECIFICATIONS / DRAWING.
12. THE BASE RING BOLT CIRCLE DIAMETER MAY VARY ± 5 mm. FOR ANY DIAMETER MEASURED AT POINTS 90° APART, DISTANCE BETWEEN TWO CONSECUTIVE HOLES MAY VARY BY ± 5 mm.
13. a) DEVIATION OF SUPPORT BASE FROM HORIZONTAL MAY BE AS FOLLOWS:-
    FOR VESSEL DIA. 1500 mm AND UNDER 3 mm
    FOR VESSEL DIA. OVER 1500 mm TO 2000 mm 5 mm
    FOR VESSEL DIA. OVER 2000 mm TO 4000 mm 6 mm
    FOR VESSEL DIA. OVER 4000 mm TO 5000 mm 8 mm
    FOR VESSEL DIA. OVER 5000 mm 10 mm
    b) DEVIATION OF SUPPORT BASE FOR BRACKET TYPE SUPPORT / SADDLE SUPPORT FROM HORIZONTAL MAY BE ± 1°
14. DISTANCE BETWEEN CL TO CL OF SUPPORTS AND BOLT HOLES IN SUPPORTS FOR HORIZONTAL VESSELS MAY VARY ± 3 mm.
15. DISTANCE BETWEEN CENTRE LINE OF HORIZONTAL VESSEL AND BOTTOM OF SUPPORT MAY VARY ± 3 mm.
16. a) TOLERANCE FOR CENTRE TO CENTRE DISTANCE BETWEEN ANY PART OF EXTERNAL STRUCTURAL ATTACHMENT SHALL NOT VARY MORE THAN ± 3 mm.
    b) TOLERANCE FOR DISTANCE FROM REFERENCE PLANE TO BASE OF VERTICAL SUPPORTS AND CENTRE LINE OF SADDLE SUPPORT MAY VARY ± 6 mm.

SPECIAL NOTES

A. CUMULATIVE TOLERANCES ON CONSECUTIVE DIMENSIONS SHALL BE LIMITED BY OVERALL DIMENSIONAL TOLERANCES. ALL TOLERANCES ARE FROM REFERENCE PLANE UNLESS OTHERWISE INDICATED.

B. INTERFERENCE BETWEEN INTERNAL AND EXTERNAL PARTS OR ANY RESTRICTION TO THE INTENDED FUNCTION OF ANY PART SHALL BE KEPT IN VIEW WHERE TOLERANCES ARE CUMULATIVE.

C. SPECIFIC TOLERANCES FOR ANY PART SHOWN ON EIL DRAWING SHALL BE GIVEN PREFERENCE TO THOSE GIVEN IN THIS STANDARD.

D. UNUSUALLY LARGE OR COMPLEX VESSELS MAY BE EXECUTED AS PER FABRICATOR'S STANDARD WHEN THE TOLERANCES AS SHOWN ARE UNREASONABLE. IN SUCH INSTANCES FABRICATOR'S TOLERANCES & LIMITS MUST BE SUBMITTED FOR APPROVAL.

E. VESSEL UPTO AND INCLUDING 750 mm NOMINAL DIAMETER SHALL HAVE CARTRIDGE TYPE TRAY. FOLLOWING TOLERANCES ON DIAMETER SHALL APPLY THROUGHOUT ITS LENGTH.

VESSEL NOMINAL DIAMETER	TOLERANCE
500 mm AND UNDER	VESSEL I.D. $^{+1\ mm}_{-0\ mm}$
501 mm TO 750 mm	VESSEL I.D. ± 3 mm

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7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	SK	NK	SM
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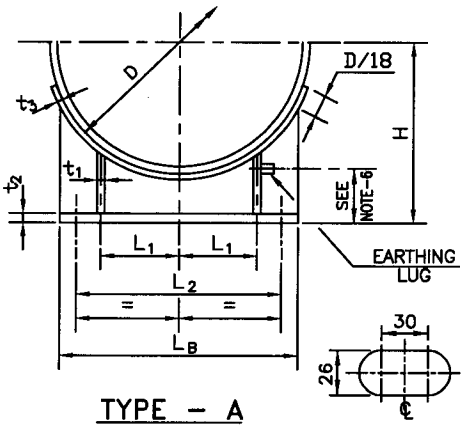
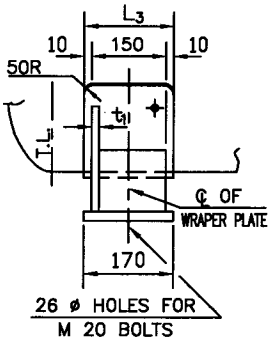
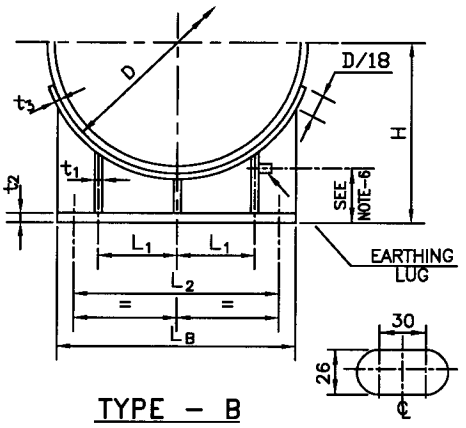
SUPPORT FOR HORIZONTAL VESSEL



TYPE – A



HOLE FOR SLIDING SUPPORT



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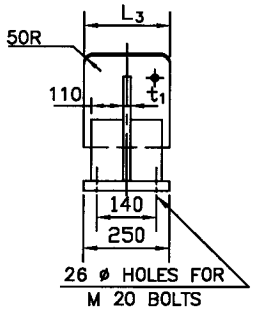
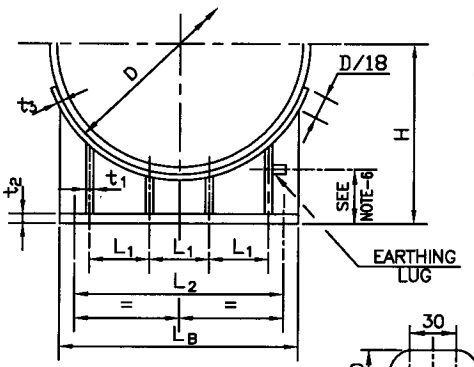
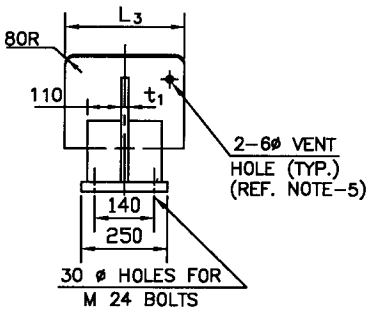


HOLE FOR SLIDING SUPPORT



TYPE – C, D, E



HOLE FOR SLIDING SUPPORT

D	L_B	H	L_1	L_2	TYPE	MAX. LOAD PER SADDLE (M. TON)	APPROX. WT. PER SADDLE (KGS.)
300	260	300	50	200	A	4.4	17
350	280	325	55	210	A	4.8	18
400	330	350	75	250	A	4.5	20
450	370	375	95	300	A	3.6	22
500	450	450	125	370	A	14.9	40
600	560	500	175	470	A	13.2	50
700	650	550	225	570	A	11.0	55
800	750	600	275	670	A	10.6	65
900	850	650	300	760	A	11.0	75
1000	950	700	330	820	B	12.3	85
1200	1100	800	375	960	B	19.4	130
1400	1250	900	465	1150	B	19.7	140
1600	1450	1000	370	1300	C	23.3	165
1800	1600	1100	410	1450	C	39.1	260
2000	1750	1200	445	1600	C	43.5	290
2200	1950	1300	495	1800	D	49.1	295
2400	2150	1450	545	2000	D	53.5	390
2600	2300	1550	585	2150	D	52.9	440
2800	2500	1650	620	2300	E	52.7	475
3000	2670	1750	670	2500	E	64.9	600
3200	2800	1850	710	2600	E	63.8	620
3400	3000	1950	760	2800	E	64.9	630
3600	3200	2050	830	3000	E	60.5	725
3800	3350	2150	845	3150	E	61.0	745
4000	3550	2250	895	3300	E	60.6	820

TYPE	t_1	t_2	L_3	t_3
A	10	10	170	12
B	10	12	250	12
C	12	16	300	16
D	16	20	350	20
E	20	20	400	20

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. VESSEL DIAMETER 'D' REFERS TO THE OUTER DIAMETER OF THE SHELL.
3. FOR INTERMEDIATE DIAMETERS TAKE THE IMMEDIATE NEAREST DIAMETER SUPPORT.
4. WELDING SHALL BE DONE ALL AROUND AND SHALL BE CONTINUOUS FILLET WELD. WELD SIZE SHALL BE 6 mm FOR VESSELS UPTO 1400 mm DIA. AND 8 mm FOR VESSELS ABOVE 1400 mm DIA.
5. PROVIDE 2 NO. 6ø VENT HOLES IN SADDLE WRAPPER PLATE. THESE HOLES SHALL BE PROVIDED DIAGONALLY OPPOSITE AND BE LEFT UNPLUGED AND SHALL BE FILLED WITH HARD GREASE ONLY.
6. WHERE EARTHING LUG CANNOT BE PUT AT AN ELEVATION OF 400 mm ABOVE THE SADDLE BASE PLATE IT SHALL BE LOCATED AS HIGH AS POSSIBLE.
7. EARTHING LUGS ARE NOT TO BE PAINTED OR GALVANIZED.
8. DETAIL, DIMENSIONS AND NOTES IN ENGINEERING DRAWING TAKE PRECEDENCE OVER THOSE SHOWN HERE.
9. MATERIALS SHALL BE AS PER ENGINEERING DRAWING.
10. EARTHING LUG SHALL BE AS PER STANDARD 7–12–0026.

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Approved by

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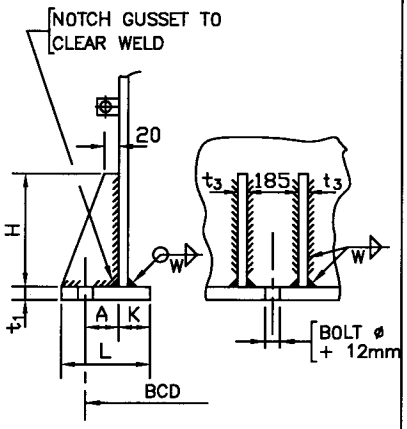
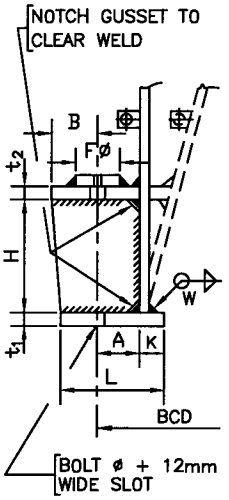
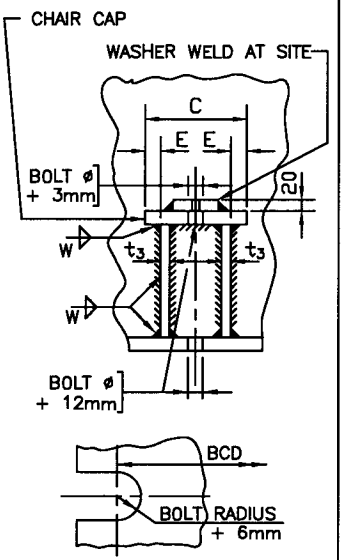
SKIRT BASE DETAILS



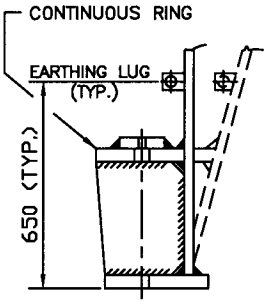
TYPE–1



TYPE–2
(SEE NOTE–6)



SLOT DETAIL



(ALL DIMENSIONS AND DETAILS ARE SAME AS SHOWN FOR TYPE–2 EXCEPT CONTINUOUS RING)

TYPE–3
(FOR CONTINUOUS RING ONLY)

BOLTø	t_1 *	t_2 *	t_3 *	A ▼	B	C	E	F	H	K	L *	W	TYPE	REMARKS
24	20	–	10	60	–	–	–	–	250	75	165	10	1	
27	20	–	10	60	–	–	–	–	250	80	170	10		
30	25	25	12	55	60	150	12	60	300	80	180	10	2 AND 3	
33	25	25	12	58	65	150	12	70	300	80	185	10		
36	25	25	12	66	70	150	12	80	300	90	200	10		
39	32	25	12	70	70	160	14	80	300	95	215	12		
42	32	25	12	72	70	160	14	90	300	100	230	12		
45	32	25	12	80	75	160	14	90	300	105	245	12		
48	32	30	14	83	75	180	16	100	380	110	260	14		
52	38	30	14	87	80	180	16	110	380	110	275	14		
56	38	30	16	91	85	180	18	120	380	115	280	14		
60	38	35	18	95	85	200	20	120	430	125	285	14		
64	38	35	18	104	90	200	25	130	430	135	300	16		
68	42	40	20	108	90	220	25	140	450	145	320	16		
72	42	40	20	112	95	220	25	150	450	150	340	16		

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. BOLT CIRCLE DIAMETER (BCD), NUMBER AND SIZE OF THE BOLTS SHALL BE AS PER ENGINEERING DRAWING.
* 3. DIMENSIONS t1, t2, t3 AND 'L' ARE TO BE CHECKED IN EVERY CASE.
4. IN CASE OF ANY CONFLICT THE ENGINEERING DRAWING SHALL GOVERN.
5. NUMBER OF BOLTS USED IS TO BE A MULTIPLE OF 4 AND BOLTS SHALL STRADDLE VESSEL NORTH–SOUTH CENTRE LINE IN PLAN.
6. USE CONTINUOUS RING (CHAIR CAP) IF DISTANCE BETWEEN CONSECUTIVE BOLTS IS LESS THAN 400 mm.
7. CIRCULAR WASHER SHALL BE SHIPPED LOOSE AND WELDED AT SITE AFTER ANCHOR BOLTS ARE IN POSITION.
▼ 8. PREFERRED DIMENSION 'A'
9. EARTHING LUG SHALL BE LOCATED BETWEEN THE ANCHOR BOLTS AND SHALL BE AS PER STANDARD 7–12–0026.
10. WHEN THE ANCHOR CHAIR CAP IS NOT CONTINUOUS, THE BASE PLATE SHALL BE SUITABLY STIFFENED USING REMOVABLE STRUCTURAL SECTIONS (BEAM/SPIDER) AT SITE DURING ERECTION.

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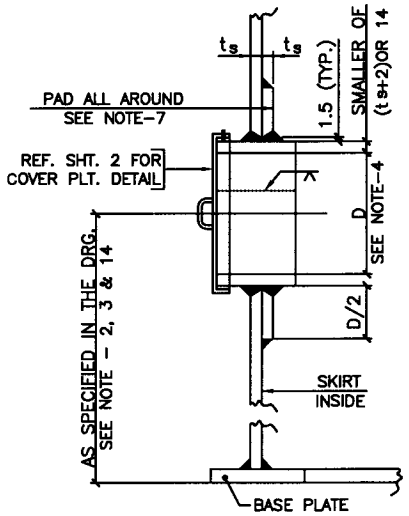
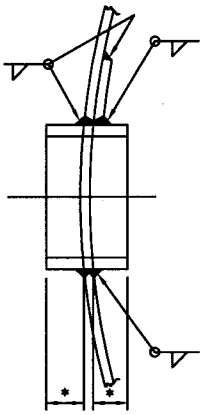
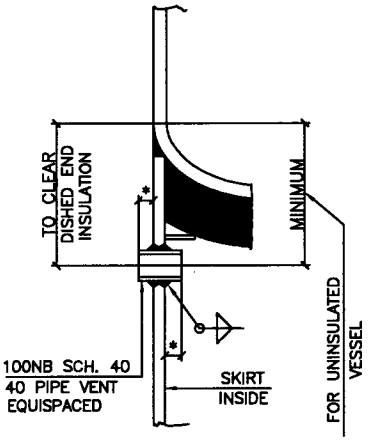


ACCESS OPENING

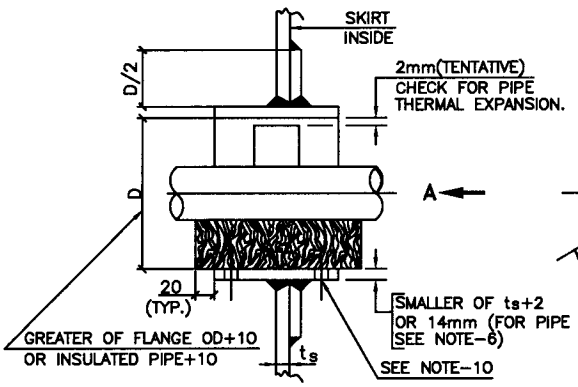


PLAN

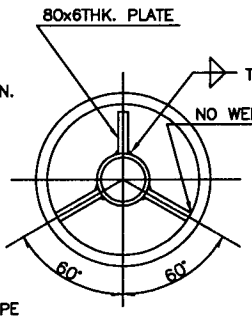


VENT
(SEE NOTE-5)

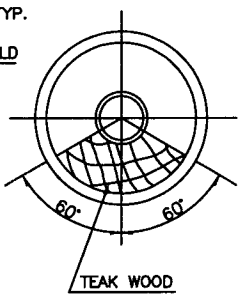
ACCESS OPENING/PIPE OPENING/ VENT OPENING (TYPICAL)



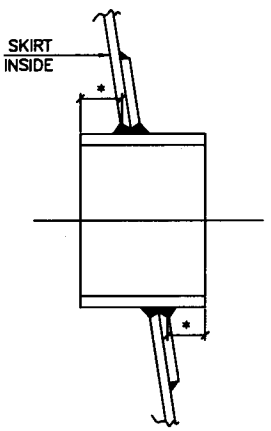
PIPE OPENING



VIEW A
(HOT TYPE VESSEL)



VIEW A
(COLD TYPE VESSEL)



FLARED SKIRT

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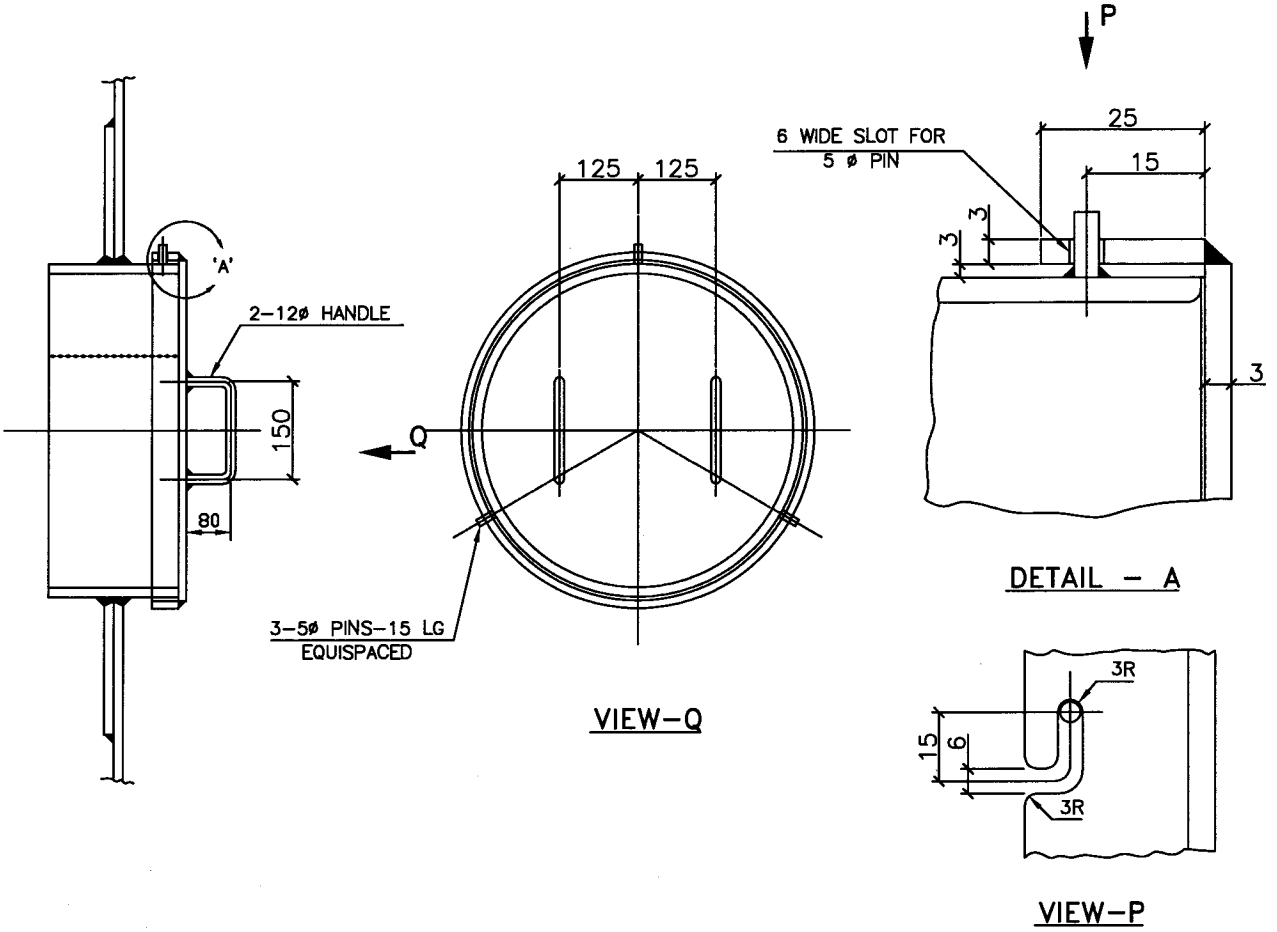
SKIRT OPENING DETAILS



NOTES

(HOT TYPE VESSEL) (COLD TYPE VESSEL)

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. ACCESS OPENING SHALL BE LOCATED BETWEEN ANCHOR BOLTS WHEREVER POSSIBLE.
3. ACCESS OPENING IS NOT TO BE BLOCKED BY BOTTOM HEAD.
4.

SKIRT DIAMETER	ACCESS OPENING DIA.(D)	NO. OF ACCESS OPENING
UP TO 1000	400	1
OVER 1000 UPTO 1500	450	1
OVER 1500 UPTO 3000	500	1
OVER 3000	500	2

5.

SKIRT DIAMETER	NO. OF VENT HOLES
UP TO 1000	2
OVER 1000 UPTO 2000	3
OVER 2000	4

6. MINIMUM SIZE OF PIPE SLEEVE IS 150NB SCH 40. USE SCH 40 UPTO 250NB PIPE SLEEVE. FOR 300NB AND ABOVE, PIPE SLEEVE SHALL BE FABRICATED FROM PLATE.
7. ALL OPENINGS 300 DIA. AND ABOVE SHALL BE PROVIDE WITH REINFORCEMENT PADS ON INNER SURFACE OF SKIRT.
8. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
9. IN FLARED SKIRT, OPENING DETAIL IS SAME AS THAT FOR CYLINDRICAL SKIRT.
10. WOODEN BLOCK SHALL BE FIXED TO SLEEVE WITH TWO NO. OF WOOD SCREWS.
11. ACCESS OPENING/PIPE OPENING/VENT SHALL BE OF SAME MATERIAL AS THAT OF SKIRT.
12. ALL FILLET WELDS SHALL BE 6 mm MINIMUM.
13. * PROJECTION OF SLEEVE/NECK SHALL BE GREATEST OF (30+INSULATION THK.), (30+FIRE PROOFING) & 50mm..
14. CENTER LINE OF ACCESS OPENING SHALL BE 850 MM (MINIMUM) ABOVE BOTTOM BASE RING FOR ANCHOR BOLTS OF SIZE M45 & BELOW AND 1100 MM (MINIMUM) FOR ANCHOR BOLTS OF SIZE ABOVE M45. IF ANCHOR CHAIR HEIGHT IS MORE THAN THAT OF GIVEN IN STANDARD. LOCATION OF ACCESS OPENING SHALL BE ESTABLISHED SUITABLY.

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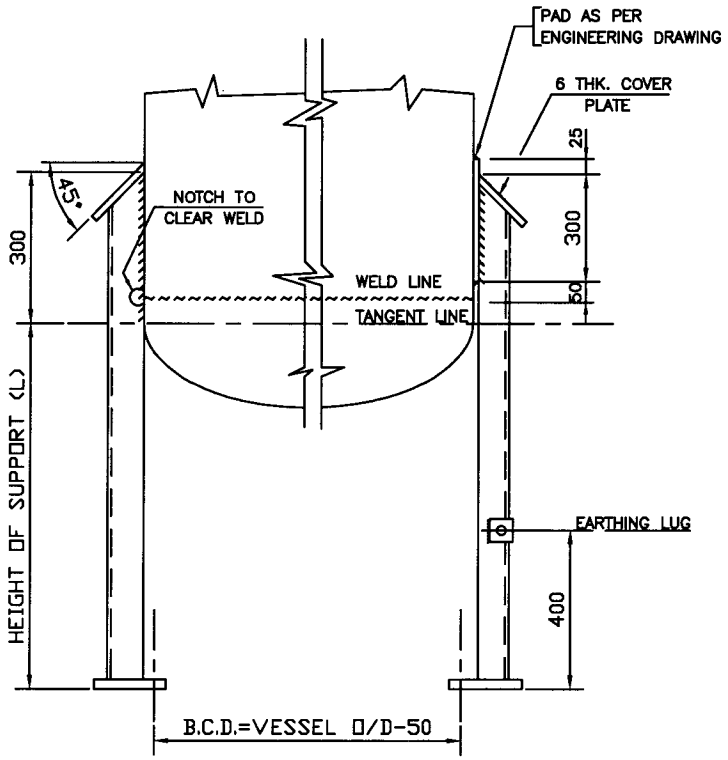
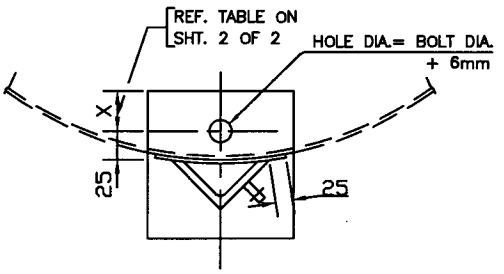
ANGLE LEG SUPPORT





SUPPORT BASE DETAIL

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. THIS STD. IS APPLICABLE FOR VESSEL DIAMETER UPTO AND INCLUDING 2000mm, MAXIMUM SHELL THICKNESS OF 20mm AND MAXIMUM LENGTH (T.L. TO T.L.) OF 3000mm VESSELS BEYOND ABOVE RANGE REQUIRE SPECIAL CONSIDERATION.
3. FOR CALCULATION, FOLLOWINGS PARAMETERS HAVE BEEN CONSIDERED.
   a) WIND PRESSURE 200 Kg/m^2
   SHAPE FACTOR 0.7
   BASIC SEISMIC CO-EFFICENT (α_0) 0.08
   SOIL FOUNDATION SYSTEM FACTOR (β) 1.5
   IMPORTANCE FACTOR (I) 2.0
   b) EMPTY WEIGHT WITH WIND LOADING OR HYDROSTATIC WEIGHT WITH SEISMIC LOADING.
4. HEIGHT AND NUMBER OF LEG SUPPORTS AND SIZE OF ANCHOR BOLTS SHALL BE AS PER ENGINEERING DRAWING.
5. MINIMUM BOLT SIZE SHALL BE M 20.
6. MAXIMUM INSULATION THICKNESS CONSIDERED IS 150 mm.
7. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
8. ALL FILLET WELDS SHALL BE 6 mm MINIMUM.
9. MATERIALS SHALL BE AS PER ENGINEERING DRAWING.
10. EARTHING LUG SHALL BE AS PER STANDARD 7-12-0026.

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LEG SUPPORT SIZES

VESSEL O/D(mm)	NO.OF LEGS	LEG SIZE			BASE PLATE SIZE (mm)	X (mm)	MAXIMUM ALLOWABLE LOAD OF VESSEL (Kg.)
		MAX. VESSEL LENGTH (T.L. TO T.L.) UP TO AND INCLUDING 3.0 M					
		L = 1.5 M	L = 2.0 M	L = 2.5 M			
500	3	ISA 100x100x8	ISA 100x100x10	ISA 110x110x15	170x170x16 THK.	40	1500
800	4	ISA 100x100x10	ISA 130x130x8	ISA 130x130x12	200x200x16 THK.	45	3150
1000	4	ISA 100x100x12	ISA 130x130x10	ISA 150x150x12	230x230x16 THK.	45	4600
1250	4	ISA 110x110x15	ISA 150x150x10	ISA 150x150x12	230x230x16 THK.	45	6750
1600	4	ISA 130x130x15	ISA 150x150x15	ISA 150x150x18	230x230x16 THK.	60	9500
1750	4	ISA 150x150x12	ISA 150x150x18	ISA 200x200x12	300x300x16 THK.	60	12700
2000	4	ISA 150x150x18	ISA 200x200x12	ISA 200x200x15	300x300x20 THK.	75	16400

NOTES

FOR A VESSEL WITH MAXIMUM SUPPORT LEG HEIGHT OF 1500mm, FOLLOWING ALTERNATIVE LEG SIZES MAY BE USED :–

a) ISA 65x65x8 WITH HYDROSTATIC WEIGHT UPTO 500 Kg.

b) ISA 80x80x8 WITH HYDROSTATIC WEIGHT 501 Kg. TO 1000 Kg.

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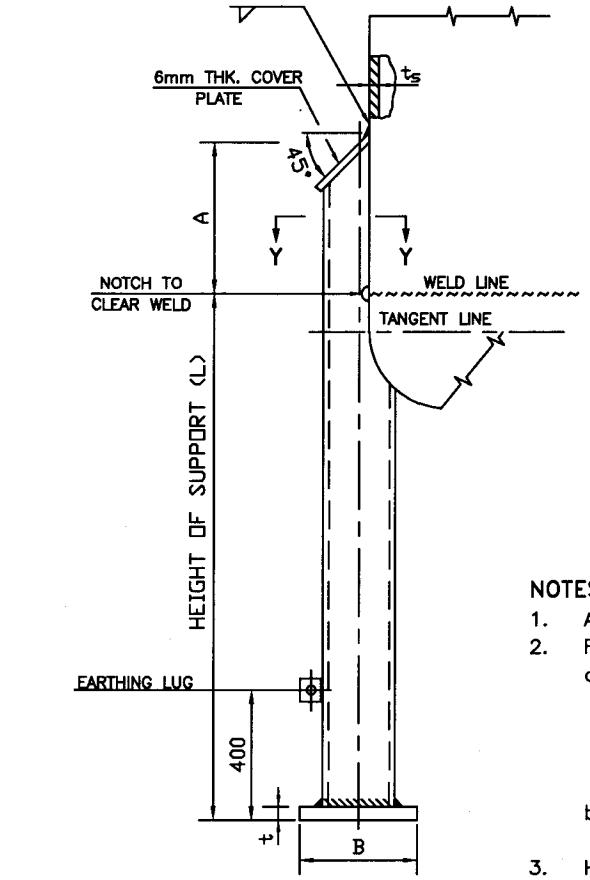
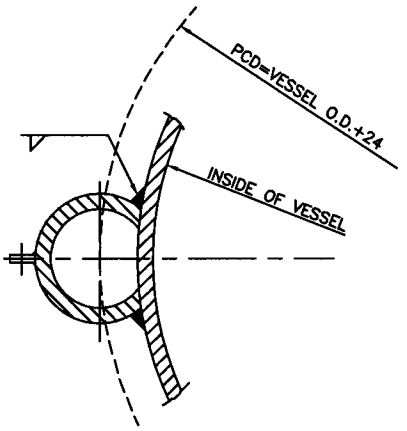
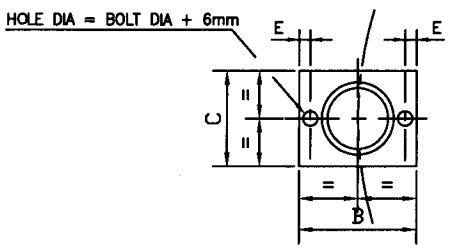
PIPE LEG SUPPORT





SECTION–YY



SUPPORT BASE DETAIL

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. FOR DESIGN OF SUPPORT, FOLLOWINGS PARAMETERS HAVE BEEN CONSIDERED.
   a) WIND PRESSURE 200 Kg/m^2
   SHAPE FACTOR 0.7
   BASIC SEISMIC CO–EFFICENT (α_0) 0.08
   SOIL FOUNDATION SYSTEM FACTOR (β) 1.5
   IMPORTANCE FACTOR (I) 2.0
   b) EMPTY WEIGHT WITH WIND LOADING OR HYDROSTATIC WEIGHT WITH SEISMIC LOADING.
3. HEIGHT AND NUMBER OF LEG SUPPORTS AND SIZE OF ANCHOR BOLTS SHALL BE AS PER ENGINEERING DRAWING.
4. MINIMUM BOLT SIZE SHALL BE M 20.
5. MAXIMUM INSULATION THICKNESS CONSIDERED IS 150 mm.
6. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
7. ALL FILLET WELDS SHALL BE 6 mm MINIMUM.
8. MATERIALS SHALL BE AS PER ENGINEERING DRAWING.
9. EARTHING LUG SHALL BE AS PER STANDARD 7–12–0026.
10. SUITABLE PAD FOR SS VESSEL SHALL BE PROVIDED.

LEG PIPE SIZE	A	B	C	E	t	MAXIMUM ALLOWABLE LOAD PER LEG (Kgs) MAXIMUM HEIGHT OF SUPPORT (L) IN METERS		
						2.0	2.5	3.0
50NB x EXTRA STRONG	120	230	140	36	20	2300	2050	1800
80NB x EXTRA STRONG	180	250	160	36	25	5700	5500	4900
100NB x EXTRA STRONG	230	310	185	42	25	9000	8600	8300
150NB x EXTRA STRONG	320	370	235	44	25	18500	18000	17500

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	TK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

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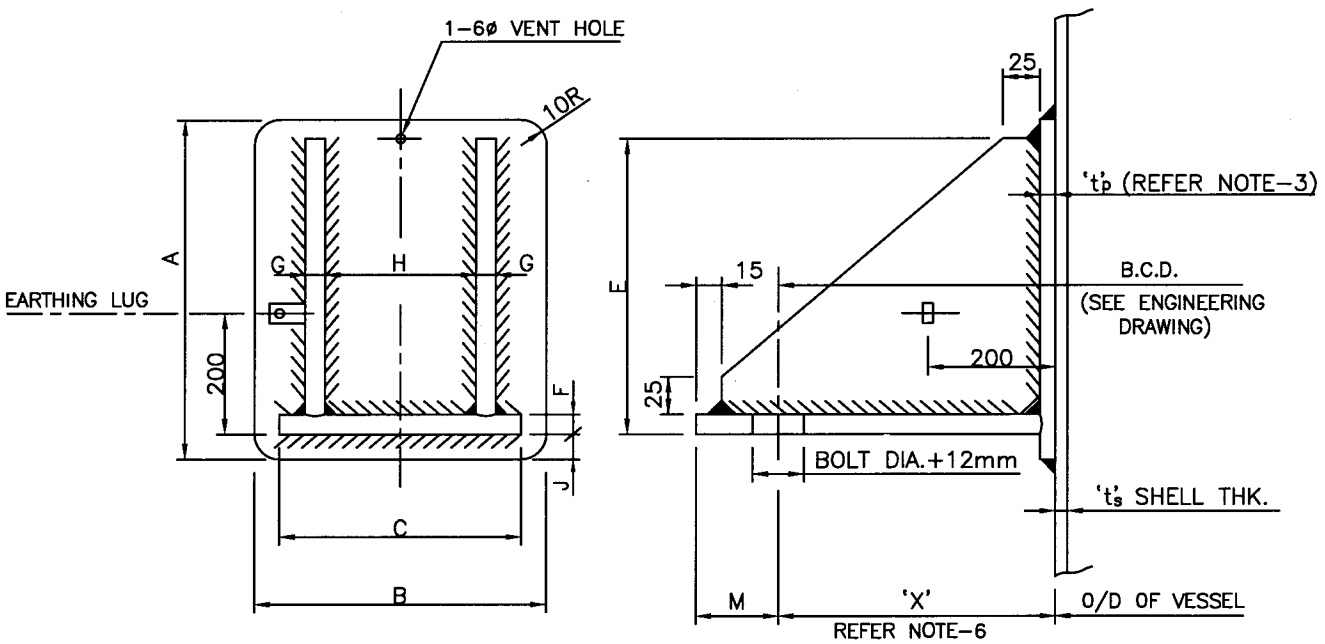
VESSEL OUTSIDE DIA.	A	B	C	E	F	G	H	J	M	ANCHOR BOLT DIA.	'X' MAXIMUM	MAXIMUM ALLOWABLE VESSEL WEIGHT (TONNE)
1801 – 2000	650	500	400	550	25	14	350	50	SEE ENGINEERING DRAWING 60 (MINIMUM)	SEE ENGINEERING DRAWING M30 (MINIMUM)	550	60
1601 – 1800	600	450	350	500	25	14	300	50			540	55
1401 – 1600	550	400	300	450	25	14	250	50			540	50
1201 – 1400	500	350	250	450	25	12	200	25			470	40
1001 – 1200	450	320	220	400	20	12	180	25			450	30
801 – 1000	450	280	200	400	20	12	150	25			450	25



NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. NUMBER OF BRACKETS SHALL BE FOUR PER VESSEL.
3. PAD THICKNESS SHALL BE AS PER ENGINEERING DRAWING.
4. FOR VESSELS UPTO 800 mm DIA. REFER ENGINEERING DRAWING.
5. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
6. DISTANCE 'X' IS TO BE FINALISED CONSIDERING INSULATION THICKNESS, BOLT SIZE AND ERECTION REQUIREMENT AND SHALL BE KEPT MINIMUM.
7. EARTHING LUG SHALL BE AS PER STANDARD 7–12–0026.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NS	SK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

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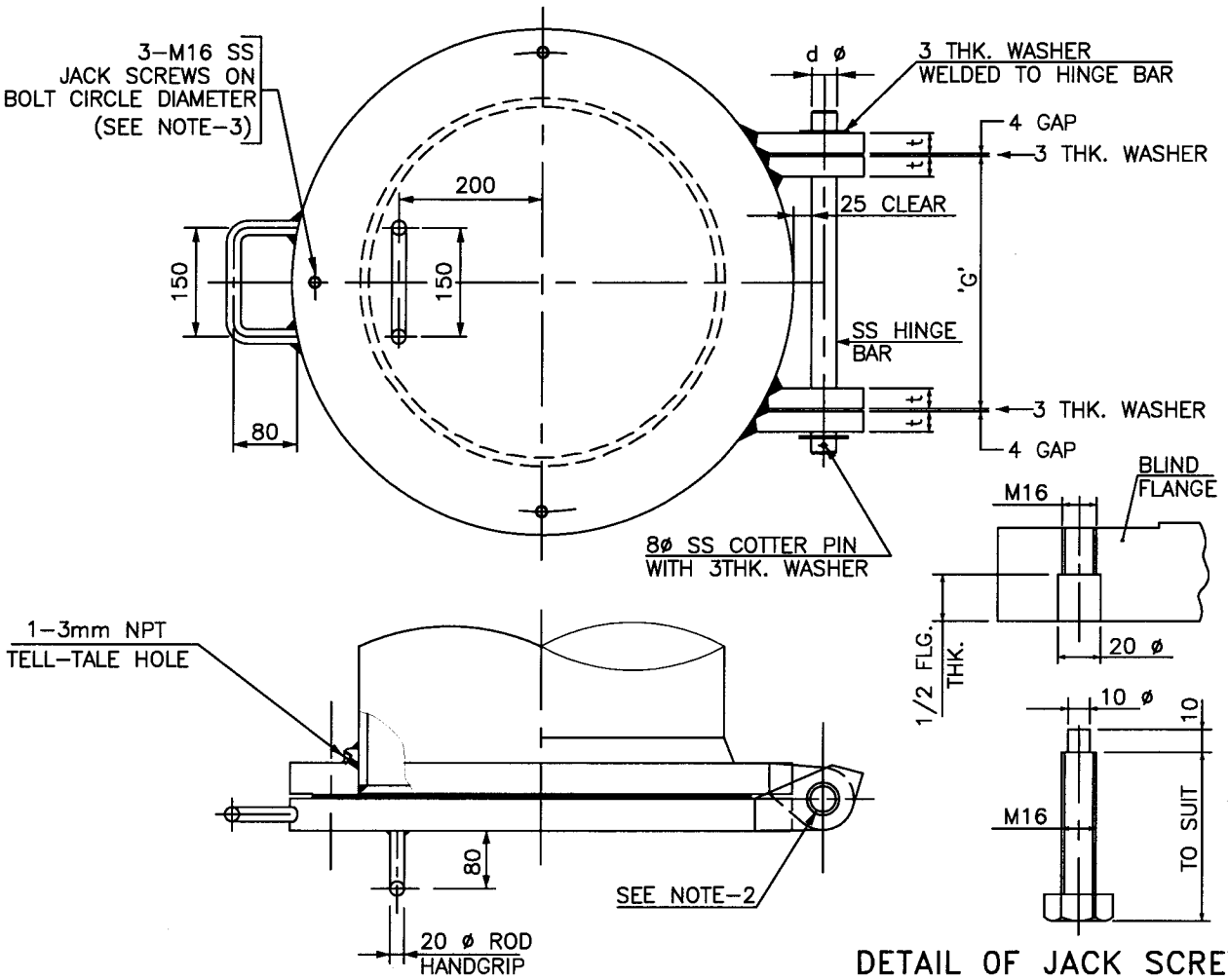
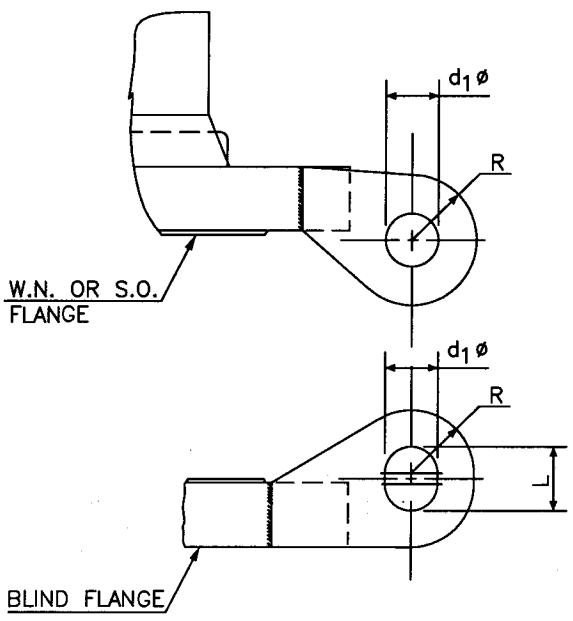
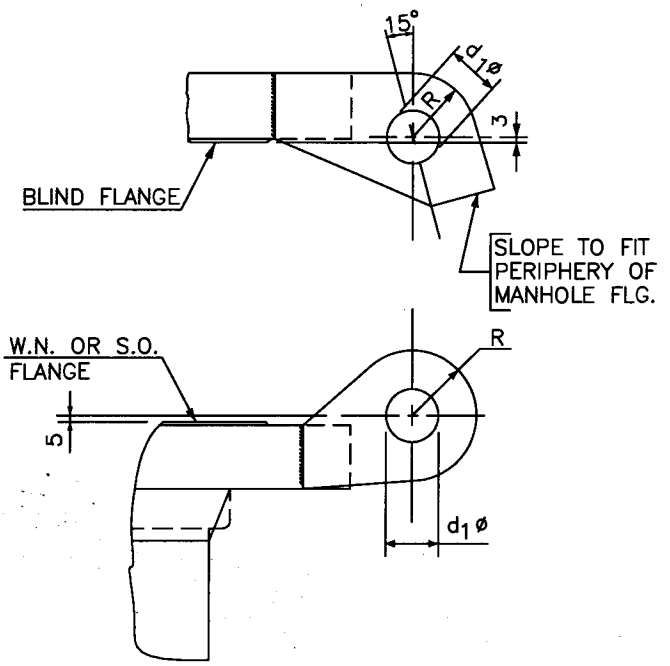


DETAIL OF JACK SCREW



SIDE AND BOTTOM MANHOLE TABS DETAILS



TOP MANHOLE TABS DETAILS

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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8	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	TK	NK	SM
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FLANGE RATING	NOMINAL BORE	G	t	d	R	d_1	L
CLASS 150	400	298	28	35	55	36	42
	450	318	28	35	55	36	42
	500	348	28	35	55	36	42
	600	406	28	35	55	36	42
CLASS 300	400	324	28	35	55	36	42
	450	355	28	35	55	36	42
	500	386	30	35	55	36	42
	600	458	30	35	55	36	42
CLASS 600	400	342	32	40	55	41	47
	450	372	32	40	60	41	47
	500	406	36	40	60	41	47
	600	470	36	40	75	41	47
CLASS 900	400	352	32	40	60	41	47
	450	394	32	40	65	41	47
	500	428	40	40	70	41	47
	600	520	40	40	90	41	47

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. WELD HINGE TABS AFTER TIGHTENING THE COVER WITH GASKET IN PLACE AND MAINTAIN A LOOSE FIT OF HINGE BAR IN HINGE TABS.
3. BCD OF JACK SCREWS IS TO BE SUITABLY CHANGED IF MANHOLE STUDS INTERFERE WITH JACK SCREWS.
4. IF SQUARE RODS ARE USED FOR HANDLES, THEIR EDGES SHALL BE ROUNDED OFF.
5. IN CASE OF CONFLICT, ENGINEERING DRAWING SHALL GOVERN.
6. ALL FILLET WELDS SHALL BE 6mm MINIMUM.
7. TELLTALE HOLE SHALL NOT BE PLUGED AND SHALL BE FILLED WITH HARD GREASE ONLY.
8. THE MATERIAL OF COMPONENTS SHALL GENERALLY BE IS : 2062 UNLESS OTHERWISE SPECIFIED ON ENGINEERING DRAWING. FOR LOW TEMPERATURE SERVICES AND SERVICES ABOVE 425°C THE HINGE TABS AND HANDLE SHALL BE OF SAME MATERIAL AS THAT OF SHELL.

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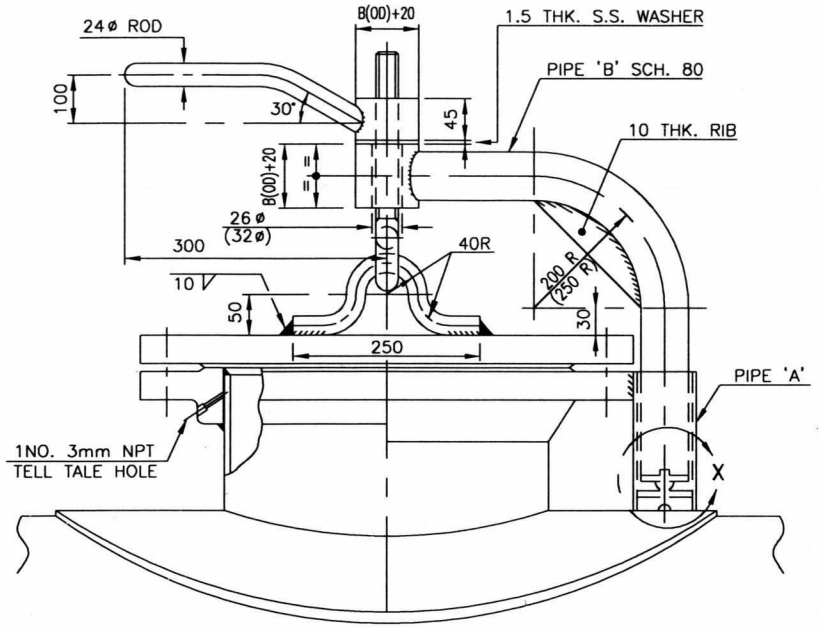
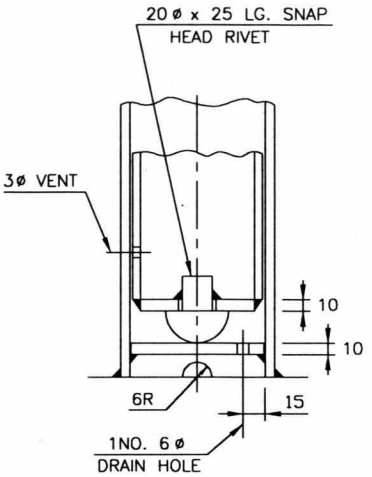
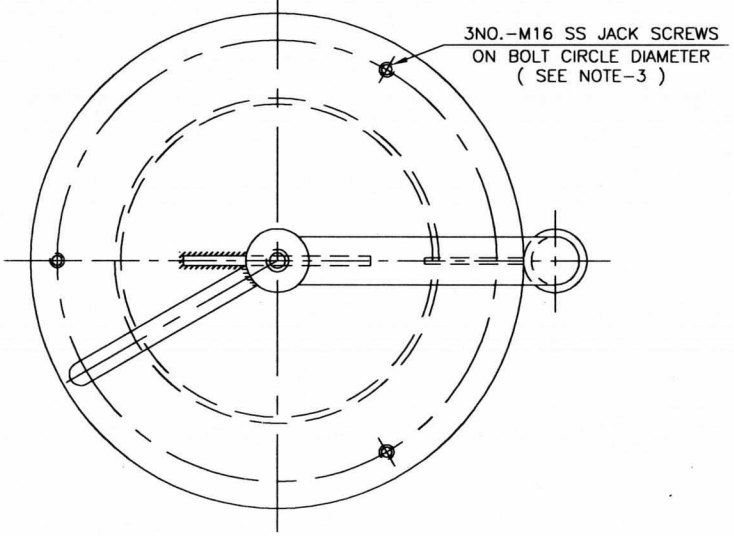
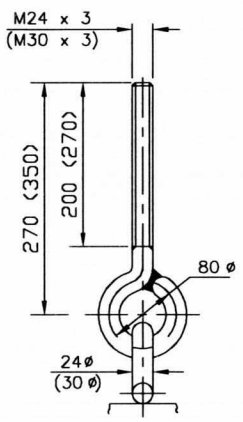
MANHOLE WITH DAVIT



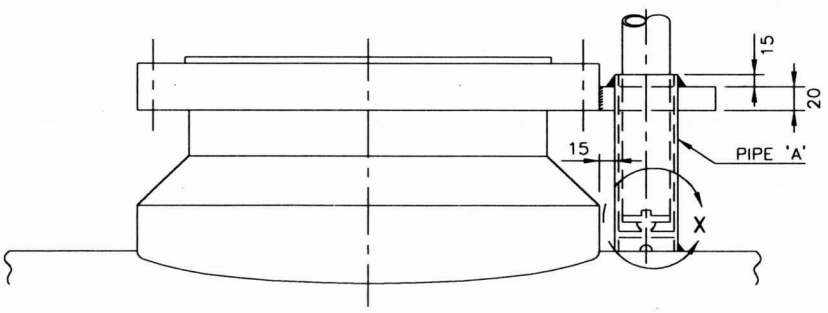


DETAIL 'X'

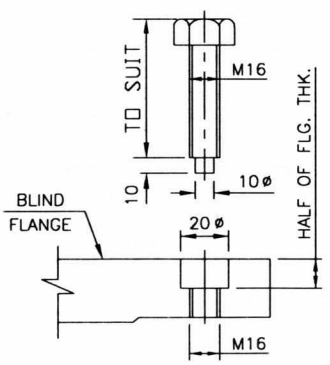




DETAIL OF EYE BOLT



TYP. DETAIL FOR SR MANHOLE



DETAIL OF JACK SCREW

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	07.07.2022	REVISED AND REISSUED AS STANDARD	JIT SINGH	PVSS/KA	NK	SM
7	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

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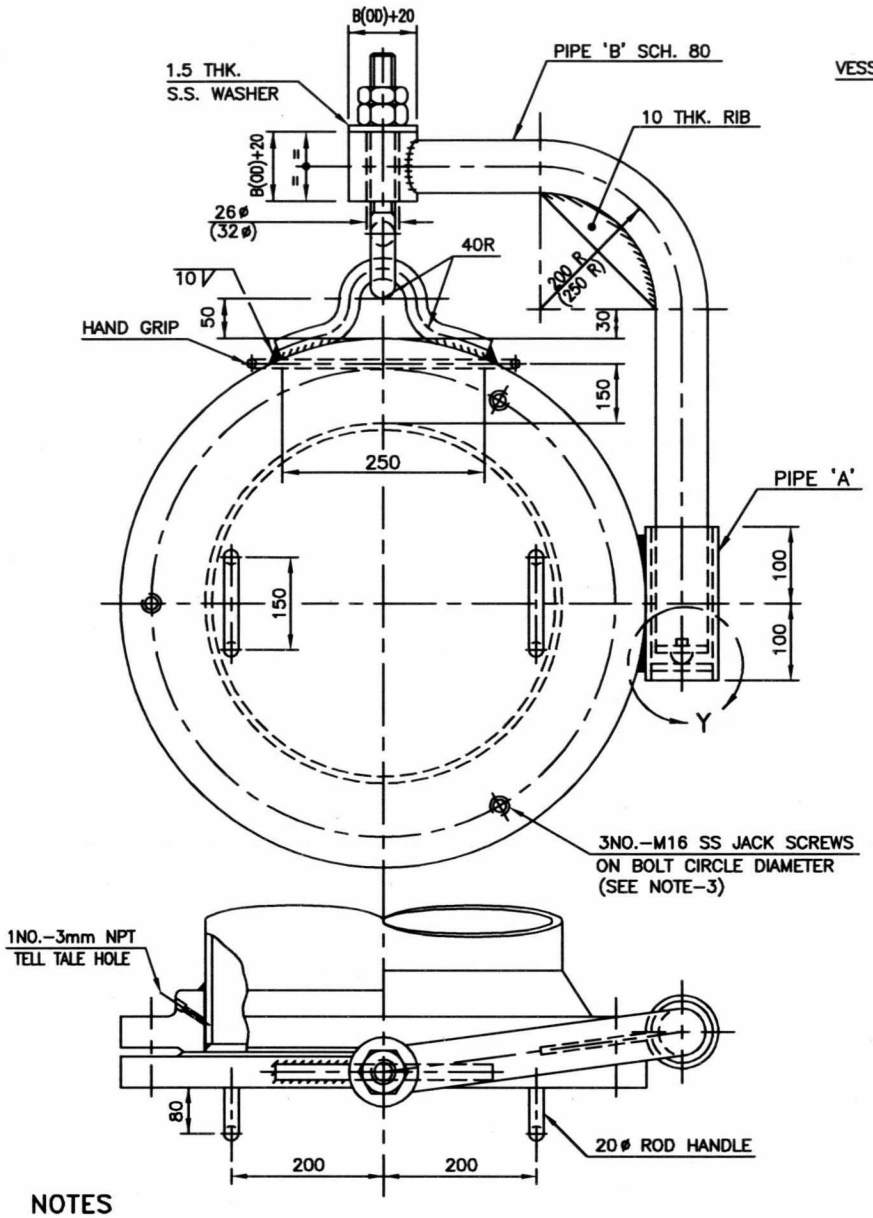
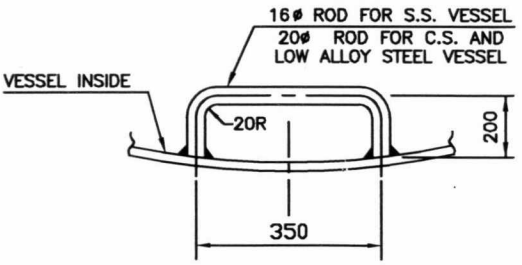
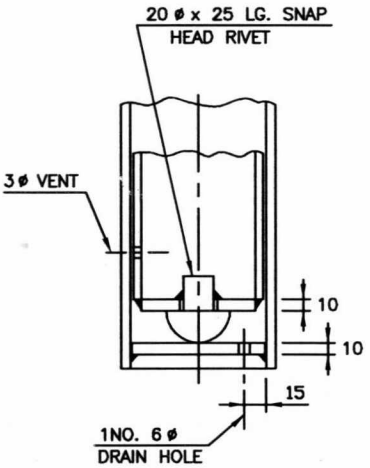
MANHOLE WITH DAVIT





DETAIL OF HAND GRIP



DETAIL 'Y'

CLASS	SIZE (NB)	A (NB)	B (NB)
150	400	50 NB SCH. 80	40
	450	50 NB SCH. 80	40
	500	65 NB SCH. 40	50
	600	65 NB SCH. 40	50
300	400	65 NB SCH. 40	50
	450	65 NB SCH. 40	50
	500	65 NB SCH. 40	50
	600	90 NB SCH. 40	80
600	400	80 NB SCH. 40	65
	450	90 NB SCH. 40	80
	500	125 NB SCH. 80	100
	600	125 NB SCH. 80	100
900	400	125 NB SCH. 80	100
	450	125 NB SCH. 80	100
	500	150 NB SCH. 80	125
	600	150 NB SCH. 80	125

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. DIMENSIONS IN BRACKETS ARE FOR CLASS 900.
3. B.C.D. OF JACK SCREWS IS TO BE SUITABLY CHANGED IF MANHOLE STUDS INTERFERE WITH JACK SCREWS.
4. THE SLEEVE PIPE 'A' SHOULD BE IN TRUE VERTICAL POSITION WITHIN A TOLERANCE OF 2 ½ DEGREE, AFTER WELDING TO THE FLANGE.
5. EDGES SHALL BE ROUNDED OFF IF SQUARE ROD IS USED FOR HANDGRIP.
6. THE COMPONENTS WHICH ARE DIRECTLY WELDED TO MANHOLE SHALL BE OF SAME METALLURGY AS THAT OF EQUIPMENT. MATERIAL FOR OTHER DAVIT COMPONENTS SHALL BE C.S. UNLESS OTHERWISE SPECIFIED IN ENGINEERING DRAWING.
7. ALL FILLET WELDS SHALL BE 6mm MINIMUM.
8. THIS STANDARD IS NOT APPLICABLE FOR LOW TEMPERATURE SERVICES.
9. MP/DP TEST SHALL BE CARRIED OUT FOR ALL THE WELD JOINTS.
10. VENDOR TO ENSURE PROPER FUNCTIONING OF DAVIT AND GUARANTEE THEIR HOLDING CAPACITY WITHOUT ANY FAILURE OF WELDED JOINTS/FILLETS/ EYEBOLTS/LINKS ETC. BY TESTING AT VENDOR'S SHOP AS BELOW:–KEEP THESE HANDLING ITEMS IN HANGED POSITION ALONG WITH CONNECTED BLIND FLANGES/ASSEMBLY ETC. KEPT OPENED & HANGED FOR A CONTINUOUS DURATION OF 8 HOURS MINIMUM.
11. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.

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7	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

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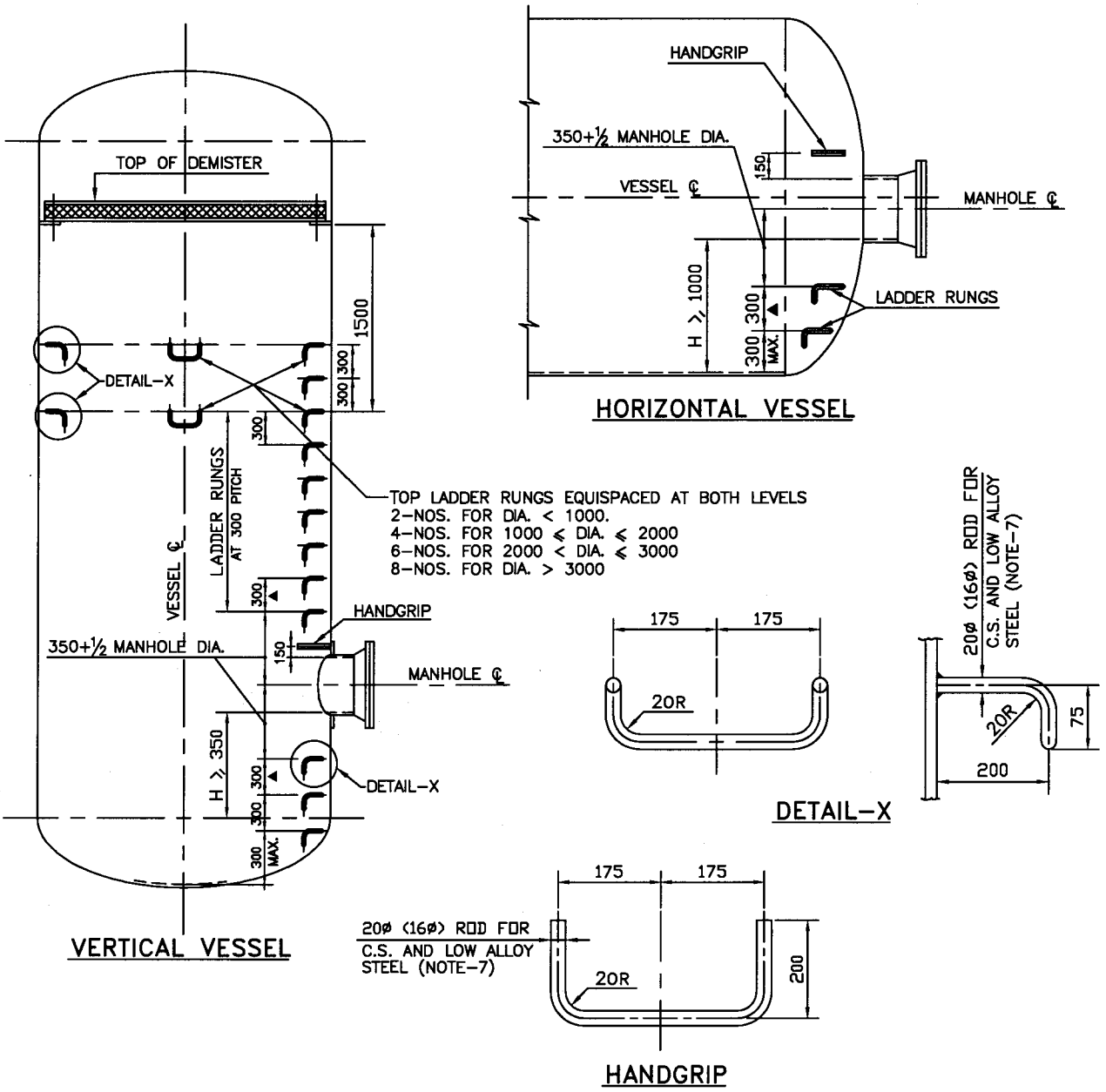

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. ▲ VARIATION IN SPACING BETWEEN LADDER RUNGS IS PERMITTED IN CASE OF INTERFERENCE WITH SOME NOZZLE OR INTERNALS. HOWEVER THE SPACING OF RUNGS SHALL BE EQUAL.
3. SQUARE RODS MAY BE USED FOR HANDGRIP / LADDER RUNGS. IF FABRICATED FROM PLATE THE EDGES ARE TO BE ROUNDED OFF.
4. MATERIAL SHALL BE AS PER ENGINEERING DRAWING.
5. ALL FILLET WELDS SHALL BE 6 mm MINIMUM.
6. ORIENTATION OF LADDER RUNGS SHALL BE SAME AS OF MANHOLE.
7. DIMENSIONS SHOWN IN BRACKETS ARE FOR STAINLESS STEEL MATERIAL.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NS	TK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

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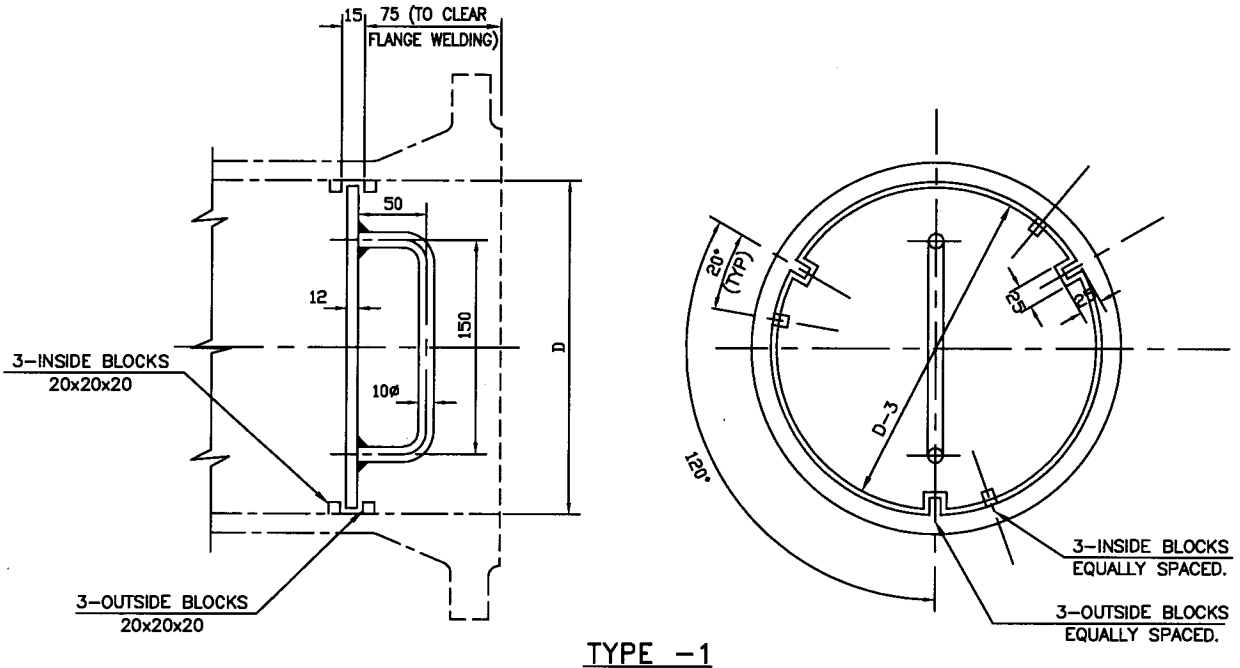
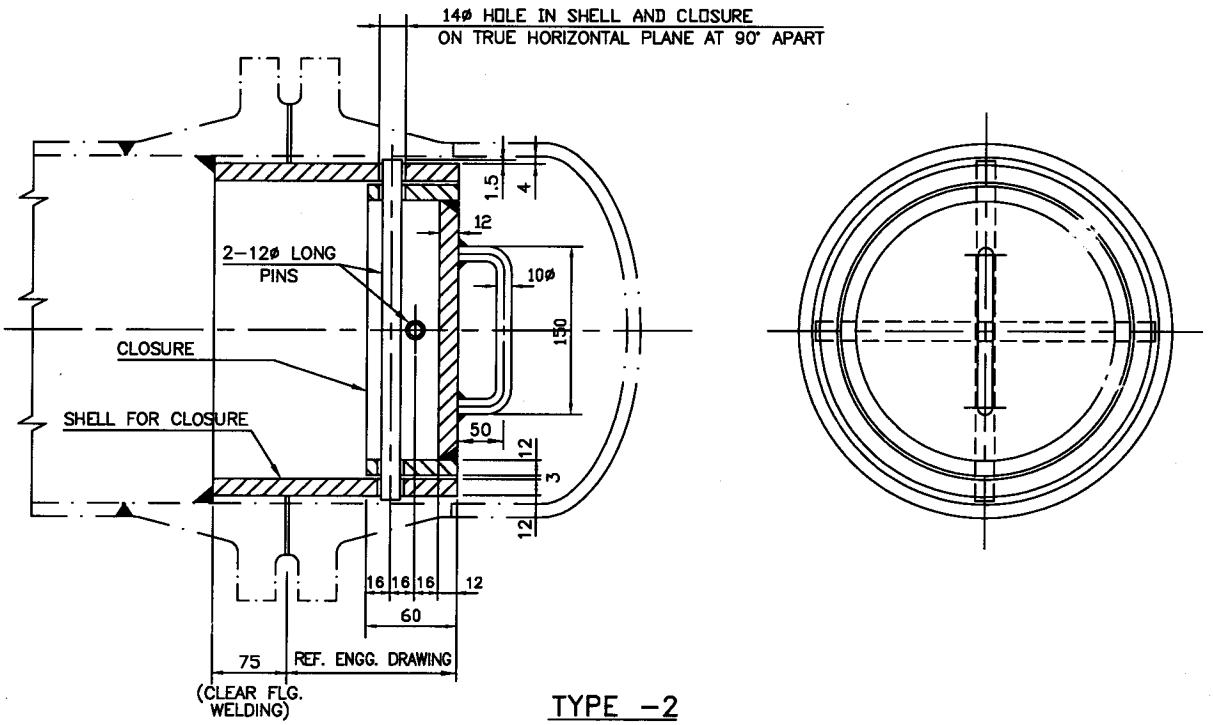
RETAINING PLATE



TYPE –1



TYPE –2

NOTE

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	TK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

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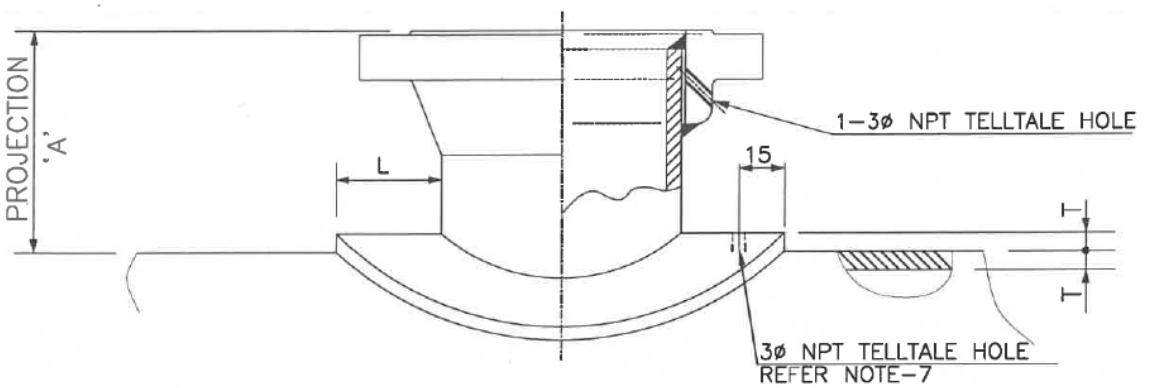

NOMINAL PIPE SIZE	OUTSIDE DIAMETER	L (WIDTH OF PAD) ⊛		PROJECTION 'A' SEE NOTE–4,5,9&10			
		SHELL WELD EFF.=0.85	SHELL WELD EFF.=1.0	CLASS 150	CLASS 300	CLASS 600	CLASS 900
BELOW 3"	STANDARD	–	–	150	150	150	150
3"	88.9	40	45	200	200	200	200
4"	114.3	50	60	200	200	200	200
6"	168.3	70	85	200	200	200	250
8"	219.1	95	110	200	200	250	250
10"	273.0	115	135	200	200	250	300
12"	323.8	135	160	200	200	250	300
14"	355.6	150	175	250	250	250	300
16"	406.4	170	200	250	250	250	300
18"	457.2	195	225	250	300	300	350
20"	508.0	215	250	250	300	300	350
22"	558.8	235	275	250	300	300	–
24"	609.6	255	300	250	300	300	400
26"	660.4	285	330	250	300	350	450
28"	711.2	305	355	250	300	350	450
30"	762	325	380	250	300	400	450
32"	812.8	350	405	300	350	400	500
34"	863.6	370	430	300	350	400	500
36"	914.4	390	455	300	350	–	–
38"	965.2	410	480	300	350	–	–
40"	1016	435	505	300	350	–	–
42"	1066.8	455	530	300	400	–	–
44"	1117.6	475	555	300	400	–	–
46"	1168.4	500	585	300	400	–	–
48"	1219.2	520	610	300	400	–	–

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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8	21.02.2025	REVISED AND REISSUED AS STANDARD	AS	TKh	KA/NK	I.N
7	23.01.2020	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
6	07.06.2013	REVISED AND REISSUED AS STANDARD	NIKHIL	KA	RKT/SC	DM

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NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
3. ⊛ WIDTH IS MINIMUM AND SHALL BE CHECKED AGAINST CODE REQUIREMENT. CHECK REINFORCEMENT REQUIREMENT FOR ALL EXTERNAL PIPING LOADING ALSO.
4. NOZZLE PROJECTIONS ARE BASED ON INSULATION THICKNESS EQUAL TO 75mm. FOR INSULATION THICKNESS GREATER THAN 75mm, THE NOZZLE PROJECTION IS 'A' + [INSULATION THICKNESS(mm)−75].
5. PROJECTION 'A' FOR SELF−REINFORCED NOZZLE SHALL BE BASED ON DESIGN OF REINFORCEMENT SUBJECT TO MINIMUM REQUIREMENTS AS PER THIS STD.
6. EXTEND PAD LOCALLY FOR MANHOLE DAVIT SUPPORT, IF REQUIRED.
7. EXTERNAL REINFORCING PADS SHALL HAVE A MINIMUM OF 1 NO. TELL−TALE HOLE EXCEPT THAT PADS FOR NOZZLES GREATER THAN 10"NB(250NB) SHALL HAVE MINIMUM TWO NOS. TELL−TALE HOLES AND NOZZLES IN EXCESS OF 36"NB (900NB) SHALL HAVE 4 NOS. TELL−TALE HOLES. PAD INSTALLED IN SECTIONS SHALL HAVE ATLEAST ONE TELL−TALE HOLE PER SECTION. TELL−TALE HOLES ON REINFORCEMENT PADS SHALL BE EQUALLY SPACED IN CIRCUMFERENTIAL DIRECTION OF PAD.
8. TELL−TALE HOLE SHALL NOT BE PLUGGED AND SHALL BE FILLED WITH HARD GREASE ONLY, AFTER HYDROTEST/PNEUMATIC TEST OF EQUIPMENT.
9. a) FOR COLUMNS & VERTICAL VESSELS, PROJECTION OF NOZZLE ON TOP HEAD SHALL BE 500mm MINIMUM FROM OUTSIDE.
   b) FOR HORIZONTAL VESSELS, PROJECTION OF NOZZLES ON TOP SIDE OF SHELL SHALL BE 400mm MINIMUM FROM OUTSIDE.
10. PROJECTIONS ARE BASED ON ASME B16.5 FLANGES FOR UPTO AND INCLUDING 24"NB NOZZLES AND ASME B16.47 SERIES 'B' FLANGES FOR NOZZLE SIZES ABOVE 24"NB.

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7	23.01.2020	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
6	07.06.2013	REVISED AND REISSUED AS STANDARD	NIKHIL	KA	RKT/SC	DM

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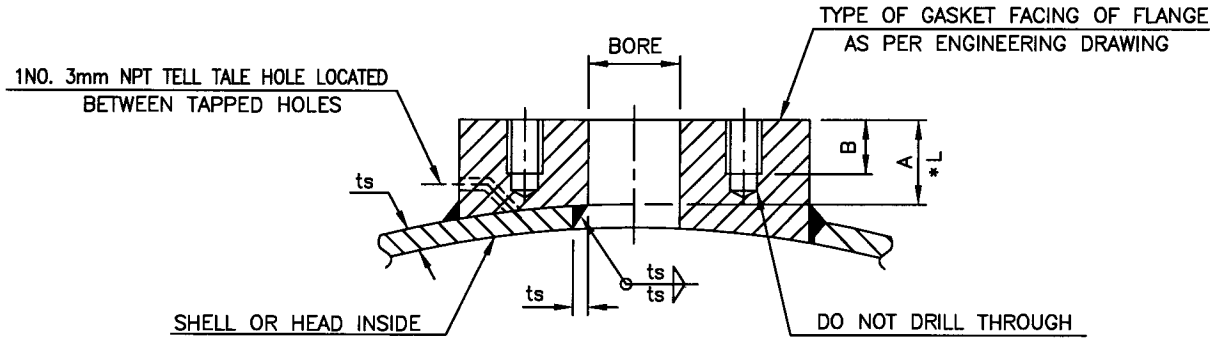
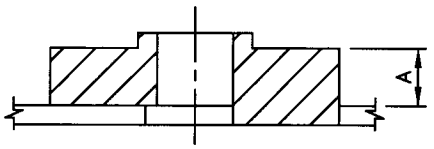
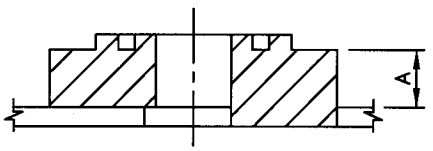


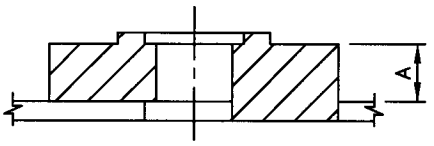
TYPE – 1 TYPE – 2



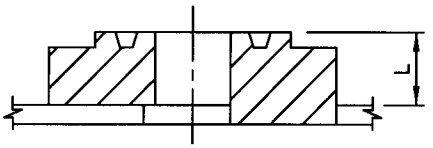
RAISED FACE TYPE



GROOVE TYPE



FEMALE TYPE



RING JOINT TYPE

NOMINAL PIPE SIZE OR BORE	CLASS 150		CLASS 300		CLASS 600			CLASS 900		
	A	B	A	B	A	B	L	A	B	L
40	28	20	36	28	40	32	46	46	38	54
50	34	24	36	28	40	32	46	48	38	54
65	34	24	36	28	42	34	48	50	38	56
80	34	24	38	30	44	34	52	50	40	58
100	34	24	40	30	48	38	54	56	44	62
150	38	30	44	34	52	42	60	58	48	66
200	40	30	46	36	58	48	66	64	54	72
250	44	34	48	38	64	54	72	70	60	78
300	44	34	50	40	68	58	76	74	64	82
350	48	38	54	44	70	60	78	86	76	98
400	48	38	58	48	76	66	84	88	78	100
450	54	44	58	48	82	72	91	102	92	115
500	54	44	58	48	88	78	99	108	98	122
600	58	48	66	56	102	92	113	120	130	156

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. PAD NOZZLE OUTSIDE DIAMETER, FACING, STUD CIRCLE DIAMETER, NUMBER AND SIZE OF STUDS AND TOLERANCES SHALL BE AS PER ASME B 16.5 LATEST EDITION.
3. MATERIAL SHALL BE AS PER ENGINEERING DRAWING.
4. FABRICATOR SHALL SUPPLY REQUIRED NUMBER OF GASKETS AND STUDS.
5. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.

*6. DIMENSION 'L' INCLUDES HEIGHT OF RAISED FACE.

7. THESE TYPE OF NOZZLES ARE NOT TO BE USED FOR HYDROGEN SERVICE, UNLESS SPECIFICALLY REQUIRED BY LICENSOR.

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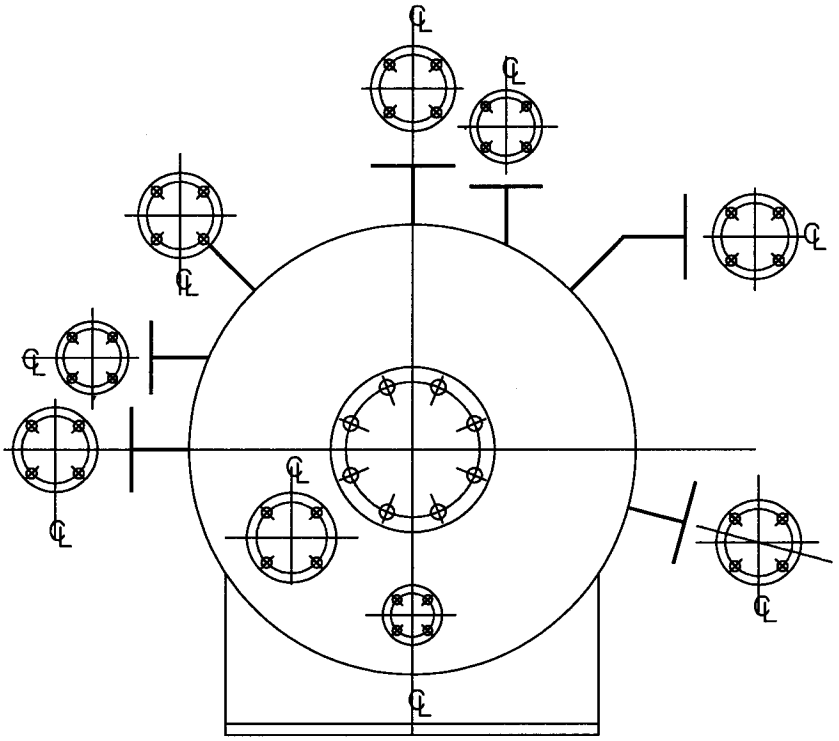
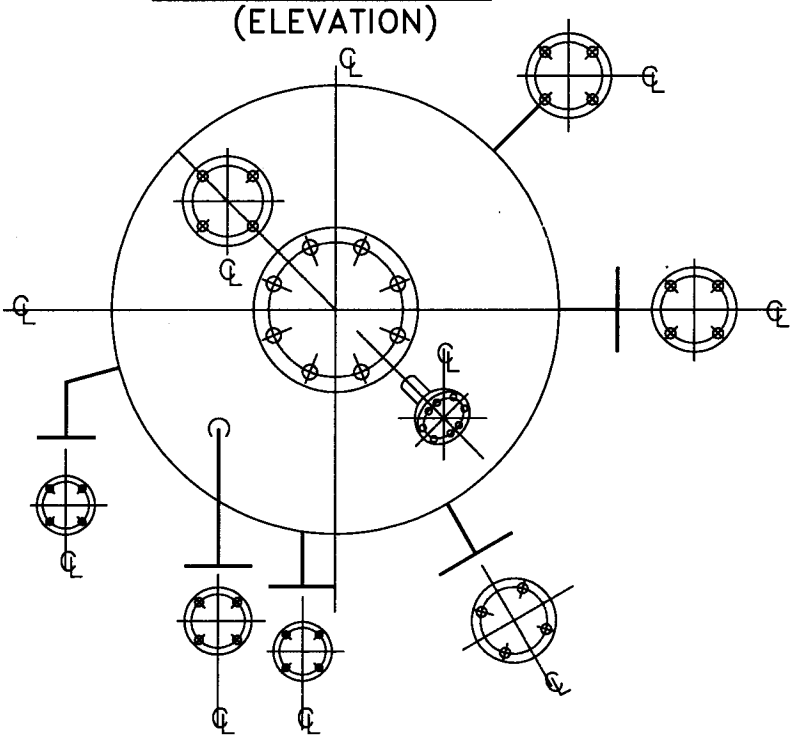
STANDARD BOLT HOLE ORIENTATION



HORIZONTAL VESSEL
(ELEVATION)



VERTICAL VESSEL
(PLAN)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
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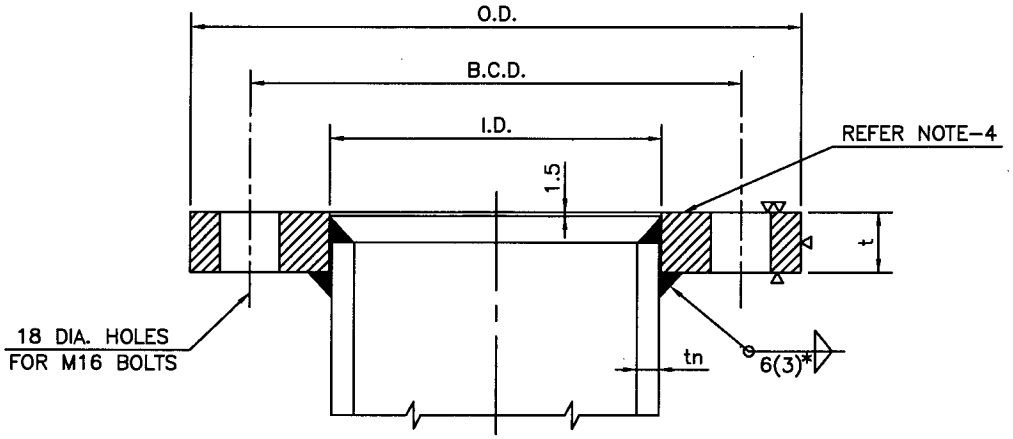
INTERNAL FLANGES



NOMINAL PIPE SIZE (mm)	I.D.	B.C.D.	O.D.	NUMBER OF BOLTS	THICKNESS OF FLANGE t	
					CARBON STEEL	S. STEEL OR MONEL
40	51	110	160	4	16	10
50	63	120	170	4	16	10
80	92	150	200	4	16	10
100	117	180	230	4	16	10
150	171	240	290	4	16	10
200	222	290	340	8	20	12
250	276	350	400	8	20	12
300	327	400	450	8	20	12
350	358	430	480	12	24	16
400	409	480	530	12	24	16
450	460	530	580	12	24	16
500	511	580	630	12	24	16
600	612	680	730	12	24	16

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
* 3. FILLET SIZE IN BRACKET ARE FOR STAINLESS STEEL / MONEL.
4. FULL FACED GASKETS SHALL BE USED.
5. DIMENSIONS EXCEPT THICKNESS FOR INTERNAL FLANGES OF SIZE 25NB OR LESS SHALL BE AS PER ASME B16.5 CLASS 150. FLANGE THICKNESS AND FACING SHALL BE EQUIVALENT TO 40NB FLANGE COVERED IN THIS STANDARD.

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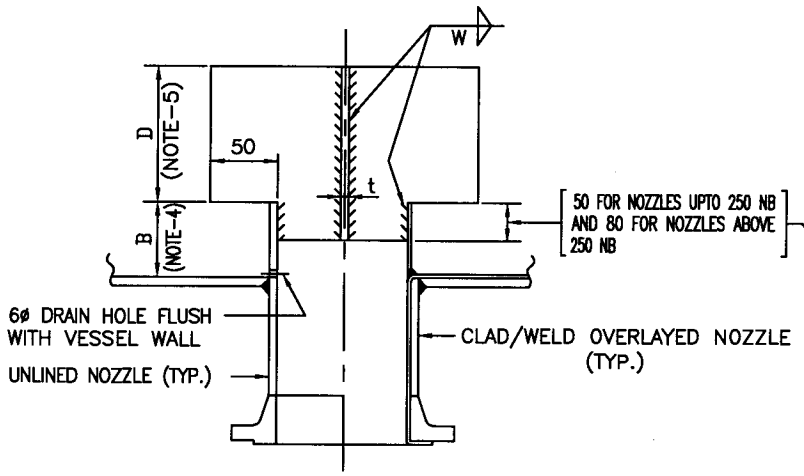
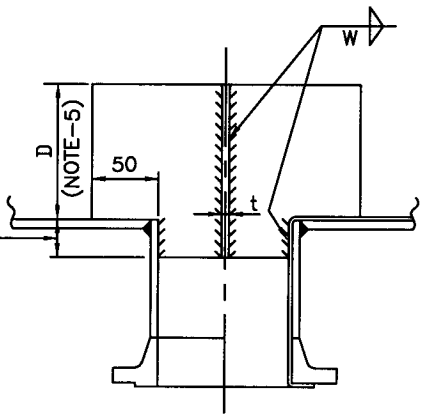
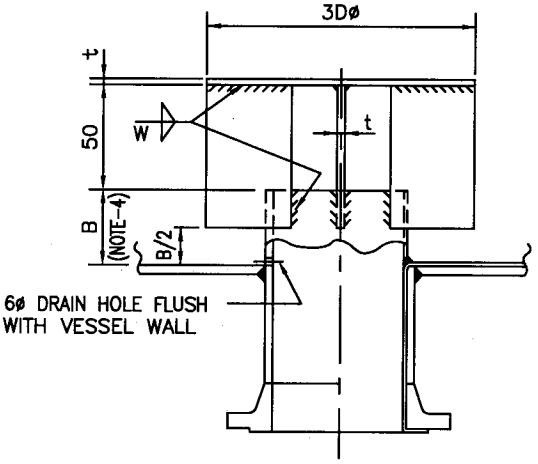


TYPE – 1A

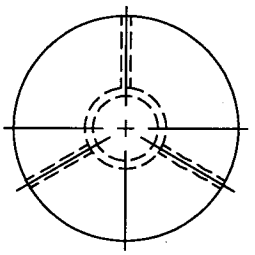


TYPE – 2A

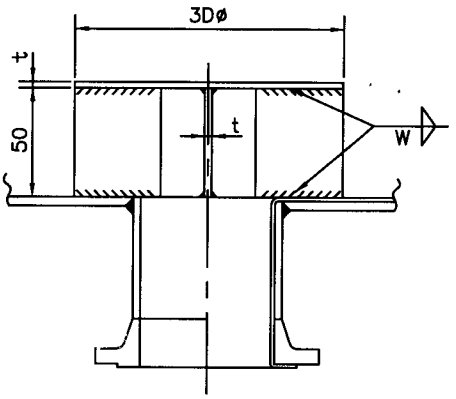
FOR NOZZLE NB ≥ 100



TYPE – 1B



PLAN VIEW FOR 1B AND 2B



TYPE – 2B

FOR NOZZLE NB < 100

VESSEL MATERIAL	CARBON STEEL/LOW ALLOY STEEL				ALLOY / ALLOY CLAD/ ALLOY LINED (NOTE–3a)	CONCRETE LINED (NOTE–3b)
CORROSION ALLOWANCE	1.5	3	4.5	6	–	–
THICKNESS 't'	6	8	12	14	5	5
WELD SIZE 'W'	6	6	8	8	5	5

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
3. a) FOR ALLOY LINED VESSELS, THE BAFFLE MATERIAL SHALL BE SAME AS ALLOY LINING.
   b) FOR CONCRETE LINED VESSELS, THE BAFFLE MATERIAL SHALL BE ALLOY AS SPECIFIED IN ENGINEERING DRAWING.
4. REFER ENGINEERING DRAWING FOR DIMENSION 'B'.
5. 'D' DENOTES NOMINAL BORE SIZE OF SUBJECT NOZZLE.

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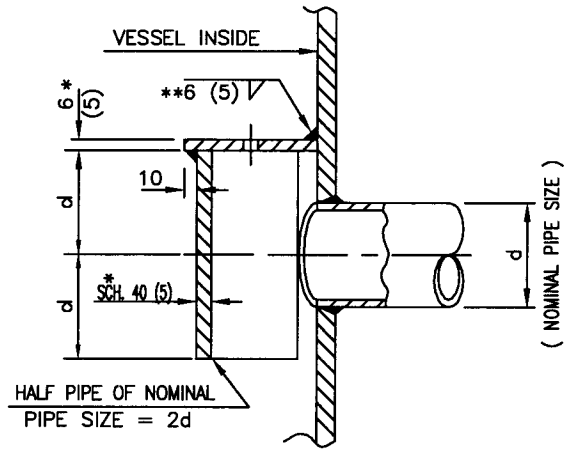
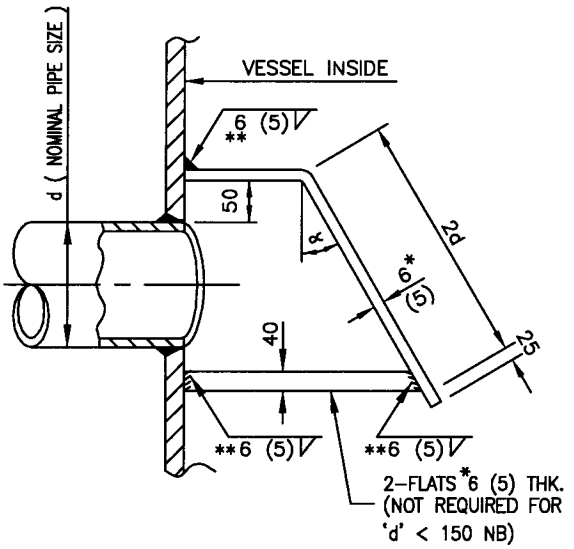
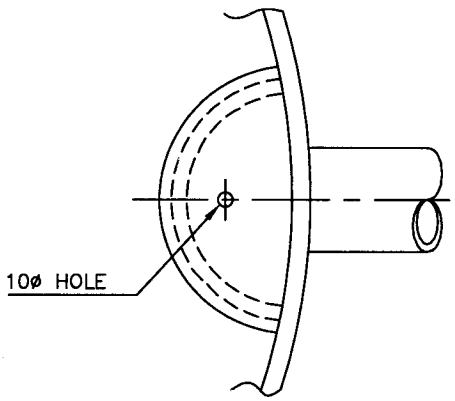
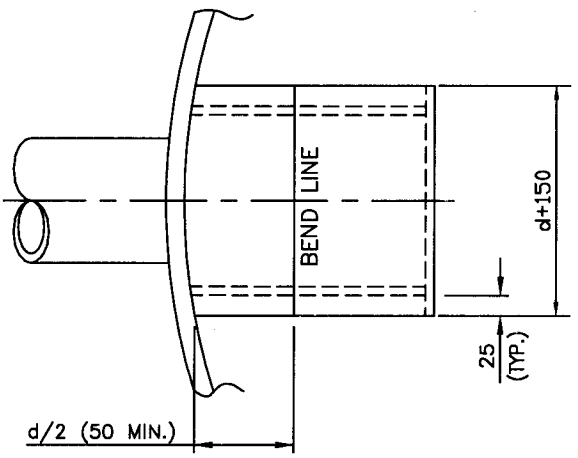






TYPE–1



TYPE–2

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. ∝ = 30° UNLESS OTHERWISE STATED (TO BE ADJUSTED TO PREVENT BLOWING INTO SEAL PAN).
3. MATERIALS SHALL BE AS PER ENGINEERING DRAWING.
4. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
5. DIMENSIONS IN BRACKETS ARE FOR STAINLESS STEEL.

* 6. INDICATED THICKNESS OF INTERNAL BAFFLE PLATE IS MINIMUM TO WHICH TWICE THE CORROSION ALLOWANCE IS TO BE ADDED.

**7. ALL FILLET WELD SIZE SHALL BE OF 6MM MINIMUM TO WHICH THE CORROSSION ALLOWANCE IS TO BE ADDED.

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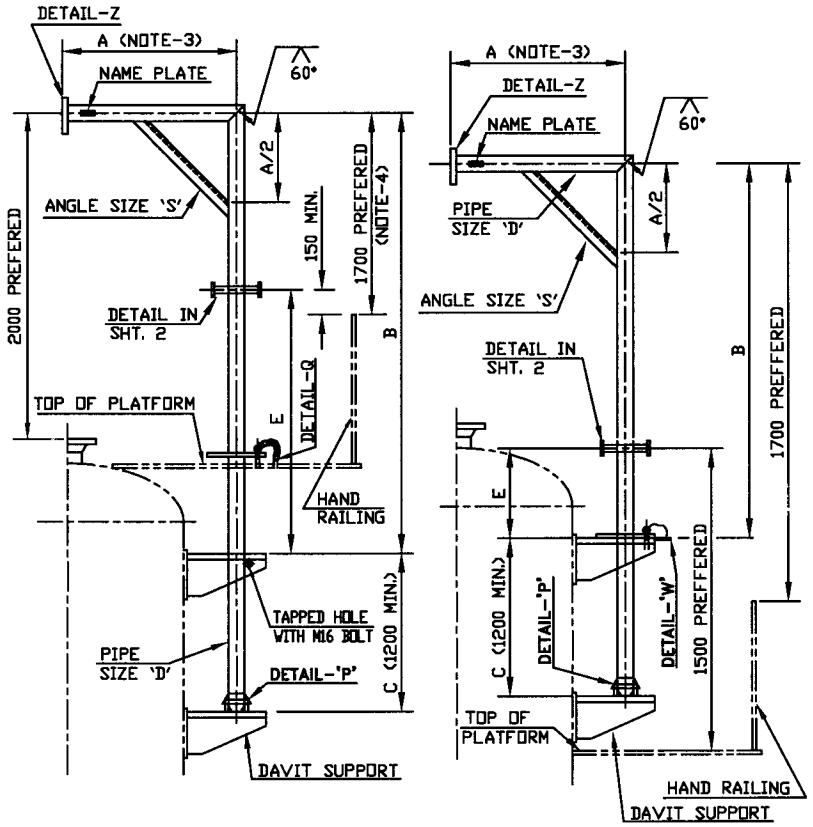
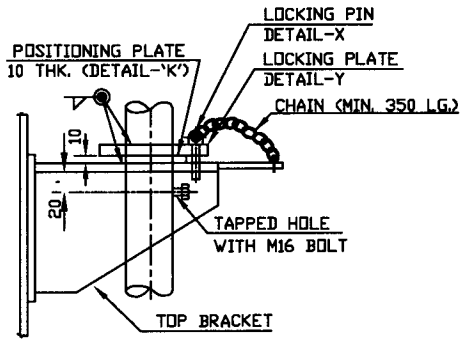
PIPE DAVIT

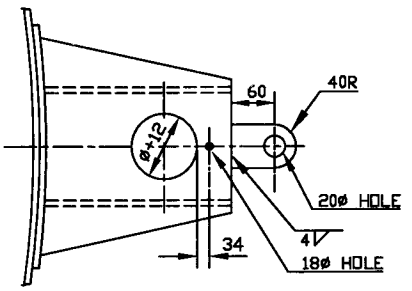


(TYPE-1)
DEVIT FOR TOP MOUNTED PLATFORM

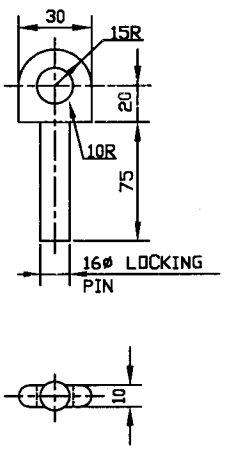
(TYPE-2)
DEVIT FOR SIDE MOUNTED PLATFORM

A (MAX) (mm)	B (mm)	CAPACITY (kgs.)	PIPE SIZE D	ANGLE SIZE S	R1	R2	r	t
1000	≤4000 (NOTE-13)	500	100NBxSCH.160	75x75x6	75	60	10	20
		1000	150NBxSCH.80	100x100x8	110	60	12	25
2000		500	150NBxSCH.80	100x100x8	110	60	10	20
		1000	200NBxSCH.80	150x150x10	140	60	12	25
3000		500	200NBxSCH.80	150x150x10	140	60	10	20
		1000	200NBxSCH.160	150x150x12	140	60	12	25

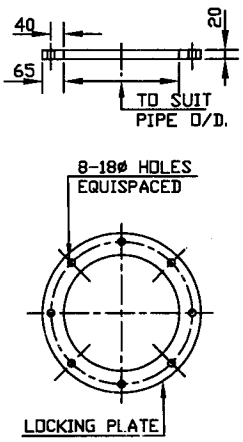




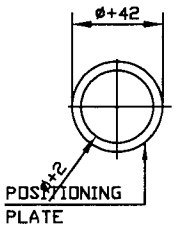
DETAIL – W



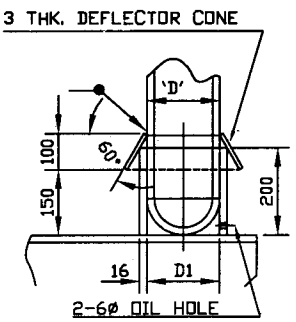
DETAIL–X



DETAIL–Y

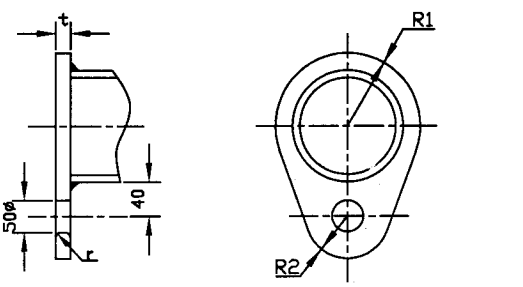


DETAIL–K



D (NB)	D1
100	120
150	175
200	225

DETAIL–P



DETAIL–Z (DAVIT EYE)

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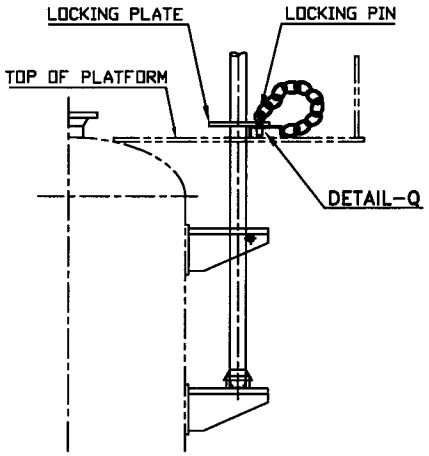
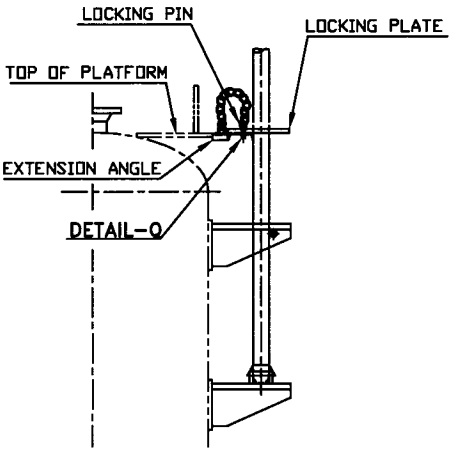
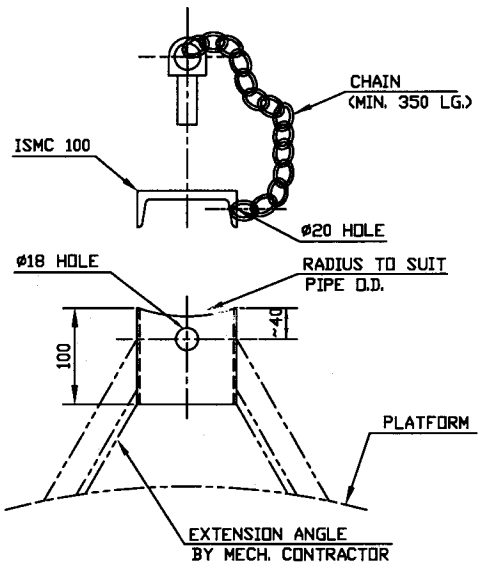


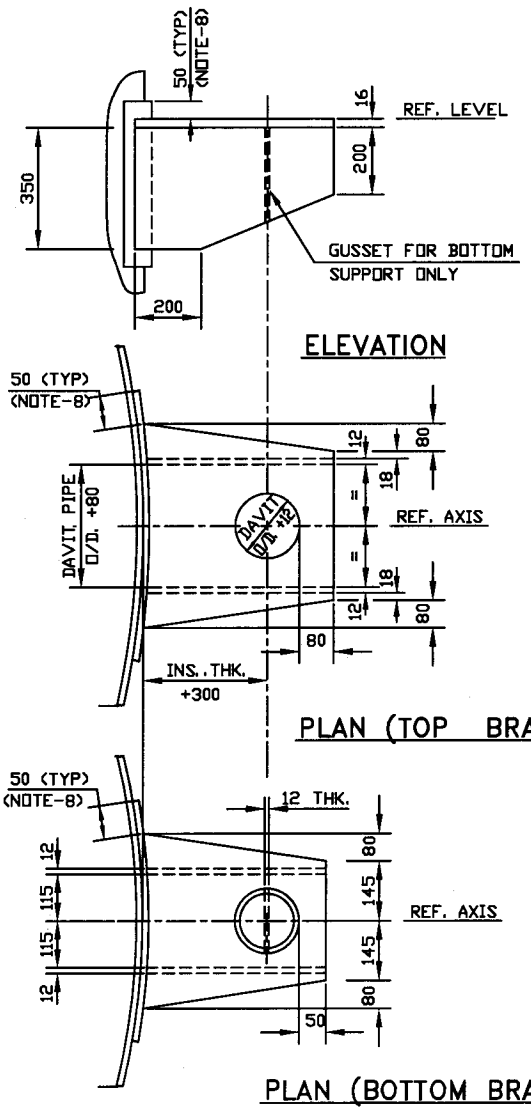
LOCKING ARRANGEMENT OF DAVIT PIPE PASSING THROUGH PLATFORM



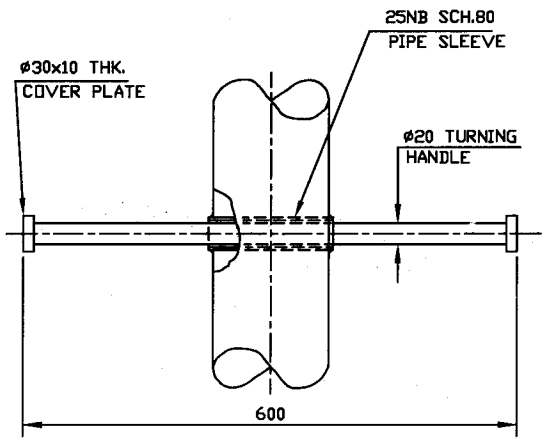
LOCKING ARRANGEMENT OF DAVIT PIPE PASSING THROUGH SIDE OF PLATFORM



DETAIL – Q



DAVIT SUPPORTS



TURNING HANDLE DETAIL

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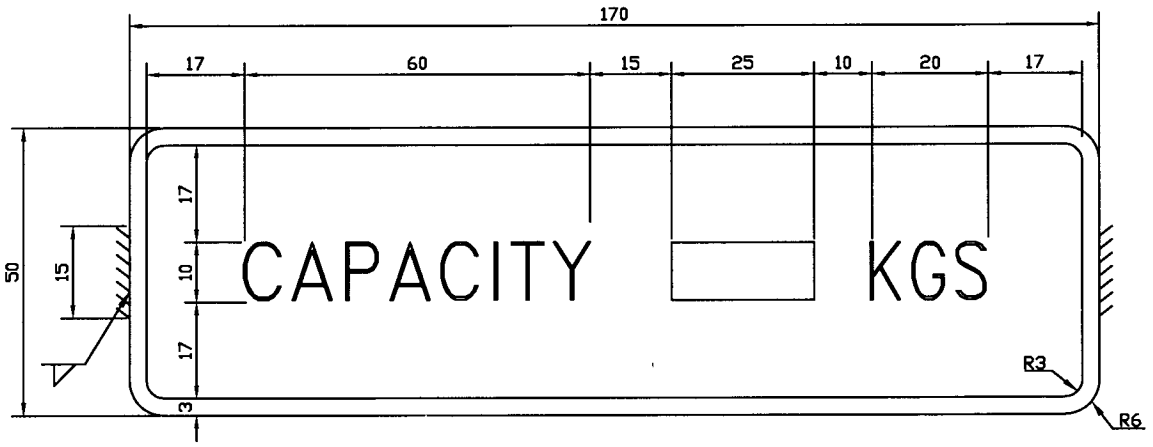

NAME PLATE

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. NAME PLATE
   a) MATERIAL STAINLESS STEEL 2mm THICK.
   b) NAME PLATE IS TO BE TACK WELDED TO THE DAVIT PIPE.
   c) THE LETTERS AND NUMBERS SHALL HAVE RAISED POLISHED FACE.
   d) BACKGROUND SHALL BE BLACK.
3. DIMENSION 'A' SHALL BE SUCH THAT THE DAVIT EYE EXTENDS PREFERABLY BY 900 mm OUTSIDE PLATFORM.
4. REFER ENGINEERING DRAWING FOR DIMENSIONS A, B, C, E, CAPACITY OF DAVIT AND INSULATION THICKNESS.
5. THE DAVIT USED SHALL CLEAR HANDRAIL OF THE EQUIPMENT.
6. MATERIAL OF PIPE SHALL BE A–53 / IS:1978 OR EQUIVALENT AND STRUCTURAL PARTS SHALL BE IS:2062 GR.B OR EQUIVALENT.
7. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
8. FOR THIN WALLED EQUIPMENT, DESIGNER SHALL ANALYSE THE STIFFNESS OF SHELL AT THE BRACKET LOCATIONS.
9. DETAIL DIMENSIONS AND NOTES IN ENGINEERING DRAWING TAKE PRECEDENCE OVER THOSE SHOWN HERE.
10. LOCKING PLATE (DETAIL –Y), LOCKING PIN (DETAIL –X) WITH CHAIN, POSITIONING PLATE (DETAIL –K), DEFLECTOR CONE (DETAIL–P) AND LOCKING SUPPORT CHANNEL (DETAIL –Q) SHALL BE SUPPLIED LOOSE BY FABRICATOR AND WELDED AT SITE BY MECHANICAL CONTRACTOR.
11. ALL FILLET WELDS SHALL BE 6 mm MINIMUM.
12. FOR LOW TEMPERATURE SERVICE, BRACKET DETAILS SHALL BE AS PER EIL STD. 7–12–0034
13. IN CASE DIMENSIONS 'B' IS BEYOND THIS STANDARD, IT IS RECOMMENDED TO INSTALL PIPE DAVIT ON STRUCTURAL PLATFORM.

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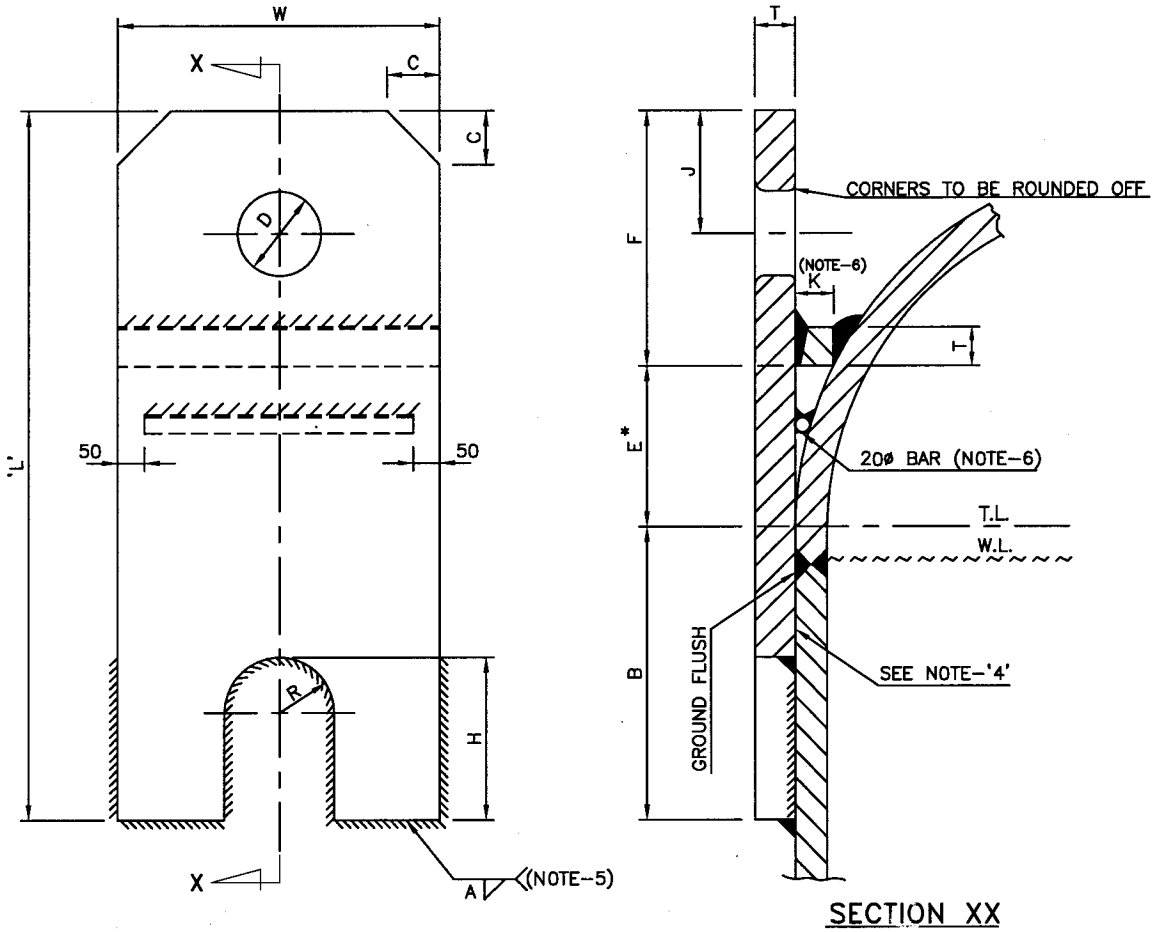

SECTION XX

MAX. ERECTION WT. OF VESSEL (TONNES)		≤10	25	45	90	140	180
THICKNESS OF PLATE (MINIMUM)	T	12	28	40	50	70	80
WIDTH	W	200	230	300	400	500	610
LENGTH	L	400+E	460+E	580+E	750+E	900+E	1080+E
DIAMETER OF HOLE	D	60	75	75	100	130	150
HEIGHT OF NOTCH & SIDE WELD	H	130	130	150	200	250	300
RADIUS OF NOTCH	R	40	40	50	75	90	100
WELD SIZE (SEE NOTE 5)	A	10	14	20	30	38	46
BOTTOM OF BRACE TO TOP OF LUG	F	200	230	300	400	500	600
BOTTOM OF BRACE TO T.L. OF HEAD	E	SEE NOTE 2					
T.L. OF VESSEL TO BOTTOM OF LUG	B	200	230	280	350	400	480
	C	30	40	50	70	90	100
TOP OF LUG TO ℄ OF HOLE	J	90	90	115	150	180	230
	K	30	40	50	70	80	100
NO. OF LUGS		2	2	2	2	2	2

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
*2. DIMENSION 'E' IS TO BE DETERMINED BY THE SHAPE OF HEAD IN CONJUNCTION WITH DIMENSION 'K'.
3. DETAIL, DIMENSIONS AND NOTES GIVEN IN ENGINEERING DRAWING TAKE PRECEDENCE OVER THOSE SHOWN HERE.
4. FOR THIN WALLED EQUIPMENTS, DESIGNER SHALL ANALYSE THE STIFFENESS OF SHELL AT THE LIFTING LUG LOCATION.
5. IF PADS ARE USED ON STAINLESS STEEL EQUIPMENTS THE SIZE OF FILLET WELD BETWEEN SHELL AND STAINLESS STEEL PAD SHALL BE ANALYSED.
6. MATERIAL SHALL BE COMPATIBLE WITH HEAD MATERIAL.
7. FOR INTERMEDIATE ERECTION WEIGHT, NEXT HIGHER SIZE OF LIFTING LUG SHALL BE USED.
8. LIFTING LUG SHALL BE MACHINED TO COVER OFFSET BETWEEN OUTER DIAMETERS OF SHELL AND HEAD.

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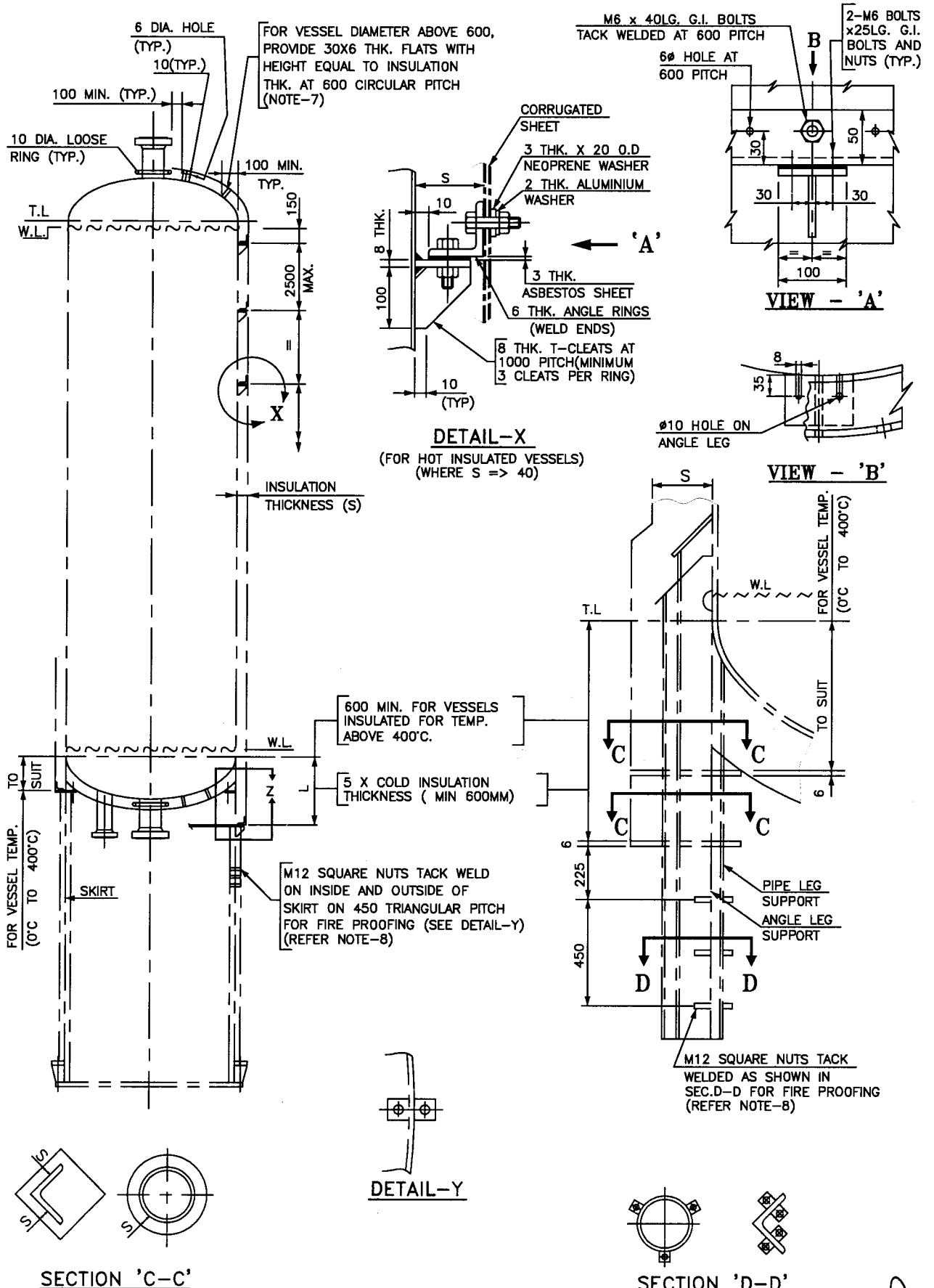

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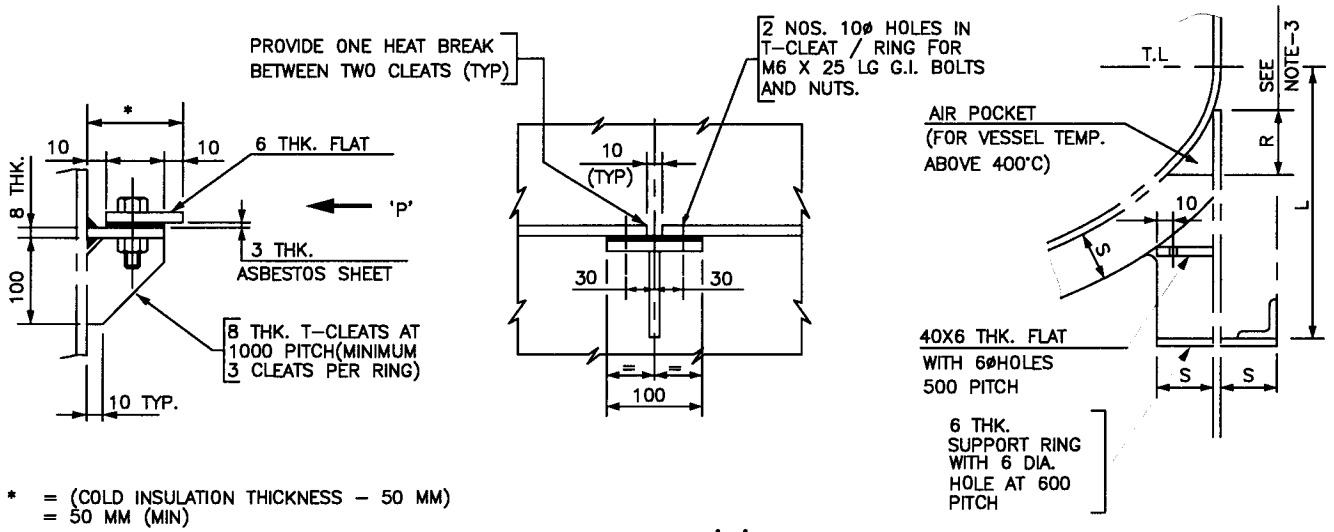
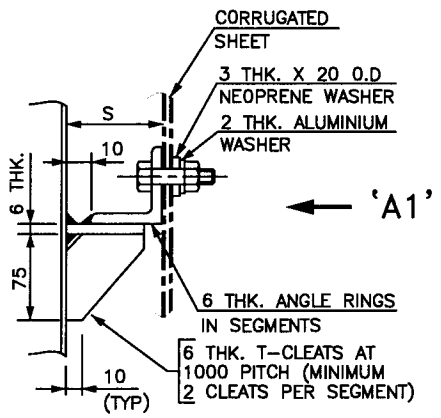


* = (COLD INSULATION THICKNESS – 50 MM)
= 50 MM (MIN)

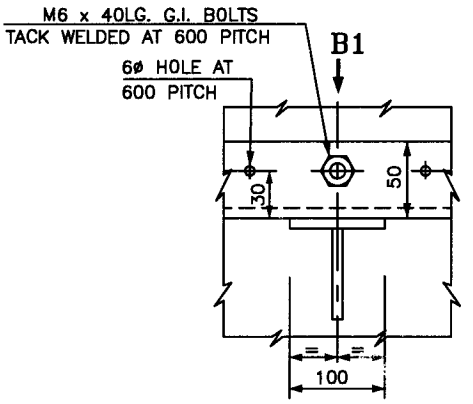
DETAIL–X
(FOR COLD INSULATED VESSELS)

VIEW – 'P'

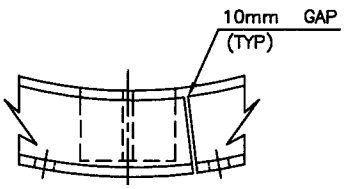
DETAIL – 'Z'



DETAIL–X
(FOR HOT INSULATED VESSELS)
(WHERE S < 40)



VIEW – 'A1'



VIEW – 'B1'

NOTES

1. ALL DIMENSIONS ARE IN mm.
2. FOR MATERIAL SPECIFICATION REFER ENGINEERING DRAWING.
3. 'R' SHALL BE EQUAL TO 175mm FOR VESSELS UPTO 3000mm DIAMETER AND 300mm FOR VESSELS ABOVE 3000mm DIAMETER.
4. DETAILS, DIMENSIONS AND NOTES ON ENGINEERING DRAWING SHALL TAKE PRECEDENCE OVER THOSE SHOWN HEREIN.
5. CLIPS SHALL CLEAR WELD SEAMS AND INSULATION RINGS SHALL BE SUITABLY NOTCHED INCASE OF INTERFERENCE WITH NOZZLES/ATTACHMENTS.
6. ONLY T–CLEATS WITH ASBESTOS SHEET AND G.I. BOLTINGS, ANGLE RING ALONG WITH TACK WELDED BOLTS, INSULATION SUPPORT CLEATS WELDED TO EQUIPMENT, LOOSE RINGS & M12 NUTS SHALL BE SUPPLIED BY EQUIPMENT FABRICATOR.
7. a) FOR COLD INSULATED VESSELS CLEATS ON DISHED ENDS ARE NOT REQUIRED.
   b) FOR COLD INSULATED VESSELS CLEATS ON SHELL ARE TO BE PROVIDED IF COLD INSULATION THICKNESS IS MORE THAN 60mm.
8. FOR UNINSULATED VESSELS SQUARE NUTS SHALL BE PROVIDED FOR ENTIRE HEIGHT OF SUPPORT (SKIRT, PIPE/ANGLE LEG).

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	TR	NK	RM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

Approved by

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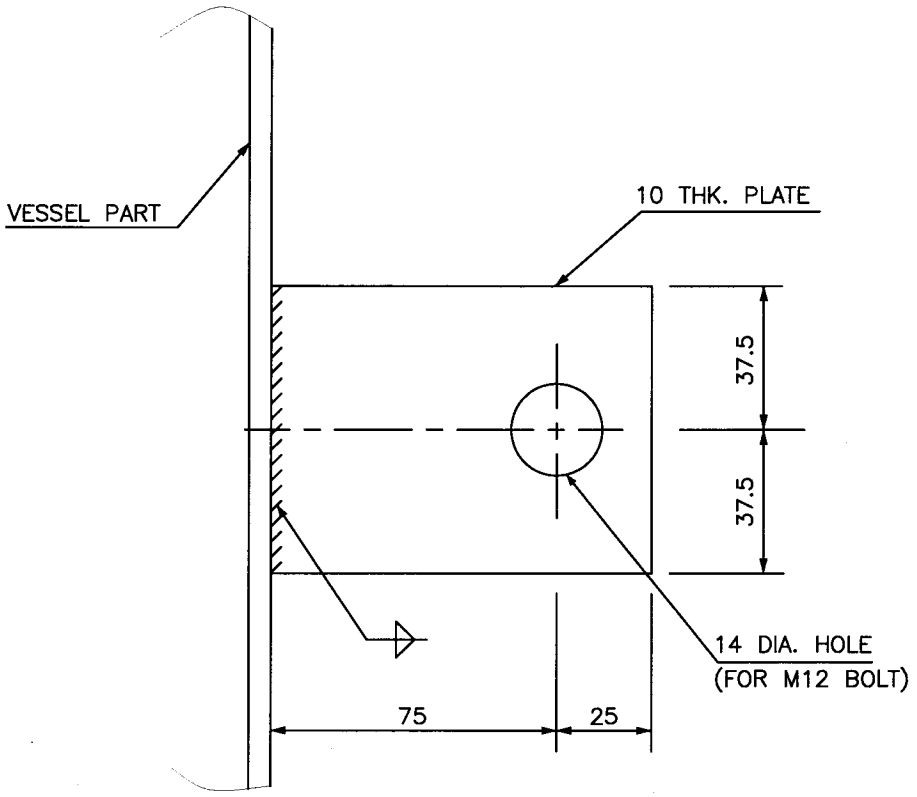
EARTHING LUG



NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. ALL EQUIPMENTS SHALL BE PROVIDED WITH TWO(2) EARTHING LUGS, UNLESS OTHERWISE STATED.

3.(a) EARTHING LUGS SHALL BE LOCATED DIAMETRICALLY OPPOSITE ON NORTH–SOUTH CENTER LINE ON SKIRT SUPPORTED EQUIPMENTS, ON ANY TWO(2) LEGS OF THREE(3) LEG SUPPORTED VERTICAL VESSEL, ON DIAMETRICALLY OPPOSITE LEGS OF FOUR(4) LEG SUPPORTED VERTICAL VESSEL AND ON EACH SADDLE OF HORIZOTAL VESSEL.

(b) TWO(2) EATHING LUGS ARE TO BE LOCATED ON EACH SADDLE OF HORIZONTAL VESSEL OF LENGTH GREATER THAN 20 METERS.

(c) FOR SPHERE, TOTAL 4–NOS. OF EARTHING LUGS SHALL BE PROVIDED PREFERABLY ON DIAMETRICALLY OPPOSITE AND EQUALLY SPACED LEGS. (SPHERES ARE USUALLY PROVIDED WITH LEGS IN NUMBERS WHICH ARE MULTIPLE OF 4 FOR THE SYMMETRY)

4. DO NOT WELD EARTHING LUG ON PRESSURE PART.
5. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
6. MATERIAL OF CONSTRUCTION SHALL BE CARBON STEEL.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	JK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

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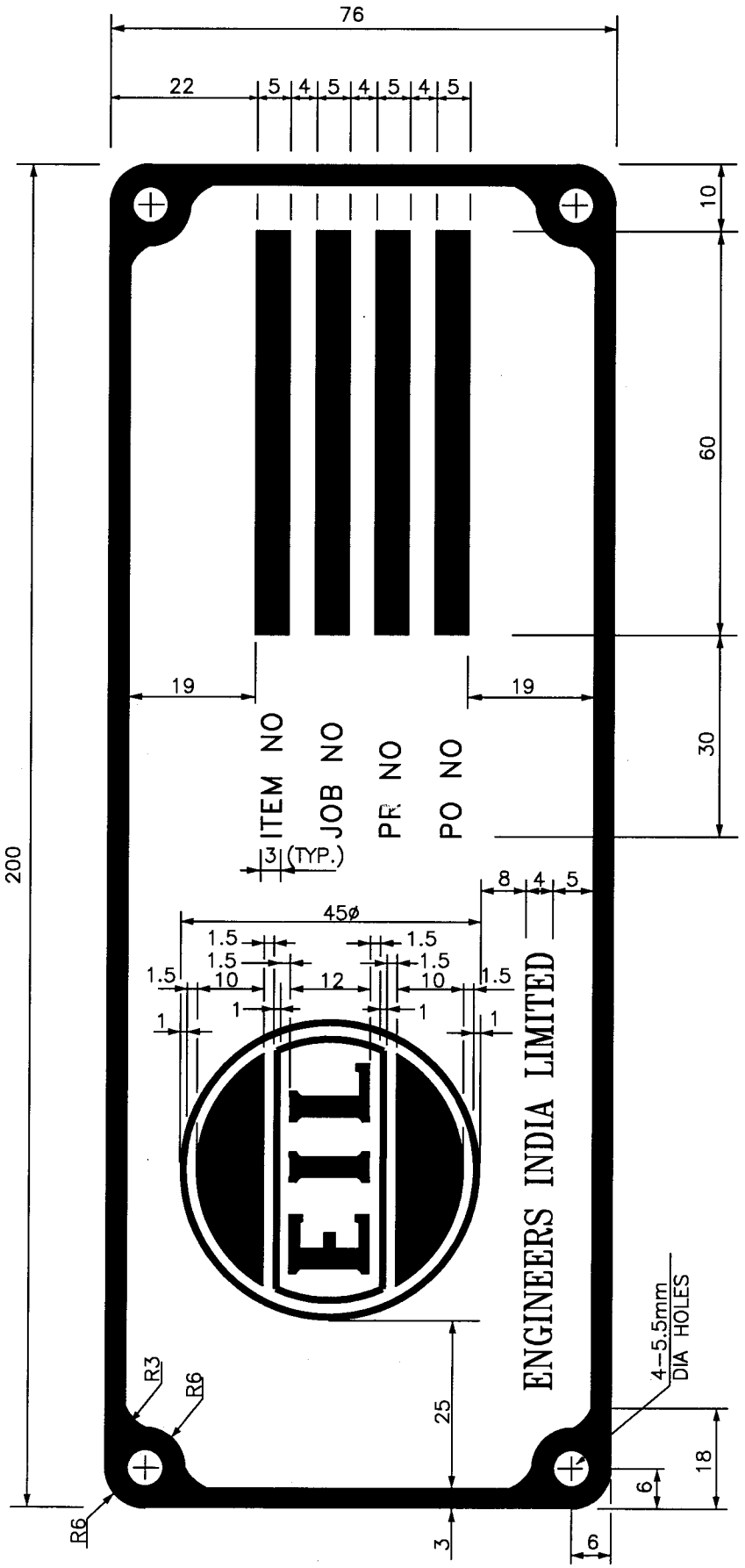

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. ALL LETTERS, BLOCKS AND BORDER SHALL BE OF RAISED POLISHED FACE.
3. BACK GROUND SHALL BE BLACK.
4. NAME PLATE SHALL BE TACK-WELDED TO THE BRACKET. WHERE NOT POSSIBLE IT MAY BE RIVETTED.
5. REFER STANDARD 7-12-029 FOR BRACKET DETAIL OF NAME PLATE.
6. NAME PLATE SHALL BE OF STAINLESS STEEL OF 2mm THICK.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	FK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

Approved by

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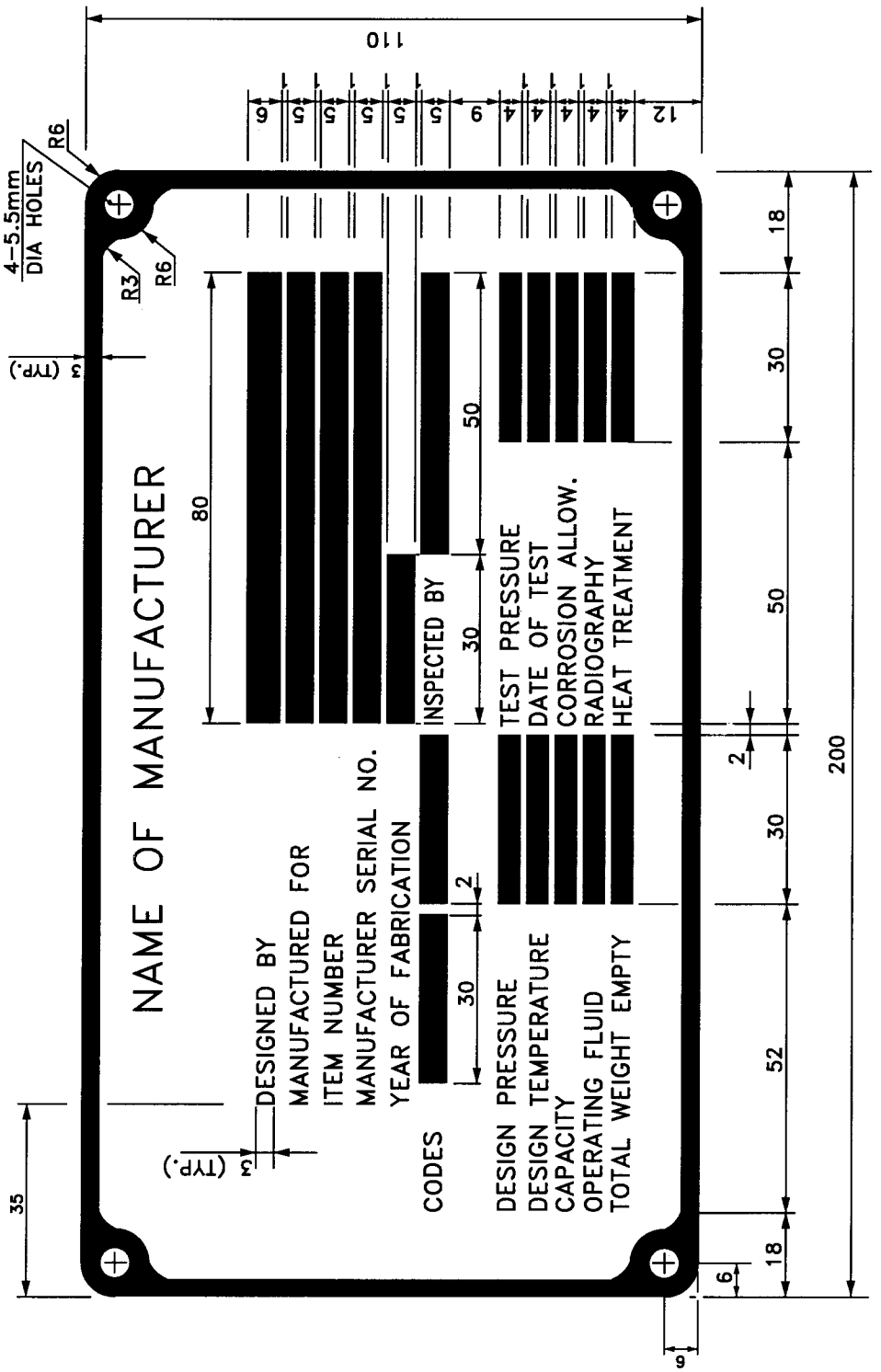
MANUFACTURER NAME PLATE



NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. ALL LETTERS, BLOCKS AND BORDER SHALL BE OF RAISED POLISHED FACE.
3. BACK GROUND SHALL BE BLACK.
4. NAME PLATE SHALL BE TACK–WELDED TO THE BRACKET. WHERE NOT POSSIBLE IT MAY BE RIVETTED.
5. REFER STANDARD 7–12–029 FOR BRACKET DETAIL OF NAME PLATE.
6. NAME PLATE SHALL BE OF STAINLESS STEEL OF 2mm THICK.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	TK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

Approved by

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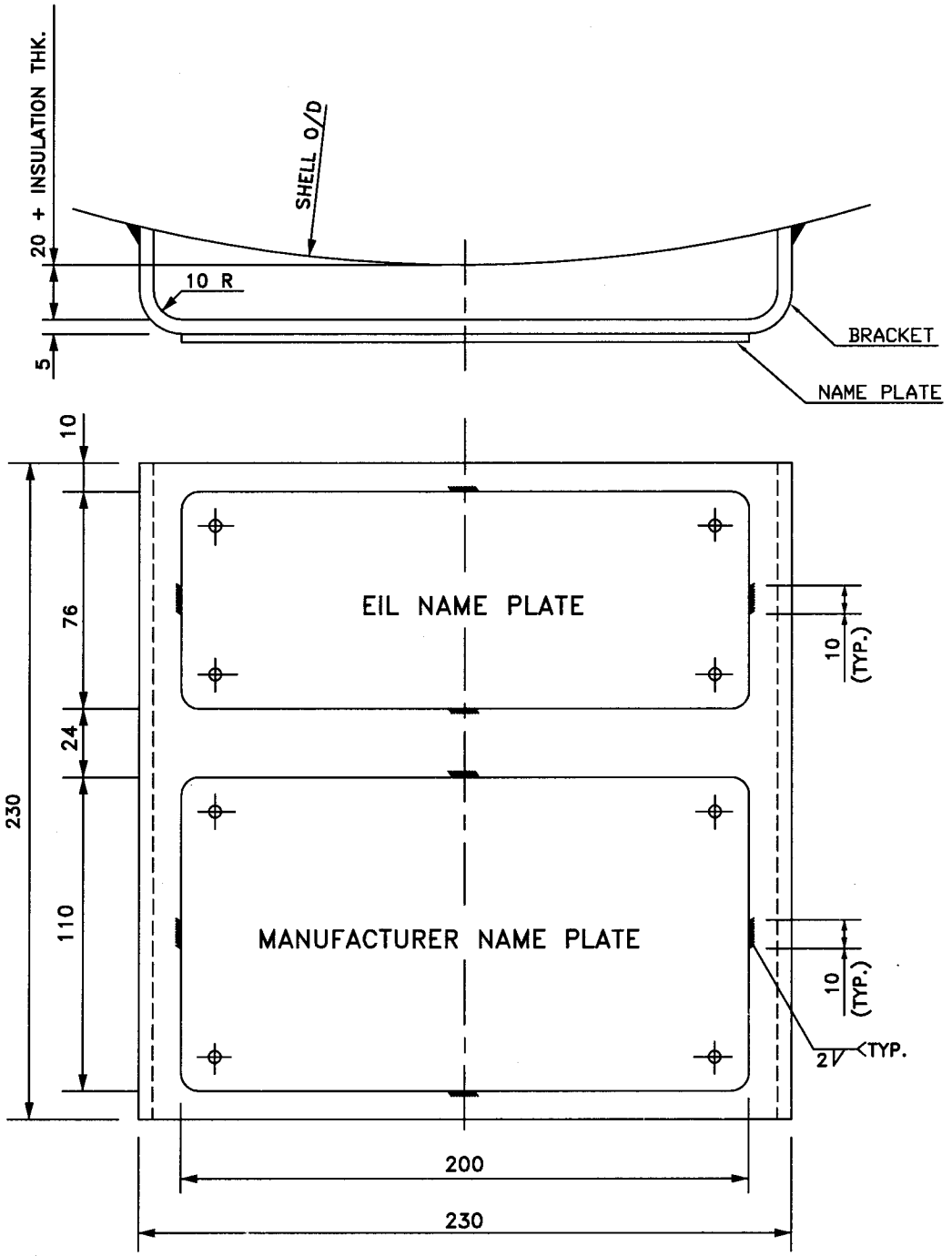
BRACKET FOR NAME PLATE



NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. BRACKET MATERIAL SHALL BE SAME AS SHELL MATERIAL.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	YK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

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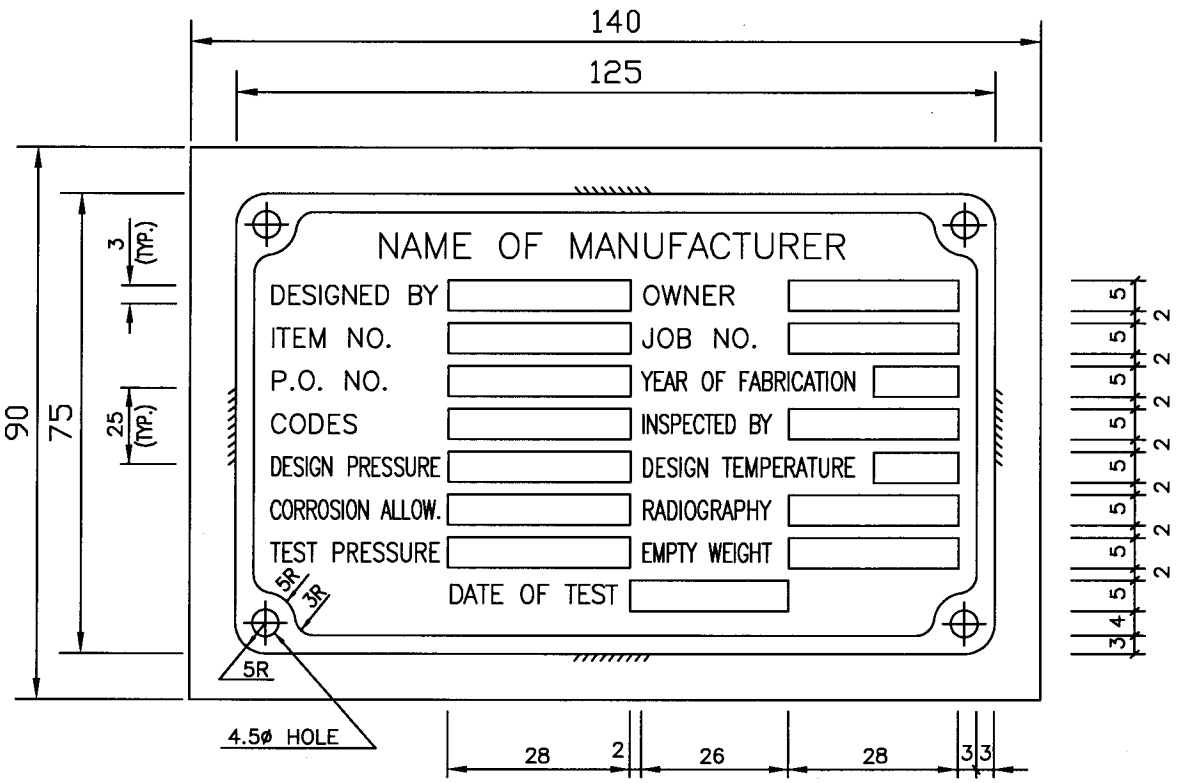

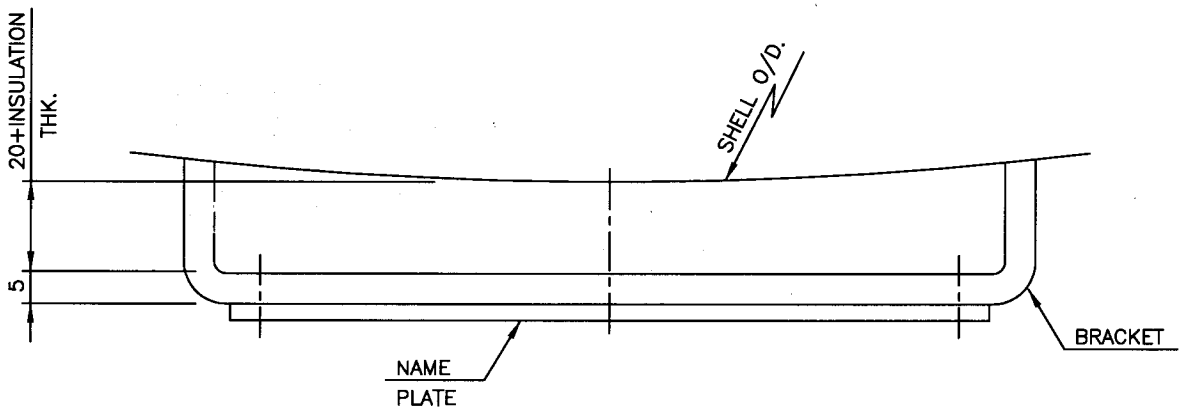

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED.
2. ALL LETTERS, BLOCKS AND BORDERS SHALL BE RAISED POLISHED FACE.
3. BACKGROUND SHALL BE BLACK.
4. NAME PLATE SHALL BE TACK–WELDED TO THE BRACKET. WHERE NOT POSSIBLE IT MAY BE RIVETTED.
5. NAME PLATE SHALL BE OF STAINLESS STEEL OF 2mm THICK.
6. BRACKET MATERIAL SHALL BE SAME AS SHELL MATERIAL.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	TK	NK	BM
5	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

Approved by

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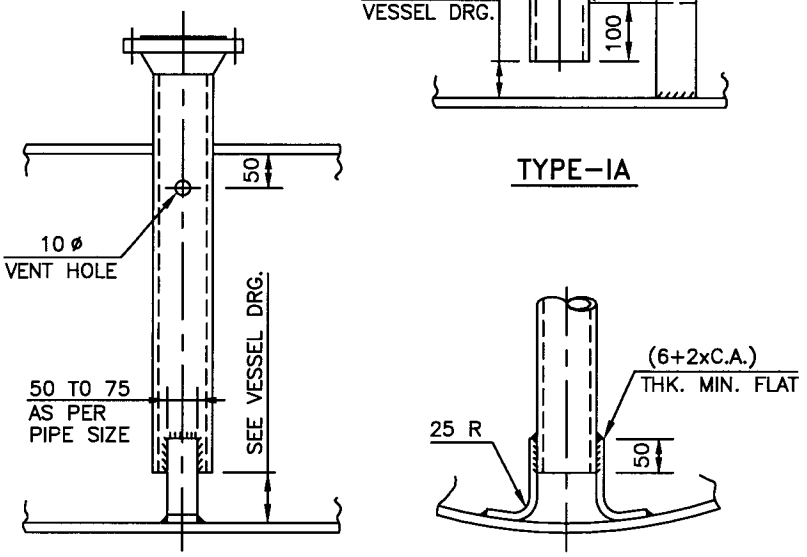
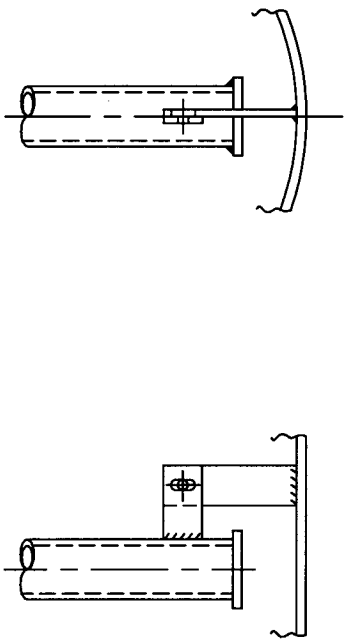


TYPE–IA

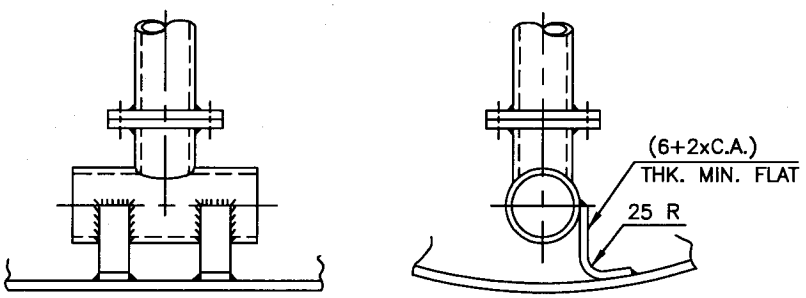
TYPE–I

INTERNAL FEED PIPE FOR HORIZONTAL VESSEL

NOTE TYPE–IA IS APPLICABLE FOR LARGE THERMAL EXPANSION

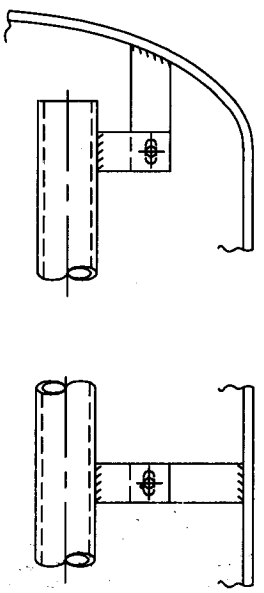


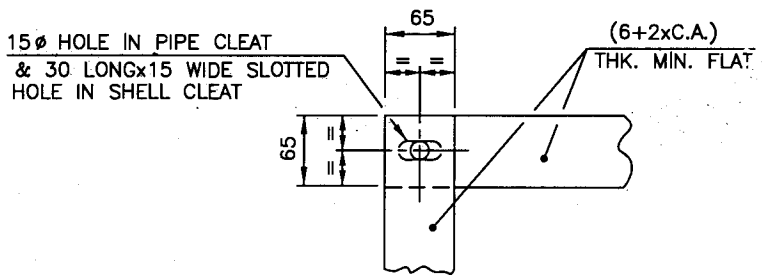
SPARGER/FEED PIPE SUPPORT (AIR / GAS SERVICE)



TYPE–2

INTERNAL SPLASH FEED PIPE FOR HORIZONTAL VESSEL





TYPICAL DETAIL OF BOLTING CLEATS

SUPPORT CLEAT FOR VERTICAL VESSEL

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	TK	NK	SM
5	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

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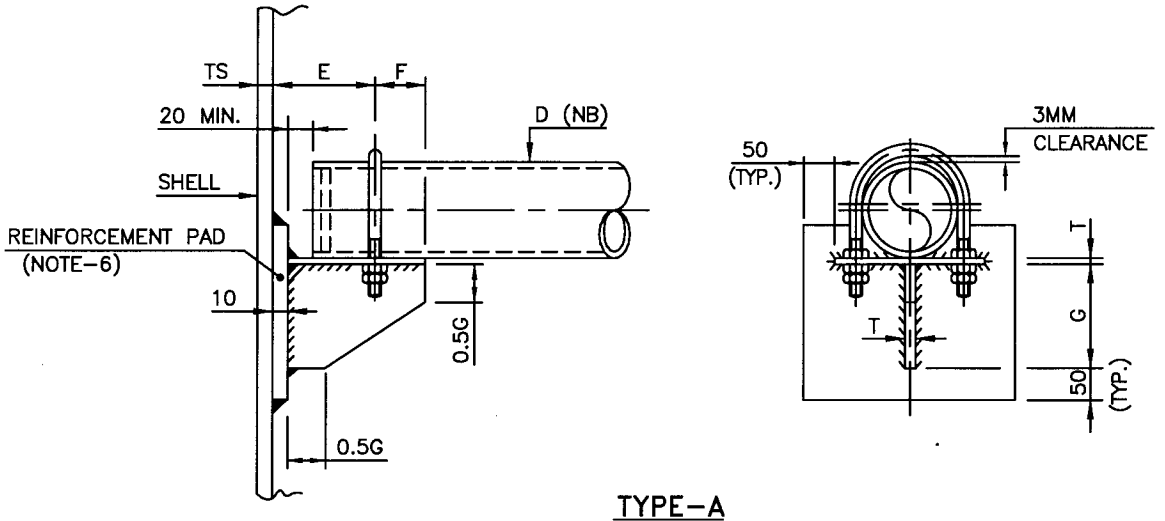
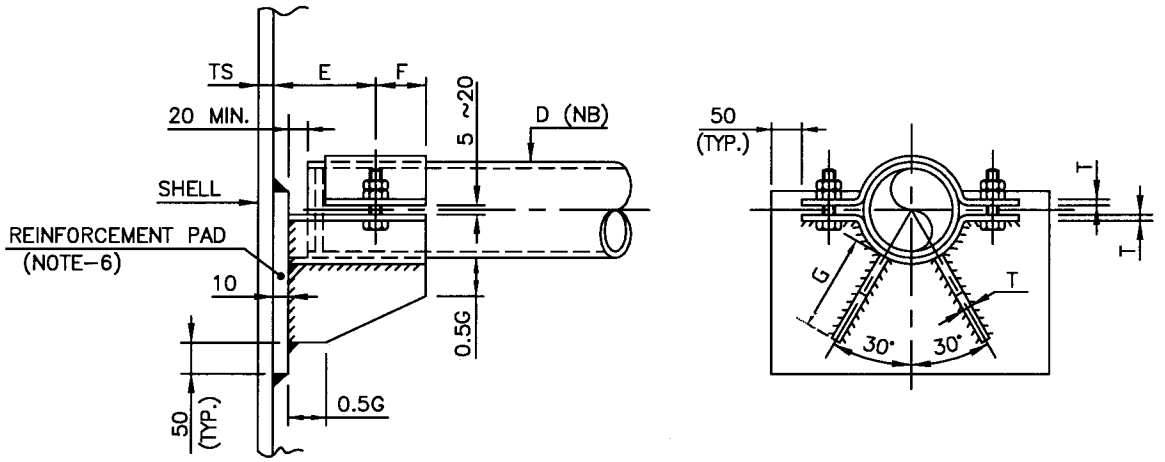


TYPE-A
(FOR PIPES UPTO 250NB)



TYPE-B
(FOR PIPES ABOVE 250NB)

INTERNAL FEED PIPE FOR VERTICAL VESSEL/COLUMN

PIPE N.B. D	BOLT SIZE	T					E	F	G
		CA=0	CA=1.5	CA=3	CA=5	CA=7			
50 – 80	M 12	6	10	12	16	20	60	40	60
100 – 200	M 16	10	14	16	20	25	100	50	100
250 ~ OVER	M 16	14	18	20	25	28	150	100	150

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. IN CASE OF CONFLICT VESSEL ENGG. DRAWING SHALL GOVERN.
3. MATERIAL OF CLEATS SHALL BE AS PER VESSEL ENGG. DRAWING.
4. ALL FILLET WELDS TO BE ALL AROUND & SIZE OF WELDS ARE (6+1xC.A.) MINIMUM UNLESS OTHERWISE STATED.
5. ALL INTERNAL BOLTS SHALL BE MIN. M 12 SIZE AND OF STAINLESS STEEL WITH DOUBLE NUTS.
6. REINFORCING PAD SHALL BE LARGER BY 50mm ALL AROUND THAN BRACKET CLEATS. NO PAD IS REQUIRED FOR VESSELS WITH WALL THICKNESS GREATER THAN 25mm.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	SK	NK	SM
5	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

Approved by

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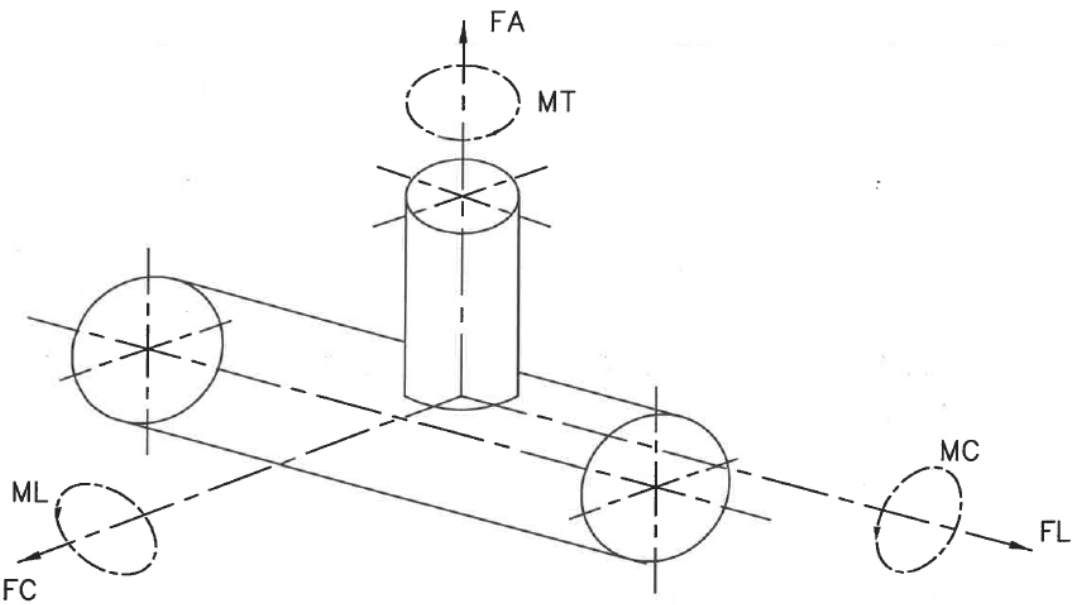

NOTES: –

1. THIS STANDARD COVERS ALLOWABLE NOZZLE LOADS FOR PRESSURE VESSELS & COLUMNS ONLY.
2. EACH PROCESS NOZZLE OF VESSELS SHALL BE ANALYZED FOR THE LOADS PROVIDED IN THIS STANDARD.
3. THESE LOADS SHALL BE CONSIDERED TO BE ACTING SIMULTANEOUSLY WITH INTERNAL/EXTERNAL DESIGN PRESSURE. ALLOWABLE STRESS SHALL BE AS PER APPLICABLE DESIGN CODE.
4. STRESS CALCULATIONS SHALL BE CARRIED OUT AS PER WRC BULLETIN NO. 537/ 297 (AS APPLICABLE). WRC 537 SHALL BE USED FOR NOZZLES ON DISHED ENDS AND WRC 297 SHALL BE USED FOR NOZZLES ON CYLINDRICAL SHELL.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
2	02.12.2024	REVISED AND REISSUED AS STANDARD	JS/SM	TKh	KA/NK	MN
1	20.06.2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
0	31.07.14	ISSUED AS STANDARD	GCP	KA	RKT	SC

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CARBON STEEL AND LOW ALLOY STEEL EQUIPMENTS (CLASS 150 AND CLASS 300)

NOZZLE SIZES (DN)	FA (Kgf)	FL (Kgf)	FC (Kgf)	MT (Kgf–m)	ML (Kgf–m)	MC (Kgf–m)
50	135	200	200	50	40	30
80	202	300	300	112	90	67
100	270	400	400	200	160	120
150	405	600	600	450	360	270
200	540	800	800	800	640	480
250	675	1000	1000	1250	1000	750
300	810	1200	1200	1800	1440	1080
350	945	1400	1400	2450	1960	1470
400	1080	1600	1600	3200	2560	1920
450	1215	1800	1800	4050	3240	2430
500	1350	2000	2000	5000	4000	3000
600	1620	2400	2400	7200	5760	4320
650	1755	2600	2600	8450	6760	5070
700	1890	2800	2800	9800	7840	5880
750	2025	3000	3000	11250	9000	6750
800	2160	3200	3200	12800	10240	7680
850	2295	3400	3400	14450	11560	8670
900	2430	3600	3600	16200	12960	9720
950	2565	3800	3800	18050	14440	10830
1000	2700	4000	4000	20000	16000	12000
1050	2835	4200	4200	22050	17640	13230
1100	2970	4400	4400	24200	19360	14520
1150	3105	4600	4600	26450	21160	15870
1200	3240	4800	4800	28800	23040	17280
1250	3375	5000	5000	31250	25000	18750
1300	3510	5200	5200	33800	27040	20280
1350	3645	5400	5400	36450	29160	21870
1400	3780	5600	5600	39200	31360	23520
1450	3915	5800	5800	42050	33640	25230
1500	4050	6000	6000	45000	36000	27000

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CARBON STEEL AND LOW ALLOY STEEL EQUIPMENTS (CLASS 600 AND ABOVE)

NOZZLE SIZES (DN)	FA (Kgf)	FL (Kgf)	FC (Kgf)	MT (Kgf–m)	ML (Kgf–m)	MC (Kgf–m)
50	168	250	250	62	50	37
80	253	375	375	140	112	84
100	337	500	500	250	200	150
150	506	750	750	562	450	337
200	675	1000	1000	1000	800	600
250	843	1250	1250	1562	1250	937
300	1012	1500	1500	2250	1800	1350
350	1181	1750	1750	3062	2450	1837
400	1350	2000	2000	4000	3200	2400
450	1518	2250	2250	5062	4050	3037
500	1687	2500	2500	6250	5000	3750
600	2025	3000	3000	9000	7200	5400
650	2193	3250	3250	10562	8450	6337
700	2362	3500	3500	12250	9800	7350
750	2531	3750	3750	14062	11250	8437
800	2700	4000	4000	16000	12800	9600
850	2868	4250	4250	18062	14450	10837
900	3037	4500	4500	20250	16200	12150
950	3206	4750	4750	22562	18050	13537
1000	3375	5000	5000	25000	20000	15000
1050	3543	5250	5250	27562	22050	16537
1100	3712	5500	5500	30250	24200	18150
1150	3881	5750	5750	33062	26450	19837
1200	4050	6000	6000	36000	28800	21600
1250	4218	6250	6250	39062	31250	23437
1300	4387	6500	6500	42250	33800	25350
1350	4556	6750	6750	45562	36450	27337
1400	4725	7000	7000	49000	39200	29400
1450	4893	7250	7250	52562	42050	31537
1500	5062	7500	7500	56250	45000	33750

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
2	02.12.2024	REVISED AND REISSUED AS STANDARD	JS/SM	TKh	KA/NK	MN
1	20.06.2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
0	31.07.14	ISSUED AS STANDARD	GCP	KA	RKT	SC

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STAINLESS STEEL EQUIPMENTS
(ALL CLASSES)

NOZZLE SIZES (DN)	FA (Kgf)	FL (Kgf)	FC (Kgf)	MT (Kgf–m)	ML (Kgf–m)	MC (Kgf–m)
50	135	200	200	50	40	20
80	202	300	300	112	90	45
100	270	400	400	200	160	80
150	405	600	600	450	360	180
200	540	800	800	800	640	320
250	675	1000	1000	1250	1000	500
300	810	1200	1200	1800	1440	720
350	945	1400	1400	2450	1960	980
400	1080	1600	1600	3200	2560	1280
450	1215	1800	1800	4050	3240	1620
500	1350	2000	2000	5000	4000	2000
600	1620	2400	2400	7200	5760	2880
650	1755	2600	2600	8450	6760	3380
700	1890	2800	2800	9800	7840	3920
750	2025	3000	3000	11250	9000	4500
800	2160	3200	3200	12800	10240	5120
850	2295	3400	3400	14450	11560	5780
900	2430	3600	3600	16200	12960	6480
950	2565	3800	3800	18050	14440	7220
1000	2700	4000	4000	20000	16000	8000
1050	2835	4200	4200	22050	17640	8820
1100	2970	4400	4400	24200	19360	9680
1150	3105	4600	4600	26450	21160	10580
1200	3240	4800	4800	28800	23040	11520
1250	3375	5000	5000	31250	25000	12500
1300	3510	5200	5200	33800	27040	13520
1350	3645	5400	5400	36450	29160	14580
1400	3780	5600	5600	39200	31360	15680
1450	3915	5800	5800	42050	33640	16820
1500	4050	6000	6000	45000	36000	18000

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
2	02.12.2024	REVISED AND REISSUED AS STANDARD	JS/SM	TKh	KA/NK	MN
1	20.06.2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
0	31.07.2014	ISSUED AS STANDARD	GCP	KA	RKT	SC

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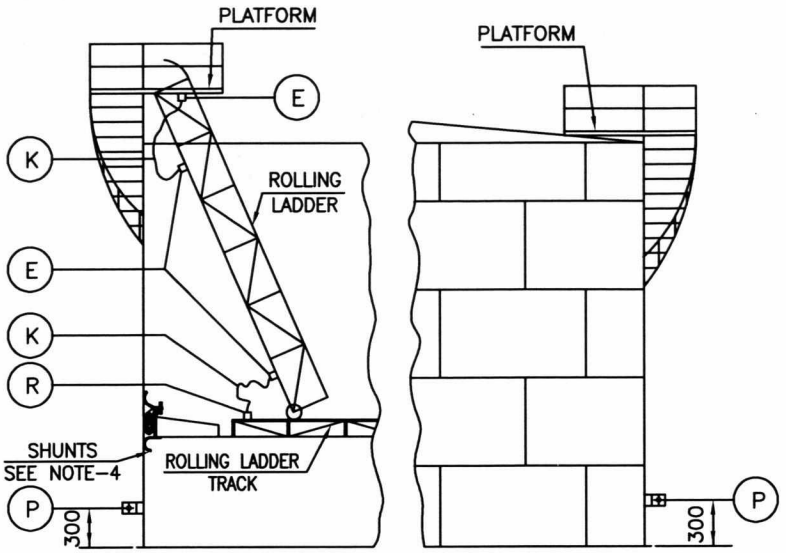
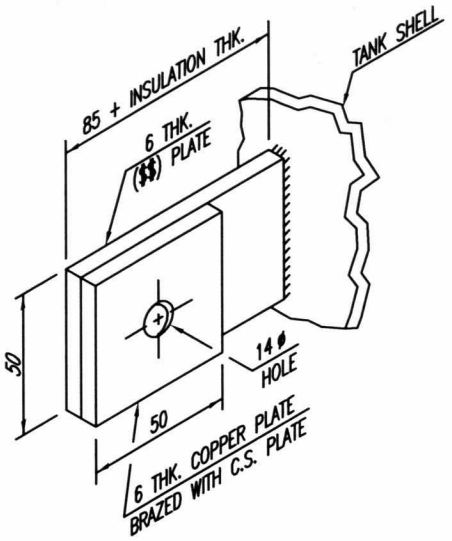
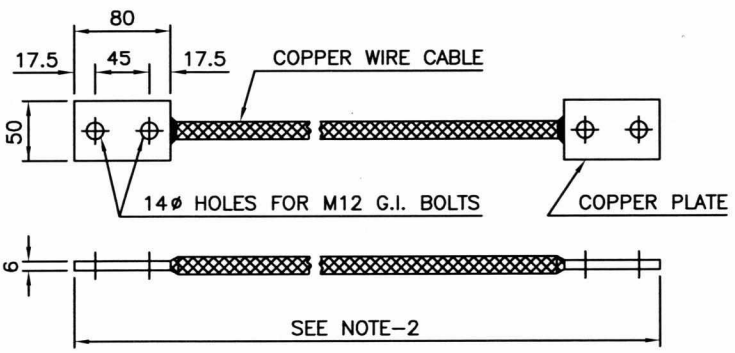


FLOATING ROOF TANK FIXED ROOF TANK

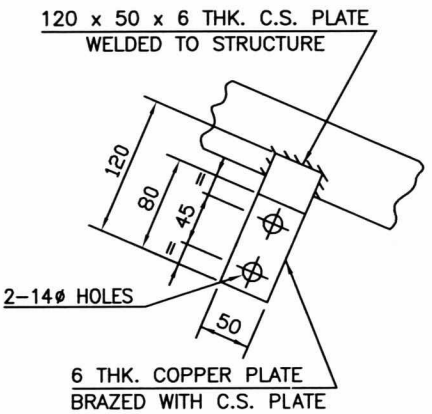


DETAIL – P

($$) AUSTENITIC STAINLESS STEEL WHEN ATTACHED TO C.S./LAS. WHEN ATTACHED TO OTHER MATERIALS, MOC SHALL BE SAME AS SHELL MOC.

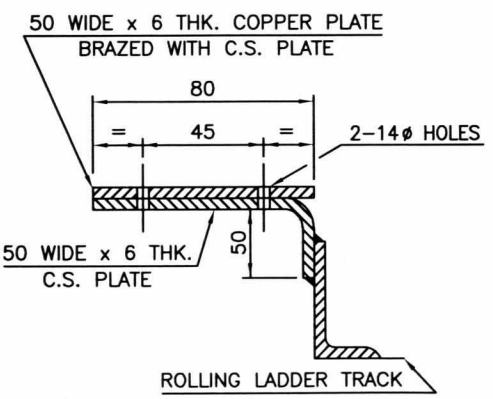


DETAIL – K



DETAIL – E

TABLE – A	
NO. OF EARTH CONNECTIONS (P) REQUIRED	
TANK DIAMETER (D) (IN MTRS)	EARTHING CONNECTION
<15	4 AT 90°
<=15 D < 25	4 AT 90°
<=25 D < 35	4 AT 90°
<=35 D < 45	5 AT 72°
<=45 D < 55	6 AT 60°
<=55 D < 65	7 AT 51.43°
<=65 D < 75	8 AT 45°
<=75 D < 85	9 AT 40°
<=85 D < 95	10 AT 36°



DETAIL – R

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	20.03.2024	REVISED AND REISSUED AS STANDARD	JIT SINGH	TKh	KKA/NK	MN
7	02.08.2018	REVISED AND REISSUED AS STANDARD	JIT SINGH	RKK	KJH	RKT

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NOTES

1. ALL DIMENSIONS ARE IN mm. UNLESS OTHERWISE STATED.
2. ELECTRIC WIRES SHALL BE LONG ENOUGH TO COVER THE ENTIRE MOVEMENT OF THE ROLLING LADDER AND CONTINUITY SHALL BE CHECKED AFTER INSTALLATION. QUANTITY REQUIRED PER TANK 2 SETS. TYPE OF WIRE P.V.C. INSULATED COPPER WIRE CABLE, 50 mm^2 CROSS SECTION.
3. LIGHTNING PROTECTION OF FLOATING ROOF TANK SHALL BE CARRIED OUT AS PER API–RP–545 AND SHALL ALSO MEET THE REQUIREMENT OF OISD–180.
4. SPRING QUALITY STAINLESS STEEL SUBMERGED SHUNTS OF 0.4 mm THICK x 51 mm WIDE SHALL BE PROVIDED FOR INTERNAL & EXTERNAL FLOATING ROOF TANKS AT MAXIMUM SPACING OF 3000 mm.
   THE SHUNT TO SHELL CONTACT POINT SHALL BE SUBMERGED AT LEAST 0.3 m BELOW THE SURFACE OF THE LIQUID PRODUCT. THE SHUNT SHALL HAVE AS SHORT AND DIRECT A PATH AS POSSIBLE FROM THE CONDUCTIVE FLOATING ROOF TO THE TANK SHELL. THE SHUNTS SHALL BE OF THE MINIMUM LENGTH NECESSARY TO PERMIT THE FUNCTION OF THE FLOATING–ROOF SEAL ASSEMBLY. THE SHUNTS SHALL BE MINIMUM LENGTH NECESSARY TO REMAIN IN CONTACT WITH THE SHELL DURING THE FULL HORIZONTAL AND VERTICAL DESIGN MOVEMENT OF THE FLOATING ROOF.
5. BYPASS CONDUCTORS SHALL BE PROVIDED BETWEEN THE ROOF AND SHELL AT EVERY 30 m (MIN.) AROUND THE EXTERNAL FLOATING ROOF TANK CIRCUMFERENCE EVENLY SPACED AROUND THE ROOF PERIMETER WITH A MINIMUM OF TWO PER TANK. EACH CONDUCTOR, INCLUDING CONNECTIONS, SHALL HAVE A MAXIMUM END–TO–END ELECTRICAL RESISTANCE OF 0.03 OHMS. THE BYPASS CONDUCTORS SHALL BE OF THE MINIMUM LENGTH NECESSARY TO PERMIT FULL MOVEMENT OF THE FLOATING ROOF. THE BYPASS CONDUCTORS AND TERMINATION CONNECTIONS SHALL BE POSITIONED AND OF SUFFICIENT FLEXIBILITY, CROSS SECTIONAL AREA AND CORROSION RESISTANCE TO HAVE A MINIMUM SERVICE LIFE OF 30 YEARS. THESE BYPASS CONDUCTORS SHALL BE IN ADDITION TO THOSE PROVIDED ON THE LADDER.
6. ALL SEAL ASSEMBLY COMPONENTS (INCLUDING SPRINGS, SCISSOR ASSEMBLIES, SEAL MEMBRANES ETC.) AND ALL GAUGE AND GUIDE POLES SHALL BE ELECTRICALLY INSULATED IN EXTERNAL FLOATING ROOF TANK. THE INSULATION LEVEL SHALL BE RATED 1kV OR GREATER.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	20.03.2024	REVISED AND REISSUED AS STANDARD	JIT SINGH	TKh	KA/NK	MN
7	02.08.2018	REVISED AND REISSUED AS STANDARD	JIT SINGH	RKK	KJH	RKT

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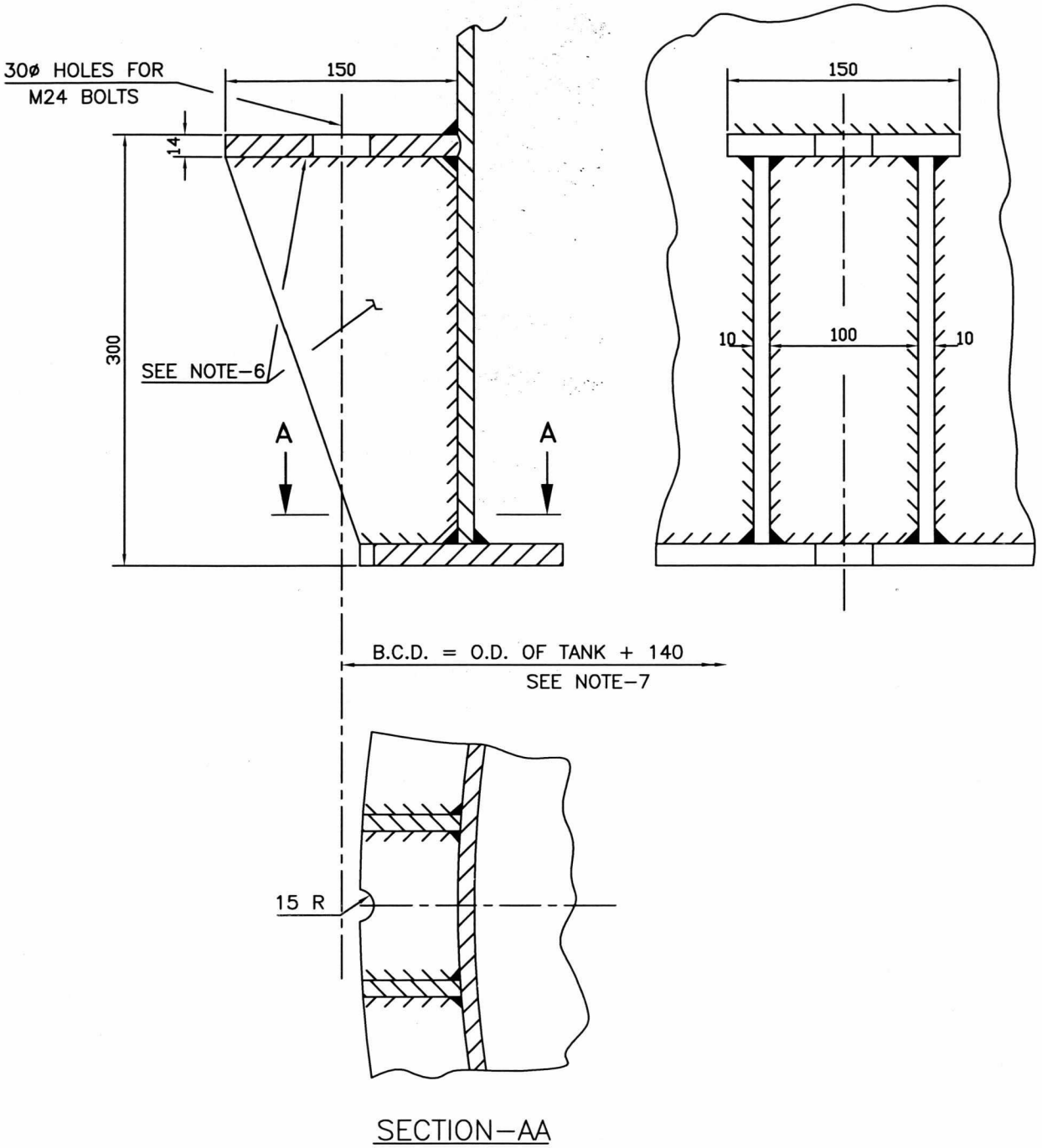
ANCHOR CHAIR



SECTION–AA

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. FOR NON–PRESSURIZED TANKS OF DIAMETER =< 10 METER, ANCHOR CHAIR SHALL BE PROVIDED AS PER THIS STANDARD. IF REQUIRED BY DESIGN, ANCHOR CHAIR SHALL BE AS PER 7–12–0004.
3. NO. OF ANCHOR CHAIRS SHALL BE MULTIPLE OF FOUR AND STRADDLE NORTH SOUTH CENTRE LINE.
4. FOR MATERIAL SPECIFICATION REFER ENGINEERING DRAWING.
5. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
6. ANCHOR CHAIR DESIGN SHALL BE CHECKED FOR PRESSURIZED TANKS AS PER THE PROVISIONS OF DESIGN CODE.
7. SUITABLE B.C.D. AND SLOTTED HOLES ON TOP PLATE SHALL BE SELECTED FOR STRESS RELIEVED TANKS TO TAKE CARE OF THERMAL EXPANSION.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	20.03.2024	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	TKh	KA/NK	MN
7	02.08.2018	REVISED AND REISSUED AS STANDARD	JIT SINGH	RKK	KJH	RKT

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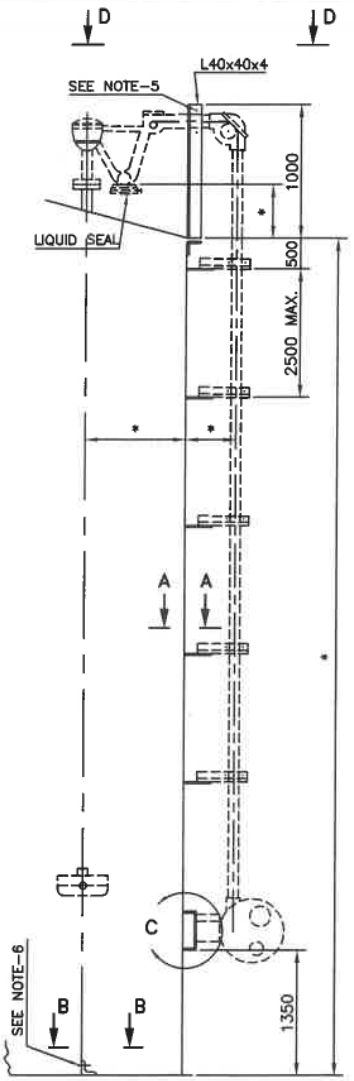
इंजीनियर्स इंडिया लिमिटेड (भारत सरकार का उपक्रम) ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)

LEVEL INDICATOR SUPPORTS

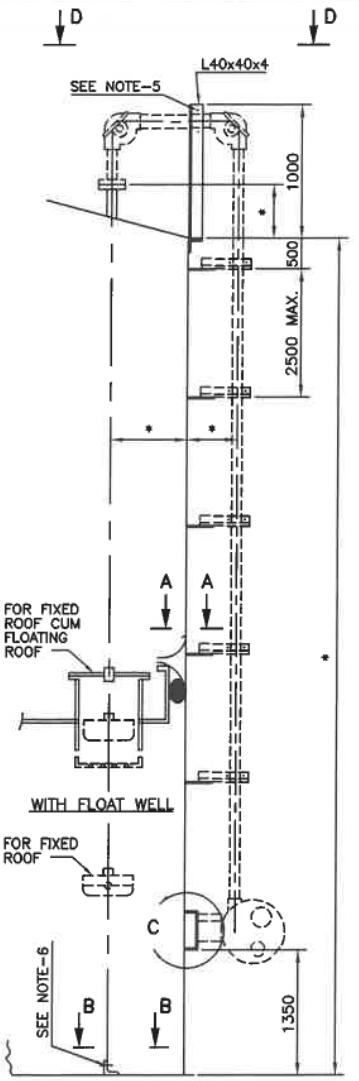
(FOR CONE ROOF / FLOATING ROOF TANKS)

STANDARD No.

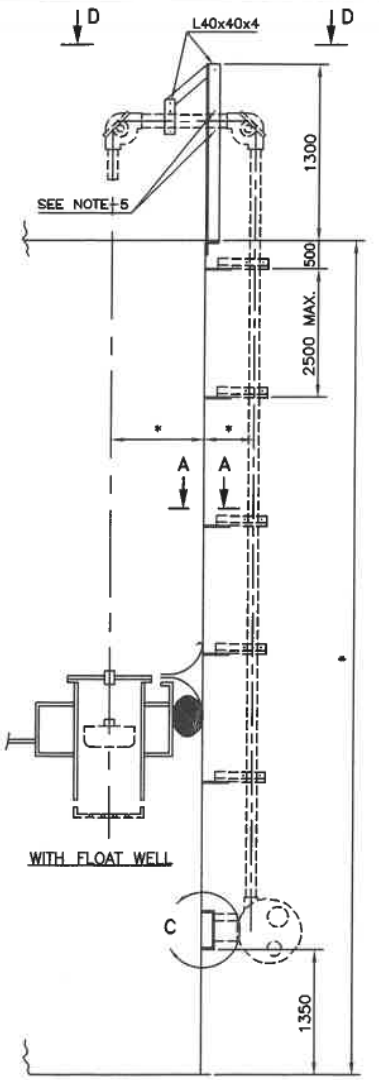
7-13-0006 Rev. 8



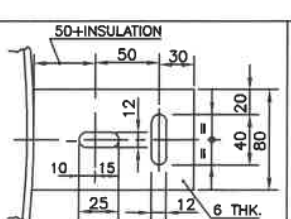
FOR PRESSURE TIGHT TANK



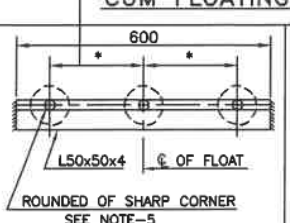
FOR FIXED ROOF AND FIXED ROOF CUM FLOATING ROOF TANK



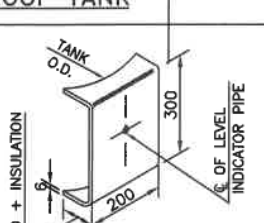
FOR FLOATING ROOF TANK



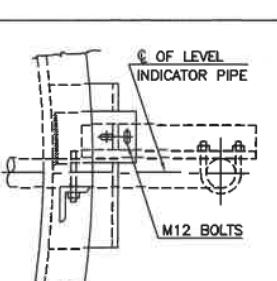
SECTION A-A (TYP.)



SECTION B-B



DETAIL - C



SECTION D-D

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
3. FOR MATERIAL SPECIFICATION REFER ENGINEERING DRAWING.
4. DIMENSIONS MARKED (*) SHALL BE AS PER FABRICATION / ENGINEERING DRAWING.
5. DRILLING OF THE HOLES BY THE INSTRUMENT CONTRACTOR.
6. ARRANGEMENT NOT APPLICABLE FOR LINED TANKS.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	05.11.2024	REAFFIRMED AND REISSUED AS STANDARD	AS	TKh	KA/NK	MN
7	16.09.2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
6	01.10.2013	REAFFIRMED AND REISSUED AS STANDARD	GCP	TK	RKT	SC

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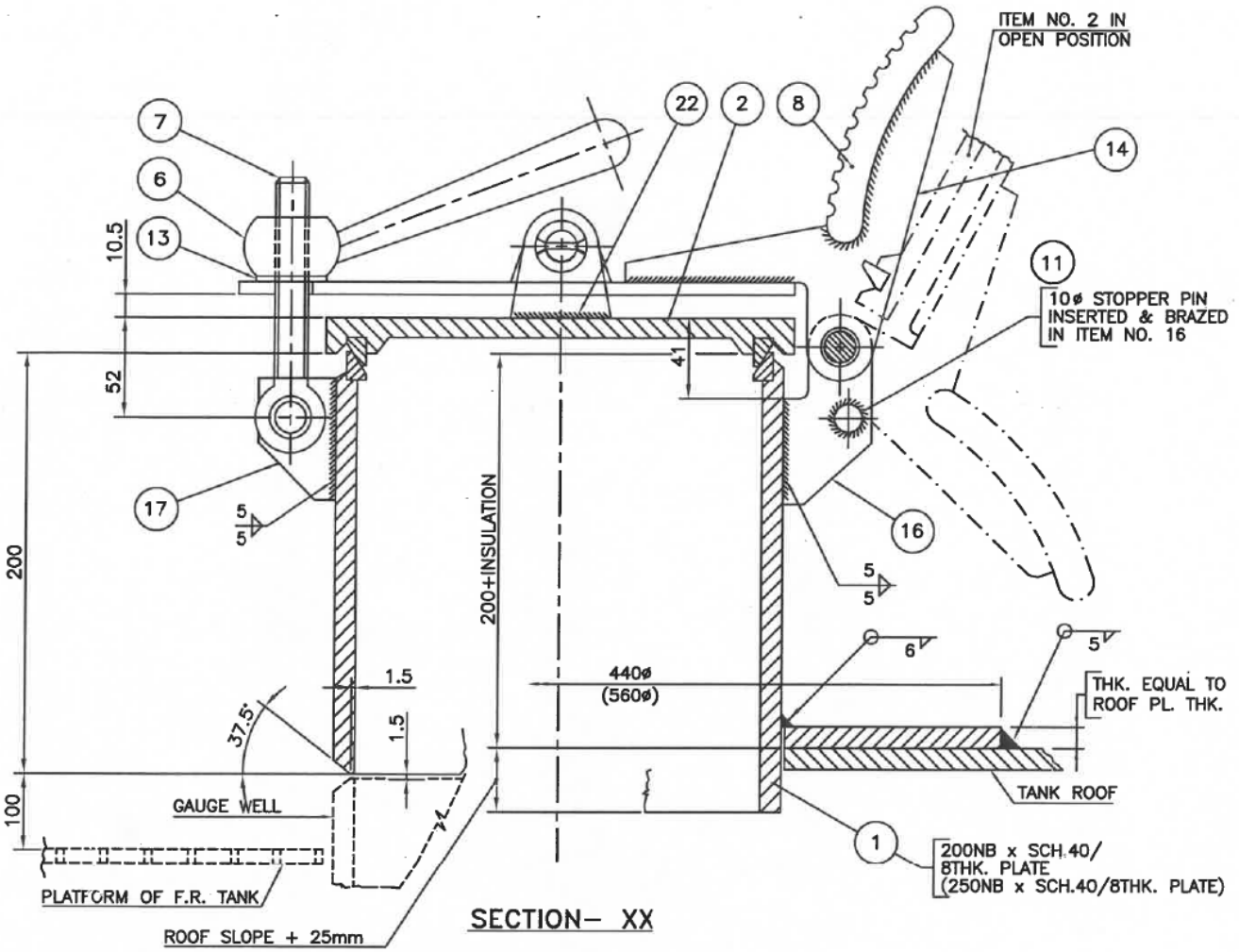

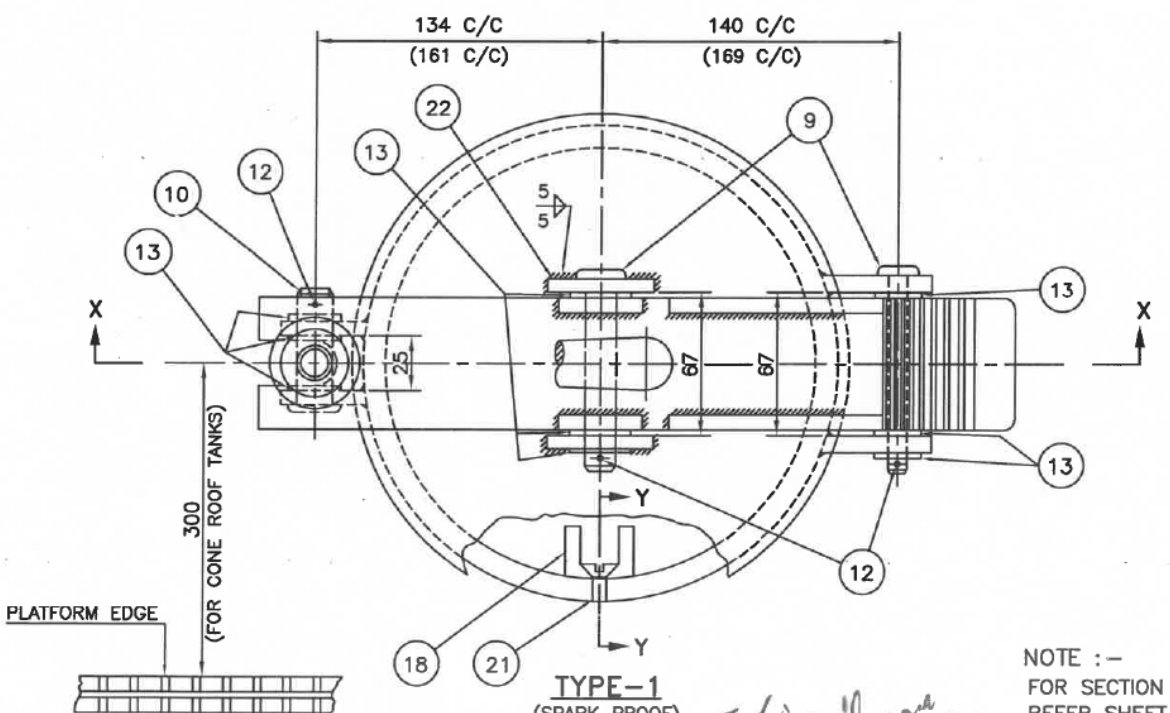

NOTE :–
FOR SECTION 'YY' REFER SHEET 3 OF 6

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
8	02.12.2024	REVISED AND REISSUED AS STANDARD	J.SINGH	TKh	KA/NK	MN
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6	01.10.2013	REVISED AND REISSUED AS STANDARD	GCP	TK	RKT	SC

Approved by

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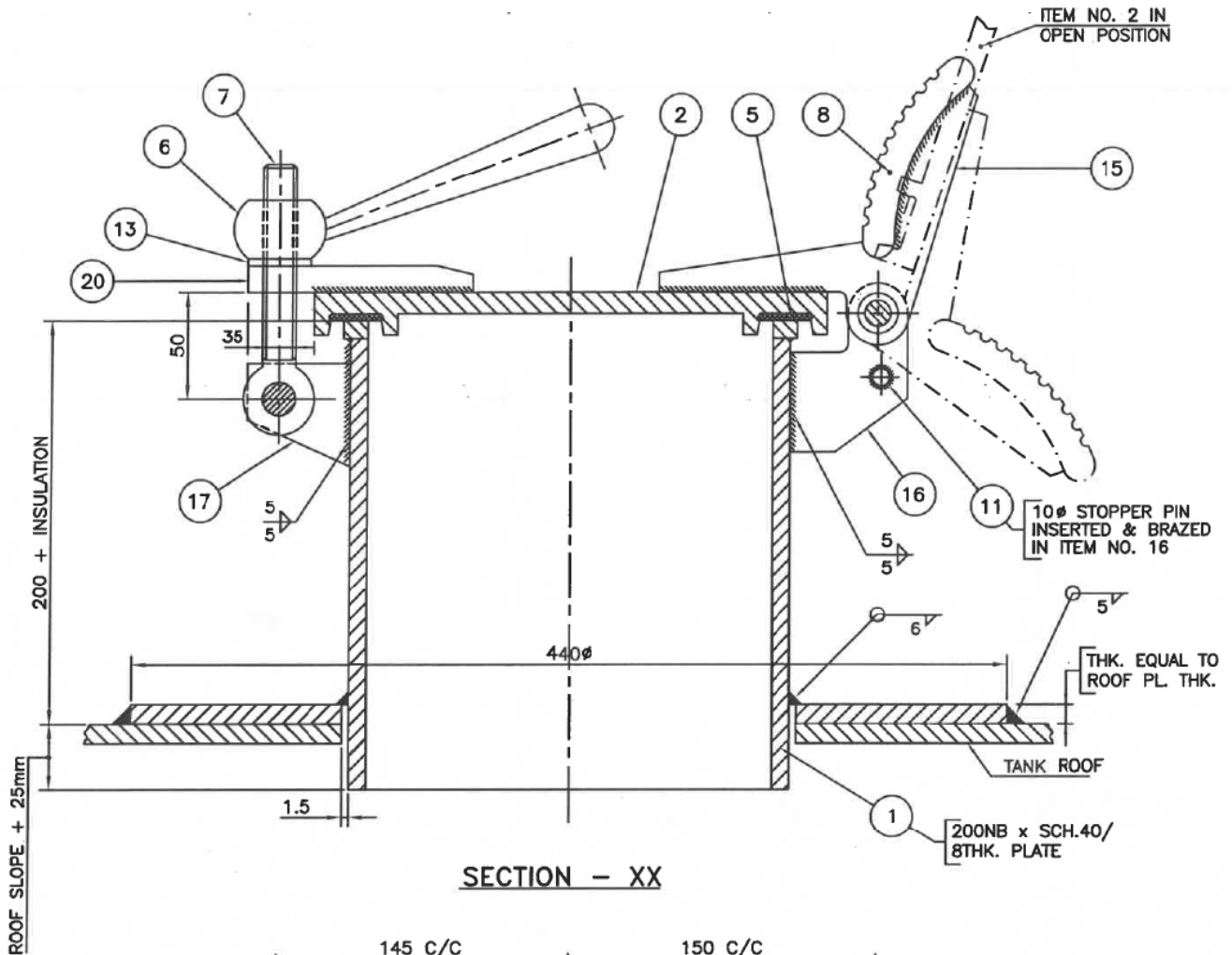
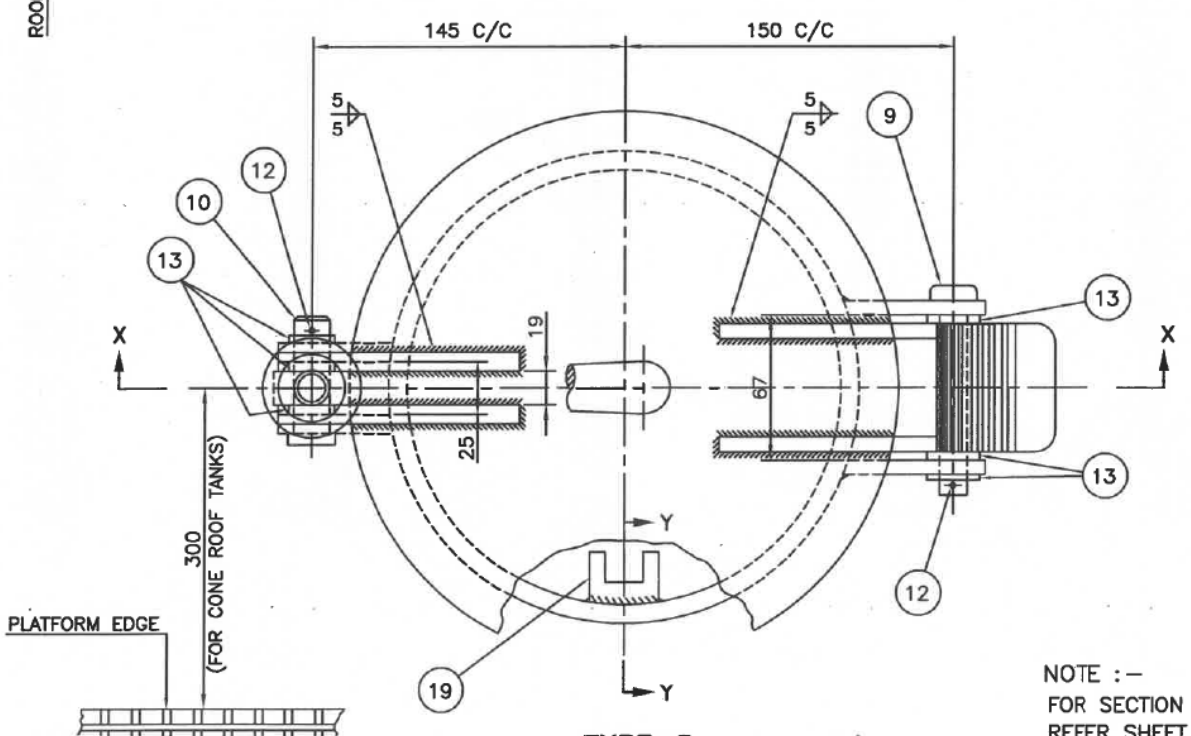


SECTION – XX



TYPE–2

NOTE :–
FOR SECTION 'YY'
REFER SHEET 3 OF 6

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
8	02.12.2024	REVISED AND REISSUED AS STANDARD	J.SINGH	TKh	KA/NK	MN
7	20.06.2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
6	01.10.2013	REVISED AND REISSUED AS STANDARD	GCP	TK	RKT	SC

Approved by

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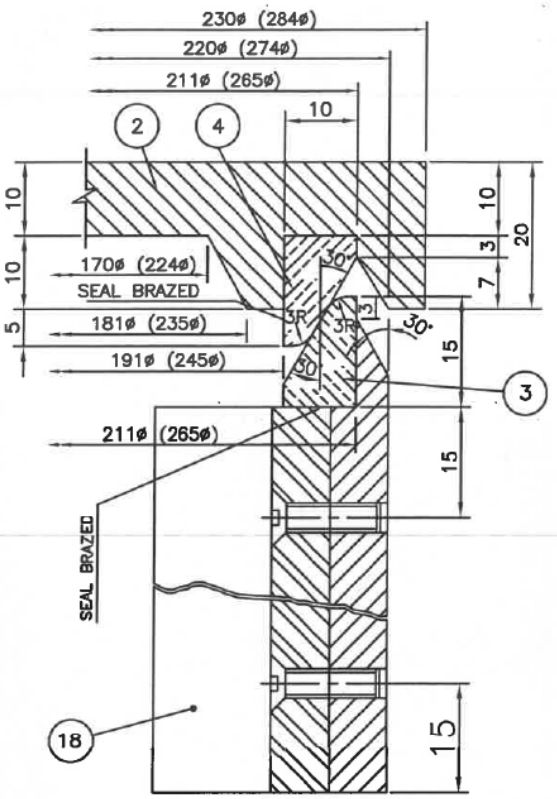
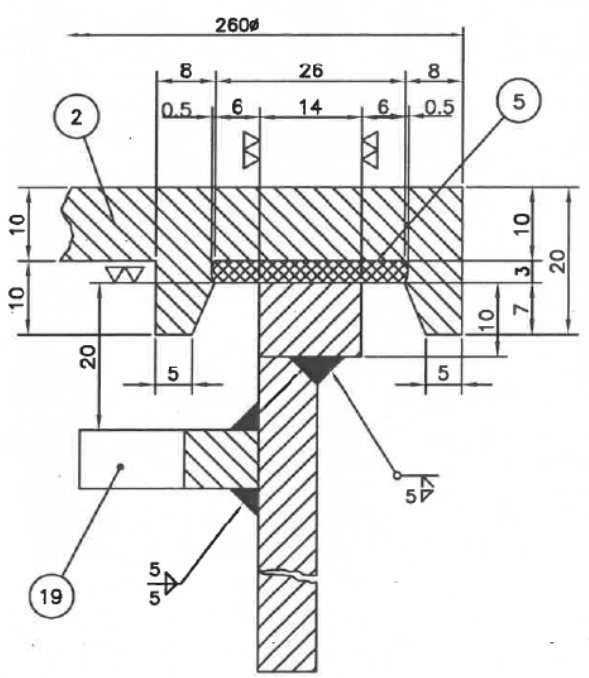


SECTION –'YY'
(TYPE–1)



SECTION –'YY'
(TYPE–2)

* COMPRESSED FIBRE ASBESTOS FREE GASKET

ITEM NO.	TYPE 1	TYPE 2	DESCRIPTION	TYPE–1	TYPE–2
	NO. OFF			MATERIAL	
22	2	–	EAR PLATE	M.S.	–
21	2	–	SCREW	BRASS	–
20	–	2	GUIDE PLATE	–	M.S.
19	–	1	TAP GUIDE	–	M.S.
18	1	–	CHANNEL	ALUMINIUM	–
17	2	2	GUSSET FOR EYE	M.S.	M.S.
16	2	2	EAR PLATE	M.S.	M.S.
15	–	2	PADDLE BRACKET	–	M.S.
14	1	–	PADDLE BRACKET	M.S.	–
13	10	7	WASHER 3 THK. FOR M16 / 16 ø PIN	BRASS	M.S.
12	3	2	SPLIT PIN	S.S	S.S.
11	1	1	STOPPER PIN	BRASS	M.S.
10	1	1	LOCK PIN	BRASS	S.S
9	2	1	LOCK PIN	BRASS	S.S
8	1	1	PADDLE	M.S.	M.S.
7	1	1	EYE BOLT	IS–1367	IS–1367
6	1	1	NUT WITH HANDLE	IS–1875 CL–2	IS–1875 CL–2
5	–	1	GASKET	–	*
4	1	–	INSERT RING	BRASS	–
3	1	–	INSERT RING	BRASS	–
2	1	1	COVER	IS–2062 E250	IS–2062 E250
1	1	1	NOZZLE NECK	IS–2062 E250 SA–53/SA 106 GR.B	IS–2062 E250 SA–53/SA 106 GR.B

BILL OF MATERIALS

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	02.12.2024	REVISED AND REISSUED AS STANDARD	J.SINGH	TKh	RAVNK	MN
7	20.06.2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
6	01.10.2013	REVISED AND REISSUED AS STANDARD	GCP	TK	RKT	SC

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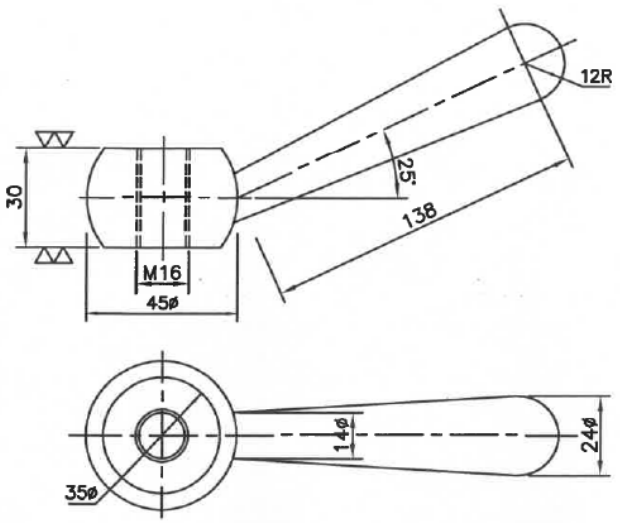
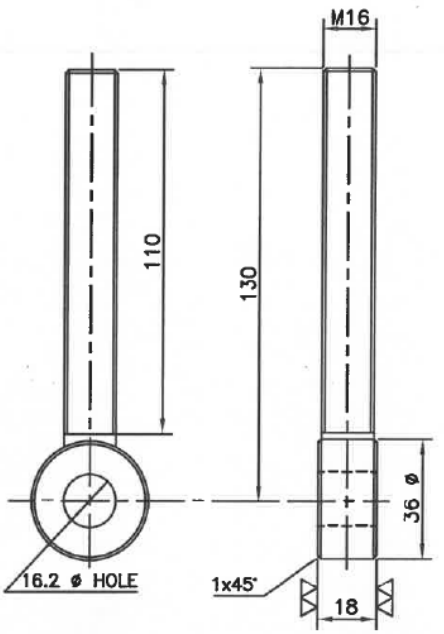
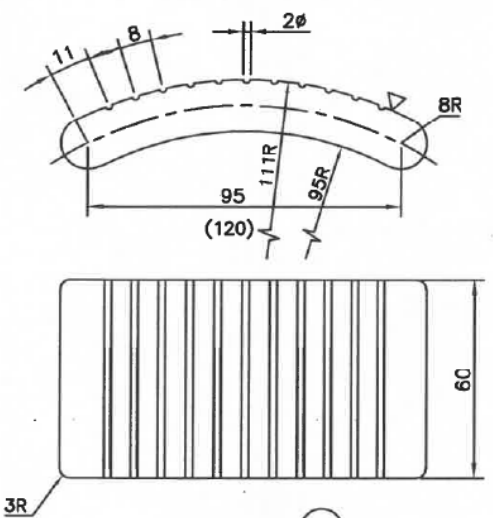


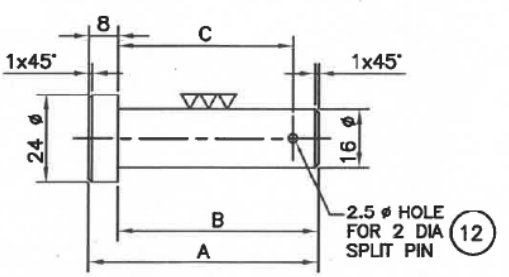
NUT WITH HANDLE (6)



EYE BOLT (7)

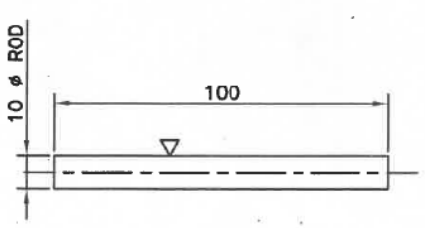


PADDLE (8)

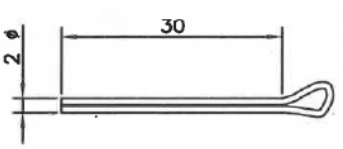


LOCK PIN (9) (10)

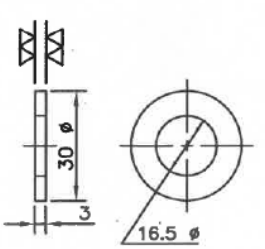
PART NO.	PIN DIA.	A	B	C
9	M 16	105	97	90
10	M 16	63	55	48



STOPPER PIN (11)



SPLIT PIN (12)



WASHER (13)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
8	02.12.2024	REVISED AND REISSUED AS STANDARD	J.SINGH	TKh	KA/NK	MN
7	20.06.2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
6	01.10.2013	REVISED AND REISSUED AS STANDARD	GCP	TK	RKT	SC

Approved by

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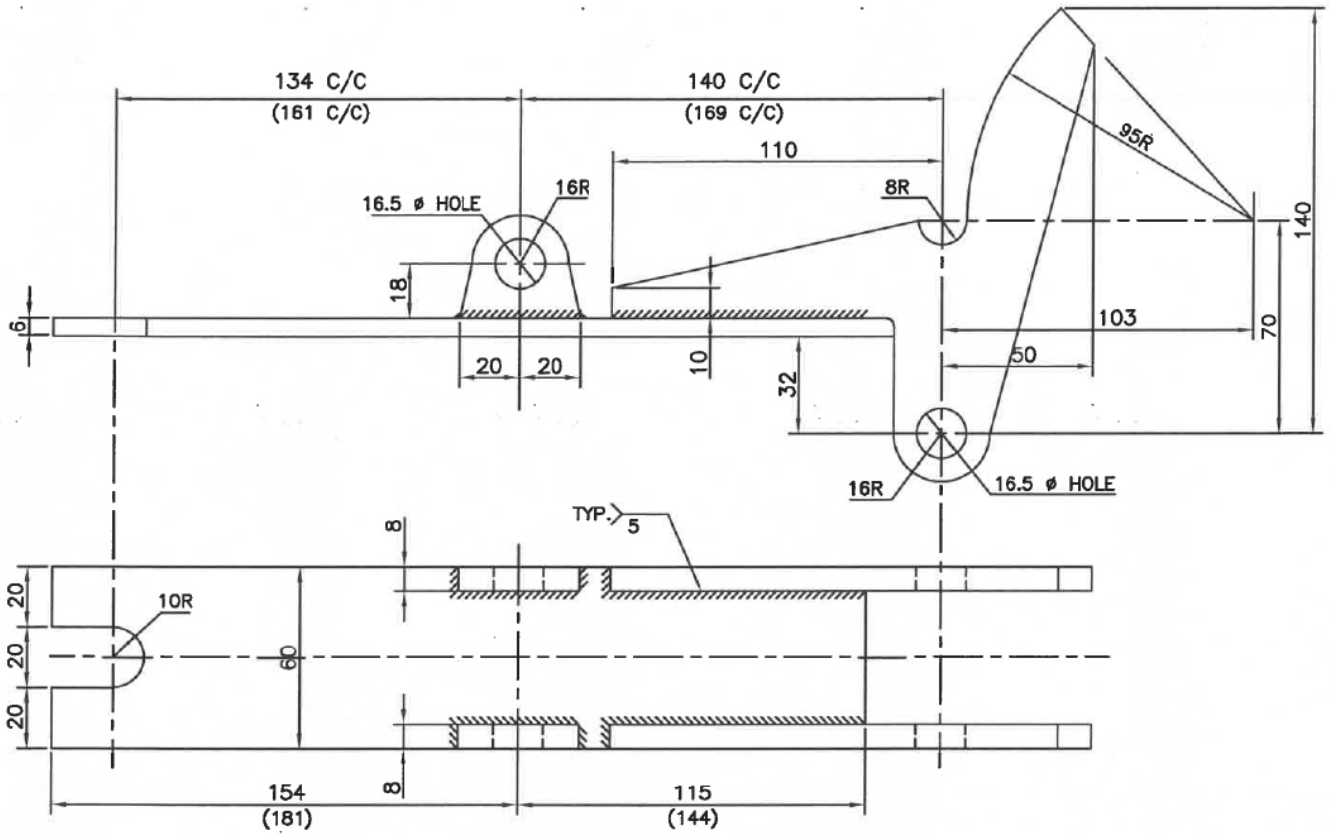
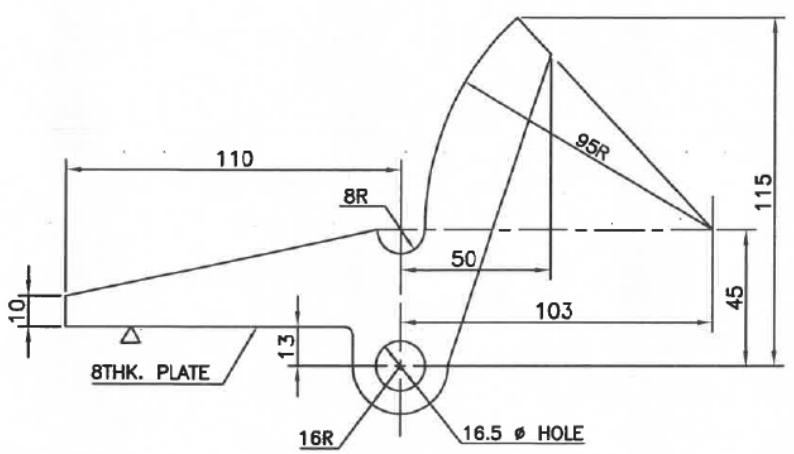
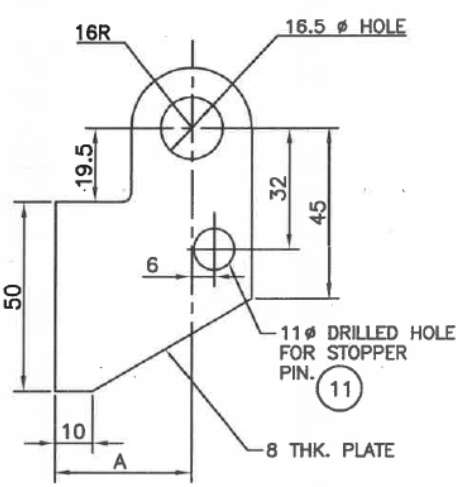


PADDLE BRACKET (14)



PADDLE BRACKET (15)



EAR PLATE (16)

TYPE	A
1	36
2	46

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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8	02.12.2024	REVISED AND REISSUED AS STANDARD	J.SINGH	TKh	KA/NK	MN
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6	01.10.2013	REVISED AND REISSUED AS STANDARD	GCP	TK	RKT	SC

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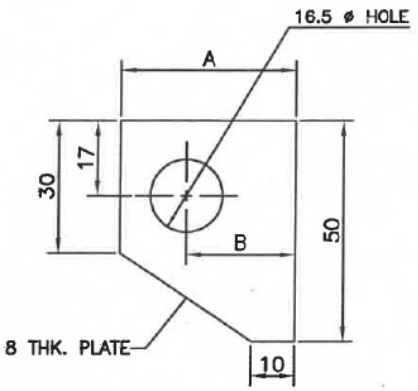
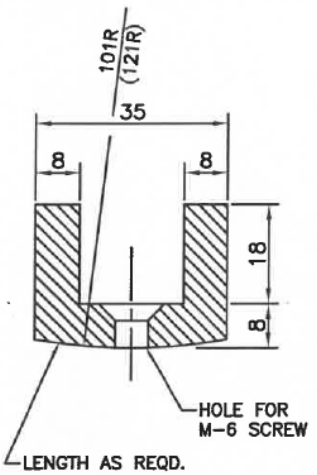
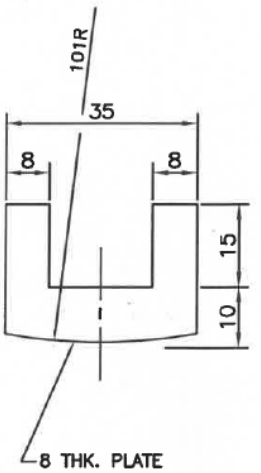


GUSSET WITH EYE (17)

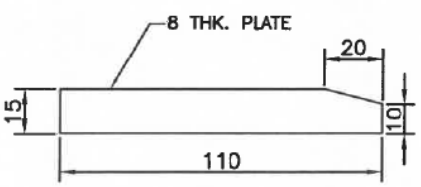
TYPE	A	B
1	40	25
2	51	36



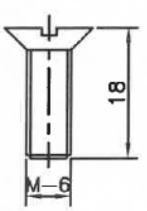
CHANNEL (18)



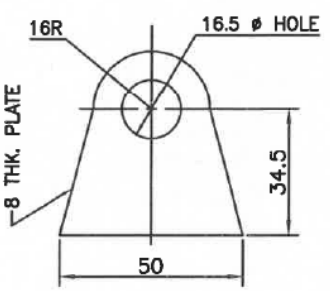
TAPE GUIDE (19)



GUIDE PLATE (20)



SCREW (21)



EAR PLATE (22)

NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. AT THE TIME OF WELDING EAR PLATE '16' WITH ITEM '1' ENSURE THAT ANNULAR GAP BETWEEN ITEM 1 AND 2 IS UNIFORM THROUGHOUT THE PERIPHERY.
3. ALL HOLES SHALL BE REAMED AFTER DRILLING.
4. CONTACT FACE OF INSERT RINGS SHALL BE MACHINED TO HAVE GAS TIGHT SEAL.
5. FOR HYDROCARBON SERVICE USE TYPE-1 AND FOR GENERAL SERVICE USE TYPE-2.
6. THIS STANDARD IS APPLICABLE ONLY FOR NON-PRESSURE TANKS.
7. DIMENSIONS SHOWN IN BRACKETS ARE FOR 250NB GAUGE HATCH.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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6	01.10.2013	REVISED AND REISSUED AS STANDARD	GCP	TK	RKT	SC

Approved by

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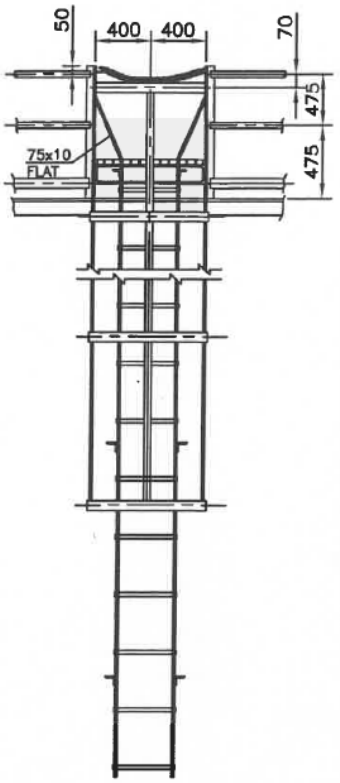
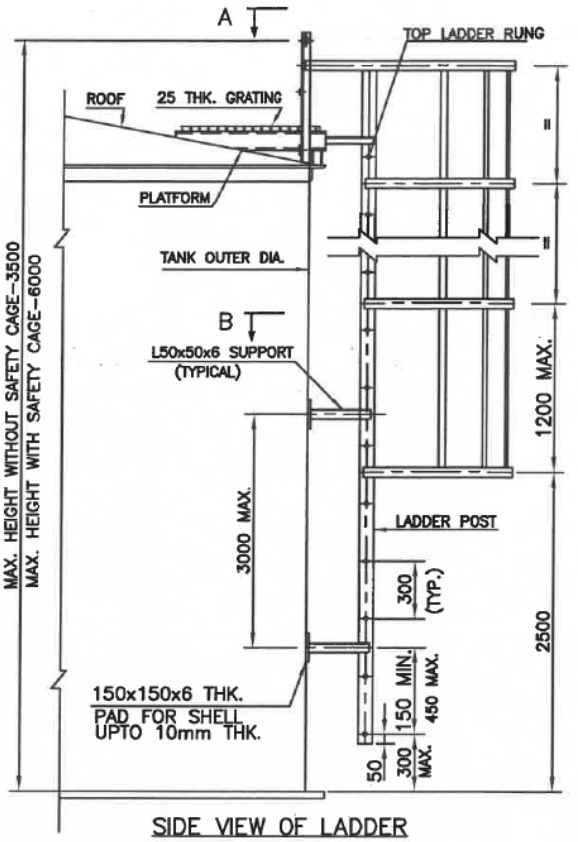
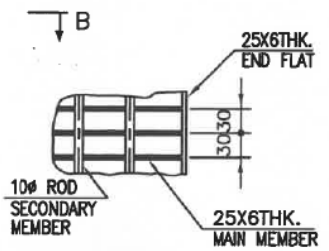


FRONT VIEW OF LADDER

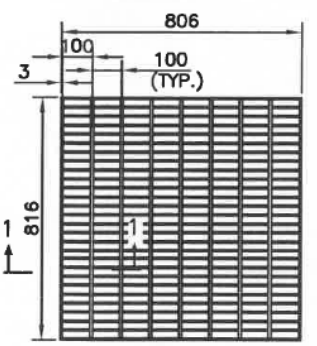


SIDE VIEW OF LADDER

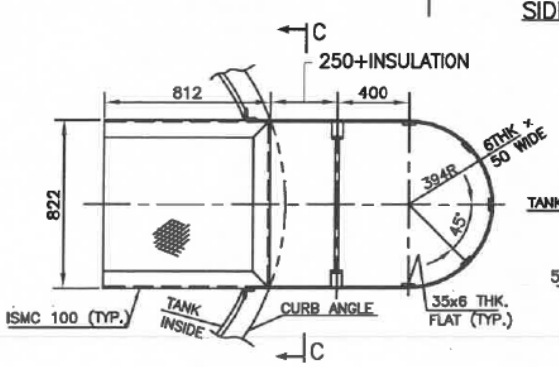
DETAIL-D



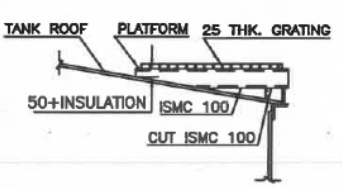
GRATING



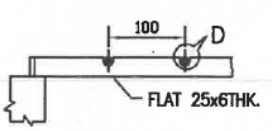
DETAIL OF GRATING



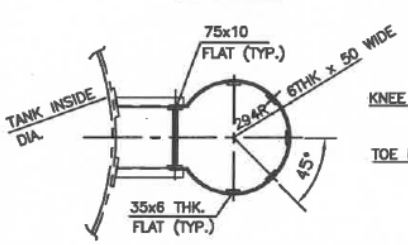
VIEW-AA



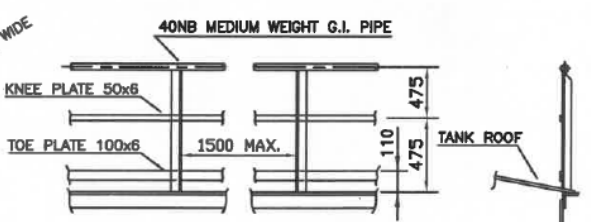
DETAIL OF LANDING PLATFORM



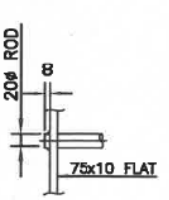
VIEW 1-1



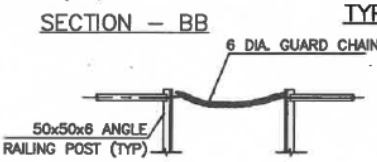
SECTION - BB



TYP. DETAIL OF HAND RAILING



ATTACHMENT OF LADDER RUNG TO LADDER POST



VIEW - CC

NOTES :-

1. ALL DIMENSIONS ARE IN MM.
2. FOR MATERIAL SPECIFICATION REFER ENGINEERING DRAWING.
3. IN CASE OF CONFLICT, ENGINEERING DRAWING SHALL GOVERN.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	02.12.2024	REVISED AND REISSUED AS STANDARD	J.SINGH	TKh	KA/NK	MN
7	20.06.2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
6	17.10.2013	REAFFIRMED AND REISSUED AS STANDARD	GCP	KA	RKT	SC

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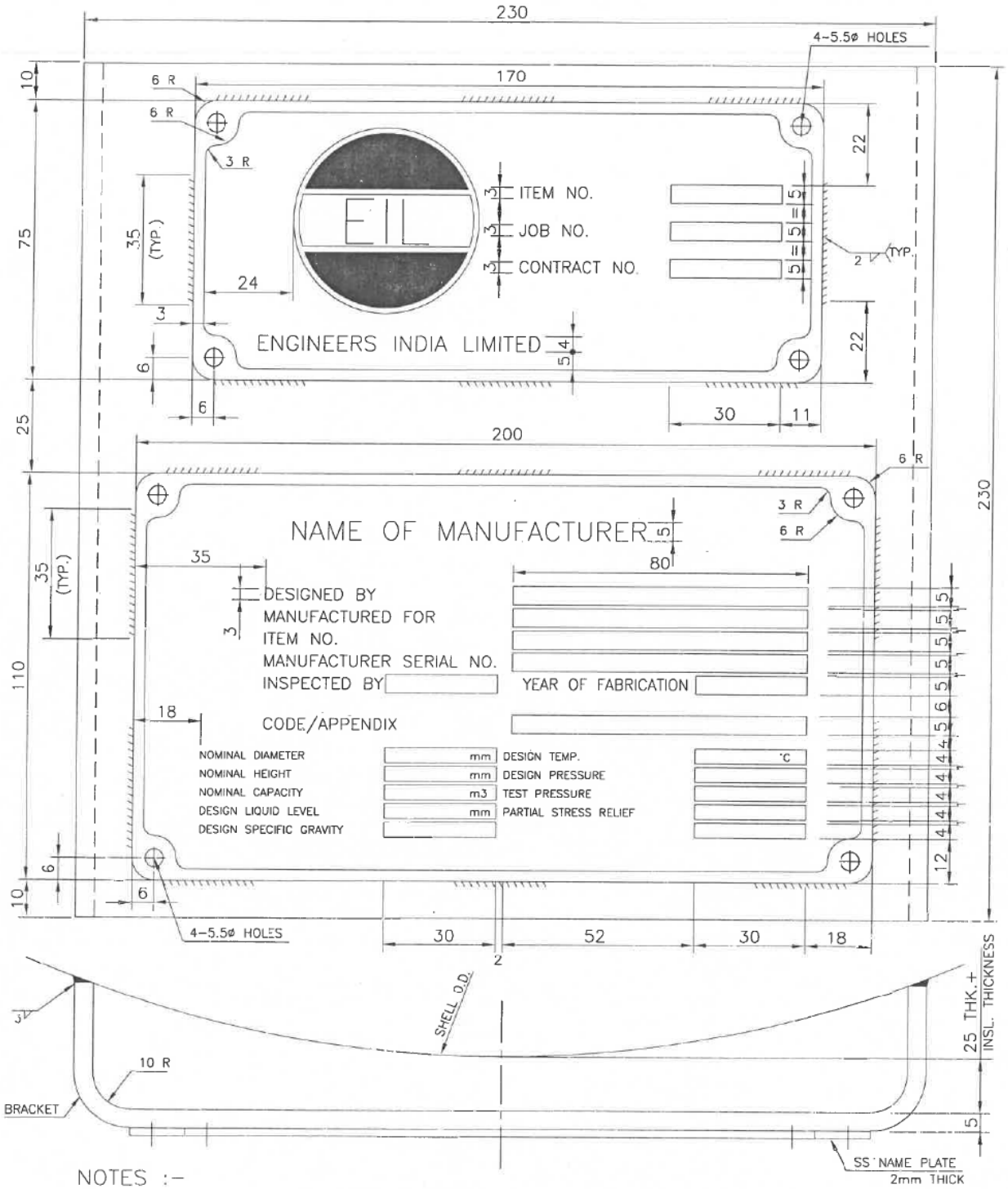

NOTES :-

1. ALL LETTERS, BLOCKS AND BORDER SHALL BE RAISED POLISHED FACE.
2. BACKGROUND TO BE BLACK.
3. ALL DIMENTIONS ARE IN mm UNLESS OTHERWISE STATED.
4. NAME PLATES MAY BE RIVED WITH S.S. RIVETS OR TACK WELDED TO BRACKET.
5. BRACKET MATERIAL SHALL BE SAME AS SHELL MATERIAL.
6. THE NAME PLATE BRACKET SHALL BE LOCATED ON THE TANK SHELL NEAR TO STAIRWAY ENTRANCE AT 1.5 M FROM BOTTOM OF TANK.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	22.01.2025	REVISED AND REISSUED AS STANDARD	J.SINGH	TKh	KA/NK	MN
5	20.06.2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
4	17.10.2013	REAFFIRMED AND REISSUED AS STANDARD	GCP	KA	RKT	SC

Approved by

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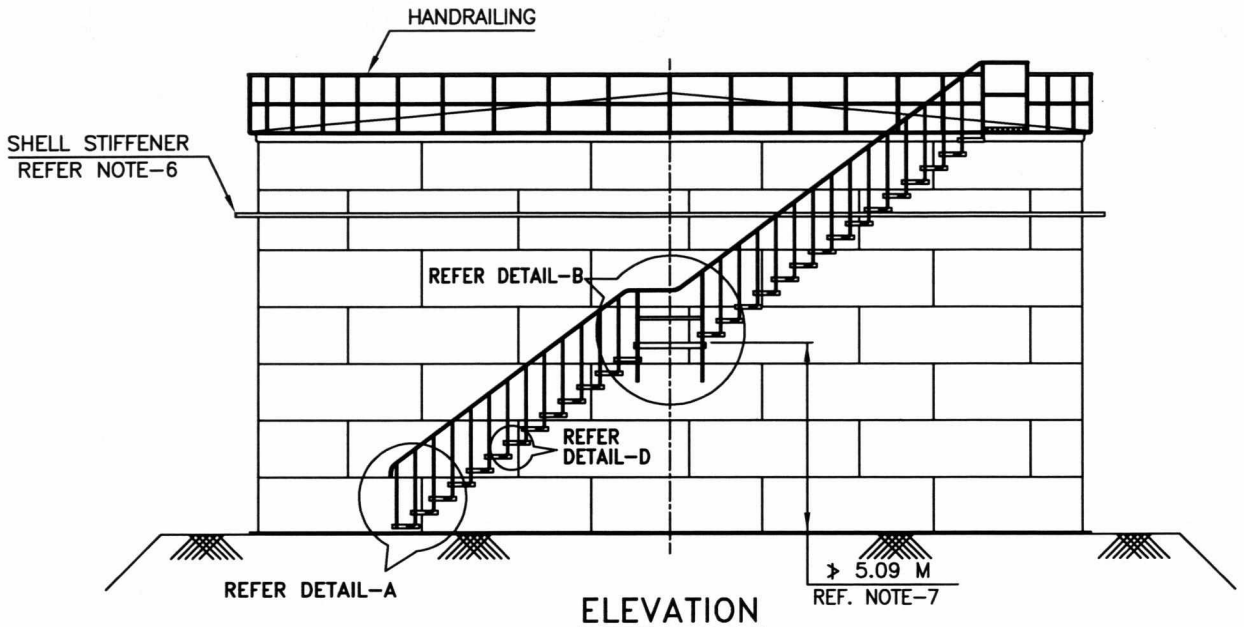
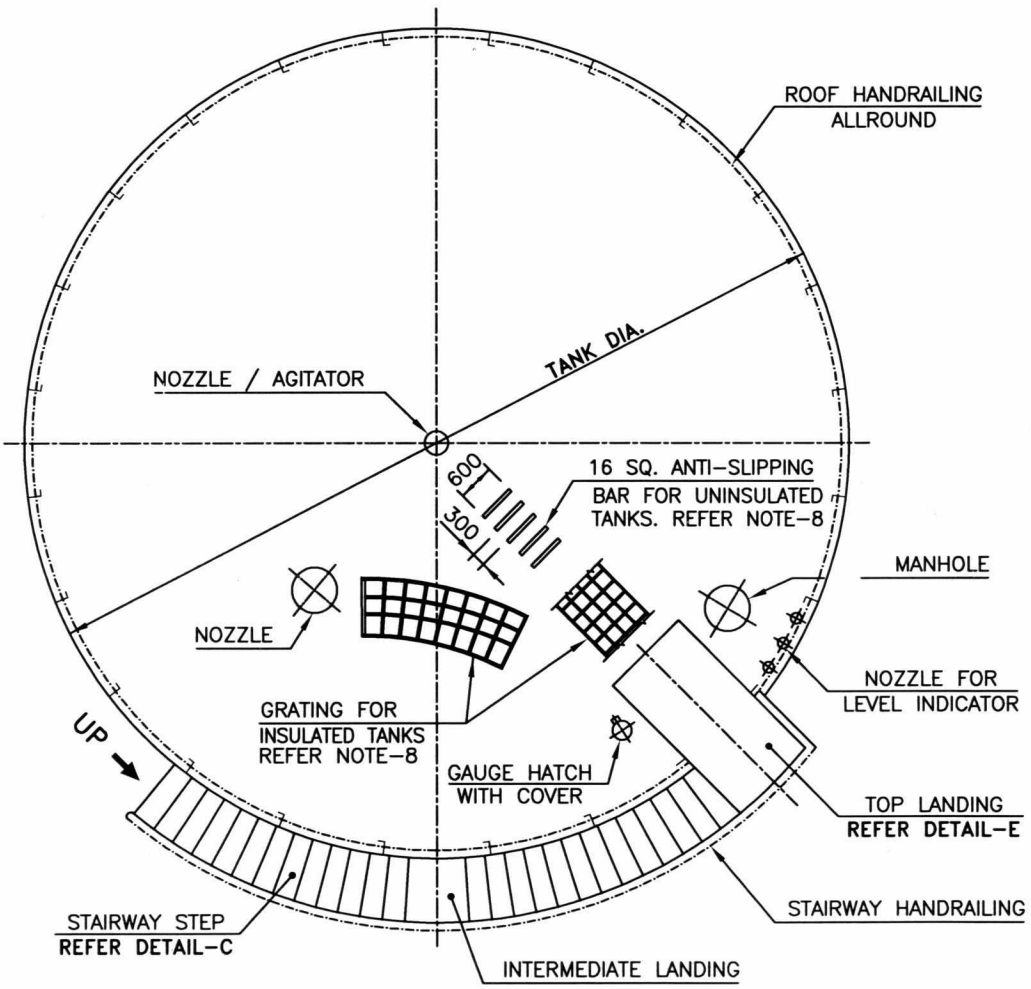


ELEVATION



PLAN

(FIXED ROOF TANKS)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	20.03.2024	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	TKh	KA/NK	MN
5	02.08.2018	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	RKK	KJH	RKT

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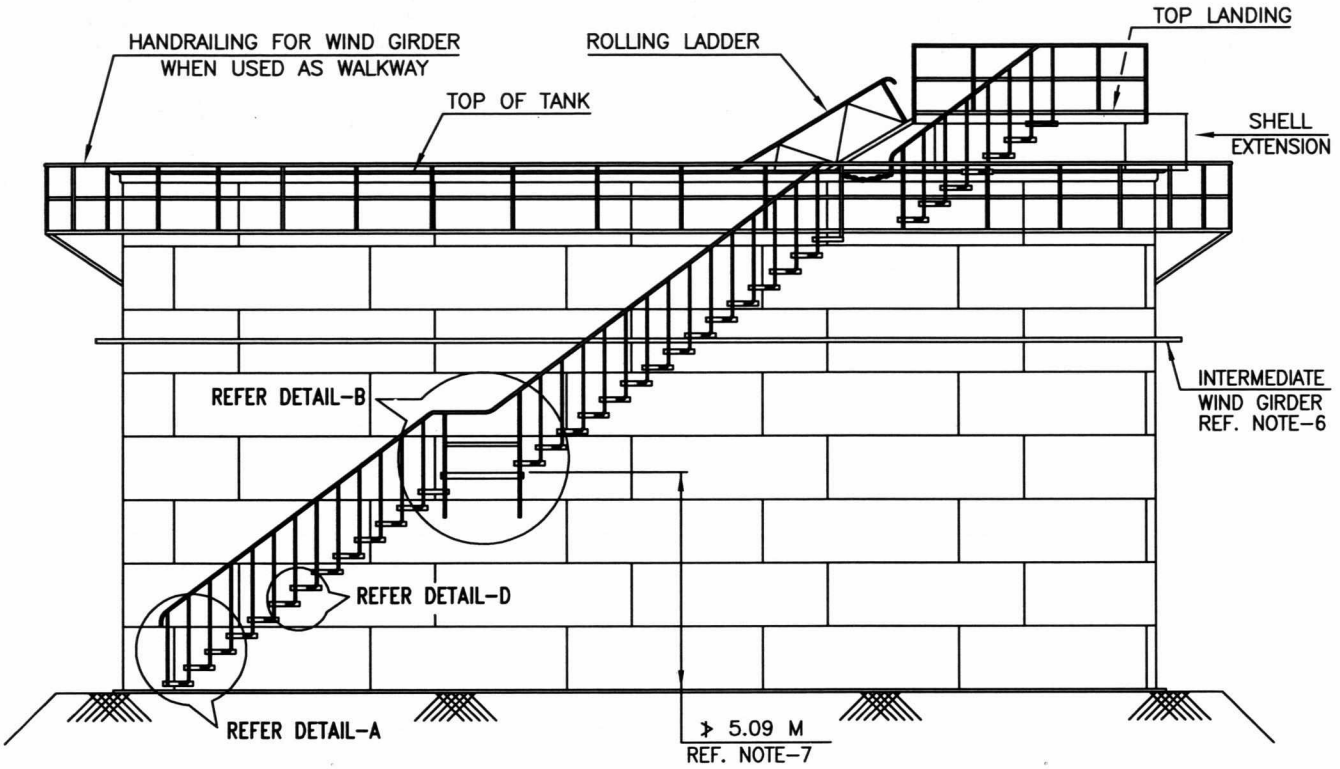
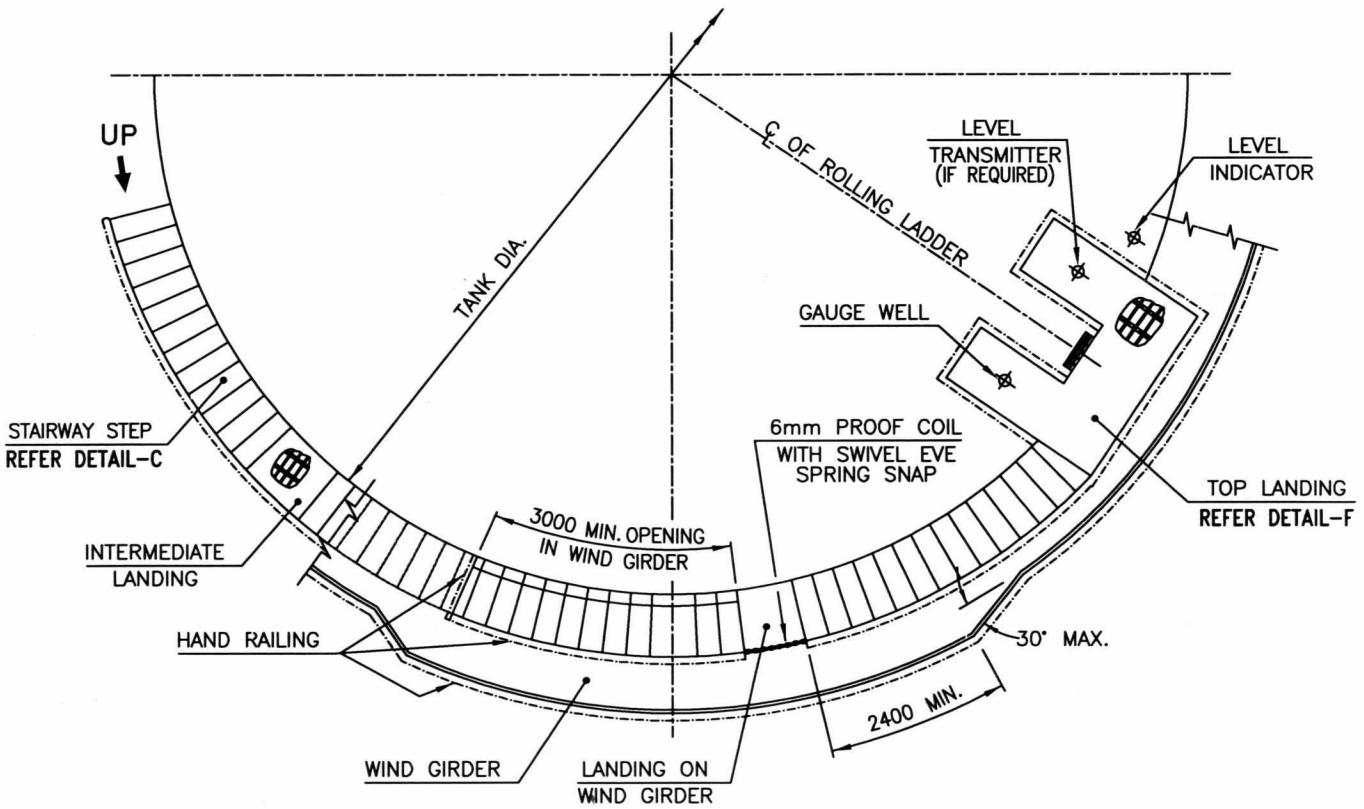


ELEVATION



PLAN

(FLOATING ROOF TANKS)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	20.03.2024	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	TKh	KANK	MN
5	02.08.2018	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	RKK	KJH	RKT

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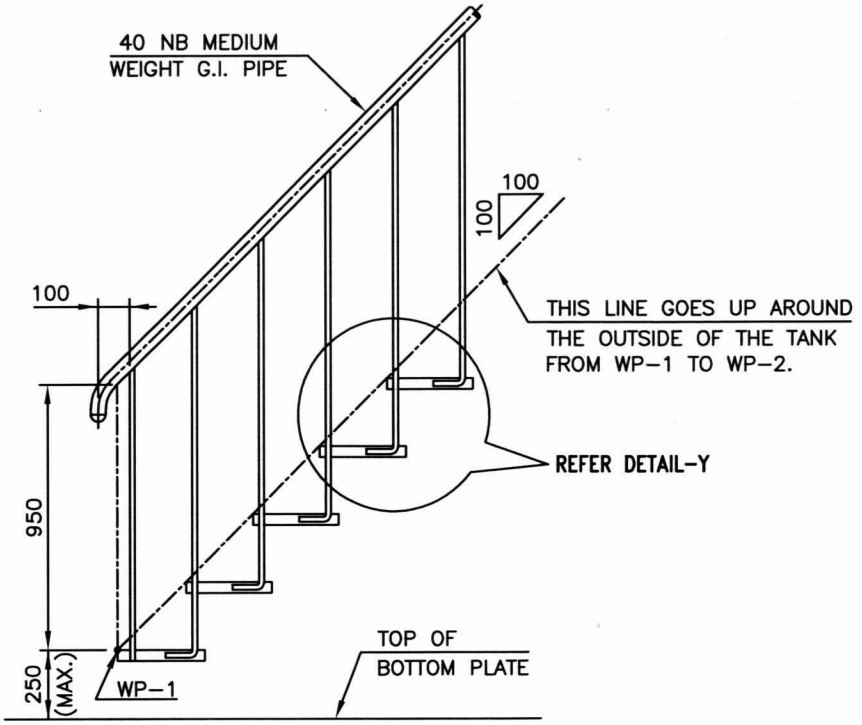
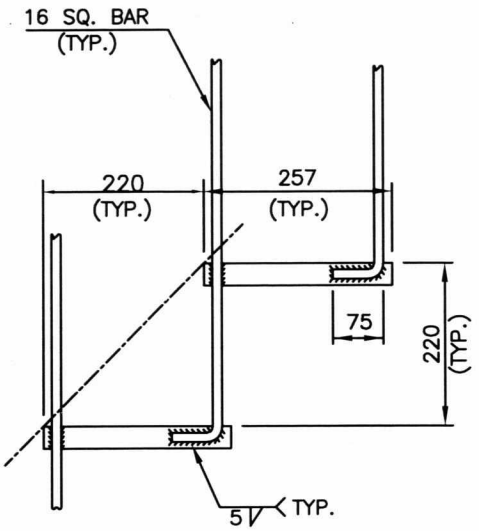
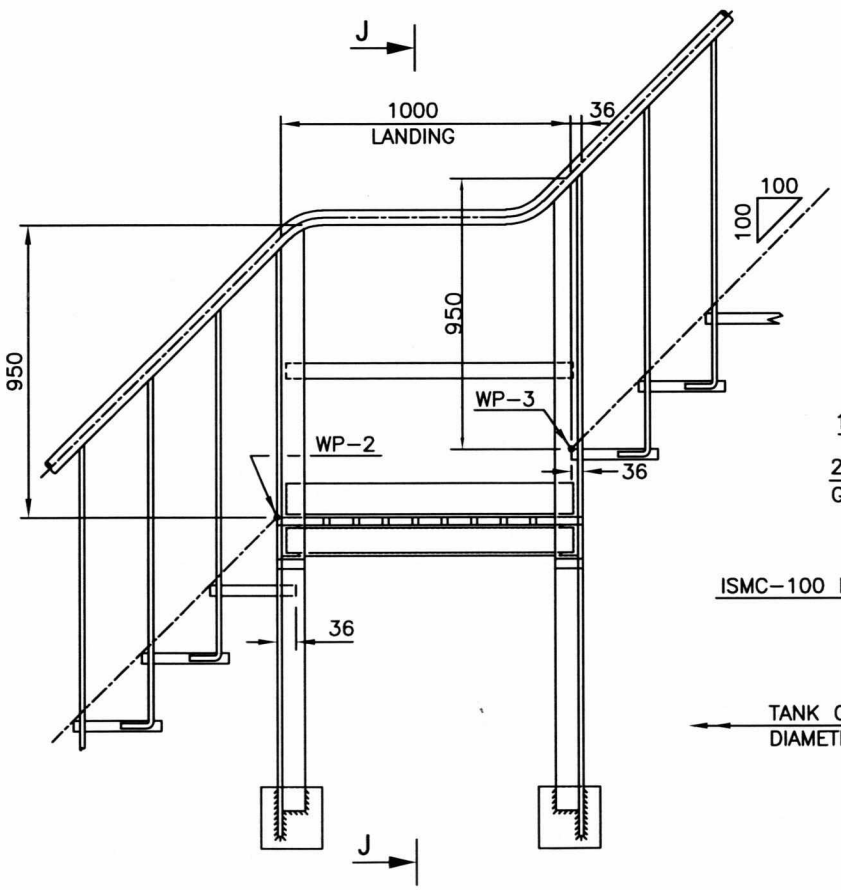


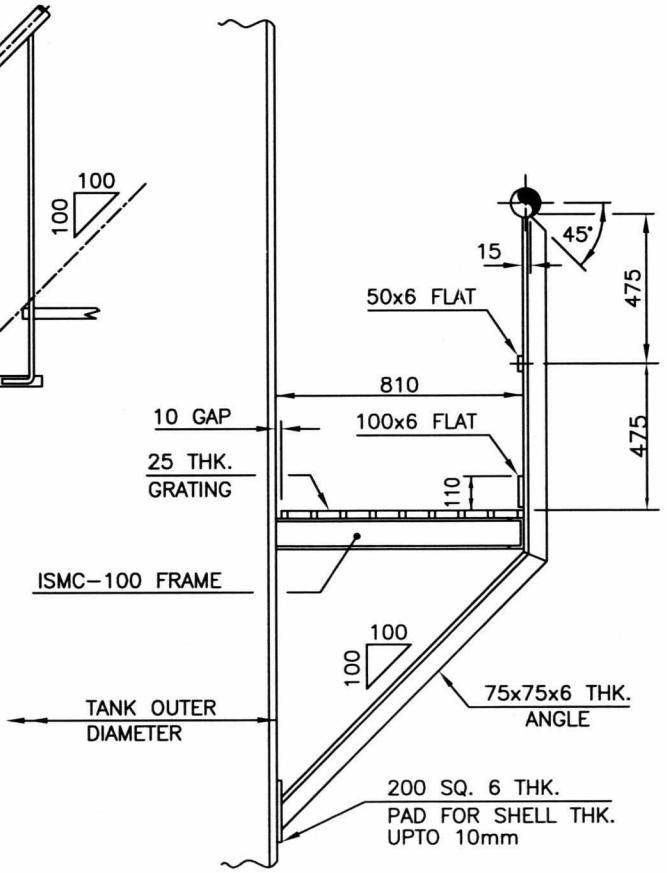
DETAIL – A



DETAIL – Y



DETAIL – B
INTERMEDIATE LANDING



SECTION J–J

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	20.03.2024	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	TKh	SKANK	MN
5	02.08.2018	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	RKK	KJH	RKT

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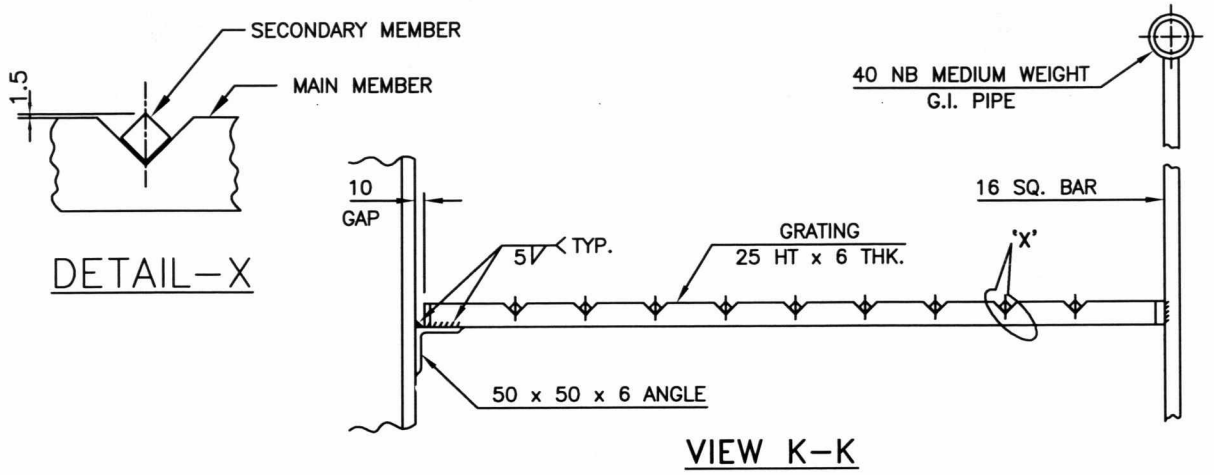

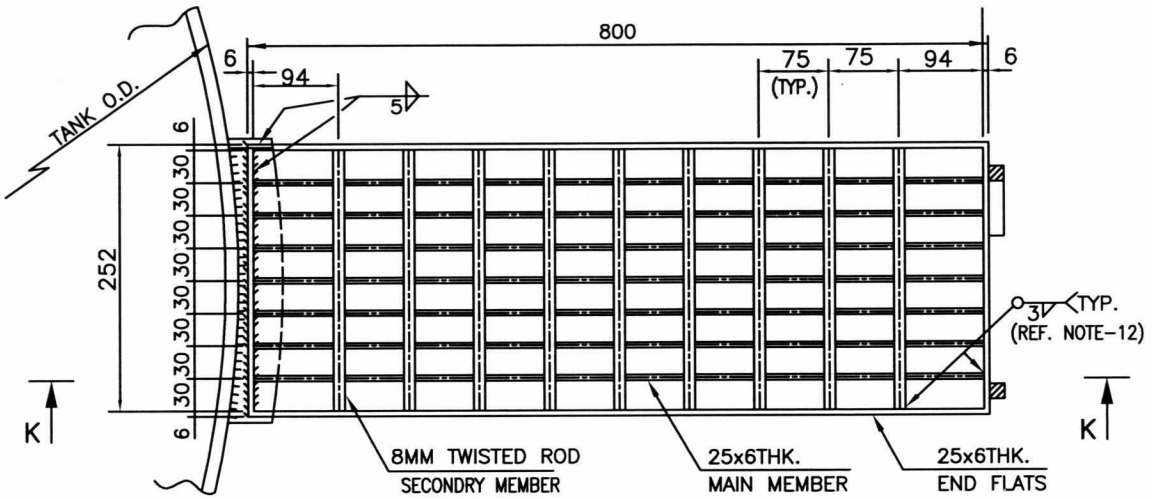

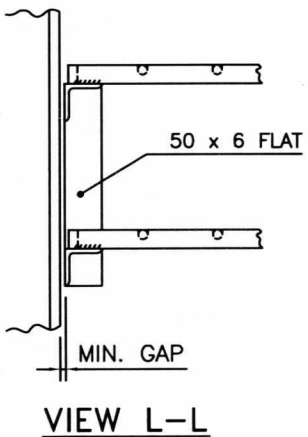

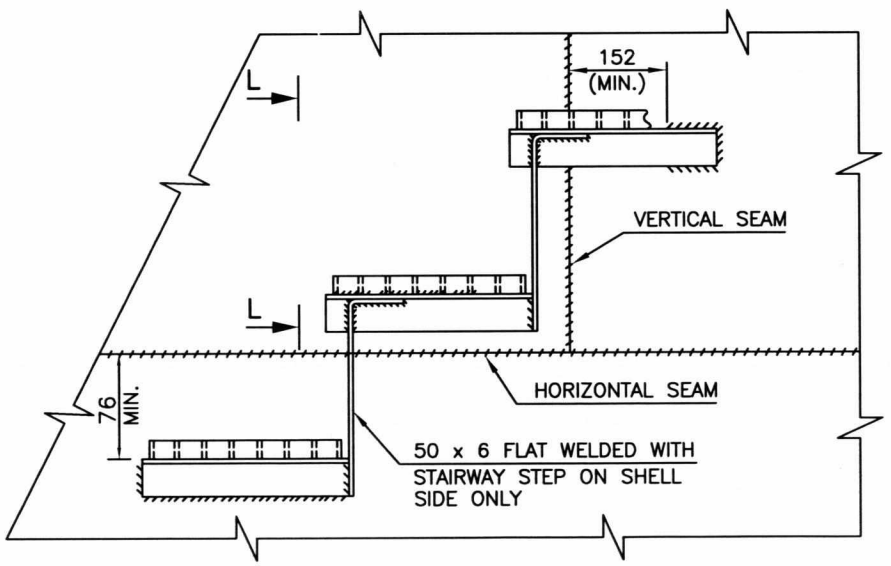

(TYP. VIEW SHOWING STAIRWAY STEPS TO SHELL ATTACHMENT NEAR WELD SEAMS)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	20.03.2024	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	TKh	KA/NK	MN
5	02.08.2018	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	RKK	KJH	RKT

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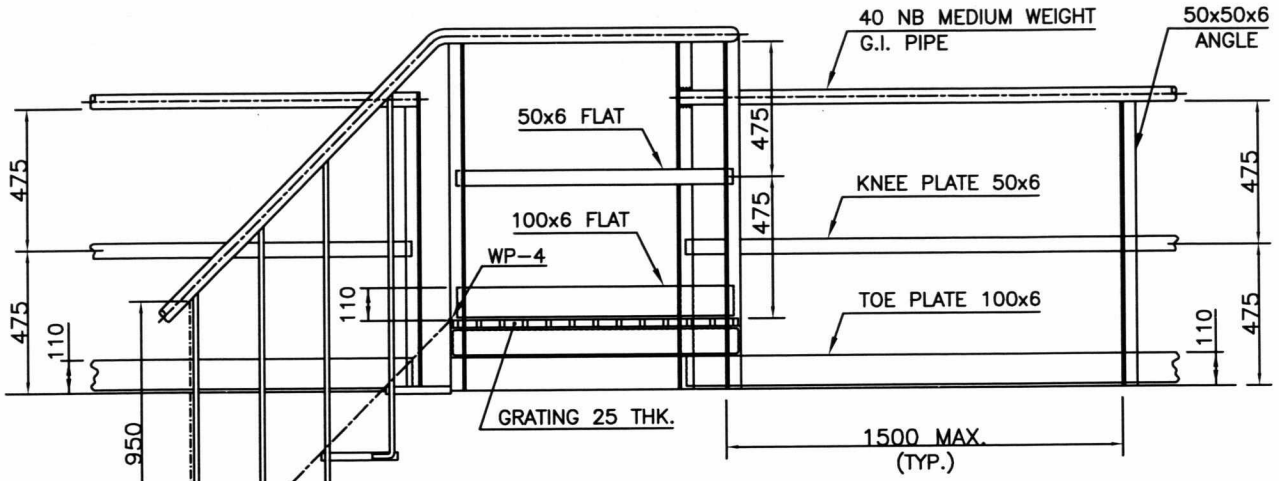
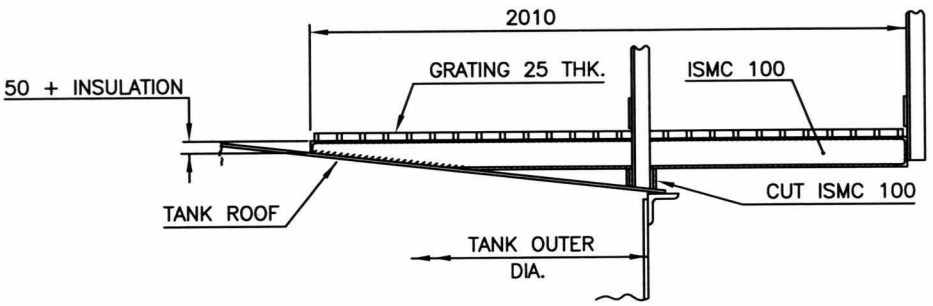
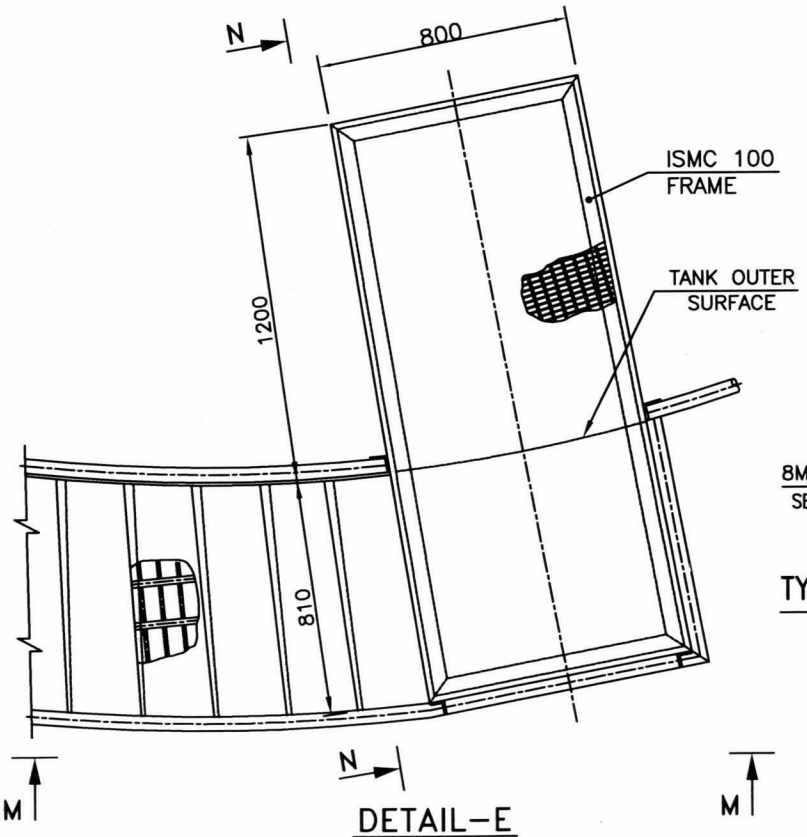


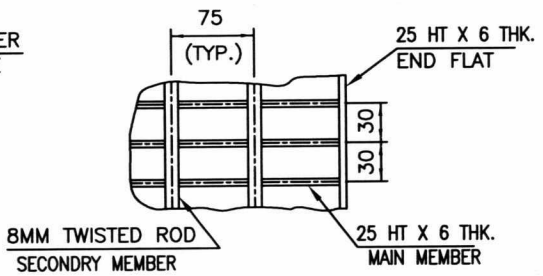
VIEW – MM



VIEW – NN



DETAIL–E
(TOP LANDING)



TYP. DETAIL OF PLATFORM GRATING

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	20.03.2024	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	TKh	KA/NK	MN
5	02.08.2018	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	RKK	KJH	RKT

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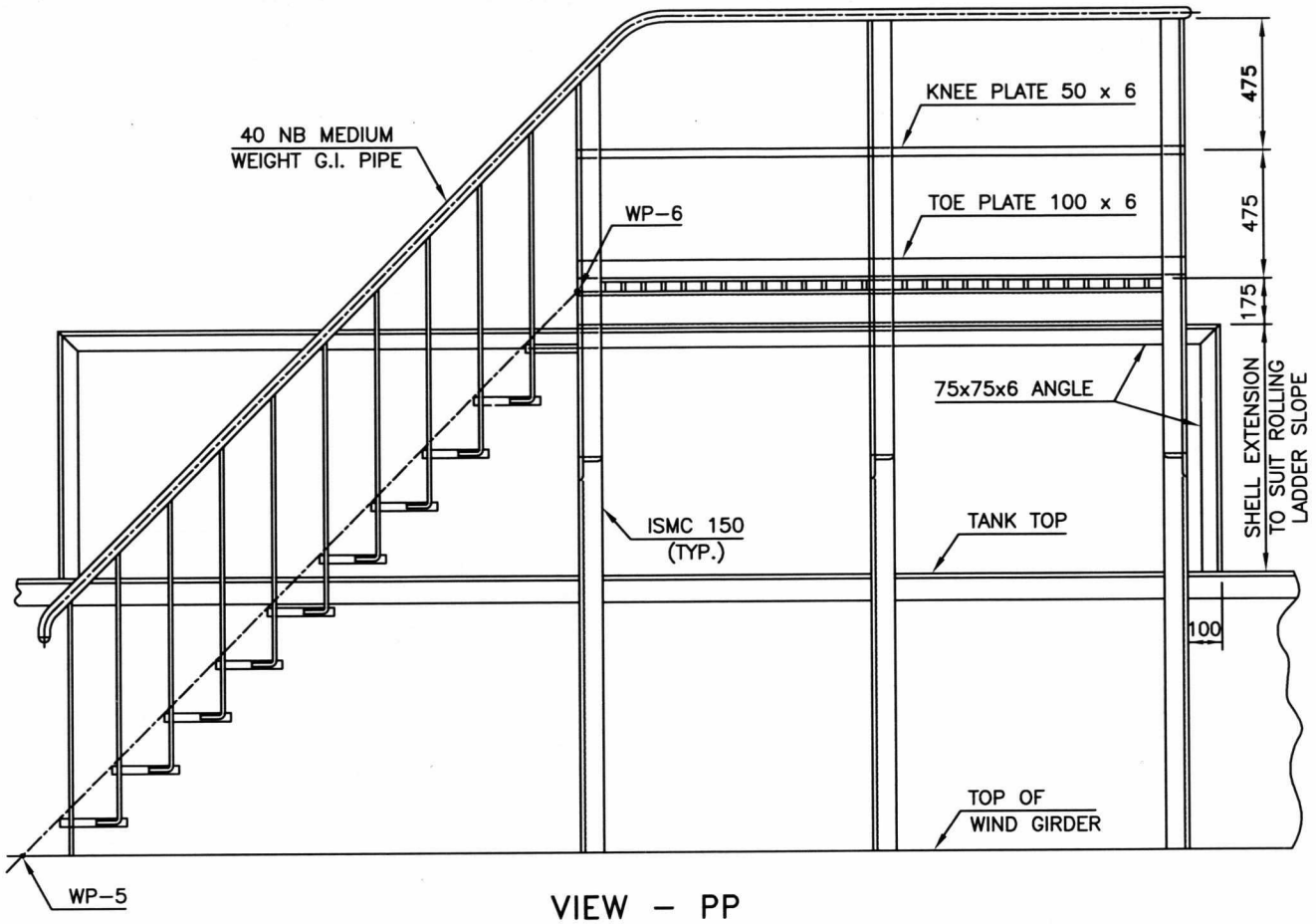
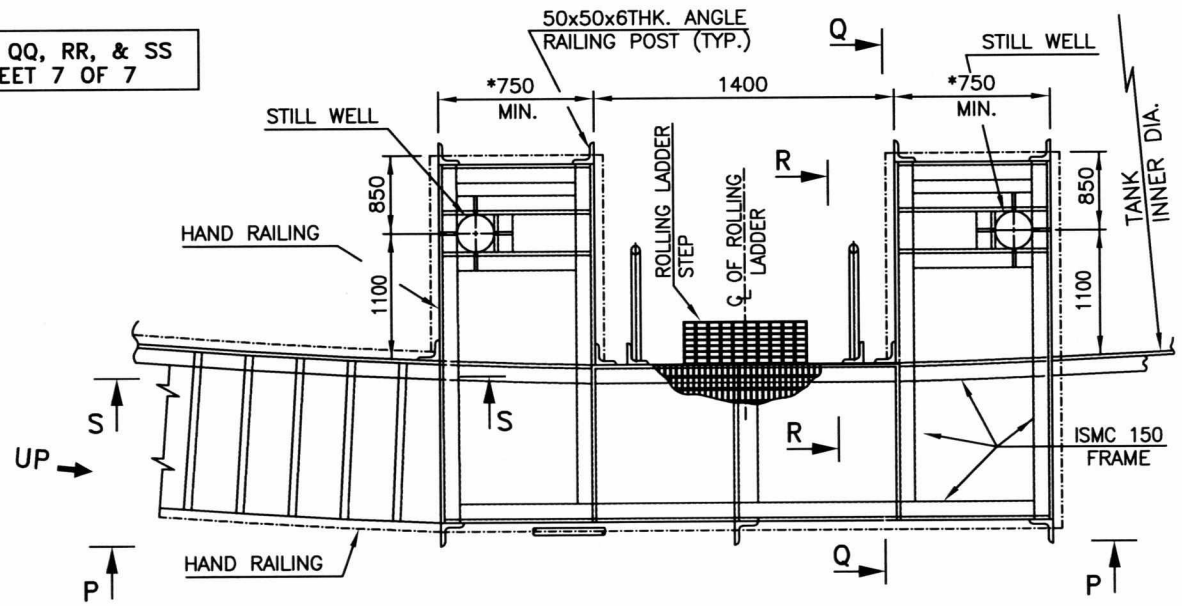


VIEW – PP

FOR SEC. QQ, RR, & SS REFER SHEET 7 OF 7



DETAIL–F
(TOP LANDING)

* : STILL WELL PIPE/FLANGE OD. +500 (750 MIN.)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	20.03.2024	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	TKh	KANK	MN
5	02.08.2018	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	RKK	KJH	RKT

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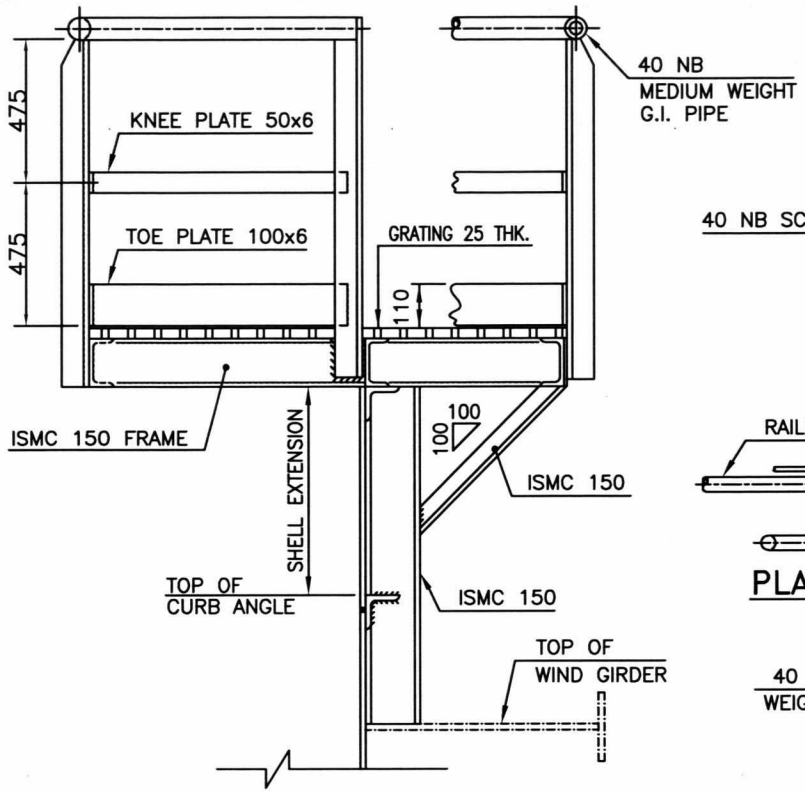
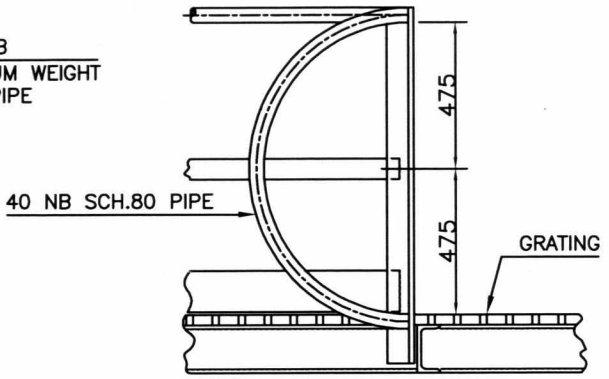
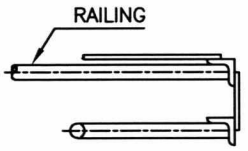


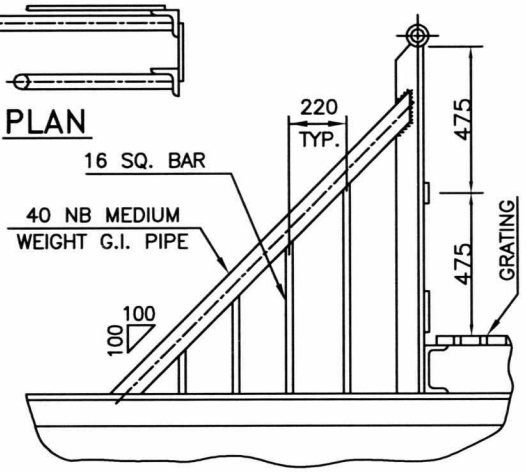
SECTION–QQ



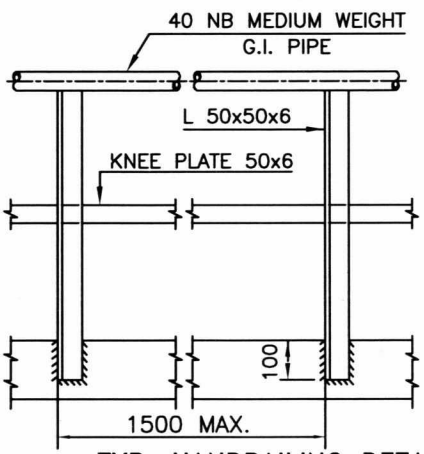
SECTION–RR

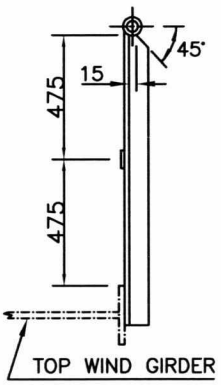


PLAN

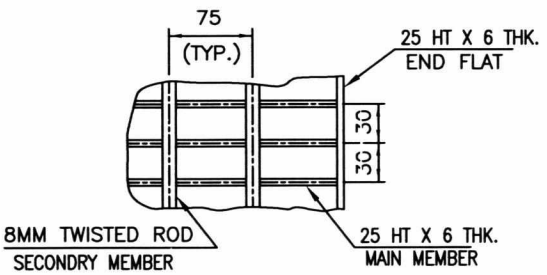


SECTION–SS





TYP. HANDRAILING DETAIL FOR WIND GIRDER



TYP. DETAIL OF PLATFORM GRATING

NOTES

1. ALL DIMENSIONS ARE IN mm. UNLESS OTHERWISE STATED.
2. UNLESS SPECIFIED OTHERWISE MATERIALS OF ALL PARTS OF SPIRAL STAIRWAY, ANGLES, CHANNELS, TWISTED BARS, FLATS SHALL BE OF IS : 2062 GR.A/B.
3. ALL FILLET WELDS SHALL BE 6mm CONTINUOUS UNLESS OTHERWISE SHOWN.
4. IN CASE ENGINEERING DRAWING SHOWS/REFERS TO DETAILS OTHER THAN SHOWN IN THIS STANDARD, SAME SHALL GOVERN.
5. SUITABLE OPENING SHALL BE MADE IN RAILING ON CONE ROOF TANKS IF MAINTENANCE PLATFORM FOR FOAM SYSTEM IS PROVIDED.
6. WIND GIRDER/STIFFENERS EXTENDING UPTO 152mm FROM OUTSIDE OF THE SHELL DO NOT REQUIRE ANY OPENING IN WIND GIRDER/STIFFENER.
7. INTER LANDING PLATFORM SHALL BE LOCATED IN SUCH A WAY THAT THEY ARE EQUISPACED, HOWEVER THE HEIGHT BETWEEN THEM SHALL NOT EXCEED THE LIMIT GIVEN IN THIS STANDARD.
8. ANTI–SLIPPING BARS/GRATING TO BE PROVIDED FOR APPROACH TO NOZZLES ON THE ROOF.
9. ALL GRATINGS SHALL BE MADE BY ELECTROFORGING PROCESS.
10. GRATING SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH IS:2629 AND TESTED AS PER IS:2633 AND IS:6745. QUANTITY OF ZINC COATING SHALL BE MINIMUM 900 gm/m2 OF SURFACE AREA (0.12MM UNIFORM THICKNESS).
11. THE ELLECTROFORGED GRATING SHALL FULLFILL THE FOLLOWING MINIMUM REQUIREMENTS.
    i) THE UNFUSED JOINTS ARE NOT IN EXCESS OF 5% OF THE TOTAL JOINTS AND ARE WELDED BY SMAW/GMAW PROCESS.
    ii) THE JOINTS ARE ABLE TO SUSTAIN A MINIMUM PULL OUT LOAD OF 1.2 TIMES THE ALLOWABLE SHEAR CAPACITY OF THE CROSS MEMBER.
12. EVERY CROSS BAR AND MAIN MEMBER SHALL BE WELDED WITH END FLATS.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	20.03.2024	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	TKh	KA/NK	MN
5	02.08.2018	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	RKK	KJH	RKT

Approved by

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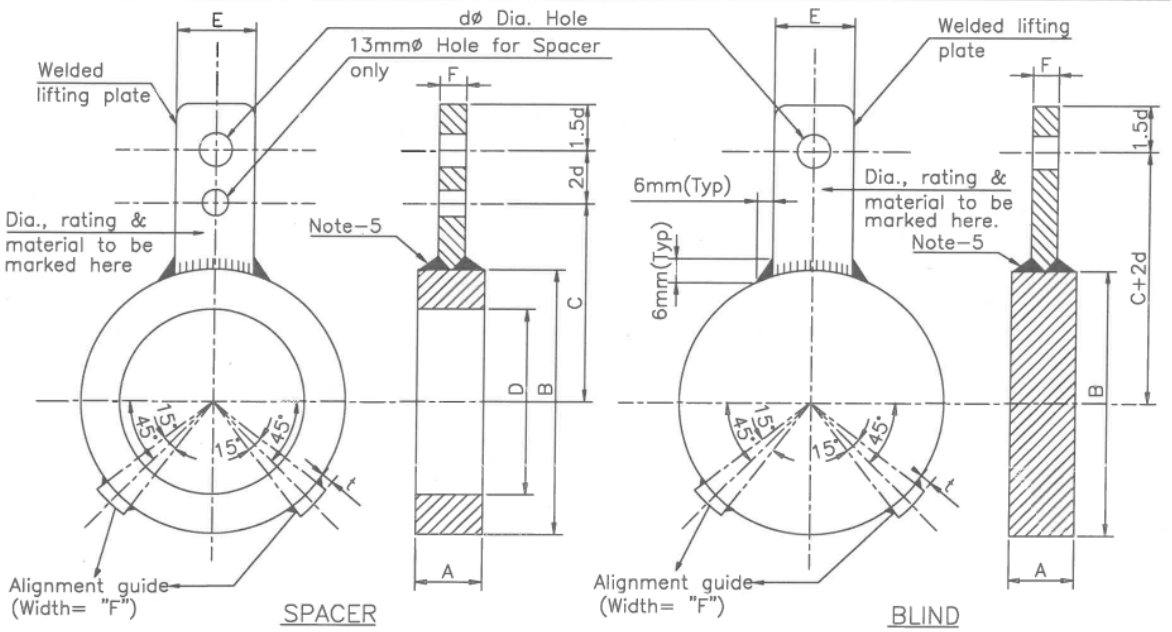

NOTES:

1. Both surfaces shall have a resultant surface finish of 125µin to 250µin average roughness with either a concentric or spiral serrated finish.
2. Dimensions are for flanges to ASME B 16.47B (erstwhile API 605) for sizes 26" to 60".
3. Diameter, rating & material specification shall be marked on welded fixed plate. Material as per line class.
4. Thickness 'A' is based on ASTM A285 Gr.C for 150# and ASTM A516 Gr.70 for 300# & 600# with corrosion allowance of 1.5mm on each face.
5. Welding and heat treatment requirements shall be in accordance with ASME B31.3
6. Alignment Guide shall be welded in the middle of thickness of Spacer & Blind.
7. All dimensions are in mm unless otherwise specified.

DIA. NB	150#								WEIGHT KG(APPROX)	
	A	B	C	D	E	F	d	t	BLIND	SPACER
26	40	711	473	648	35	15	20	5	120	22
28	42	762	498	698	33	15	20	5	140	25
30	45	813	524	749	31	15	20	5	175	30
32	48	864	551	800	29	15	20	6	210	35
34	50	921	583	851	42	15	20	5	250	40
36	53	972	609	902	39	15	20	6	295	45
38	54	1022	642	925	48	15	20	9	345	50
40	59	1080	668	1003	44	15	20	6	400	65
42	61	1130	693	1054	41	18	20	6	460	70
44	64	1181	718	1105	38	18	20	6	520	80
46	67	1235	751	1156	62	18	20	8	595	90
48	70	1289	776	1205	56	18	20	7	680	100
50	72	1340	803	1255	51	18	26	7	770	110
52	75	1391	827	1306	45	18	26	6	865	120
54	77	1441	855	1356	44	27	26	9	950	125
56	80	1492	880	1406	42	27	26	9	1060	140
58	83	1543	918	1455	63	27	26	16	1180	160
60	86	1600	943	1505	59	27	26	13	1315	175
TOL.	±0.3	±0.5		±0.5	±0.5					

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	17.12.25	REVISED & ISSUED AS STANDARD	SRG	PK	SH	MN
5	04.05.20	REAFFIRMED & ISSUED AS STANDARD	SG	SH	GB	SKS

Approved by

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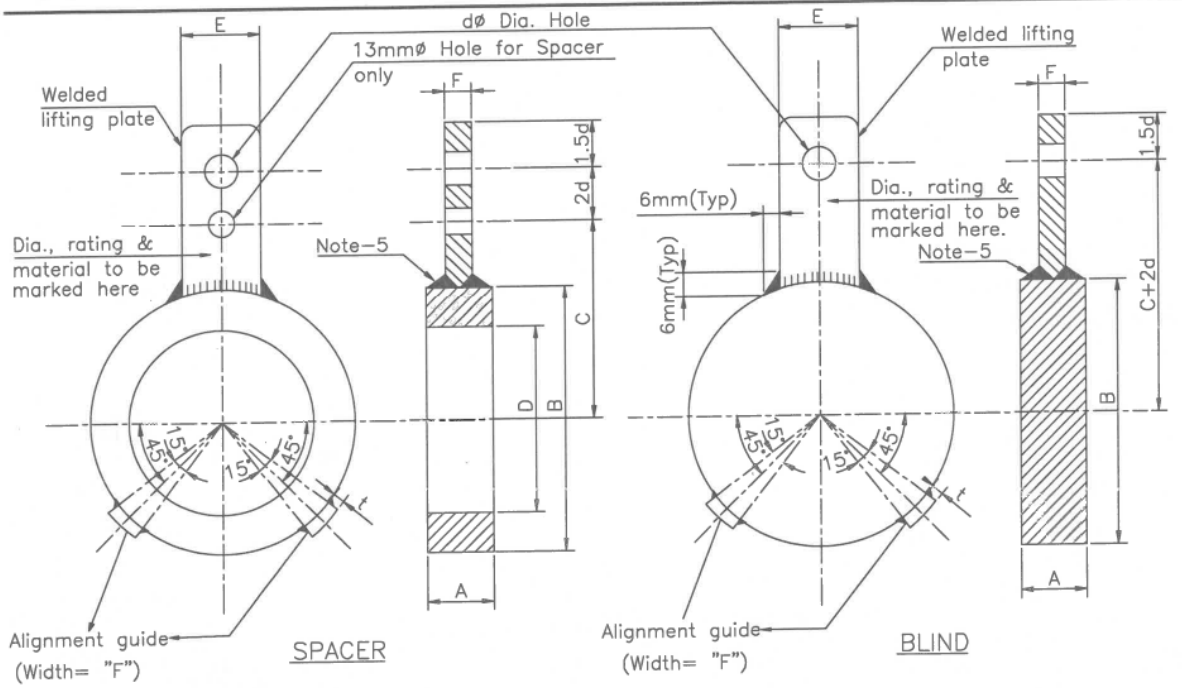

NOTES:

REFER PAGE 1 OF 3 FOR NOTES.

DIA. NB	300#								WEIGHT KG(APPROX)	
	A	B	C	D	E	F	d	t	BLIND	SPACER
26	60	737	513	641	36	15	20	15	195	55
28	65	787	540	689	32	15	20	17	240	60
30	69	845	575	738	35	15	20	18	295	70
32	73	902	608	787	47	15	20	17	355	85
34	77	953	635	835	41	15	20	18	420	95
36	82	1010	665	886	55	18	20	17	495	115
38	86	1060	690	941	47	18	20	17	595	130
40	91	1114	718	992	41	18	20	16	685	150
42	95	1168	748	1038	53	18	26	14	785	165
44	100	1219	773	1092	47	27	26	14	895	185
46	104	1270	810	1140	61	27	26	22	1010	200
48	107	1327	835	1183	53	27	26	19	1145	225
50	112	1378	860	1234	46	35	26	19	1285	250
52	116	1429	888	1286	41	35	26	18	1430	270
54	119	1480	918	1333	45	35	26	23	1575	290
56	125	1537	963	1381	76	40	32	26	1785	330
58	130	1594	993	1429	67	40	32	29	2000	380
60	133	1651	1020	1478	71	40	36	26	2210	420
TOL.	±0.3	±0.5		±0.5						

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	17.12.25	REVISED & ISSUED AS STANDARD	SRG	PK	SH	MN
5	04.05.20	REAFFIRMED & ISSUED AS STANDARD	SG	SH	GB	SKS

Approved by

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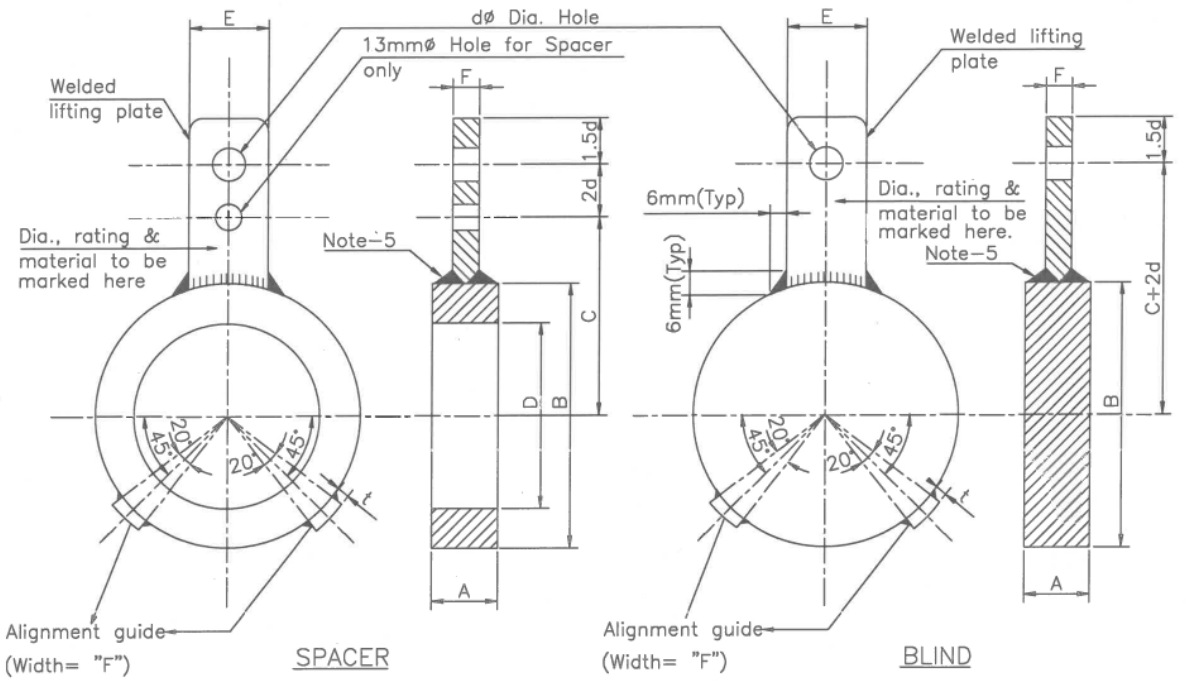

NOTES:

REFER PAGE 1 OF 3 FOR NOTES.

DIA. NB	600#								WEIGHT KG(APPROX)	
	A	B	C	D	E	F	d	t	BLIND	SPACER
26	82	727	525	632	38	15	20	17	260	65
28	88	784	555	681	42	15	20	15	320	80
30	95	841	590	732	46	15	20	17	405	100
32	100	895	623	779	49	18	20	17	490	115
34	107	953	660	829	70	18	20	20	595	140
36	113	1010	688	879	56	18	20	17	705	165
38	119	1054	715	930	62	18	26	23	800	170
40	125	1111	740	975	51	27	26	20	940	205
42	130	1168	783	1022	69	27	26	24	1090	240
44	137	1226	808	1073	57	27	26	20	1265	275
46	143	1276	835	1122	62	35	32	23	1435	300
48	149	1334	878	1172	63	35	32	26	1635	345
50	155	1384	915	1219	84	35	32	30	1830	380
52	161	1435	940	1267	67	40	32	30	2040	410
54	167	1492	970	1316	73	40	32	30	2290	460
56	172	1543	1008	1364	73	40	36	33	2535	495
58	178	1600	1033	1413	78	40	36	30	2820	565
60	185	1657	1078	1462	104	40	36	36	3150	635
TOL.	±0.3	±0.5		±0.5	±0.5					

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	17.12.25	REVISED & ISSUED AS STANDARD	SRG	PK	SH	MN
5	04.05.20	REAFFIRMED & ISSUED AS STANDARD	SG	SH	GB	SKS

Approved by

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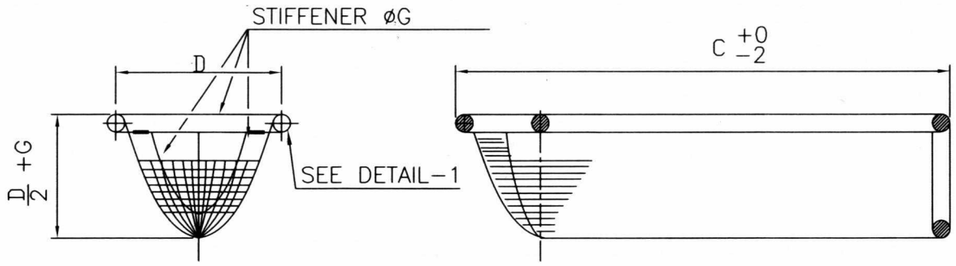
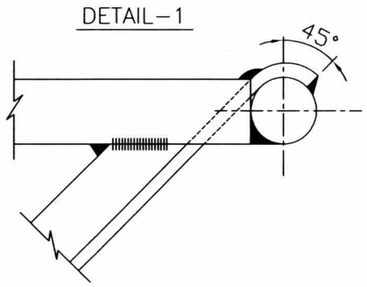
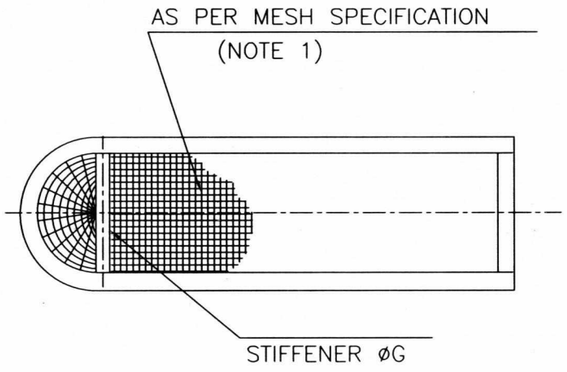
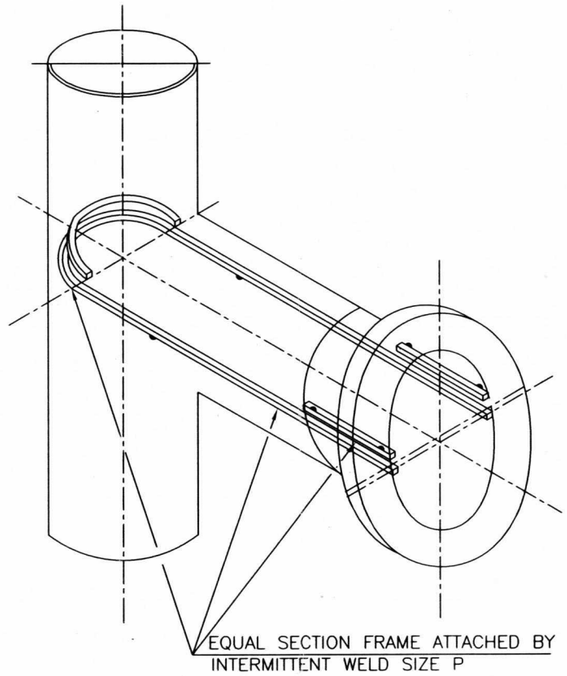
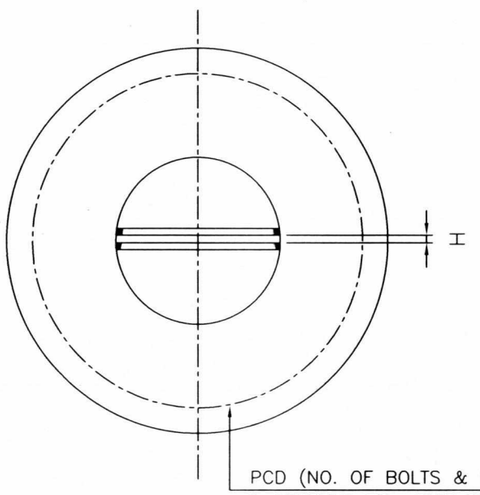


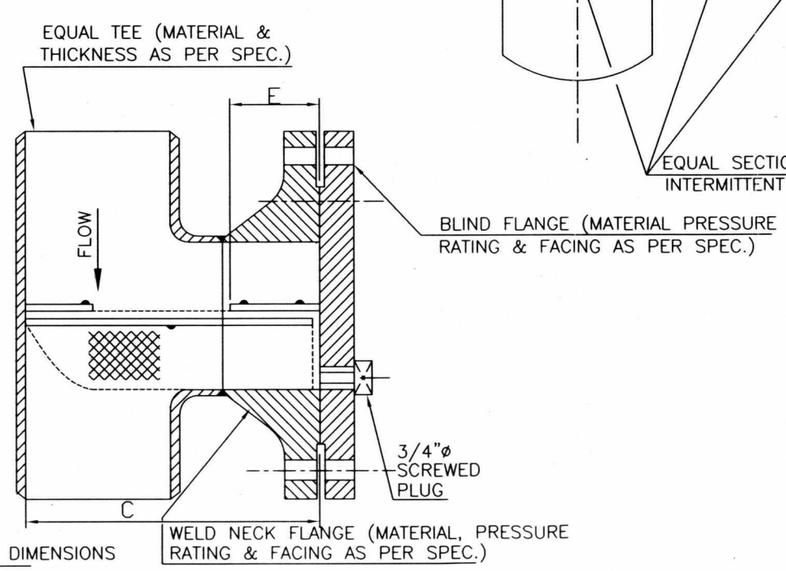
NOM Ø	SCH	C 150CL RF	C 300CL RF	C 300CL RTJ	C 600CL RF	C 600CL RTJ	D	E	H	G	P
2"	40, STD	154	160	168	170	171	51	58	8	6	6X6
	80, XS	152	158	166	168	169	48				
	160	149	155	163	165	166	40				
	XXS	147	153	161	163	164	35				
2½"	40, STD	177	183	190	192	198	61	64	8	6	6X6
	80, XS	175	181	194	190	196	57				
	160	172	179	192	188	194	51				
3"	40, STD	194	204	211	213	214	76	64	8	6	6X6
	80, XS	192	202	209	211	212	72				
	160	189	198	206	208	209	64				
	XXS	185	194	202	204	205	54				
4"	40, STD	232	242	250	264	266	100	64	8	6	6X6
	80, XS	229	239	247	261	263	95				
	120	227	237	245	259	261	89				
	160	224	234	242	256	258	83				
	XXS	221	231	239	253	255	75				











MESH SPECIFICATIONS (NOTE−1)

SERVICE		OPENING (IN)	MESH SPECIFICATION	OPEN AREA%	MESH DESIGNATION
OIL VISCOSITY IN cP	LOW VISCOCITY 0 < y < 2	0.097	8 MESH 22 SWG	62.2	TYPE 4
	MIDIUM VISCOSITY 2 ≤ y ≤ 8	0.111	7 MESH 21 SWG	60.3	TYPE 3
	HIGH VISCOSITY y > 8	0.202	4 MESH 18 SWG	65.3	TYPE 2
GASOLINE, PROPANE		0.053	14 MESH 26 SWG	55.1	TYPE 5
WATER		0.053	14 MESH 26 SWG	55.1	TYPE 5

NOTES:−

1. THE MESH SPECIFICATIONS AS GIVEN IN THE TABLE ARE TO BE USED WHEN STRAINER IS INTENDED TO BE USED AS PERMANENT STRAINER. IN CASE OF TEMPORARY STRAINER THE MESH SPECIFICATION SHALL BE AS FOLLOWS:
   FOR LINES UPTO 2½"−
   S.S STD. STOCK MESH 0.047" DIA WIRE X0.203 SQ.CLEAR OPENING−65.9 % OPEN AREA
   FOR LINES 3"& ABOVE −
   S.S STD. STOCK MESH 0.08" DIA WIRE X0.253 SQ.CLEAR OPENING− 57.6 % OPEN AREA.
2. MATERIAL AS PER LINE SPECIFICATION.
3. 3/4"ø SCREWED PLUG FOR DRAIN CONNECTION SHALL BE PROVIDED.

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Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
7	28.03.23	REAFFIRMED AND ISSUED AS STANDARD	PK	SH	GB	SM
6	22.03.18	REAFFIRMED AND ISSUED AS STANDARD	PK	SH	MI	RN

T-STRAINER TYPE-1 2"-4"
(150CL RF,300CL RF AND RTJ, 600CL RF AND RTJ)

STANDARD No.
7-44-0303 Rev. 7
Page 1 of 1

Format No. 8-00-0001-F5 Rev. 0

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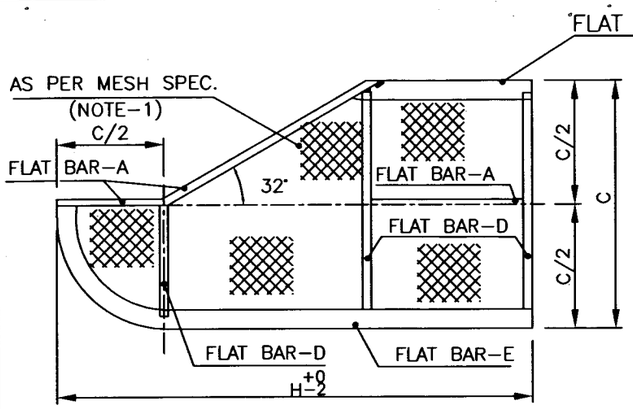
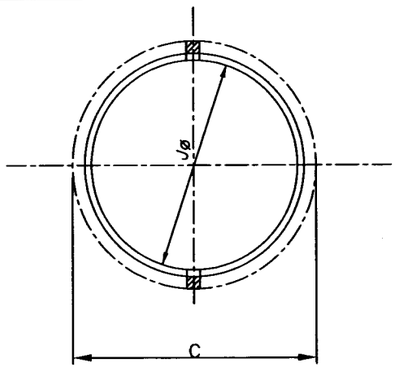
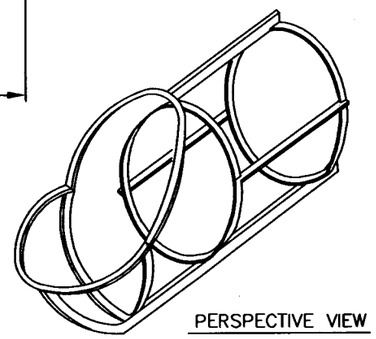


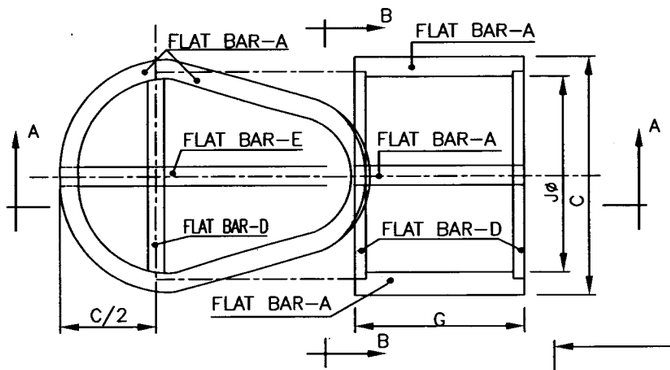
SECTION-A FILTER DETAIL



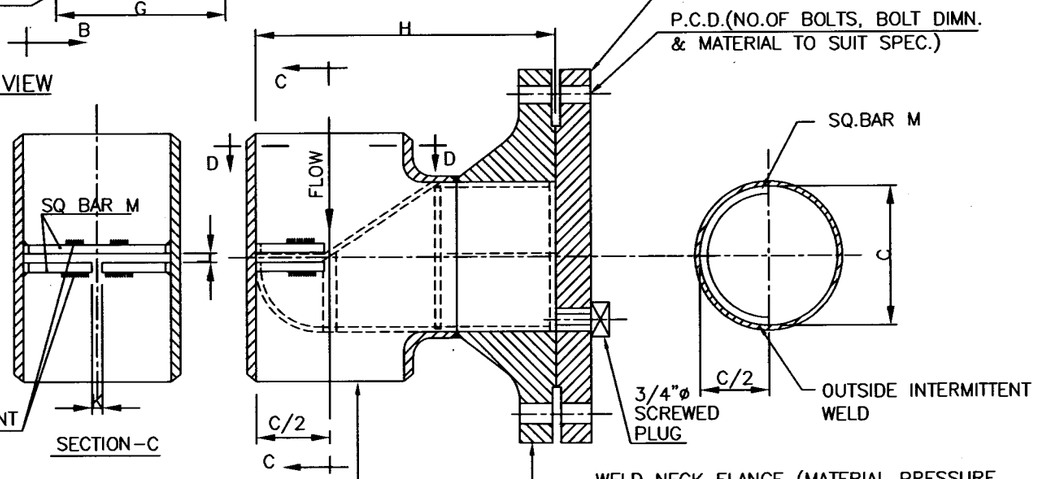
SECTION-B



PERSPECTIVE VIEW



PLAN VIEW



SECTION-C

SECTION-D

MESH SPECIFICATION(NOTE-1)

SERVICE		STRAINER SIZE NOM.(IN)	OPENING (IN)	MESH SPECIFICATION	OPEN AREA %	MESH DESIGNATION
OIL VISCOSITY IN cP	LOW VISCOCITY 0 < ϑ < 2	6"	0.097	8MESH 22SWG	60.2	TYPE 4
		8"AND ABOVE	0.111	7MESH 21SWG	60.3	TYPE 3
	MEDIUM VISCOSITY 2 < ϑ < 8	6"	0.111	7MESH 21SWG	60.3	TYPE 3
		8"AND ABOVE	0.202	4MESH 18SWG	65.3	TYPE 2
	HIGH VISCOSITY ϑ > 8	6"	0.202	4MESH 18SWG	65.3	TYPE 2
		8"AND ABOVE	0.269	3MESH 16SWG	65.2	TYPE 1
GASOLINE PROPANE		6" AND 8"	0.053	14MESH 26SWG	55.1	TYPE 5
		10"AND ABOVE	0.087	8MESH 22SWG	60.2	TYPE 4
WATER		6" ABOVE	0.115	7MESH 21SWG	60.3	TYPE 3

NOM ø	SCH	H 150# RF	H 300# RF	H 300# RTJ	H 600# RF	H 600# RTJ	C	J	G 150# RF	G 300# RF	G 300# RTJ	G 600# RF	G 600# RTJ	FLAT BAR D	FLAT BAR E	FLAT BAR A	L	K	SQ BAR M
6"	40	308	318	331	343	349	151	131	121	131	144	156	162	15X5	10X5	10X5	7	8	10X10
	80	304	314	327	339	345	143	123	129	139	152	164	170						
	120	301	311	324	336	342	137	117	133	143	156	168	174						
	160	297	307	321	332	338	129	109	139	149	162	174	180						
	XXS	293	303	316	328	334	122	102	144	154	167	179	185						
8"	20-30	382	391	404	420	425	203	183	129	138	151	167	172	15X5	10X5	10X5	7	8	10X10
	40-60	378	387	400	416	421	197	177	132	141	154	170	175						
	80	376	386	399	415	420	192	172	137	147	160	176	181						
	120	370	380	393	409	414	180	160	146	156	169	185	190						
	XXS-160	366	376	389	405	410	171	151	154	164	177	193	198						
10"	20-30	446	462	475	503	509	256	216	125	141	154	182	188	15X5	20X10	20X5	7	14	10X10
	40	444	460	473	501	508	253	213	127	143	156	184	191						
	60	441	457	470	498	504	246	206	133	149	162	190	196						
	80	439	455	468	496	502	241	201	137	153	166	194	200						
	120	432	448	461	489	495	228	188	147	163	176	204	210						
	160	–	–	–	482	488	214	174	–	–	–	215	221						
12"	20	523	539	552	571	577	310	270	132	148	161	180	186	15X5	20X10	20X5	8	14	12X12
	30	521	537	550	569	575	305	265	137	153	166	185	191						
	STD-40	519	535	548	567	573	302	262	139	155	168	187	193						
	XS-60	515	531	544	563	569	294	254	145	161	174	193	199						
	80	512	528	541	560	566	287	247	151	167	180	199	205						
	120	504	520	533	552	558	271	231	163	179	192	211	217						
	160	–	–	–	544	550	255	215	–	–	–	224	230						
14"	10	577	593	606	621	627	341	291	148	164	177	192	198	15X5	25X10	25X6	10	16	12X12
	20	575	591	604	619	625	338	288	150	166	179	194	200						
	30-40	572	588	601	616	623	332	282	155	171	184	199	206						
	XS	570	586	599	614	620	328	278	158	174	187	202	208						
	60	–	584	597	612	618	324	274	–	177	190	205	211						
	80	–	580	593	608	614	316	266	–	183	196	211	217						
16"	10	628	647	660	686	691	392	332	135	154	167	193	198	20X5	30X12	30X7	10	16	14X14
	20	627	646	659	685	690	389	329	138	157	170	196	201						
	30	625	644	657	683	688	386	326	140	159	172	198	203						
	XS-40	–	641	654	680	685	379	319	–	165	178	204	209						
	60	–	–	–	676	681	371	311	–	–	–	210	215						
	80	–	–	–	671	676	361	301	–	–	–	218	223						
18"	10	704	724	737	755	761	443	373	146	166	179	197	203	20X5	35X12	35X7	10	16	14X14
	20	703	722	735	753	759	440	370	149	168	181	199	205						
	STD	701	720	733	751	757	437	367	151	170	183	201	207						
	30	700	719	732	750	756	433	363	155	174	187	205	211						
	XS	698	717	730	748	754	430	360	157	176	189	207	213						
	40	–	–	–	747	753	427	357	–	–	–	209	215						
	60	–	–	–	743	749	419	349	–	–	–	216	222						
20"	10	773	790	805	825	832	493	413	153	170	185	205	212	20X5	40X15	40X8	11	20	14X14
	STD-20	769	787	802	822	829	487	407	156	174	189	209	216						
	XS-30	766	784	799	819	826	480	400	162	180	195	215	222						
	40	–	–	–	816	823	476	396	–	–	–	217	224						
	60	–	–	–	811	818	464	384	–	–	–	227	234						
24"	10	882	898	914	940	949	594	504	132	148	164	190	199	20X5	45X15	45X8	11	20	14X14
	STD-20	879	895	911	937	946	588	498	136	152	168	194	203						
	XS	876	892	908	934	943	582	492	141	157	173	199	208						
	30	–	–	–	932	941	579	489	–	–	–	201	210						
	40	–	–	–	928	937	572	482	–	–	–	206	215						

NOTES:-
1. THE MESH SPECIFICATION AS GIVEN IN THE TABLE IS TO BE USED WHEN STRAINER IS INTENDED TO BE USED AS PERMANENT STRAINER IN CASE OF TEMPORARY STRAINER THE MESH SPECIFICATIONS SHALL BE AS FOLLOWS: FOR LINE UPTO2½"-S.S STD. STOCK MESH 0.07" DIA WIRE X0.203 SQ.CLEAR OPENING-65.9% OPEN AREA FOR LINES 3"& ABOVE S.S.STD. STOCK MESH 0.08" DIA WIRE X0.253 SQ.CLEAR OPENING- 57.6% OPEN AREA.
2. MATERIAL AS PER LINE SPECIFICATION
3. 3/4"ø SCREWED PLUG FOR DRAIN CONNECTION SHALL BE PROVIDED

इंजीनियर्स इंडिया लिमिटेड (भारत सरकार का उपक्रम) ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	24.08.2021	REAFFIRMED & ISSUED AS STANDARD	SG	SH	GB	SM
6	30/03/2017	Revised and Issued as Standard	PK	SH	MI	RN
					Approved by	

T STRAINER TYPE-1
6"-24" (150# RF, 300# RF AND RTJ, 600# RF AND RTJ)

STANDARD No.
7-44-0304 Rev. 7

Format No. 8-00-0001-F5 Rev. 0
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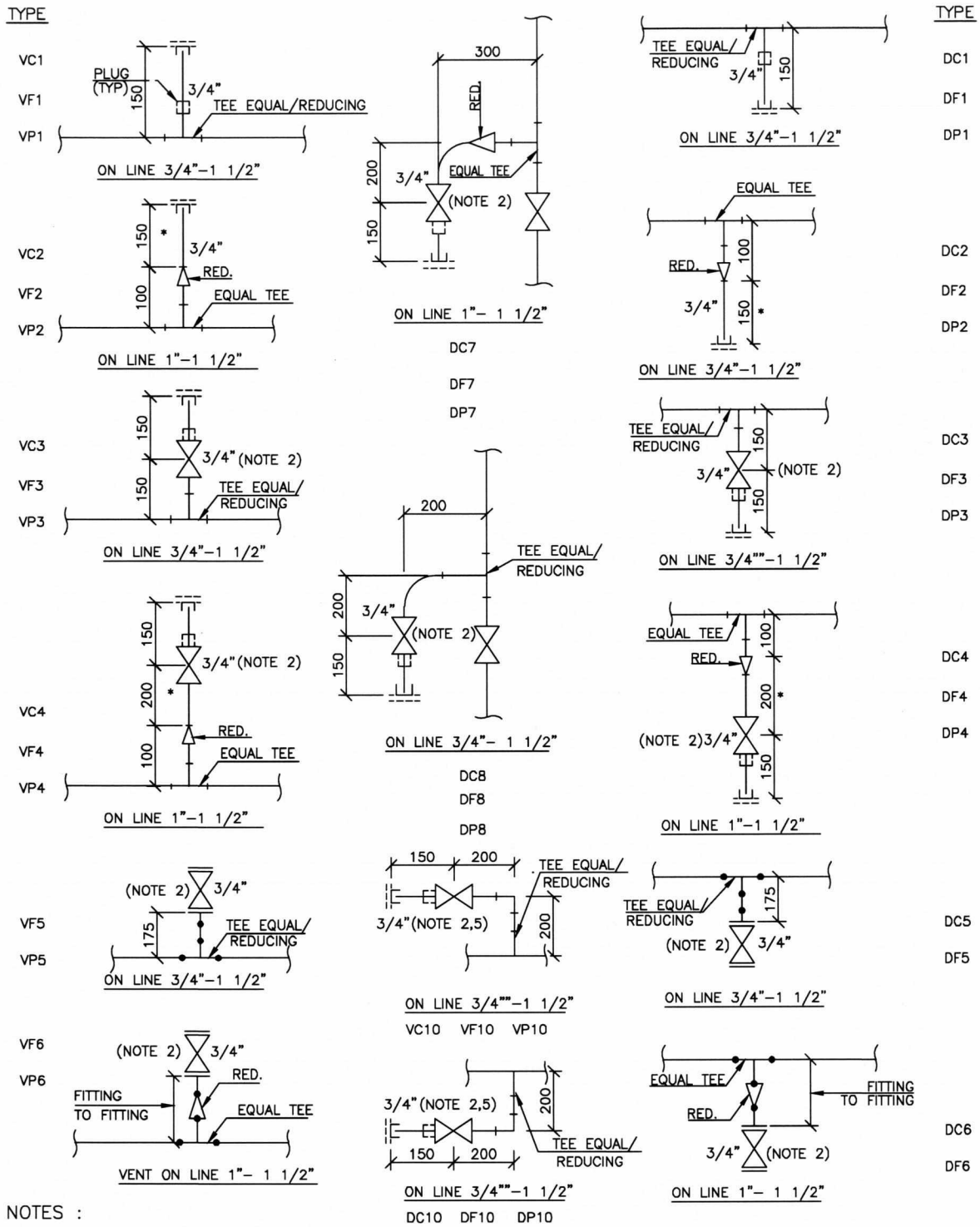
Page 5140 of 5436 : C050-TENDER DOC-C050-1U68-81-45-PB-T-8010 : Rev. A



NOTES :

1. DIMENSIONS INDICATED ARE VALID FOR 50mm(MAX) INSULATION. FOR HIGHER INSULATION THICKNESS, INCREASE DIMENSIONS AS REQUIRED. DIMENSIONS MARKED '*' ARE MAXIMUM AND MAY BE REDUCED TO SUIT.
2. VALVES TO BE PROVIDED SHALL BE SIMILAR TO LINE ISOLATION VALVE (GATE, BALL OR PLUG VALVE ETC., WITH FLGD, S.W. OR SCR'D ENDS) UNLESS OTHERWISE SPECIFIED IN PMS, BRANCH–OFFS LIKE TEES(EQUAL OR REDUCING)/HALF COUPLINGS S.W. OR SCR'D)/SOCKOLETS/WELDOLETS AND END CONNECTIONS LIKE CAP/PLUG/FLANGE & BLIND FLANGE SHALL BE AS PER PIPING MATERIAL SPECIFICATION.
3. LEGEND : V = VENT; D = DRAIN; C = CAP; F = FLANGE; RED. = REDUCER, COUPLING OR SWAGE; P = PLUG.
4. PLUGGED END OF VALVE OR FITTING SHALL BE THREADED.
5. VALVE STEM ORIENTATION TO BE AT OR ABOVE 45° ABOVE THE HORIZONTAL POSITION IN LIQUID CRYOGENIC SERVICE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	20.06.22	REVISED & ISSUED AS STANDARD	PK	SH	GB	SM
5	06.12.19	REAFFIRMED & ISSUED AS STANDARD	SG	SH	MI	RKT

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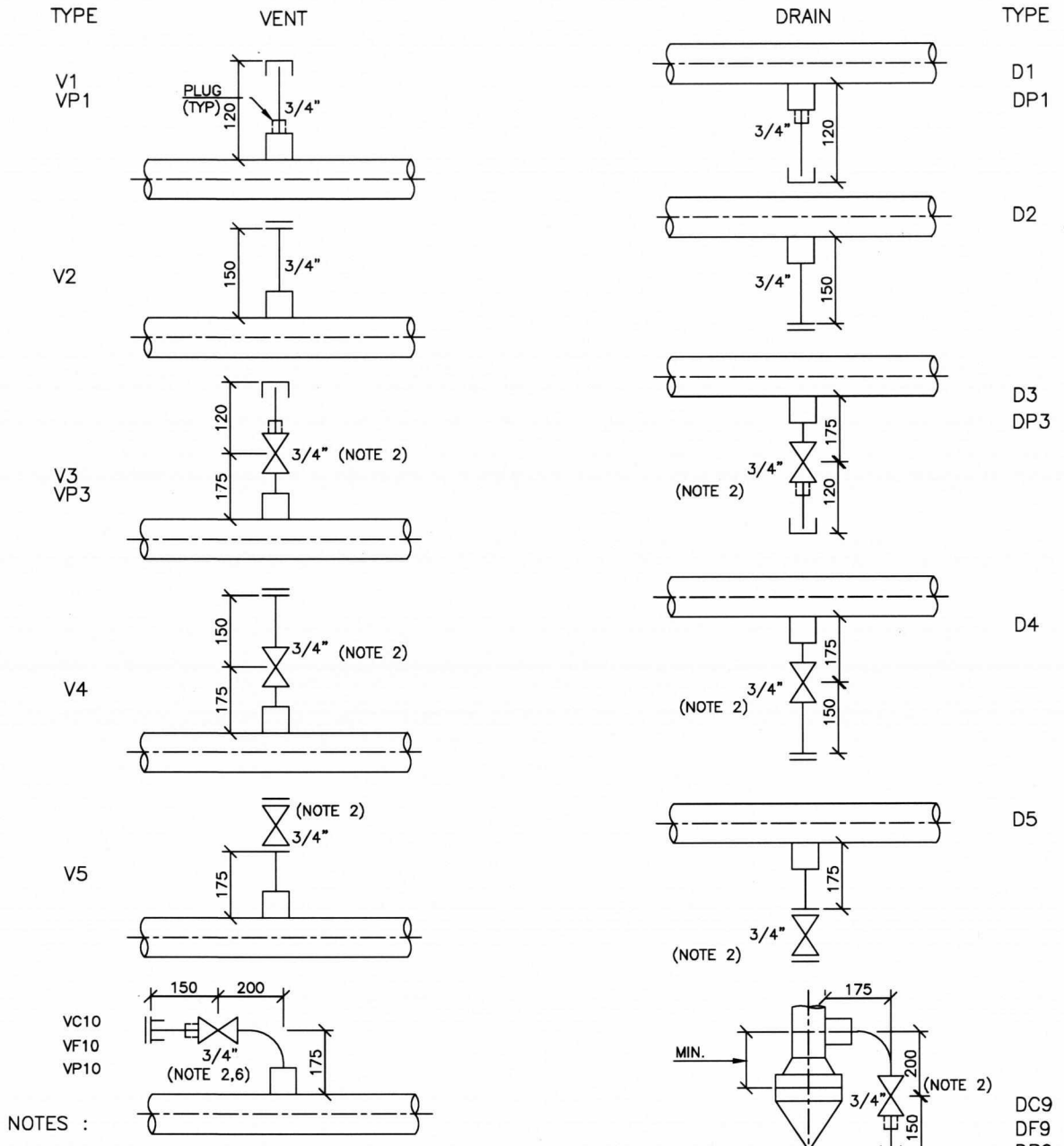

NOTES :

1. DIMENSIONS INDICATED ARE VALID FOR 75mm (MAX) INSULN. THICKNESS. FOR HIGHER INSULATION THICKNESS INCREASE DIMENSION AS REQUIRED
2. VALVES TO BE PROVIDED SHALL BE SIMILAR TO LINE ISOLATION VALVE (GATE, BALL OR PLUG VALVE ETC., WITH FLGD, SW OR SCR'D ENDS) UNLESS OTHERWISE SPECIFIED IN PMS.
   BRANCH-OFFS LIKE HALF CPLG(SW OR SCR'D)/SOCKOLET/WELDOLET & END CONNECTIONS LIKE CAP/PLUG/FLANGE & BLIND FLANGE SHALL BE AS PER PIPING MATERIAL SPECIFICATIONS.
3. VENTS/DRAINS CAN BE PROVIDED ON FLAT SIDE OF ECCENTRIC REDUCER ON SIZES 4" & ABOVE
4. LEGEND V=VENT, D=DRAIN, C=CAP, F=FLANGE, P=PLUG
5. PLUGGED END OF VALVE OR FITTING SHALL BE THREADED
6. FOR LIQUID CRYOGENIC SERVICE VALVE STEM ORIENTATION TO BE AT OR ABOVE 45° ABOVE HORIZONTAL POSITION.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	20.06.22	REVISED & ISSUED AS STANDARD	PK	SH	GB	SM
5	06.12.19	REAFFIRMED & ISSUED AS STANDARD	SG	SH	MI	RKT

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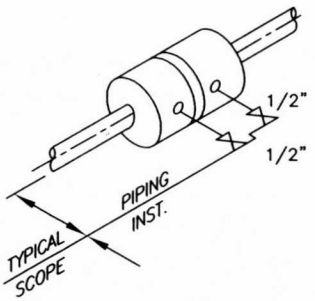
ORIENTATION OF ORIFICE TAPS (CLASS 600 & BELOW)

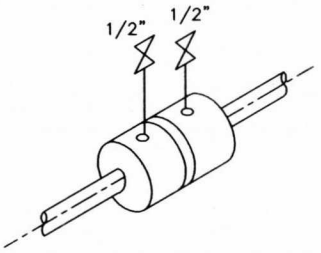
FOR LIQUID

DETAIL– ①



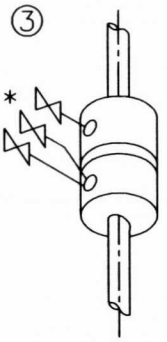
FOR GAS LINES & STEAM LINES (NOTE–10)

DETAIL– ②



FOR VERTICAL LINES

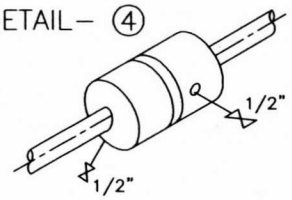
DETAIL– ③



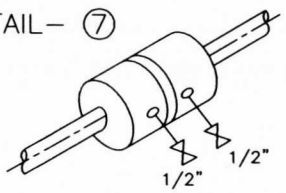
* FOR STEAM & CONDENSIBLES, LOWER BLOCK VALVE SHALL BE RAISED TO THE LEVEL OF THE UPPER BLOCK VALVE

FOR LIQUID LINES ON PIPE RACK WITH OPERATING TEMP > = 0°C

DETAIL– ④ NOTE–5

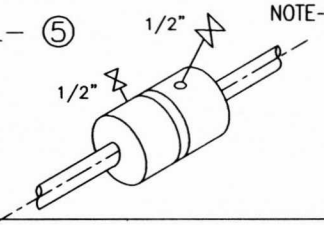


DETAIL– ⑦

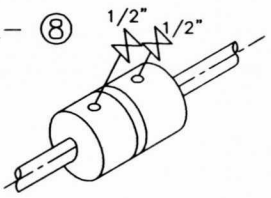


FOR STEAM & GAS LINES ON PIPE RACK & LIQUID LINES WITH TEMP BELOW 0°C

DETAIL– ⑤ NOTE–5

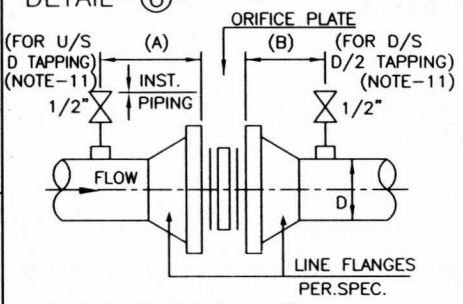


DETAIL– ⑧



FOR TAPS ON PIPE RACK (150# & 300#)

DETAIL– ⑥ (NOTE–3)



ORIENTATON OF TAPS SHALL BE
LIQUID LINES WITH OPERATING TEMP. >= 0°C : 45° FROM VERTICAL DOWNWARDS
STEAM, GAS & LIQUID LINES WITH OP.TEMP < 0°C : 45° FROM VERTICAL UPWARDS

INSTRUMENT SCOPE

A. ORIFICE FLANGES ASSEMBLY WITH BOLTS/NUTS AND GASKETS
B. IMPULSE LINE STARTING AFTER THE TAPPING VALVE

PIPING SCOPE

A. TAPPING NIPPLE, COUPLINGS AND VALVES

NOTES :

1. ORIFICE FLANGES IN HORIZONTAL LINES SHALL BE PREFERED.
2. TAPS SHALL BE ORIENTED TO SUIT LOCATION OF INSTRUMENT.
3. TAPPING ON PIPE AS PER DETAIL–6 SHALL BE CONSIDERED IN ACCORDANCE WITH THE COUPLING POSITIONS FROM UPSTREAM AND DOWNSTREAM SIDE FLANGE FACES FOR LINE OF :–
   A. RATING 150# AND SIZE >=16"
   B. RATING 300# AND SIZE >=20"

   FOR ALL OTHER LINE SIZES AND RATINGS. TAP SHALL BE CONSIDERED ON ORIFICE FLANGE FOR ORIFICE ASSEMBLIES BY INSTRUMENTATION.
4. IN CASE OF VERTICAL LINES FLOW SHALL BE UPWARDS FOR LIQUIDS CONTAINING VAPOUR & DOWNWARDS FOR WET GASES & STEAM.
5. THE ORIENTATION OF TAPPING IN CASE OF DETAILS 4 & 5 SHALL BE AS FOLLOWS:
   FOR LIQUID LINES WITH OPERATING TEMPERATURE >= 0°C :
   4,8 &16 BOLT FLANGE – AT 45° TO VERTICAL POINTING DOWNWARDS
   12 BOLT FLANGE – AT 60° TO VERTICAL POINTING DOWNWARDS
   20 BOLT FLANGE – AT 54° TO VERTICAL POINTING DOWNWARDS.

   FOR LIQUID LINES WITH OPER. TEMP. < 0°C AND STEAM AND GAS LINES :
   4,8 & 16 BOLT FLANGE – AT 45° TO VERTICAL POINTING UPWARDS,
   12 BOLT FLANGE – AT 60° TO VERTICAL POINTING UPWARDS
   20 BOLT FLANGE – AT 54° TO VERTICAL POINTING UPWARDS.
6. DETAILS 4 & 5 SHALL NOT BE USED FOR PRE–FABRICATED HOOK–UPS.
7. FOR CLEARANCE REQUIREMENT AROUND ORIFICE FLANGE REFER EIL STD. 7–44–0504
8. FOR DETAILS OF ORIFICE TAPPINGS AND ORIENTATION, REFER EIL STD. 7–52–0005.
9. IN CASE OF PRE–FABRICATED HOOKUP, NIPPLE & ISOLATION VALVE SHALL BE SUPPLIED BY PREFABRICATION VENDOR.
10. FOR STEAM LINES, DETAIL–1 CAN BE CONSIDERED IN CASE OF SPACE CONSTRAINTS OR AS PER LICENSOR REQUIREMENT.
11. FOR DIMENSIONS A & B REFER STD. 7–52–0022.
12. FOR LIQUID CRYOGENIC SERVICE VALVE STEM ORIENTATION TO BE AT OR ABOVE 45° ABOVE HORIZONTAL POSITION.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	20.06.22	REVISED & ISSUED AS STANDARD	PK	SH	GB	SM
5	24.01.20	REVISED & ISSUED AS STANDARD	SG	SH	MI	RKT

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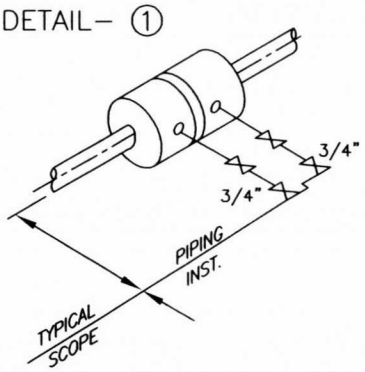
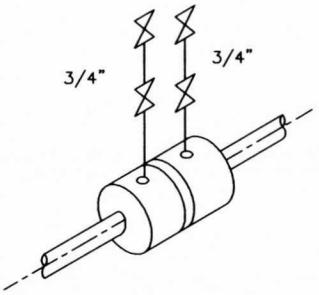
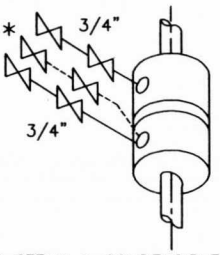
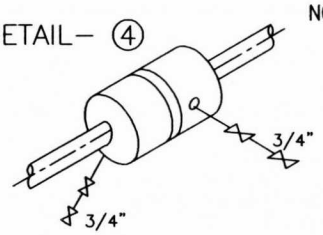
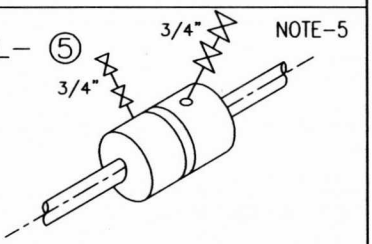
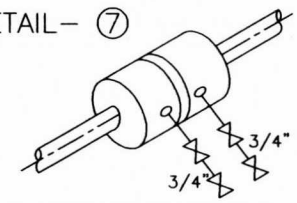
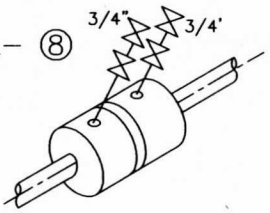
FOR LIQUID	FOR GAS LINES & STEAM LINES (NOTE-10)	FOR VERTICAL LINES
DETAIL– ① 	DETAIL– ② 	DETAIL– ③  * FOR STEAM & CONDENSIBLES, LOWER BLOCK VALVE SHALL BE RAISED TO THE LEVEL OF THE UPPER BLOCK VALVE
FOR LIQUID LINES ON PIPE RACK WITH OPERATING TEMP > = 0°C	**FOR STEAM & GAS LINES ON PIPE RACK & LIQUID LINES WITH TEMP BELOW 0°C**	
DETAIL– ④ NOTE-5 	DETAIL– ⑤ NOTE-5 	
DETAIL– ⑦ 	DETAIL– ⑧ 	

INSTRUMENT SCOPE

A. ORIFICE FLANGES ASSEMBLY WITH BOLTS/NUTS AND GASKETS
B. IMPULSE LINE STARTING AFTER THE TAPPING VALVE

PIPING SCOPE

A TAPPING NIPPLE, COUPLINGS AND VALVES

NOTES :

1. ORIFICE FLANGES IN HORIZONTAL LINES SHALL BE PREFERED.
2. TAPS SHALL BE ORIENTED TO SUIT LOCATION OF INSTRUMENT.
3. DELETED.
4. IN CASE OF VERTICAL LINES FLOW SHALL BE UPWARDS FOR LIQUIDS CONTAINING VAPOUR & DOWNWARDS FOR WET GASES & STEAM.
5. THE ORIENTATION OF TAPPING IN CASE OF DETAILS 4 & 5 SHALL BE AS FOLLOWS:
   FOR LIQUID LINES WITH OPERATING TEMPERATURE >= 0°C :
   4,8 &16 BOLT FLANGE – AT 45° TO VERTICAL POINTING DOWNWARDS
   12 BOLT FLANGE – AT 60° TO VERTICAL POINTING DOWNWARDS
   20 BOLT FLANGE – AT 54° TO VERTICAL POINTING DOWNWARDS.
   FOR LIQUID LINES WITH OPER. TEMP. < 0°C AND STEAM AND GAS LINES :
   4,8 & 16 BOLT FLANGE – AT 45° TO VERTICAL POINTING UPWARDS,
   12 BOLT FLANGE – AT 60° TO VERTICAL POINTING UPWARDS
   20 BOLT FLANGE – AT 54° TO VERTICAL POINTING UPWARDS.
6. DETAILS 4 & 5 SHALL NOT BE USED FOR PRE–FABRICATED HOOK–UPS.
7. FOR CLEARANCE REQUIREMENT AROUND ORIFICE FLANGE REFER EIL STD. 7–44–0504
8. FOR DETAILS OF ORIFICE TAPPINGS AND ORIENTATION. REFER EIL STD. 7–52–0005.
9. IN CASE OF PRE–FABRICATED HOOKUP, NIPPLE & ISOLATION VALVE SHALL BE SUPPLIED BY PREFABRICATION VENDOR.
10. FOR STEAM LINES, DETAIL–1 CAN BE CONSIDERED IN CASE OF SPACE CONSTRAINTS OR AS PER LICENSOR REQUIREMENT.
11. FOR LIQUID CRYOGENIC SERVICE VALVE STEM ORIENTATION TO BE AT OR ABOVE 45° ABOVE HORIZONTAL POSITION.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	20.06.22	REVISED & ISSUED AS STANDARD	PK	SH	GB	SM
5	24.01.20	REVISED & ISSUED AS STANDARD	SG	SH	MI	RKT

Approved by

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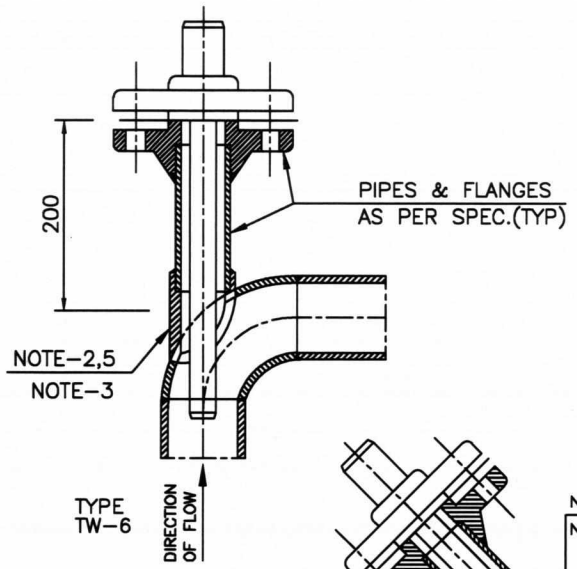

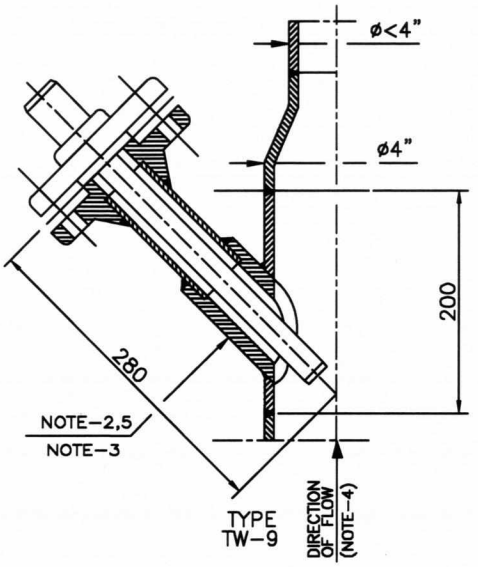

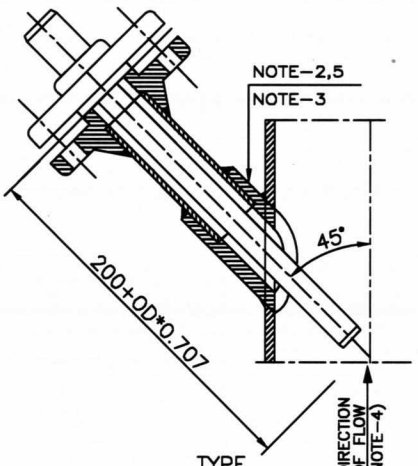

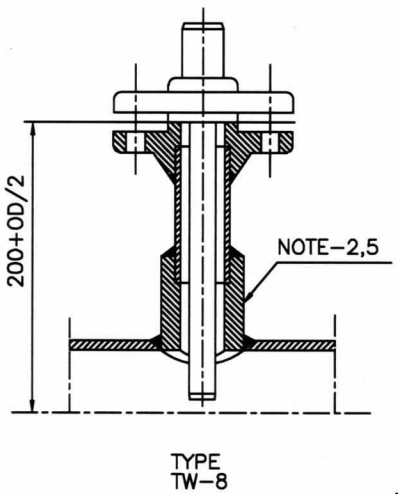

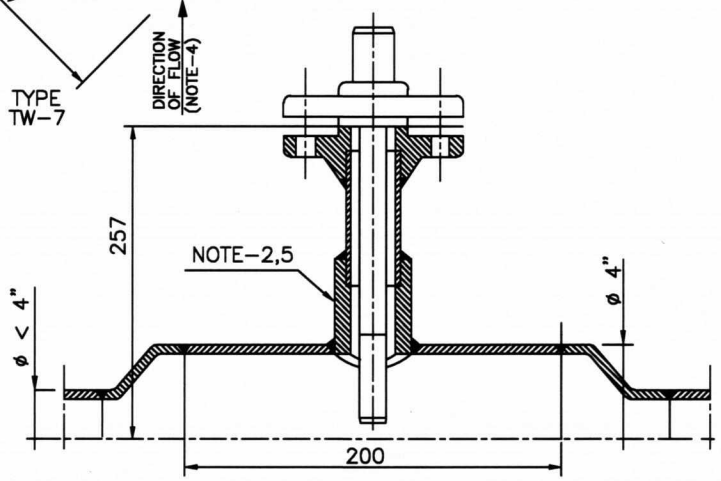

LINE DIA.	MINIMUM CLEARANCE FOR REMOVAL
4"	630
6"	630
8"	670
10"	670
12"	670
14"	670
16"	670
18"	670
20" AND LARGER	750
VESSELS	750

NOTES:–

1. BOLTS, NUTS AND GASKETS BY PIPING.
2. BRANCH FITTING SHALL BE AS PER PMS
3. IF BRANCH FITTING IS A COUPLING, IT SHALL BE OF SPECIAL LENGTH.
4. THE ARRANGEMENT CAN BE USED FOR DOWNWARD FLOW ALSO, IF CONFIRMED BY INSTRUMENTATION.
5. SIZE AND DETAIL OF TAPPING SHALL BE AS PER APPLICABLE SPECIFICATION FOR CLADDED/LINED/JACKETED PIPING.

OD : OUTSIDE DIA IN MM
TYPE TW–6 : ELBOW MIN. 4" DIA. OR LARGER
TYPE TW–7 : VERTICAL LINE 4" DIA. OR LARGER
TYPE TW–8 : HORIZONTAL LINE 4" DIA. OR LARGER
TYPE TW–9 : VERTICAL LINE DIA. LESS THAN 4"
TYPE TW–10: HORIZONTAL LINE DIA. LESS THAN 4"

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Approved by
6	20.06.22	REVISED & ISSUED AS STANDARD	PK	SH	GB	SM
5	24.01.20	REVISED & ISSUED AS STANDARD	SG	SH	MI	RKT

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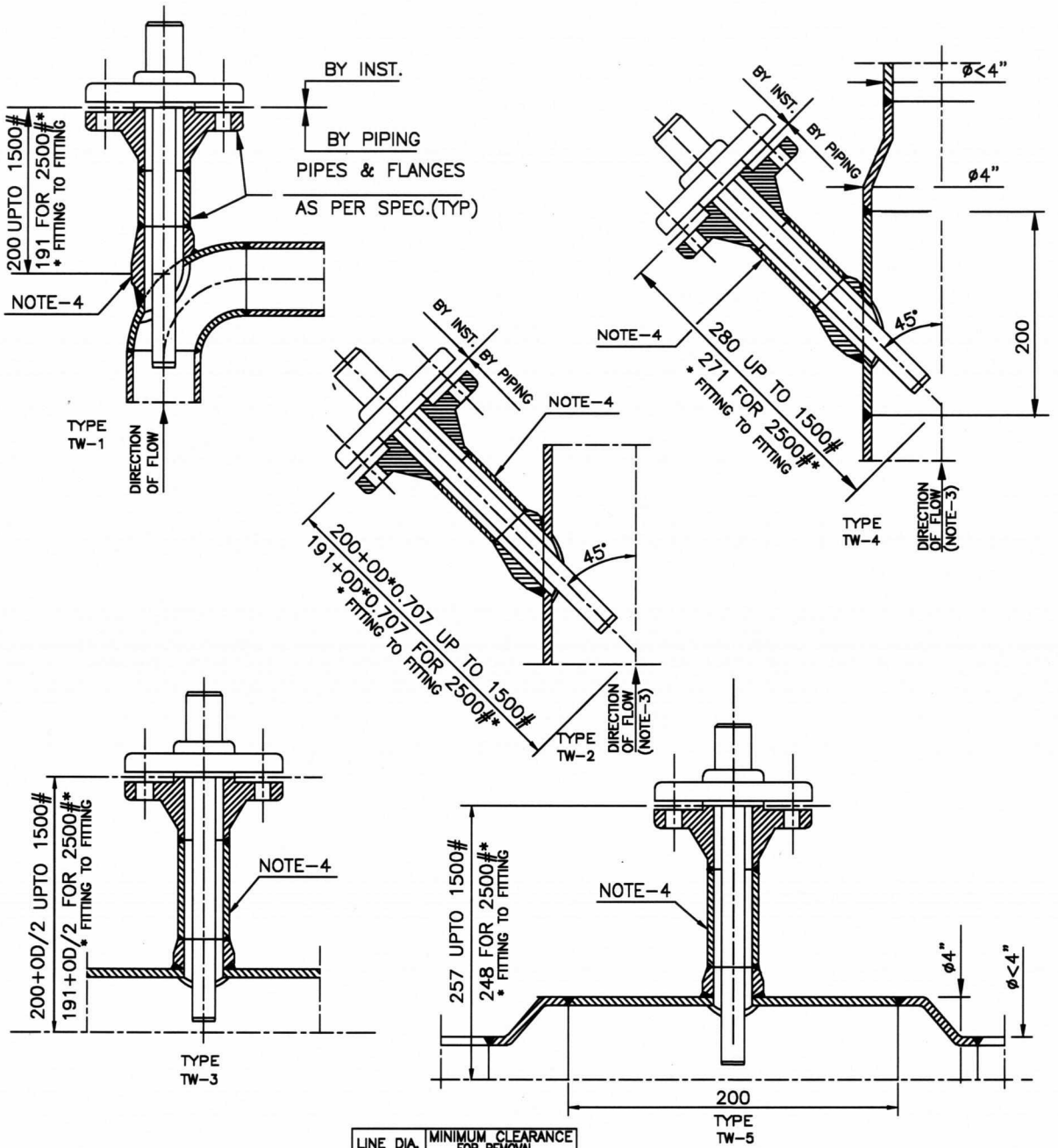

LINE DIA.	MINIMUM CLEARANCE FOR REMOVAL
4"	630
6"	630
8"	670
10"	670
12"	670
14"	670
16"	670
18"	670
20" & ABV	750
VESSELS	750

NOTES:-

1. BOLTS, NUTS AND GASKETS BY PIPING.
2. BRANCH FITTING SHALL BE AS PER PMS.
3. THE ARRANGEMENT CAN BE USED FOR DOWNWARD FLOW ALSO, IF CONFIRMED BY INSTRUMENTATION.
4. SIZE AND DETAIL OF TAPPING SHALL BE AS PER APPLICABLE SPECIFICATION FOR CLADDED/LINED/JACKETED PIPING.

OD : OUTSIDE DIA IN MM

TYPE TW-1 : ELBOW MIN. 4" ø OR LARGER
TYPE TW-2 : VERTICAL LINE 4" ø OR LARGER
TYPE TW-3 : HORIZONTAL LINE 4" ø OR LARGER
TYPE TW-4 : VERTICAL LINE DIA. LESS THAN 4"
TYPE TW-5 : HORIZONTAL LINE DIA. LESS THAN 4"

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	20.06.22	REVISED & ISSUED AS STANDARD	PK	SH	GB	SM
5	24.01.20	REVISED & ISSUED AS STANDARD	SG	SH	MI	RKT

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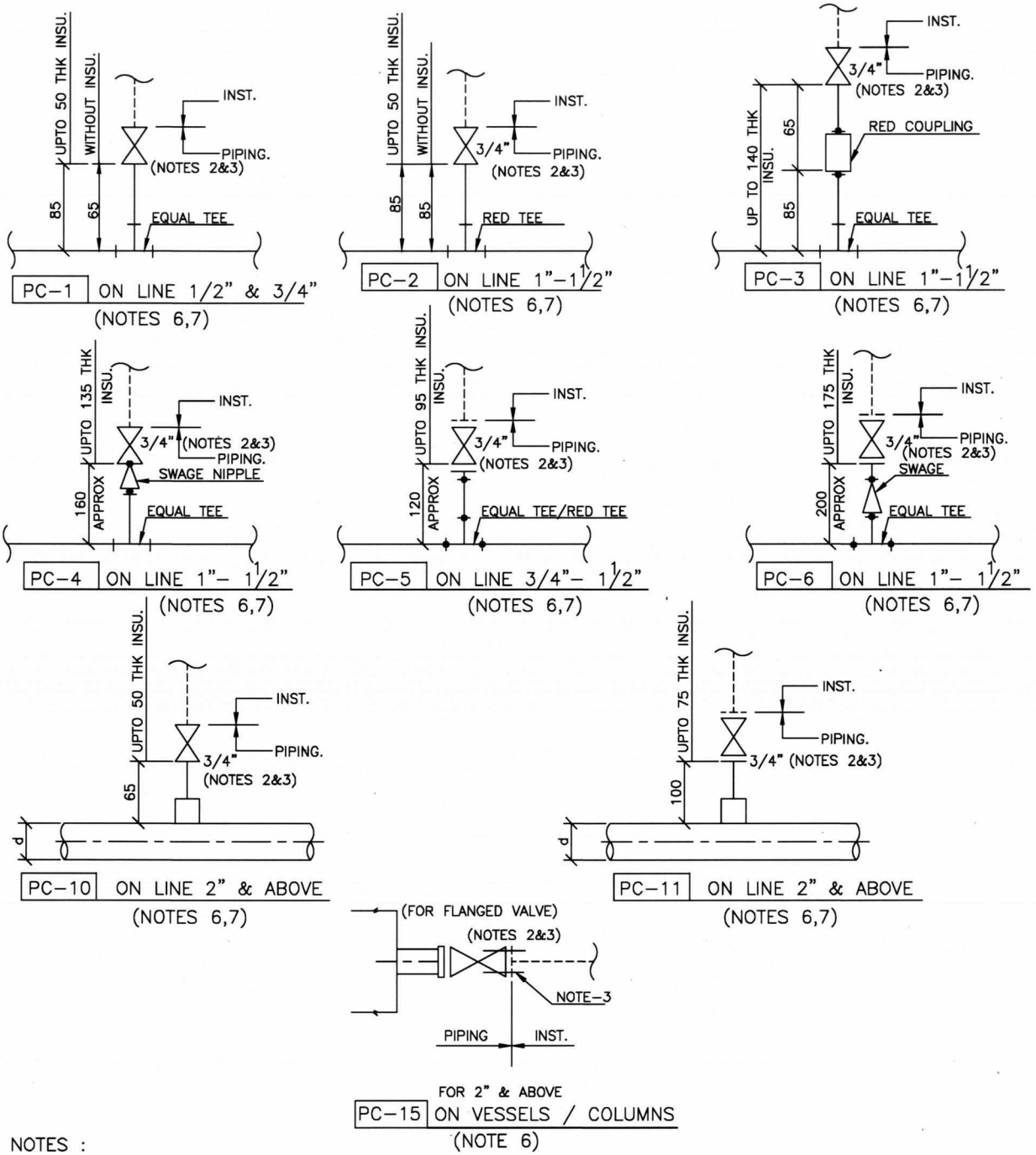

NOTES :

1. THE INDICATED DIMENSIONS ARE MINIMUM WHICH ALSO COVER INSULATION TO THE EXTENT SHOWN ABOVE. IN CASE OF HIGHER THICKNESS OF INSULATION THAN INDICATED THE DIFFERENCE SHALL BE ADDED IN THE DIMENSIONS SHOWN ABOVE.
2. PRESSURE TAPPING SHALL BE PROVIDED WITH VALVE SIMILAR TO LINE ISOLATION VALVE (GATE, BALL OR PLUG VALVE ETC., WITH FLGD, S.W. OR SCR'D ENDS) UNLESS OTHERWISE SPECIFIED IN PMS, TEE(EQUAL OR REDUCING)/HALF COUPLING(S.W. OR SCR'D)/STUB IN/SOCKOLET/WELDOLET SHALL BE AS PER PIPING MATERIAL SPECS. DOUBLE ISOLATION VALVE SHALL BE USED FOR CLASS 900 & ABOVE.
3. IN CASE OF FLGD VALVES BOLTING & GASKET ON BOTH SIDES OF VALVE SHALL BE IN PIPING SCOPE
4. IN CASE OF TAPPING PROVIDED OTHER THAN INDICATED IN THIS STD FOR LAYOUT REASONS DETAILED DIMENSIONS WILL BE CALLED OUT.
5. IN CASE OF PRE-FABRICATED HOOKUP, ISOLATION VALVE WITH NIPPLE SHALL BE SUPPLIED BY PREFABRICATION VENDOR HOWEVER, 3/4" WELDOLET/SOCKOLET/HALF COUPLING/EQUAL TEE/RED. TEE ETC. AS PER PMS SHALL BE IN PIPING SCOPE.
6. VALVE STEM ORIENTATION TO BE AT OR ABOVE 45° ABOVE THE HORIZONTAL POSITION IN LIQUID CRYOGENIC SERVICE.
7. FOR LIQUID CRYOGENIC SERVICE ADDITIONAL 45°/90° ELBOW TO BE INTRODUCED TO ENSURE REQUIREMENT GIVEN IN NOTE-6 IS MET.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	20.06.22	REVISED & ISSUED AS STANDARD	PK	SH	GB	SM
5	24.01.20	REAFFIRMED & ISSUED AS STANDARD	SG	SH	MI	RKT

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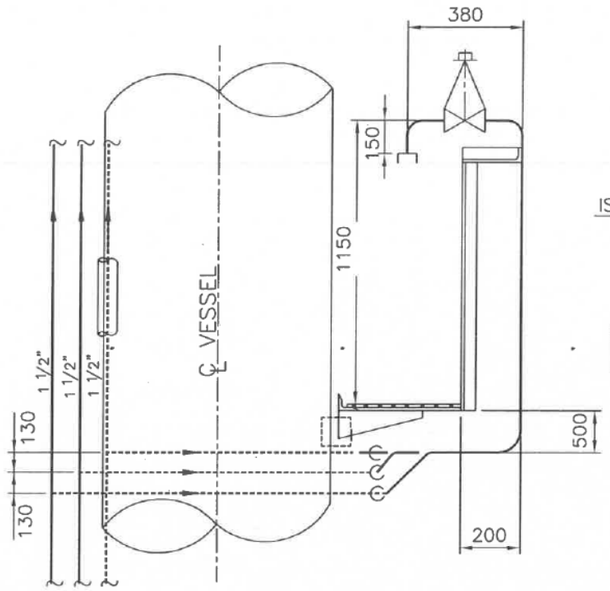
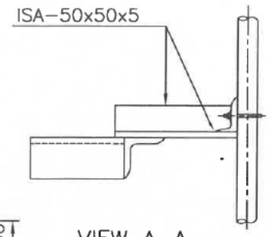
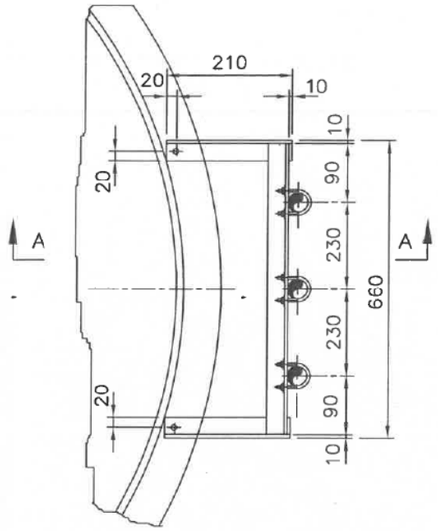
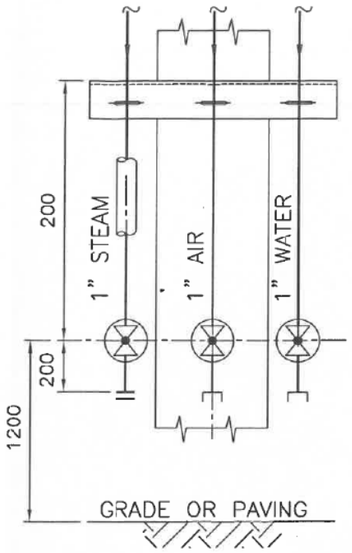


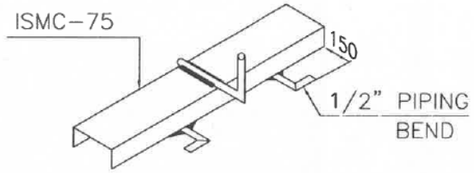


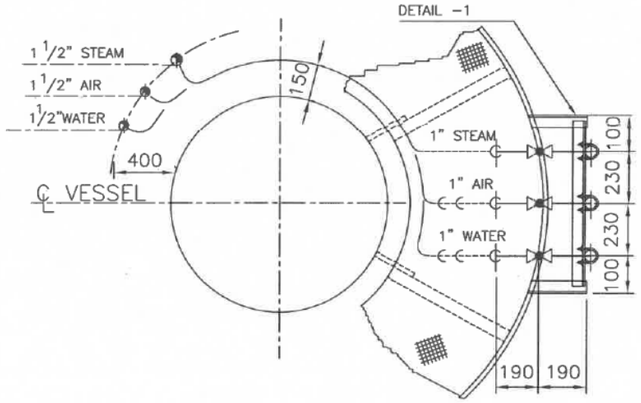
VIEW A–A



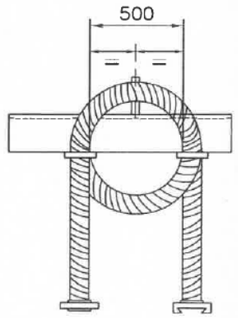
DETAIL –1



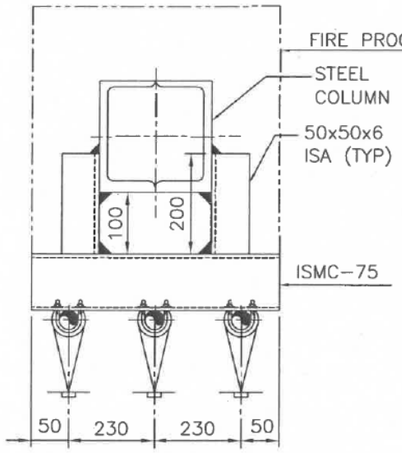




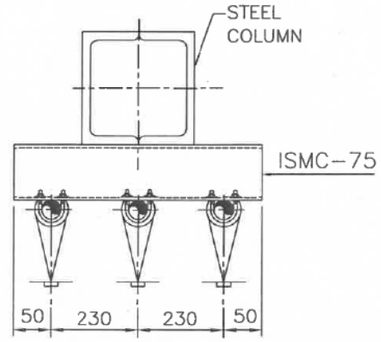
UTILITY HOSE STATION
ON VESSEL PLATFORM



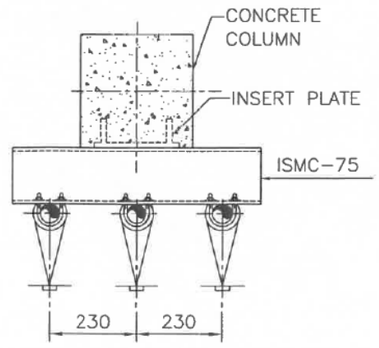
THE HOSE SUPPORT WHEN REQD. SHALL BE MOUNTED AS CLOSE AS POSSIBLE. HOSE STATION ORIENTATION AND POSITION SHALL BE DECIDED CASE BY CASE.



TYPICAL SECTION AT GRADE
WITH FIRE PROOFING



TYPICAL SECTION AT GRADE
WITHOUT FIRE PROOFING



AT GRADE

NOTES:

1. HOSE STATIONS AT GRADE SHALL BE SO LOCATED THAT AREAS TO BE SERVED CAN BE REACHED WITH A 15M HOSE.
2. SERVICE POINTS SHALL ALWAYS BE GROUPED STEAM, AIR & WATER IN THAT ORDER FROM LEFT TO RIGHT.
3. THE SIZE OF LINES SHALL BE AS GIVEN IN THIS STD. UNLESS OTHERWISE SPECIFIED ON P&ID.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	31.12.24	REAFFIRMED & ISSUED AS STANDARD	PK	SH	GB	MN
5	06.12.19	REAFFIRMED & ISSUED AS STANDARD	SG	SH	MI	RKT

Approved by

इंजीनियर्स इंडिया लिमिटेड (भारत सरकार का उपक्रम) ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)

UTILITY HOSE STATION

STANDARD No.
7-44-0401 Rev. 6
Page 1 of 1

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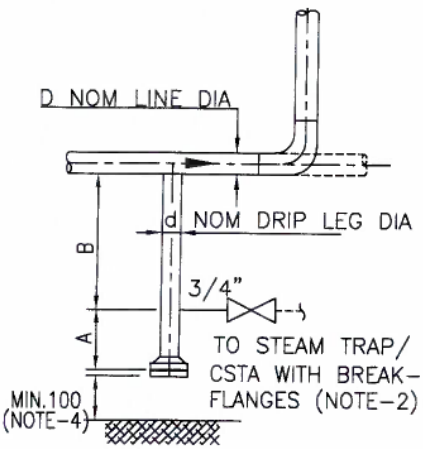
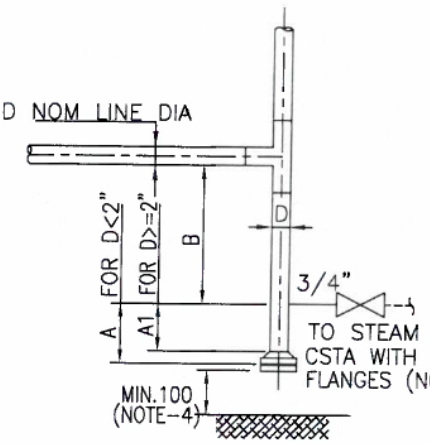
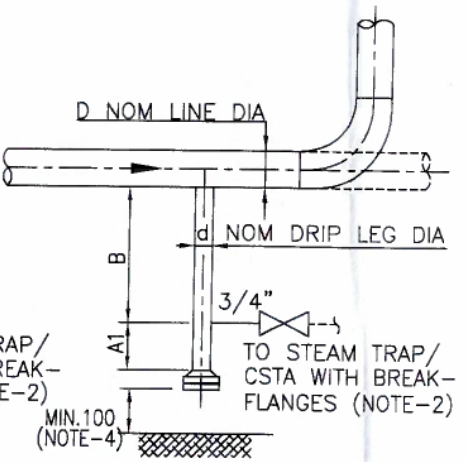


LINE SIZE 3/4" – 1 1/2"
DRIP LEG IN MAIN RUNS/RISERS



LINE SIZE 3/4" TO 6"
(NOTE 3)



LINE SIZE 2" AND ABOVE
DRIP LEG AT MAIN RUNS/RISERS

NOM LINE DIA D INCH	NOM DRIP LEG DIA d INCH	A MM	A1 MM	B MM
3/4"	3/4"	125		100
1"	1"	125		100
1 1/2"	1 1/2"	125		125
2"	2"		75	150
3"	3"		75	150
4"	4"		75	175
6"	4"		75	175
8"	4"		75	175
10"	6"		75	175
12"	6"		75	175
14"	8"		75	175
16"	8"		75	175
18"	10"		75	175
20"	10"		75	175
24" & ABOVE	12"		75	175

NOTES :–

1. DELETED
2. ALL PIPES, VALVES, FLANGES, FITTINGS, BRANCH–OFFS ETC. SHALL BE IN ACCORDANCE WITH PROJECT PIPING MATERIAL SPECIFICATIONS.
3. THIS ARRANGEMENT MAY BE USED ONLY IN CASE OF SPACE CONSTRAINT. SUPPORTING ARRANGEMENT SHALL BE REVIEWED IN DETAIL TO ENSURE THAT THERE IS NO FOULING BETWEEN SUPPORT PEDESTAL AND BLIND FLANGE ASSEMBLY.
4. BOTTOM OF PIPE ELEVATION SHALL BE MINIMUM 600MM FROM GRADE. IN CASE OF RATINGS BEYOND CLASS 600 AND SIZES BEYOND 8", BOTTOM OF PIPE SHALL BE FIXED TO ENSURE MINIMUM 100MM CLEARANCE FROM GRADE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	12.09.2025	REVISED & ISSUED AS STANDARD	SRG	PK	SH	MN
6	24.08.2021	REVISED & ISSUED AS STANDARD	SG	SH	GB	SM

Approved by

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OVERHEAD CLEARANCES :

Equipment, structure, platforms, piping & its supports shall be arranged to provide the following clearances overhead :

Over rail roads, top of rail to bottom of any obstruction	7 m
Over main plant roads for major mobile equipment	7 m
Over secondary plant roads (bottom of pipe) and access ways for mobile equipment	5 m
Clearance beneath Pipe Rack (inside battery limit)	4.75 m
Over walk-ways, pass-ways & platforms to nearest obstruction and inside building	2.2 m
Over exchangers at grade, shell cover channel end	1.5 m
Clearance below offsite Pipe rack	2.2 m

HORIZONTAL CLEARANCES: (Note-1)

Between exchangers (aisles between piping)	0.9 m
Around pumps (aisles between piping)	0.9 m
Fired heaters to pumps handling flammable stock	15 m
Fired heaters to other flammable containing equipment not closely associated with heaters	15 m
At driver end of pumps, where mobile crane access is required	3 m
At driver end of pumps, where mobile crane access is not required	1.8 m
At shell cover end of exchangers at grade, for access way	1.3 m
Between shells of adjacent horizontal vessels	2 m

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PIPE BERTHING :

Under ground	300 mm minimum clear gap between pipes
Above ground	Flange to bare pipe (or insulation) plus 25 mm

EQUIPMENT SPACING :

Small Pumps (3.7 kw & less)	Mounted on common foundations Suitable centre to centre distance
Medium/ Large Pumps (above 3.7 kw)	900 mm clear aisle
Exchangers and other equipment on structures	900 mm minimum clear aisle

PLATFORMS :

Towers, vertical & horizontal vessels :

Distance of platform below centreline of manhole flange - side platform	900-1050 mm
Width of manhole platform from manhole cover to outside edge of platform	900 mm
Platform extension on both side of centreline of manhole - side platform	900 mm
Distance of platform below underside of flange - head platform	175 mm
Width of platform on three sides of manhole - head platform	750 mm

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HORIZONTAL EXCHANGER :

Clearance in front of channel or bonnet flange	1200 mm
Heat exchanger tube bundle removal space	
Maintenenance with Hydroextractor	Bundle length+ 4M from the channel head for hydroextractor frame (1.5M on platform and rest clear in front of tech. structure subject to a minimum of 10M for crane movement)
Maintenance with monorail and chain pulley block	Bundle length + 1.5M from the channel head on the platform and 4M clear in front of Tech structure for vehicular movement
Min. clearance from edge of flanges	300 mm

VERTICAL EXCHANGER :

Distance of platform below top flange of channel or bonnet	1500 mm

Note: 1. All interdistances between equipment as per OISD-118 and PNGRG shall be met.

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ACCESSIBILITY FOR VALVES AND INSTRUMENTS

VALVES, INSTRUMENTS, EQUIPMENT TO BE OPERATED	CENTRE LINE OF ITEM TO BE OPERATED, LOCATED LESS THAN 3.6m ABOVE GRADE, 2.75m ABOVE FLOOR OR PLATFORM OR 1.8m ABOVE WING PLATFORM	CENTRE LINE OF ITEM TO BE OPERATED, LOCATED MORE THAN 3.6m ABOVE GRADE, 2.75m ABOVE FLOOR OR PLATFORM OR 1.8m ABOVE WING PLATFORM
EXCHANGER HEADS	NIL	PLATFORM
OPER. VALVES 2" & SMALLER	FIXED LADDER	FIXED LADDER
OPER. VALVES 3" & ABOVE	PLATFORM	PLATFORM
MOTOR OPERATED VALVES	PLATFORM	PLATFORM
CONTROL VALVES	PLATFORM	PLATFORM
RELIEF VALVES 2" & SMALLER	FIXED LADDER	FIXED LADDER
RELIEF VALVES 3" & ABOVE	PLATFORM	PLATFORM
BLOCK VALVES 2" & SMALLER	PORTABLE LADDER	PLATFORM
BLOCK VALVES 3" & ABOVE	PLATFORM (NOTE-1)	PLATFORM (NOTE-1)
BATTERY LIMIT VALVES	PLATFORM	PLATFORM
PRESSURE INSTRUMENT	FIXED LADDER IF ABOVE 2.2 m HEIGHT	FIXED LADDER
TEMPERATURE INSTRUMENT	FIXED LADDER IF ABOVE 2.2 m HEIGHT	FIXED LADDER
SAMPLE POINTS	PLATFORM	PLATFORM
GAUGE GLASSES	FIXED LADDER	FIXED LADDER
LEVEL CONTROLLERS	PLATFORM	PLATFORM
PROCESS BLINDS & SPACERS 2" & SMALLER	PORTABLE LADDER / PLATFORM	PLATFORM
PROCESS BLINDS & SPACERS 3" & ABOVE	PLATFORM	PLATFORM
MANWAYS / MANHOLES	PLATFORM	PLATFORM
HANDHOLES/ INSPECTION HOLES	PLATFORM	PLATFORM
NOZZLES	NO ACCESS REQD. (NOTE-2)	NO ACCESS REQD. (NOTE-2)
VESSEL VENTS	PORTABLE LADDER	FIXED LADDER
LINE DRAINS & VENTS	PORTABLE LADDER	PORTABLE LADDER
ORIFICE FLANGES	PORTABLE LADDER	PORTABLE LADDER

NOTE -1 : BLOCK VALVES WITH CENTRELINE LOCATED ABOVE 2m FROM THE OPERATING FLOOR, WHICH ARE REQUIRED FOR NORMAL OPERATION SHALL BE PROVIDED WITH PORTABLE PLATFORM OR CHAIN FOR OPERATION OF VALVES.

NOTE-2 : TEMPORARY ARRANGEMENT FOR ACCESS SHOULD BE FEASIBLE.

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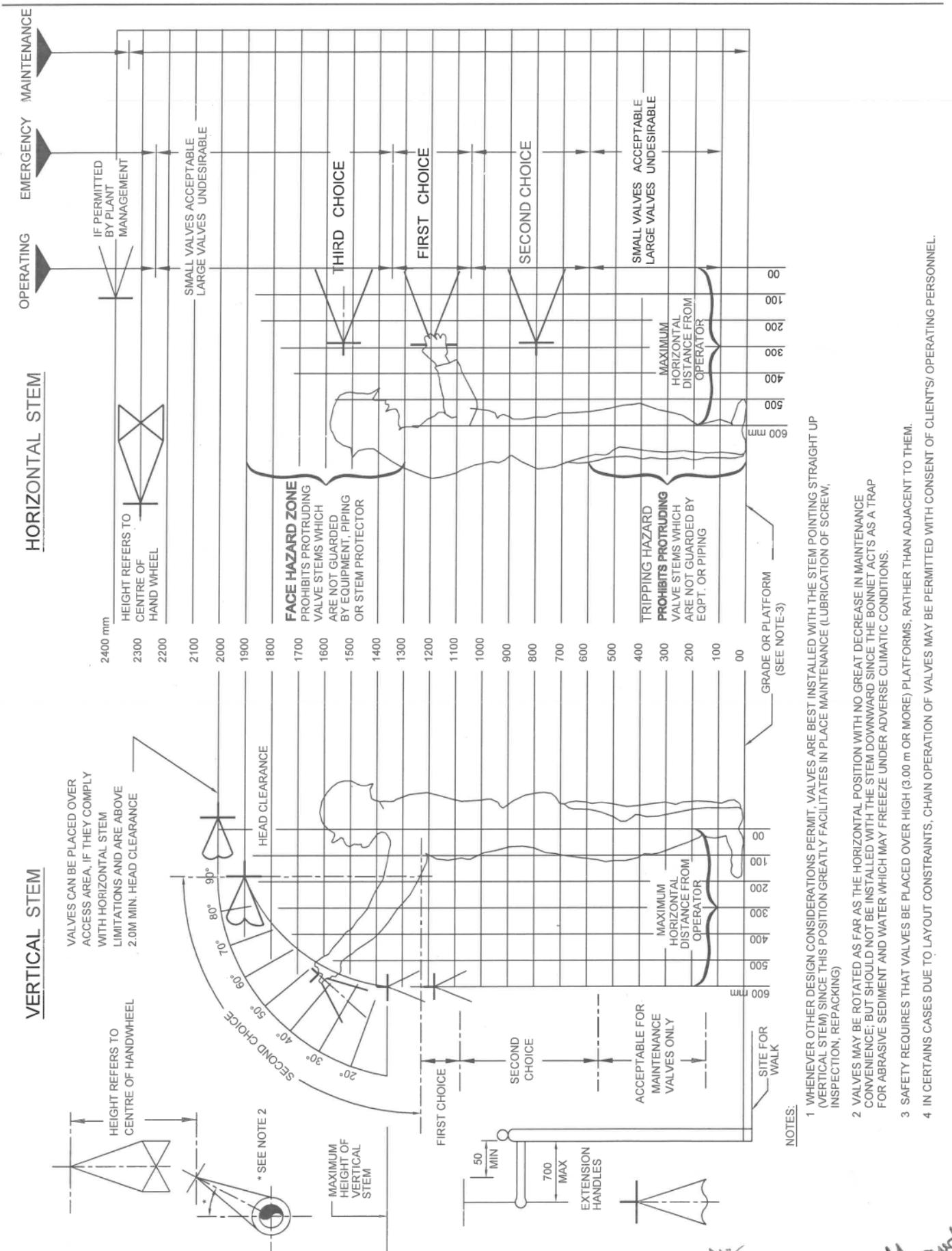

NOTES:

1 WHENEVER OTHER DESIGN CONSIDERATIONS PERMIT, VALVES ARE BEST INSTALLED WITH THE STEM POINTING STRAIGHT UP (VERTICAL STEM) SINCE THIS POSITION GREATLY FACILITATES IN PLACE MAINTENANCE (LUBRICATION OF SCREW, INSPECTION, REPACKING)

2 VALVES MAY BE ROTATED AS FAR AS THE HORIZONTAL POSITION WITH NO GREAT DECREASE IN MAINTENANCE CONVENIENCE; BUT SHOULD NOT BE INSTALLED WITH THE STEM DOWNWARD SINCE THE BONNET ACTS AS A TRAP FOR ABRASIVE SEDIMENT AND WATER WHICH MAY FREEEZE UNDER ADVERSE CLIMATIC CONDITIONS.

3 SAFETY REQUIRES THAT VALVES BE PLACED OVER HIGH (3.00 m OR MORE) PLATFORMS, RATHER THAN ADJACENT TO THEM.

4 IN CERTAINS CASES DUE TO LAYOUT CONSTRAINTS, CHAIN OPERATION OF VALVES MAY BE PERMITTED WITH CONSENT OF CLIENT'S/ OPERATING PERSONNEL.

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TABLE OF BASIC SPAN

NOM. PIPE SIZE	SCH/ THK	INSULATED PIPE						BARE PIPE				NOM. PIPE SIZE
		VAPOR			LIQUID			EMPTY		WATER FILLED		
		BASIC SPAN (L)M			BASIC SPAN (L)M			SPAN (L) M	WEIGHT KG/M	SPAN (L) M	WEIGHT KG/M	
		UP TO 175°C	176°C TO 315°C	316°C TO 400°C	UP TO 175°C	176°C TO 315°C	316°C TO 400°C	UP TO 175°C		UP TO 175°C		
3/4	40	3.5	3.5	2.5	3.5	3.0	2.0	4.5	1.68	4.0	2.04	3/4
1	40	4.5	4.0	3.0	4.5	3.5	3.0	5.0	2.52	4.5	3.07	1
1 1/2	40	5.0	5.0	4.5	5.0	4.5	3.5	6.0	4.08	5.0	5.4	1 1/2
2	40	5.5	5.0	3.5	5.0	4.5	3.5	6.5	5.47	5.5	7.65	2
2 1/2	40	6.5	6.0	3.0	6.0	5.5	4.5	7.5	8.7	6.5	11.79	2 1/2
3	40	7.5	6.5	5.5	6.5	6.0	5.0	8.0	11.35	6.5	16.15	3
4	40	8.0	7.5	6.5	7.5	7.0	6.0	9.0	16.2	7.5	24.45	4
6	40	10.0	9.5	8.5	9.0	8.0	7.5	10.5	28.3	9.0	46.7	6
8	40	12.0	11.0	10.0	10.0	10.0	9.0	12.0	42.84	10.0	75.22	8
10	40	13.5	13.0	12.0	11.5	10.5	10.5	14.0	60.74	11.5	111.9	10
12	9.53mm	14.5	13.5	13.0	12.0	11.5	11.0	15.0	74.40	12.0	147.5	12
14	9.53mm	15.0	14.5	13.5	12.0	12.0	11.5	16.0	82.5	12.5	172.05	14
16	9.53mm	16.0	15.5	14.5	13.0	12.5	12.0	17.0	94.5	13.0	213.15	16
18	9.53mm	17.0	16.5	15.0	13.5	13.0	12.0	18.0	106.5	13.5	258.3	18
20	9.53mm	18.0	17.5	16.0	14.0	13.5	12.5	19.0	118.5	14.0	307.5	20
24	9.53mm	20.0	19.0	17.5	14.5	14.5	13.0	21.0	142.5	15.0	418.2	24
3/4	80	3.5	3.5	2.5	3.5	3.0	2.0	4.5	2.20	4.0	2.49	3/4
1	80	4.5	4.0	3.0	4.5	3.5	3.0	5.0	3.25	4.5	3.72	1
1 1/2	80	5.0	5.0	4.5	5.0	4.5	4.0	6.0	5.45	5.0	6.60	1 1/2
2	80	6.0	5.0	4.5	5.5	5.0	4.0	6.5	7.53	6.0	9.45	2
2 1/2	80	6.5	6.0	5.5	6.0	6.0	5.0	7.5	11.49	6.5	14.25	2 1/2
3	80	7.5	6.5	6.0	6.5	6.5	6.0	8.0	15.37	7.0	19.66	3
4	80	8.0	8.0	7.0	7.5	7.5	6.5	9.0	22.47	8.0	29.94	4
6	80	10.5	10.0	9.0	9.5	9.0	8.5	10.5	42.90	9.5	59.85	6
8	12.7mm	12.0	11.5	10.5	10.5	10.0	10.0	12.0	65.10	11.0	94.8	8
10	12.7mm	13.5	13.0	12.0	11.5	11.5	10.5	14.0	82.20	12.0	130.69	10
12	12.7mm	14.5	13.5	13.0	12.5	12.0	11.5	15.0	98.13	13.0	168.64	12
14	12.7mm	15.0	14.5	13.5	13.0	12.5	12.0	16.0	108.15	13.5	194.4	14
16	12.7mm	16.0	15.5	15.0	13.5	13.0	13.0	17.0	124.2	14.0	240.0	16
18	12.7mm	17.5	17.0	16.0	14.5	14.0	13.5	18.0	140.25	14.5	286.64	18
20	12.7mm	18.0	17.5	17.0	15.0	14.5	14.0	19.0	157.5	15.0	341.8	20
24	12.7mm	20.0	19.0	18.5	16.0	15.0	15.0	21.0	188.25	16.0	458.44	24
1	10 S	4.0	3.5	3.0	4.0	3.0	2.5	4.5	2.08	4.0	2.7	1
1 1/2	10 S	5.0	4.5	3.0	4.5	4.0	3.0	5.5	3.12	5.0	4.57	1 1/2
2	10 S	5.0	4.5	3.5	4.5	4.0	3.0	6.0	3.94	5.5	6.33	2
2 1/2	10 S	6.5	5.5	4.5	5.5	5.0	4.5	7.0	5.26	6.0	8.85	2 1/2
3	10 S	7.0	6.0	5.0	6.0	5.5	5.0	7.5	6.45	6.0	11.91	3
4	10 S	7.5	7.0	6.0	6.5	6.0	6.0	8.0	8.34	7.0	17.67	4
6	10 S	9.5	9.0	8.0	8.0	7.5	7.5	10.0	13.82	8.5	34.54	6
8	10 S	11.0	10.5	10.0	10.9	9.5	8.5	11.5	19.94	10.0	55.5	8
10	10 S	12.5	12.0	11.0	10.5	10.0	9.5	13.0	27.83	11.0	83.4	10
12	10 S	14.0	13.0	12.0	11.0	11.0	10.0	14.5	36.00	11.5	114.6	12
14	10 S	14.5	14.0	13.0	11.5	11.0	11.0	15.5	41.18	11.5	132.6	14
16	10 S	16.5	14.5	14.0	12.0	11.5	11.5	16.5	47.33	12.5	172.2	16
18	10 S	16.5	15.5	14.5	12.5	12.5	11.5	17.5	53.18	13.0	212.1	18
20	10 S	17.5	16.5	15.5	13.0	13.0	12.0	18.5	68.50	13.0	264.5	20
24	10 S	19.0	18.0	17.0	14.0	13.5	12.5	20.5	94.37	14.0	376.8	24

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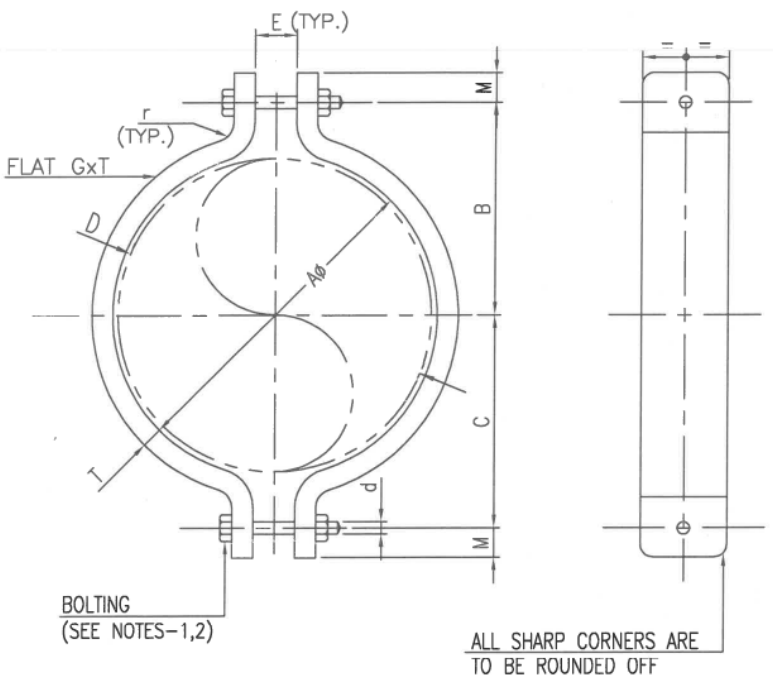
PIPE CLAMP FOR BARE CS/AS/SS PIPE NPS 1/2 THRU 24 TYPE - C1



PIPE MATL.	TEMPERATURE	CLAMP TYPE
CS/AS	-29°C TO 343°C	C1A
	344°C TO 427°C	C1B
AS	ABOVE 427°C	C1C
SS	-29°C & ABOVE	C1C

CLAMP TYPE	MATERIAL	
	CLAMP	BOLTS AND NUTS
C1A	IS-2062	IS-1367 CLASS 10.9 IS-1367 CLASS 12
C1B	ASTM A516/A515 (GR.60/65/70)/ IS-2002 GR.2	ASTM A193 GR.B7 ASTM A194 GR.2H
C1C	SS-316 PLATE	ASTM A193 GR.B16 ASTM A194 GR.7

D (NPS)	DIMENSIONS								BOLT SIZE (d) NOTE-2		MAX. ALLOWABLE LOAD (kg)
	A	B	C	G	M	E	r	T	M/C BOLTS	STUD BOLTS	
1/2	22	35	35	35	18	15	9	6	M12x55	M12x70	450
3/4	27	40	40								
1	35	45	45								
1 1/2	50	50	50								
2	62	60	55								
3	92	80	75								
4	116	90	85	50	25	20	12	8	M16x70	M16x95	800
6	170	125	120	70	30	25	12	8	M20x80	M20x110	1200
8	222	160	155								
10	276	190	185	80	40	28	15	10	M24x95	M24x135	1500
12	327	220	215								
14	358	230	225	100	40	30	18	12	M24x100	M24x150	2100
16	410	270	265								
18	460	290	285								
20	511	320	315	100	50	33	20	14	M27x120	M27x170	2800
24	613	370	365								

NOTES:-

1. WHEREVER THE PIPE CLAMPS ARE SUBJECTED TO VIBRATION AN ADDITIONAL LOCK-NUT SHALL BE USED. M/C-BOLT/STUD-BOLT LENGTH SHALL BE SUITABLY INCREASED TO ACCOMODATE THE LOCK-NUT.
2. FOR CARBON STEEL PIPE, M/C-BOLTS SHALL BE USED,WHEREAS FOR ALLOY STEEL AND STAINLESS STEEL PIPE,STUD-BOLTS SHALL BE USED.

SYMBOL

C1A - D
TYPE — NOM.PIPE SIZE

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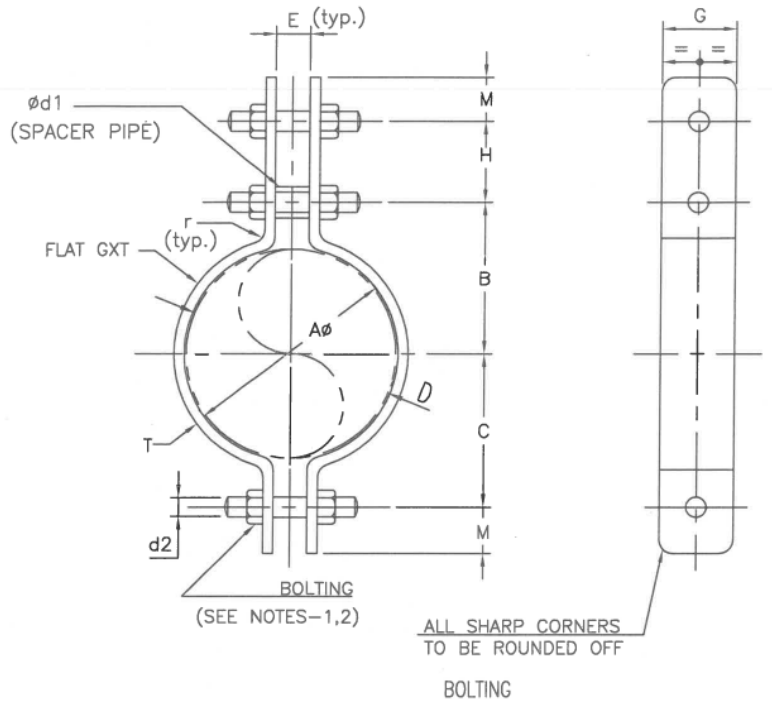
PIPE CLAMP FOR INSULATED CS/AS/SS PIPE NPS 1/2 THRU 24 TYPE - C3



PIPE MATL.	TEMPERATURE	CLAMP TYPE
CS/AS	–29°C TO 343°C	C3A
	344°C TO 427°C	C3B
AS	ABOVE 427°C	C3C
SS	–29°C & ABOVE	C3C

CLAMP TYPE	MATERIAL	
	CLAMP	BOLTS AND NUTS
C3A	IS–2062	IS–1367 CLASS 10.9 IS–1367 CLASS 12
C3B	ASTM A516/A515 (GR.60/65/70)/ IS–2002 GR.2	ASTM A193 GR.B7 ASTM A194 GR.2H
C3C	SS–316 PLATE	ASTM A193 GR.B16 ASTM A194 GR.7

D (NPS)	DIMENSIONS					d1 NPS	G	M	E	r	T	BOLT SIZE (d2) NOTE-2		Max. allowable load (kg)
	A	B	C	H UPTO 450°C	H ABOVE 450°C							M/C BOLTS	STUD BOLTS	
1/2	22	35	35	70	95	1/2	35	18	15	9	6	M12x55	M12X70	450
3/4	27	40	40	75	100									
1	35	45	45	75	100									
1 1/2	50	50	50	85	115									
2	62	60	55	85	115									
3	92	80	75	100	130									
4	116	90	85	105	135	3/4	50	25	20	12	8	M16x70	M16X95	800
6	170	125	120	120	160	1	70	30	25			M20x80	M20X110	1200
8	222	160	155	120	155									
10	276	190	185	125	170	1 1/2	80	40	28	15	10	M24x95	M24X135	1500
12	327	220	215	125	170									
14	358	230	225	135	175	1 1/2	100	40	30	18	12	M24x100	M24X150	2100
16	410	270	265	120	165									
18	460	290	285	135	180									
20	511	320	315	130	175	1 1/2	100	50	33	20	14	M27x120	M27X170	2800
24	613	370	365	145	190									

NOTES:-

1. WHEREVER THE PIPE CLAMPS ARE SUBJECTED TO VIBRATION AN ADDITIONAL LOCK–NUT SHALL BE USED. M/C–BOLT/STUD–BOLT LENGTH SHALL BE SUITABLY INCREASED TO ACCOMODATE THE LOCK–NUT.
2. FOR CARBON STEEL PIPE M/C–BOLTS SHALL BE USED, WHEREAS FOR ALLOY STEEL AND STAINLESS STEEL PIPE STUD–BOLTS SHALL BE USED.
3. SPACER–PIPE MATERIAL SHALL BE EQUIVALENT TO CLAMP MATERIAL.

C3A - D
TYPE
NOM.PIPE SIZE

SYMBOL

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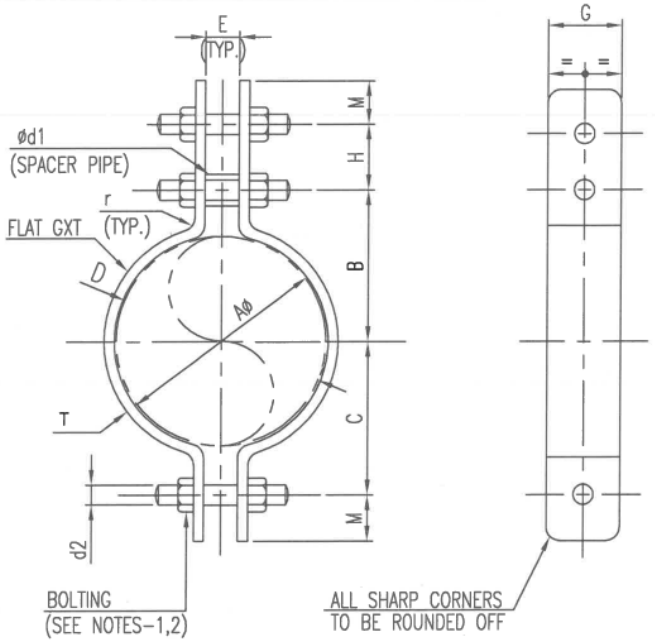

PIPE MATL.	TEMPERATURE	CLAMP TYPE
CS/AS	-29°C TO 343°C	C10A
	344°C TO 427°C	C10B
AS	ABOVE 427°C	C10C
SS	-29°C & ABOVE	C10C

CLAMP TYPE	MATERIAL	
	CLAMP	BOLTS AND NUTS
C10A	IS-2062	IS-1367 CLASS 10.9 IS-1367 CLASS 12
C10B	ASTM A516/A515 (GR.60/65/70)/ IS-2002 GR.2	ASTM A193 GR.B7 ASTM A194 GR.2H
C10C	SS-316 PLATE	ASTM A193 GR.B16 ASTM A194 GR.7

D (NPS)	DIMENSIONS					d1 NPS	G	M	E	r	T	BOLT SIZE (d2) NOTE-2		MAX. ALLOWABLE LOAD (kg)
	A	B	C	H UPTO 450°C	H ABOVE 450°C							M/C BOLTS	STUD BOLTS	
1/2	22	35	35	70	95	1/2	35	18	15	9	6	M12x55	M12X70	450
3/4	27	40	40	75	100									
1	35	45	45	75	100									
1 1/2	50	50	50	85	115									
2	62	60	55	85	115									
3	92	80	75	100	130	3/4	50	25	30	15	10	M16x75	M16x75	800
4	116	90	85	105	135	1 1/2	100	40						
6	170	125	120	120	160					18	12	M24x100	M24x100	1950
8	222	160	155	120	155									
10	276	190	185	125	170		120	45	35	24	16	M27x125	M27x160	2600
12	327	220	215	125	170									
14	358	230	225	135	175									
16	410	270	265	120	165									
18	460	290	285	135	180		140	60				M30x125	M30x160	3000
20	511	320	315	130	175									
24	613	370	365	145	190			65	40	30	20	M36x150	M36x180	4500

NOTES:-

1. WHEREVER THE PIPE CLAMPS ARE SUBJECTED TO VIBRATION AN ADDITIONAL LOCK-NUT SHALL BE USED. M/C-BOLT/STUD-BOLT LENGTH SHALL BE SUITABLY INCREASED TO ACCOMODATE THE LOCK-NUT.
2. FOR CARBON STEEL PIPE M/C-BOLTS SHALL BE USED, WHEREAS FOR ALLOY STEEL AND STAINLESS STEEL PIPE STUD-BOLTS SHALL BE USED.
3. SPACER-PIPE MATERIAL SHALL BE EQUIVALENT TO CLAMP MATERIAL.

SYMBOL

C10A - D
TYPE — NOM.PIPE SIZE (INCH)

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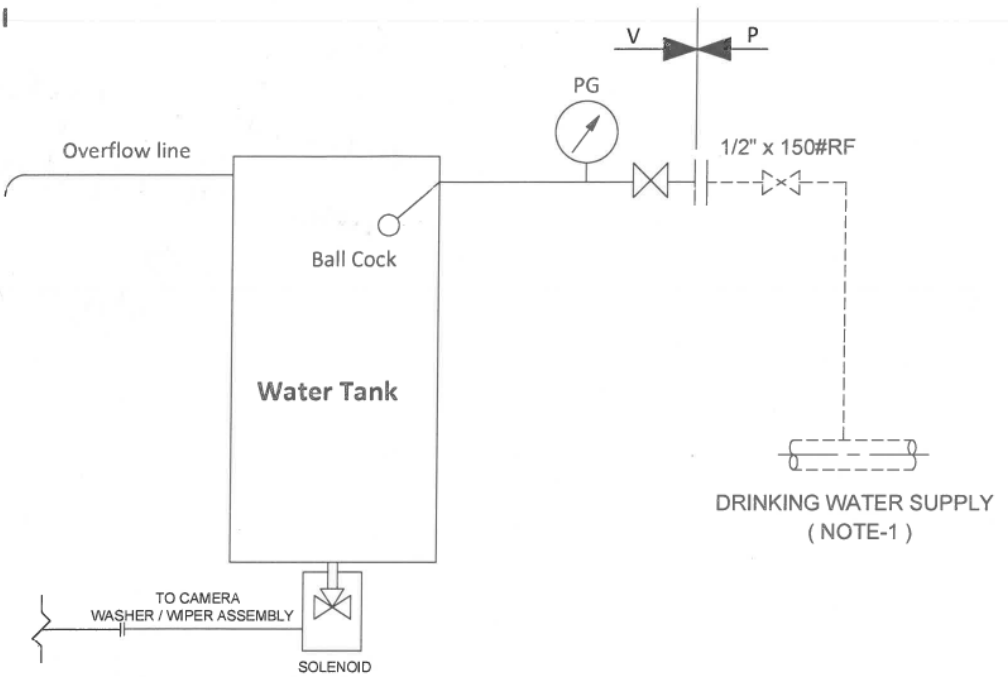
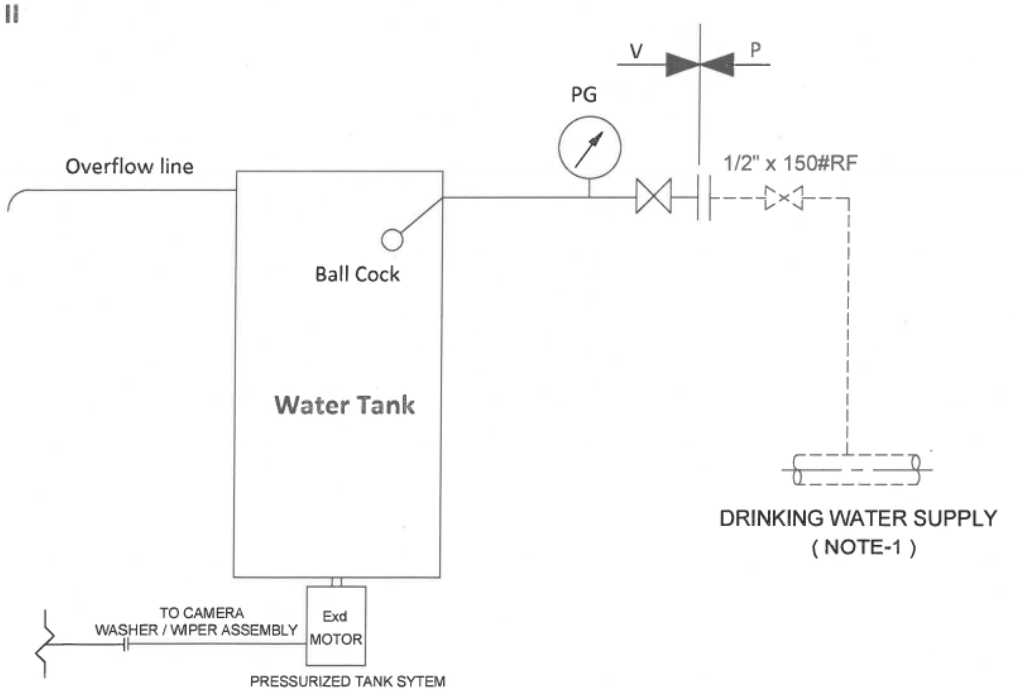
OPTION - I



OPTION - II



I - BY INSTRUMENTATION
P - BY PIPING
V - BY INST. VENDOR

NOTES :

1. FOR QTY AND EXACT LOCATION OF CCTV CAMERA PIPING SHALL REFER TO CCTV'S CAMERA MODELLED IN 3D MODEL.
2. VENDOR SHALL SELECT ANY ONE OPTION FROM THE ABOVE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
1	08-12-2025	REVISED & REISSUED AS STANDARD	Manoj	PP/AJS	MN	MN
0	24-11-2020	ISSUED AS STANDARD	Manoj	AJS	MN	SM

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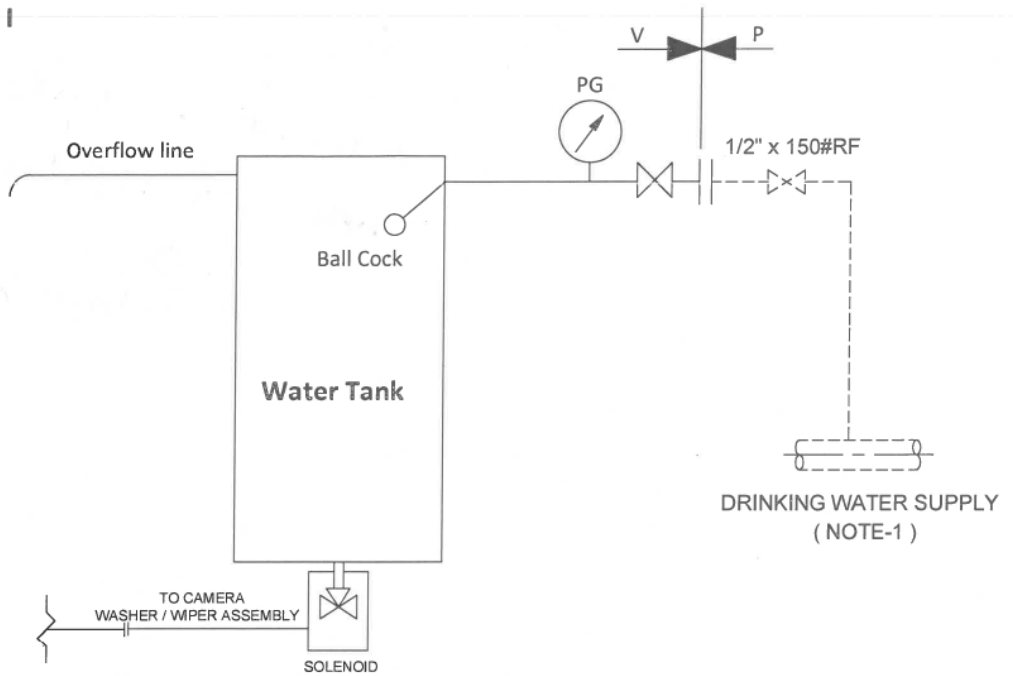
OPTION - I



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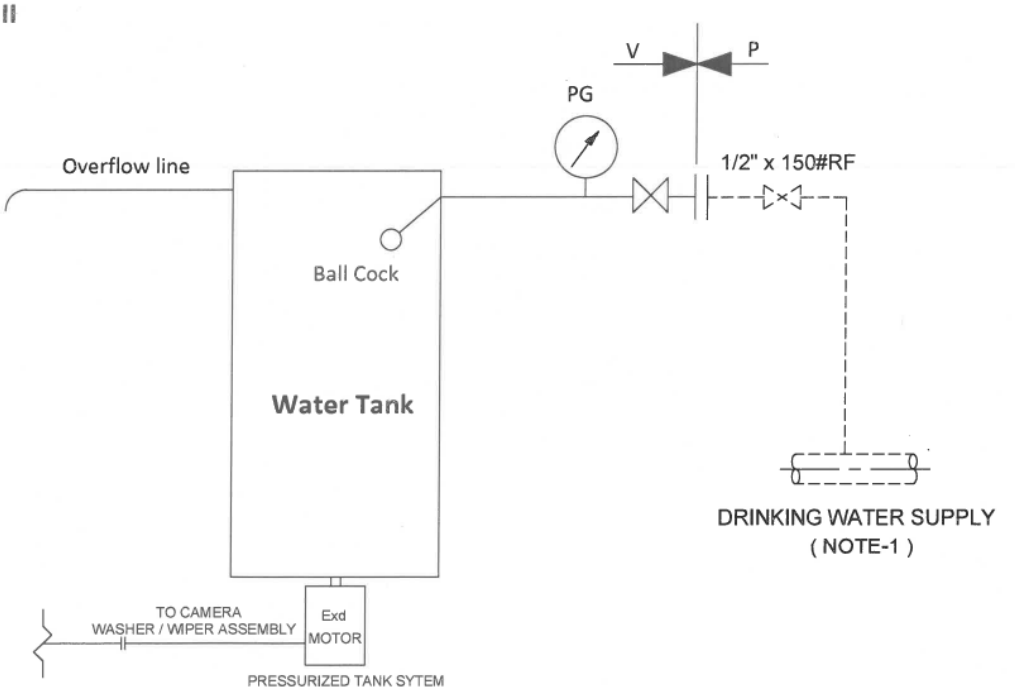

I - BY INSTRUMENTATION
P - BY PIPING
V - BY INST. VENDOR

NOTES :

1. FOR QTY AND EXACT LOCATION OF CCTV CAMERA PIPING SHALL REFER TO CCTV'S CAMERA MODELLED IN 3D MODEL.
2. VENDOR SHALL SELECT ANY ONE OPTION FROM THE ABOVE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
1	08-12-2025	REVISED & REISSUED AS STANDARD	Manoj	PP/AJS	MN	MN
0	24-11-2020	ISSUED AS STANDARD	Manoj	AJS	MN	SM

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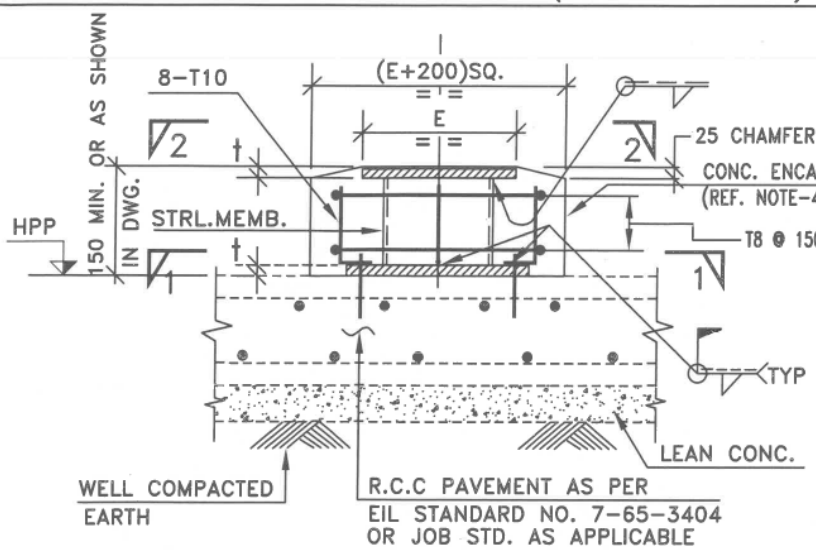
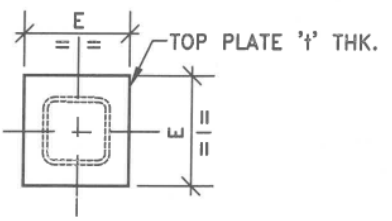
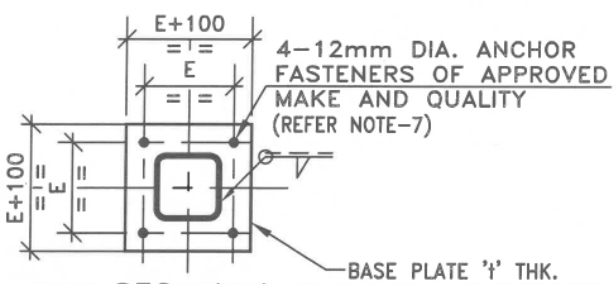


TYP. CROSS SECTION OF PIPE SUPPORT



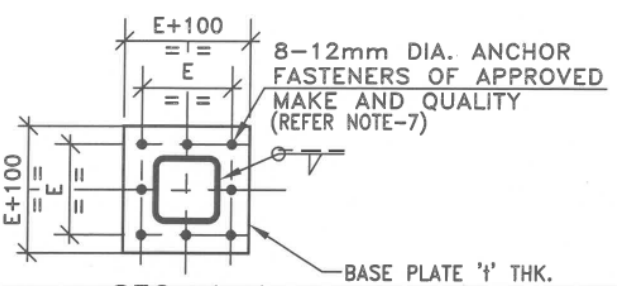
VIEW 2-2



SEC. 1-1

(FOR PIPE DIA. ≤ 18")

(CONC. ENCASEMENT & R/F NOT SHOWN FOR CLARITY)



SEC. 1-1

(FOR 18"< PIPE DIA. ≤ 36")

(CONC. ENCASEMENT & R/F NOT SHOWN FOR CLARITY)

SCHEDULE OF PIPE SUPPORTS :-

SL. NO.	SUPPORT PIPE DIA. (INCH)	MAX. VERTICAL LOAD (Kg)	MAX. HORIZONTAL LOAD AT TOP OF PEDESTAL (Kg)	STRUCTURAL MEMBER SIZE	SIZE OF TOP PLATE ExE (mm)	t(mm)	REMARKS
1	2 & 3	UP TO 500	150	SHS 150x10 OR UPN 160 BOX	AS PER RELEVANT PIPING STD. FOR LOW SUPPORTS	10	THESE SUPPORTS SHALL BE USED ONLY WHEN THE PIPE (14" TO 24") SERVICE IS GASEOUS AND NOT LIQUID
2	4	501 TO 1000	300			10	
3	6	1001 TO 1500	450			12	
4	8	1501 TO 2000	600			12	
5	10	2001 TO 2500	750			12	
6	12	2501 TO 3000	900			12	
7	14 & 16	1501 TO 2000	600			12	
8	18	2001 TO 2500	750			12	
9	20 & 24	2501 TO 3000	900			12	
10	26 TO 36	3001 TO 5000	1250	SHS 200x10 OR UPN 200 BOX		16	FOR GASEOUS SERVICE ONLY; PIPE SUPPORT ON THICKENED PAVEMENT ONLY

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
2	11.12.25	REVISED AND ISSUED AS STANDARD	JG	ALPANA	ANURAG SINHA	MAINAK NANDI
1	22.03.21	REAFFIRMED AND ISSUED AS STANDARD	SONAM	PAPIA	ANURAG SINHA	S MAJUMDAR

Approved by

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NOTES :-

1. THIS STANDARD SHALL BE READ IN CONJUNCTION WITH GENERAL NOTES OF THE PROJECT.
2. PAVEMENT DETAILS IN THE ZONE WHERE SUCH SUPPORTS ARE LOCATED, SHALL BE AS PER RELEVANT GENERAL CIVIL LAYOUT DRAWINGS.
3. MINIMUM DISTANCE BETWEEN THE CENTRE LINE OF PIPE SUPPORTS AND EDGE OF THE PAVEMENT SHALL BE KEPT AS 500mm.
4. GRADE OF CONCRETE, STRUCTURAL STEEL AND REINFORCEMENT FOR ENCASEMENT SHALL BE AS PER GENERAL NOTES OF THE PROJECT.
5. THIS STANDARD IS VALID FOR NET SAFE BEARING CAPACITY OF SOIL $\geq$ 3T/SQ.M. AT UNDERSIDE OF PAVEMENT.
6. THE PAVEMENT SHALL BE ROUGHENED BY CHISELLING BEFORE ENCASING THE PIPE SUPPORTS.
7. MEDIUM DUTY RUST PROOF ANCHOR FASTENERS SHALL HAVE MINIMUM ALLOWABLE TENSILE AND SHEAR CAPACITIES OF 0.7T & 0.85T RESPECTIVELY WITH A FACTOR OF SAFETY EQUAL TO 4.
8. THIS STANDARD IS VALID FOR PIPE SUPPORTS OF HEIGHT UPTO 1650mm ABOVE H.P.P.

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ACCESSIBILITY FOR VALVES AND INSTRUMENTS

VALVES, INSTRUMENTS, EQUIPMENT TO BE OPERATED	CENTRE LINE OF ITEM TO BE OPERATED, LOCATED LESS THAN 3.6m ABOVE GRADE, 2.75m ABOVE FLOOR OR PLATFORM OR 1.8m ABOVE WING PLATFORM	CENTRE LINE OF ITEM TO BE OPERATED, LOCATED MORE THAN 3.6m ABOVE GRADE, 2.75m ABOVE FLOOR OR PLATFORM OR 1.8m ABOVE WING PLATFORM
EXCHANGER HEADS	NIL	PLATFORM
OPER. VALVES 2" & SMALLER	FIXED LADDER	FIXED LADDER
OPER. VALVES 3" & ABOVE	PLATFORM	PLATFORM
MOTOR OPERATED VALVES	PLATFORM	PLATFORM
CONTROL VALVES	PLATFORM	PLATFORM
RELIEF VALVES 2" & SMALLER	FIXED LADDER	FIXED LADDER
RELIEF VALVES 3" & ABOVE	PLATFORM	PLATFORM
BLOCK VALVES 2" & SMALLER	PORTABLE LADDER	PLATFORM
BLOCK VALVES 3" & ABOVE	PLATFORM (NOTE-1)	PLATFORM (NOTE-1)
BATTERY LIMIT VALVES	PLATFORM	PLATFORM
PRESSURE INSTRUMENT	FIXED LADDER IF ABOVE 2.2 m HEIGHT	FIXED LADDER
TEMPERATURE INSTRUMENT	FIXED LADDER IF ABOVE 2.2 m HEIGHT	FIXED LADDER
SAMPLE POINTS	PLATFORM	PLATFORM
GAUGE GLASSES	FIXED LADDER	FIXED LADDER
LEVEL CONTROLLERS	PLATFORM	PLATFORM
PROCESS BLINDS & SPACERS 2" & SMALLER	PORTABLE LADDER / PLATFORM	PLATFORM
PROCESS BLINDS & SPACERS 3" & ABOVE	PLATFORM	PLATFORM
MANWAYS / MANHOLES	PLATFORM	PLATFORM
HANDHOLES/ INSPECTION HOLES	PLATFORM	PLATFORM
NOZZLES	NO ACCESS REQD. (NOTE-2)	NO ACCESS REQD. (NOTE-2)
VESSEL VENTS	PORTABLE LADDER	FIXED LADDER
LINE DRAINS & VENTS	PORTABLE LADDER	PORTABLE LADDER
ORIFICE FLANGES	PORTABLE LADDER	PORTABLE LADDER

NOTE -1 : BLOCK VALVES WITH CENTRELINE LOCATED ABOVE 2m FROM THE OPERATING FLOOR, WHICH ARE REQUIRED FOR NORMAL OPERATION SHALL BE PROVIDED WITH PORTABLE PLATFORM OR CHAIN FOR OPERATION OF VALVES.

NOTE-2 : TEMPORARY ARRANGEMENT FOR ACCESS SHOULD BE FEASIBLE.

Rev. No	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
5	17.12.25	REAFFIRMED & ISSUED AS STANDARD	SRG	PK	SH	MN
4	23.09.20	REAFFIRMED & ISSUED AS STANDARD	PK	SH	GB	SM

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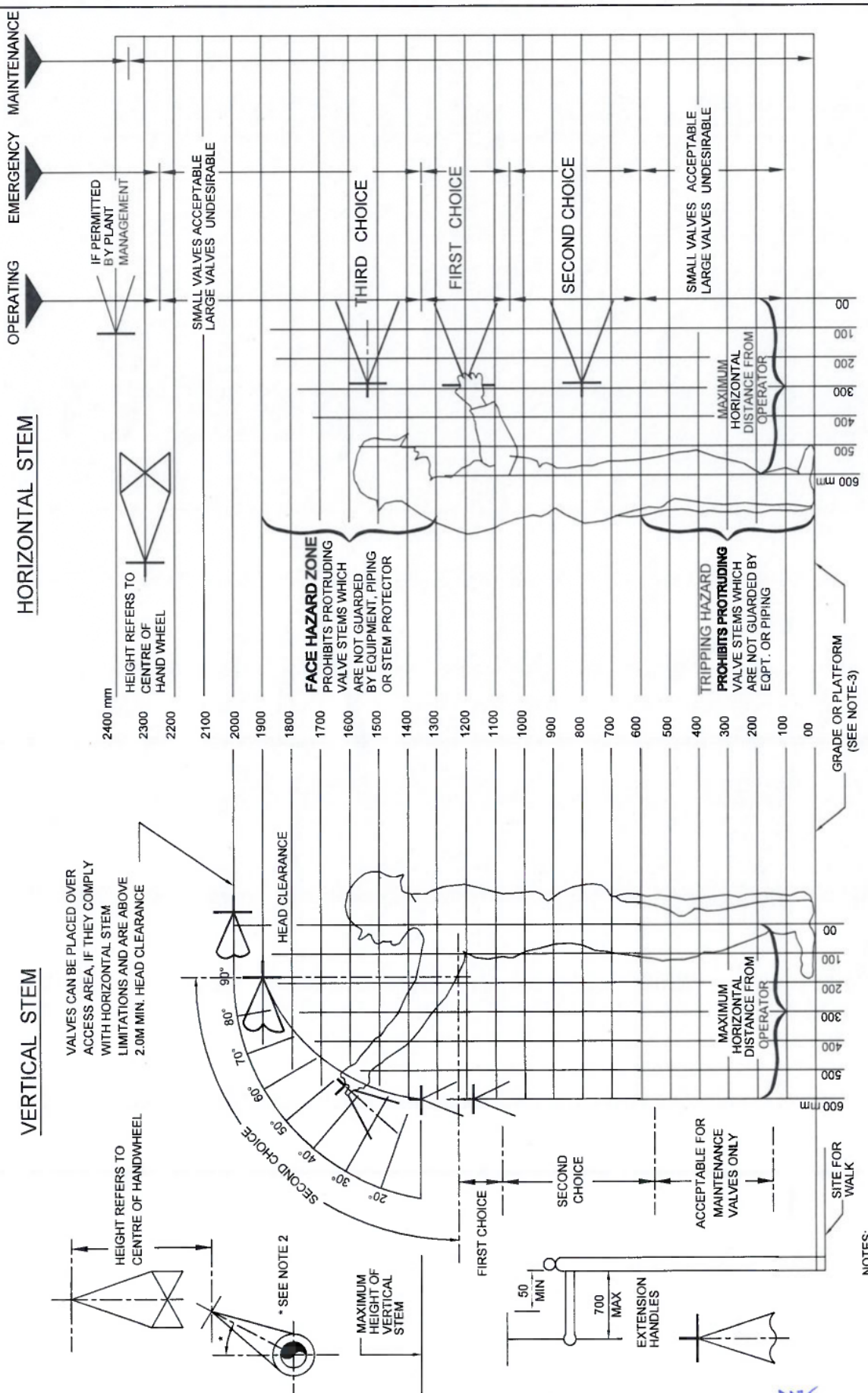

NOTES:

1 WHENEVER OTHER DESIGN CONSIDERATIONS PERMIT, VALVES ARE BEST INSTALLED WITH THE STEM POINTING STRAIGHT UP (VERTICAL STEM) SINCE THIS POSITION GREATLY FACILITATES IN PLACE MAINTENANCE (LUBRICATION OF SCREW, INSPECTION, REPACKING)

2 VALVES MAY BE ROTATED AS FAR AS THE HORIZONTAL POSITION WITH NO GREAT DECREASE IN MAINTENANCE CONVENIENCE; BUT SHOULD NOT BE INSTALLED WITH THE STEM DOWNWARD SINCE THE BONNET ACTS AS A TRAP FOR ABRASIVE SEDIMENT AND WATER WHICH MAY FREEEZE UNDER ADVERSE CLIMATIC CONDITIONS.

3 SAFETY REQUIRES THAT VALVES BE PLACED OVER HIGH (3.00 m OR MORE) PLATFORMS, RATHER THAN ADJACENT TO THEM.

4 IN CERTAINS CASES DUE TO LAYOUT CONSTRAINTS, CHAIN OPERATION OF VALVES MAY BE PERMITTED WITH CONSENT OF CLIENT'S/ OPERATING PERSONNEL.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
5	17.12.25	REVISED & ISSUED AS STANDARD	SRG	PK	SH	MN
4	23.09.20	REAFFIRMED & ISSUED AS STANDARD	SG	SH	GB	SM

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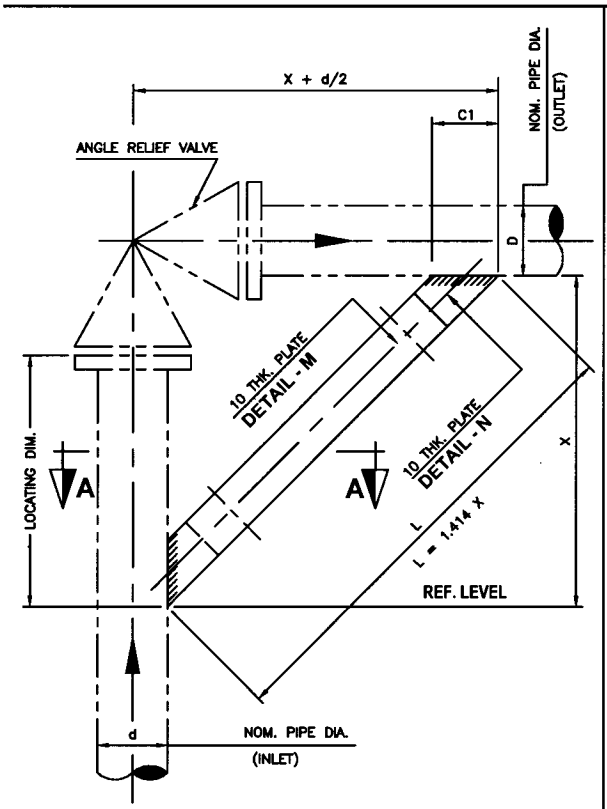
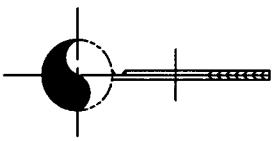
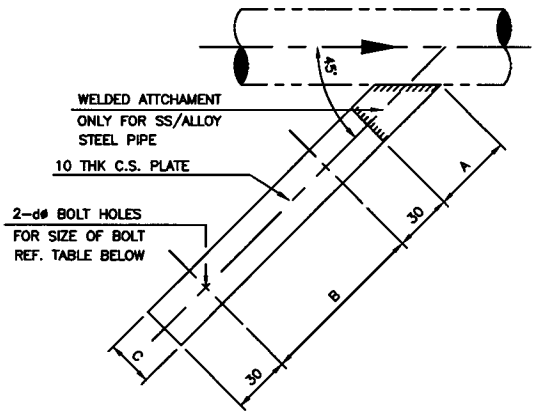
SUPPORTING ARRANGEMENT FOR ANGLE AND RELIEF VALVES TYPE - SP2

STANDARD No.
7-44-0792 Rev. 5

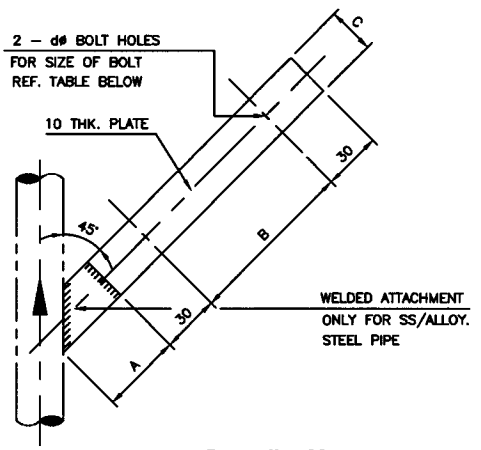




SECTION A-A



DETAIL - N



DETAIL - M

D	BOLT SIZE dØ	A	C	B (MIN.)	C1	d1
1" TO 4"	M12 X 50	75	50	150	71	14
6" TO 12"	M16 X 50	100	75	200	106	18

NOTE:-

1. MATERIAL FOR WELDED ATTACHMENT TO BE EQUIVALENT TO PIPE MATERIAL.
2. THIS IS NOT A LOAD TAKING SUPPORT AND IS FOR MAINTENANCE ONLY.

SYMBOL

SP2 - L - d/D

- SP2 - TYPE
- L - REF. LEVEL
- d/D - NOM. INLET PIPE DIA./ NOM. OUTLET PIPE DIA.
- LENGTH

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
5	30.12.2020	REAFFIRMED AND ISSUED AS STANDARD	SG	SH	SB	S M
4	16.11.2015	REAFFIRMED AND ISSUED AS STANDARD	(SH)	(AK)	(RN)	(SC)

Approved by

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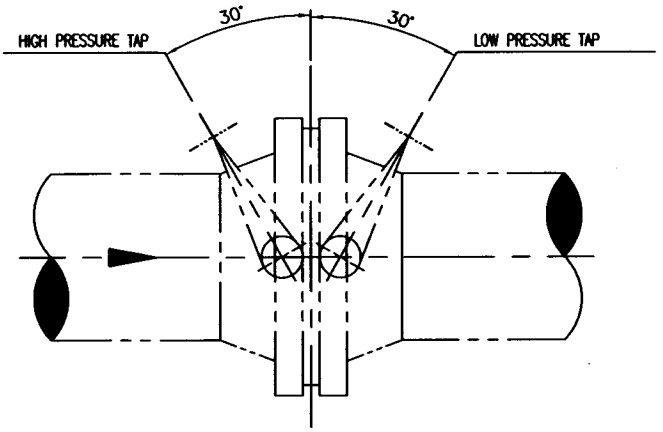
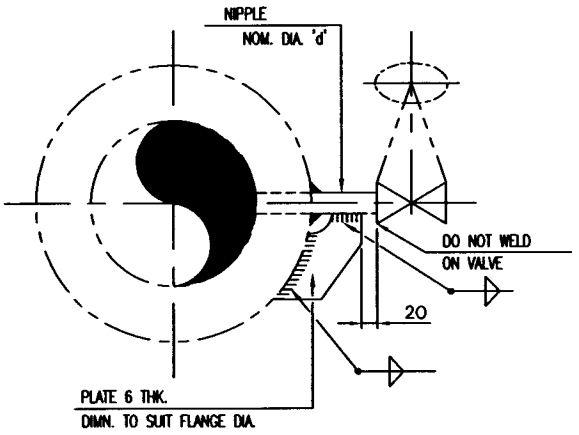
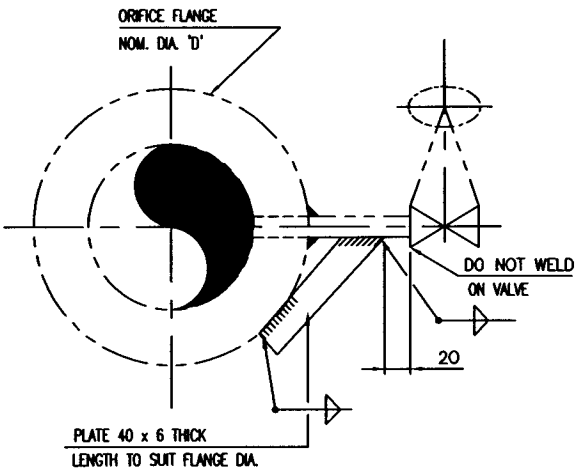


ORIFICE FLANGES ASSEMBLY



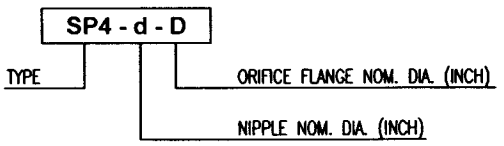
SUPPORT DETAIL OF HIGH PRESSURE TAP



SUPPORT DETAIL OF LOW PRESSURE TAP

NOTES:-

1. MATERIAL FOR WELDED ATTACHMENT TO BE EQUIVALENT TO PIPE MATERIAL.
2. INSTALLATION ARRANGEMENT AND TAPS ORIENTATION SHALL BE AS PER ISOMETRIC/ GENERAL ARRANGEMENT DRAWING.
3. PREFERRED LOCATION OF WELDED ATTACHMENT IS FROM BOTTOM SIDE OF THE TAP.



SYMBOL

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
5	23.09.20	REAFFIRMED AND ISSUED AS STANDARD	SG	SH	GB	SM
4	01.07.2015	REAFFIRMED AND ISSUED AS STANDARD	SH	AK	RN	SC

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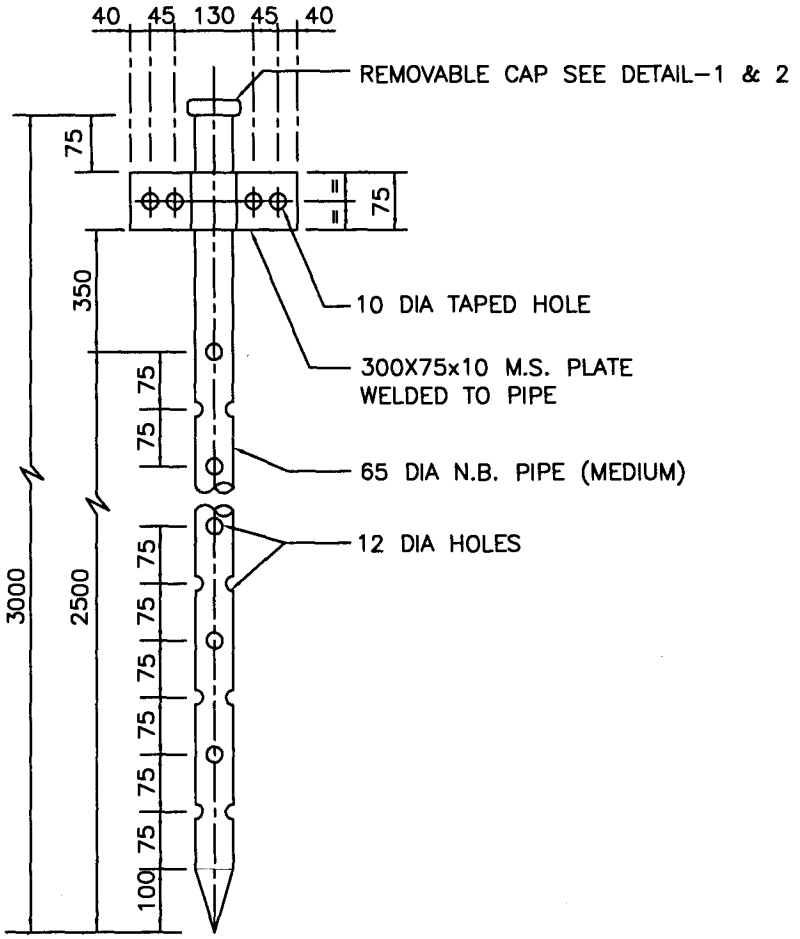
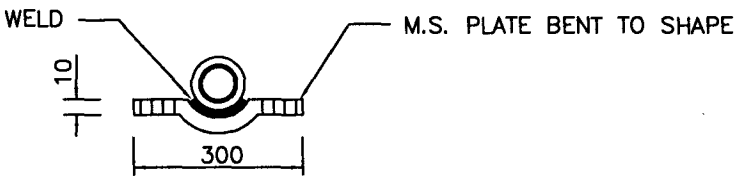
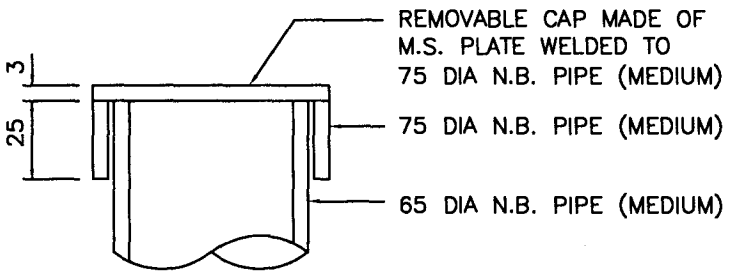
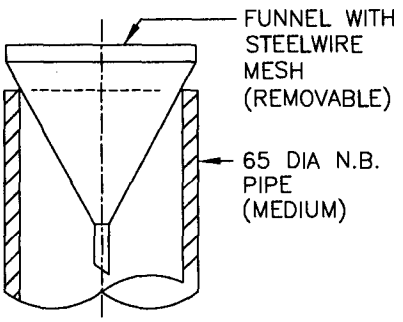






DETAIL-1



DETAIL-2

NOTE:-

1. THE PIPE ASSEMBLY SHALL BE HOT DIP GALVANISED AFTER FABRICATION. AMOUNT OF GALVANISING SHALL BE 150 MICRONS (MIN.) AS PER IS:3043.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	29.11.21	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	PG	SM
5	08.11.16	UPDATED & ISSUED AS STANDARD	BP	FA/HK	BRB	RN
4	27.06.11	REAFFIRMED & ISSUED	BP	RKS/RSC	UAP	DM

Approved by

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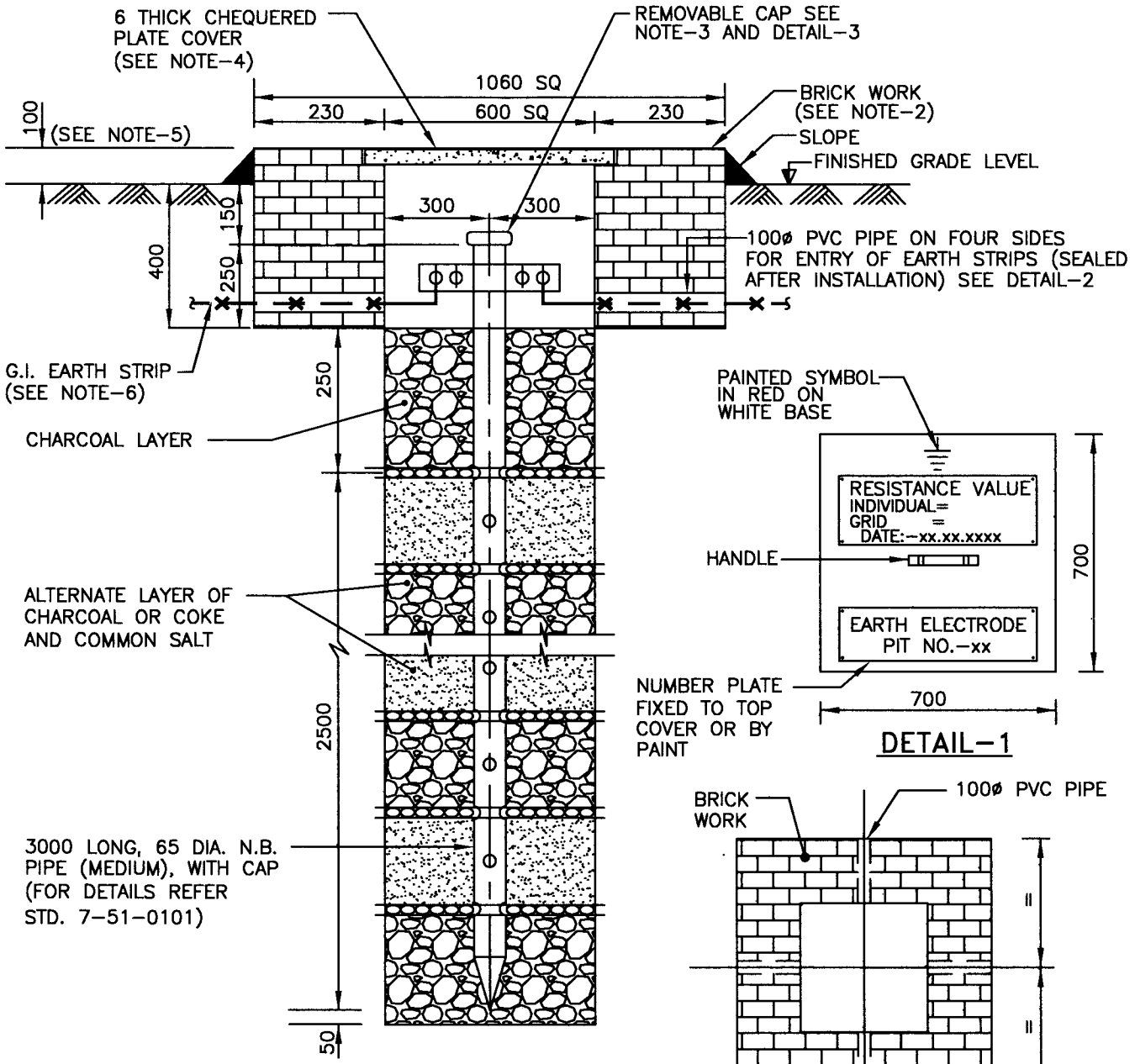
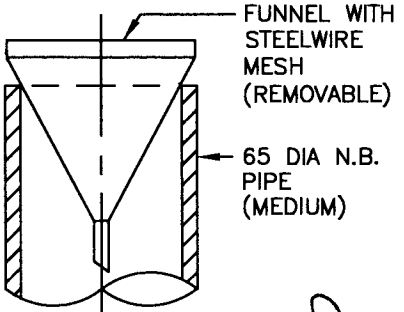


DETAIL-1

DETAIL-2



DETAIL-3

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. BRICK WORK SHALL BE DONE AFTER COMPACTING THE SOIL IN UNPAVED AREA.
3. AFTER REMOVAL OF CAP, OWNER SHALL BE ABLE TO POUR WATER THROUGH HIS OWN FUNNEL WITH STEEL WIRE MESH.
4. COLOUR CODING & PAINTING OF COVERS SHALL BE AS PER PAINTING SPEC. NO. 6-79-0020.
5. IN CASE OF PAVED AREAS, TOP OF PIT SHALL BE FLUSHED WITH FFL, WHEREAS IN UNPAVED AREAS, TOP OF PIT SHALL BE PROJECTED 100MM ABOVE FGL.
6. CONNECTIONS OF G.I. EARTH STRIP TO THE PLATE SHALL BE IN LINE WITH STD. 7-51-0103.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
8	01.11.21	REAFFIRMED & ISSUE AS STANDARD	JSK	VKS/HK	PG	SM
7	22.11.17	UPDATED & ISSUED AS STANDARD	BP	VKS/HK	BRB	RN
6	08.11.16	UPDATED & ISSUED AS STANDARD	BP	FA/HK	BRB	RN

Approved by

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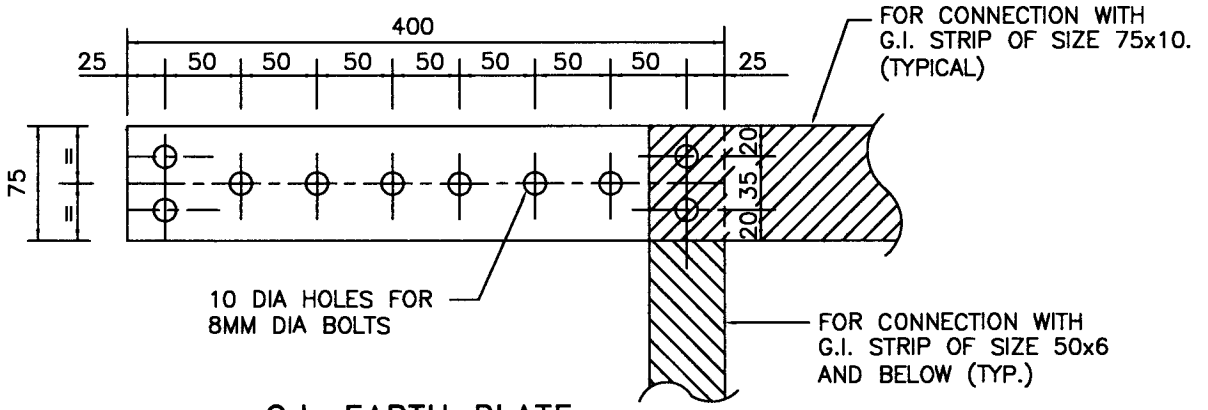
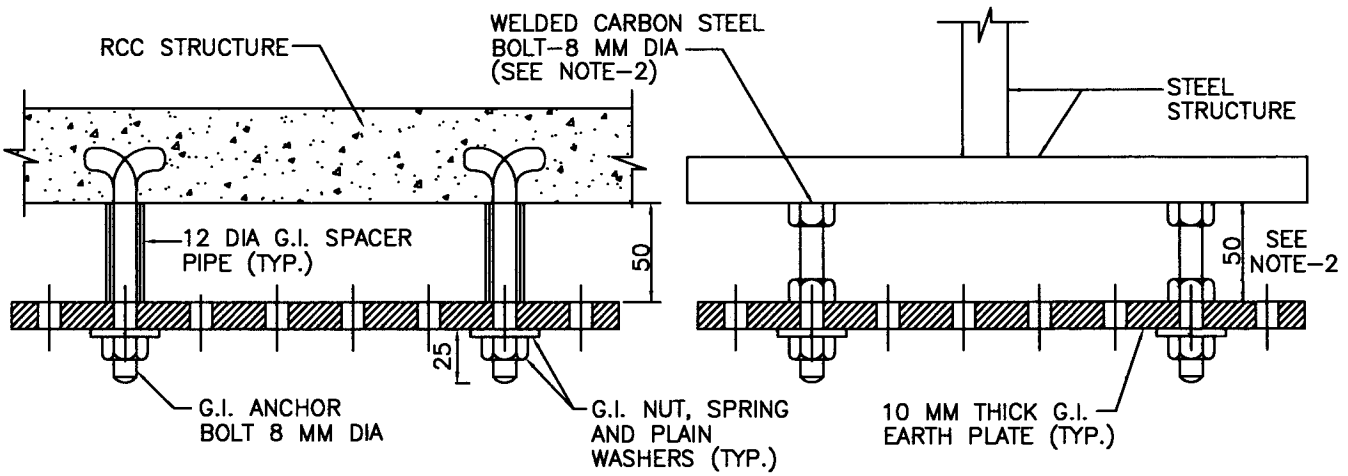
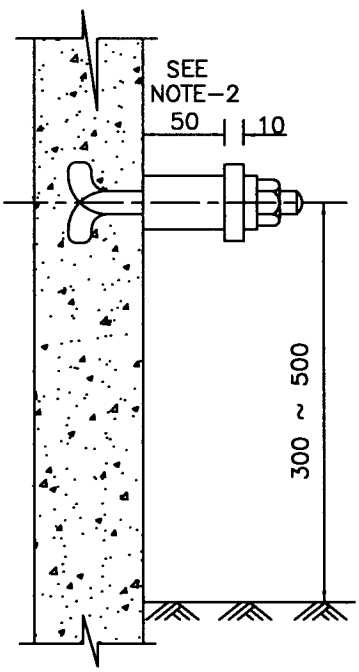
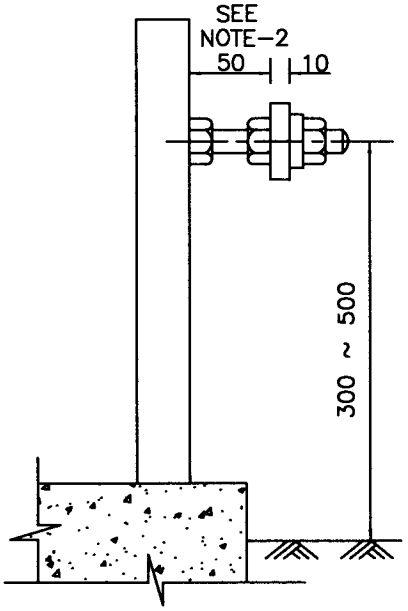


G.I. EARTH PLATE

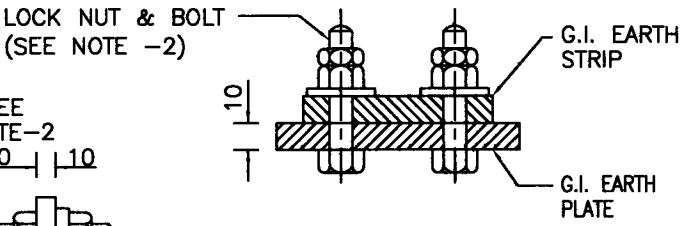




TYPICAL INSTALLATION OF EARTH PLATE ON R.C.C. STRUCTURES



TYPICAL INSTALLATION OF EARTH PLATE ON STEEL STRUCTURES



TYPICAL FIXING DETAIL OF G.I. EARTH STRIP TO EARTH PLATE

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. WHERE FIRE PROOFING OF STEEL STRUCTURES ARE ENCOUNTERED LENGTH OF CARBON STEEL BOLTS SHALL BE SUITABLY INCREASED FOR FIXING OF EARTH PLATE.
3. ALL CONNECTIONS WITH EARTH PLATE SHALL BE MADE WITH 8MM DIA. G.I. BOLT, NUT, SPRING AND PLAIN WASHERS.
4. CRIMP TYPE CABLE LUGS SHALL BE USED FOR CONNECTION WITH G.I. WIRE ROPE/CU/AL CABLES.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
7	01.11.21	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	PG	SM
6	08.11.16	UPDATED & ISSUED AS STANDARD	BP	FA/HK	BRB	RN
5	27.06.11	REAFFIRMED & ISSUED	BP	RKS/RSC	UAP	DM

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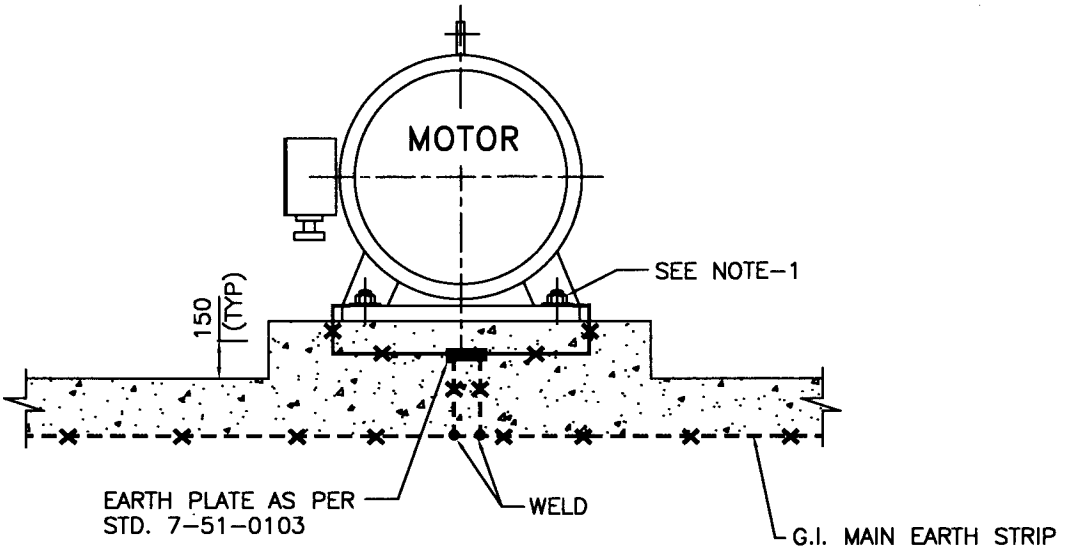
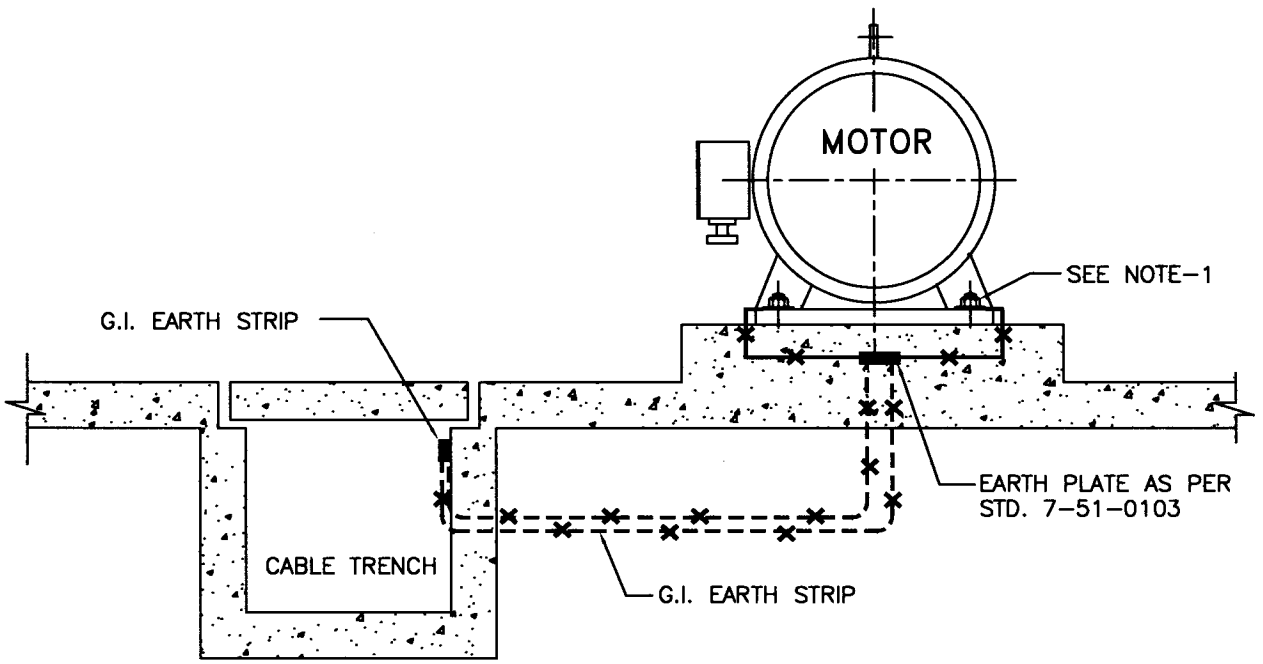


DETAIL-1
CONNECTION WITH BURIED EARTH GRID



DETAIL-2
CONNECTION WITH EARTH GRID IN RCC TRENCH

NOTE:-

1. MOTOR FOUNDATION BOLT SHALL NOT BE USED FOR EARTHING.
2. EARTHING OF P.B. STN. INSTALLED NEAR MOTOR FOUNDATION SHALL BE DONE BY TAPPING 8 SWG G.I. WIRE FROM EARTH PLATE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	01.11.21	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	PG	SM
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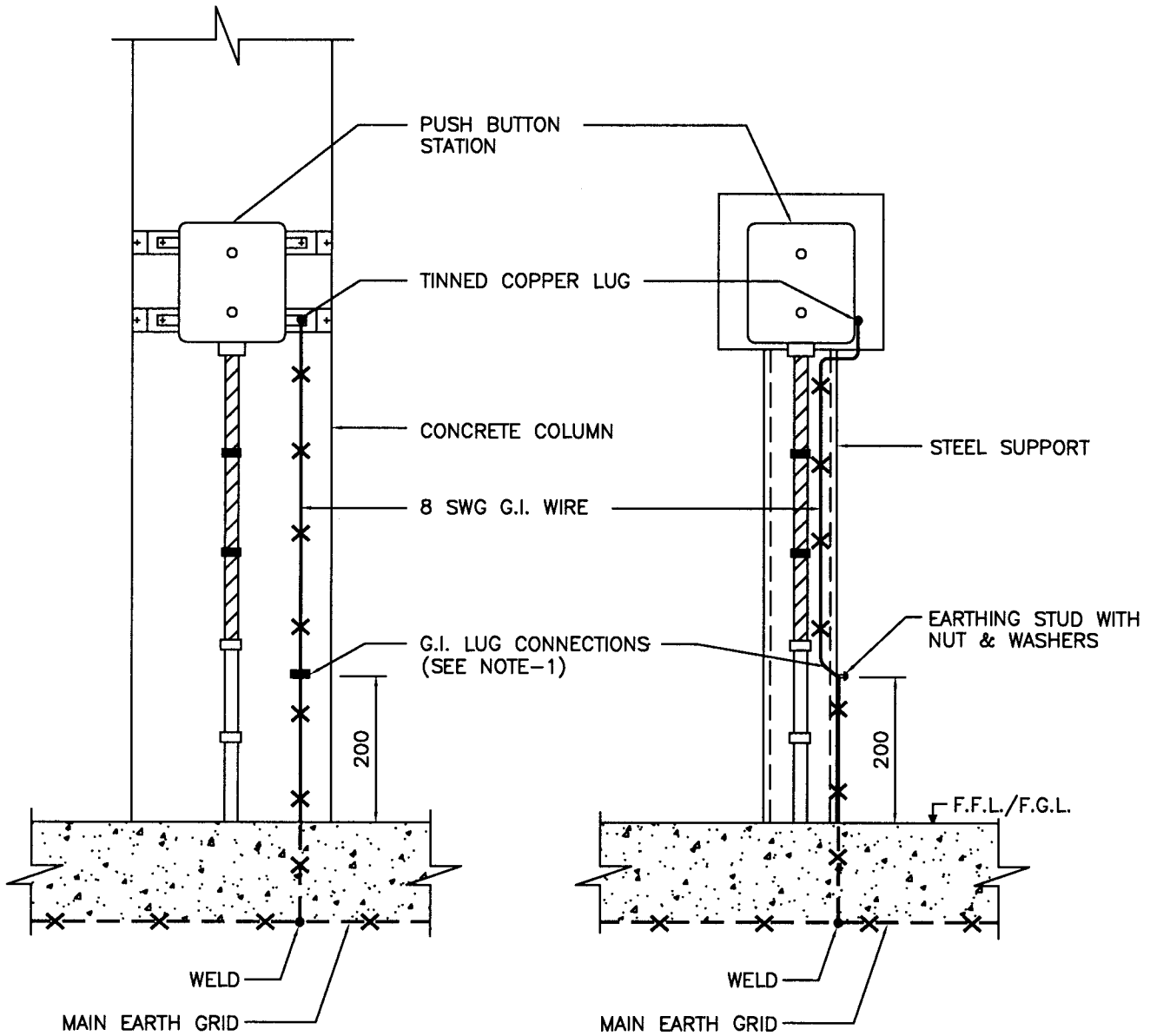

NOTES:-

1. ALTERNATIVELY, CONNECTION SHALL BE TAKEN FROM THE NEAREST AVAILABLE EARTH PLATE.

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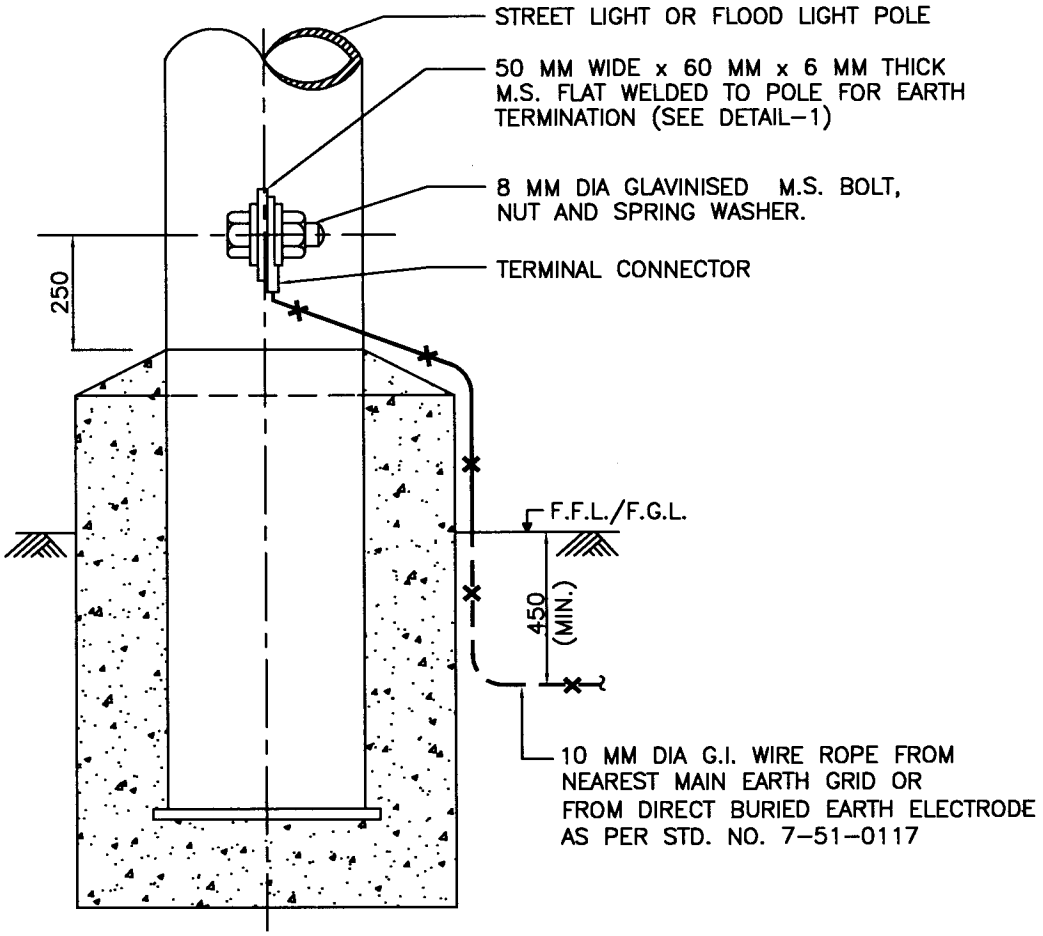
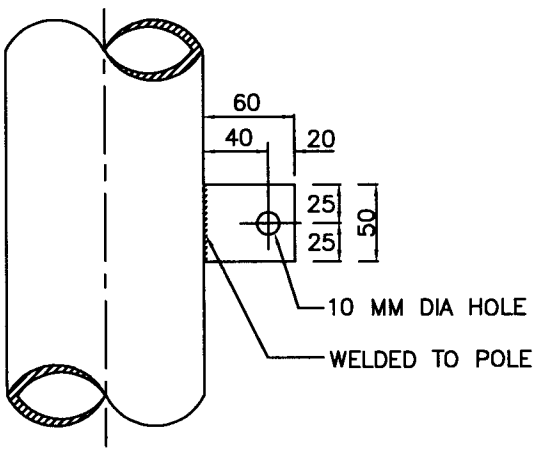
TYPICAL EARTH CONNECTION FOR LIGHTING POLE





DETAIL–1

NOTES:–

1. USE TWO WIRES ROPES IF VOLTAGE IN THE POLE JUNCTION BOX IS 415 VOLTS.

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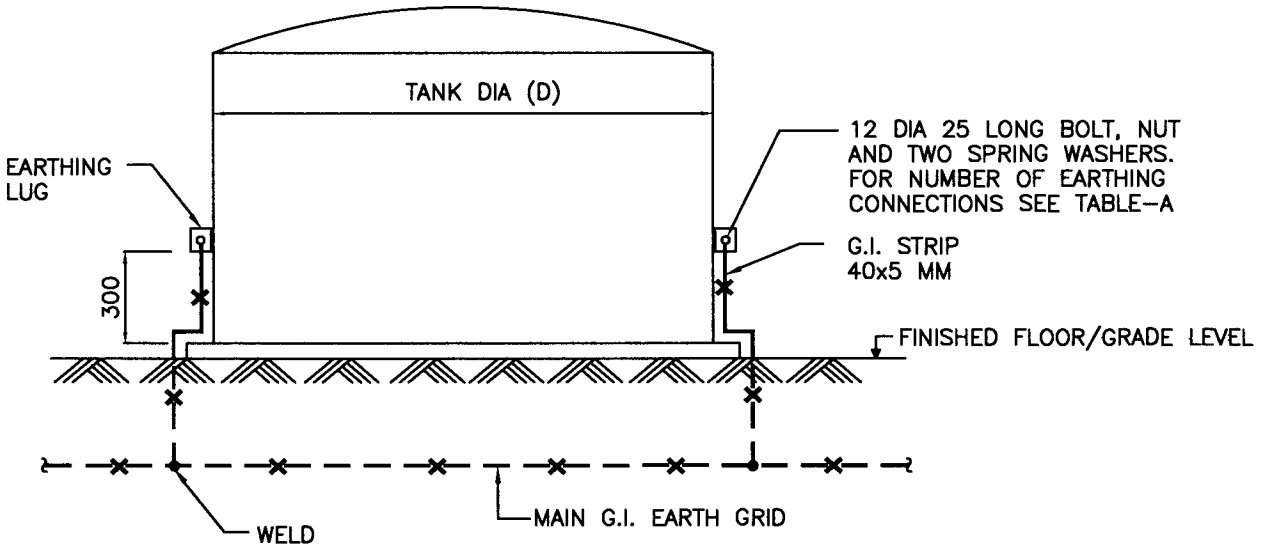
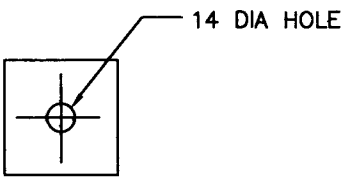


DETAIL-1 (TANK)

TABLE-A

TANK/SPHERE DIAMETER(D) (IN MTRS)	EARTHING CONNECTION
<15	2 AT 180°
15 ≤ D <25	3 AT 120°
25 ≤ D <35	4 AT 90°
35 ≤ D <45	5 AT 72°
45 ≤ D <55	6 AT 60°
55 ≤ D <65	7 AT 51.43°
65 ≤ D <75	8 AT 45°
75 ≤ D <85	9 AT 40°
85 ≤ D <95	10 AT 36°



EARTH LUG ON TANK BY TANK FABRICATOR

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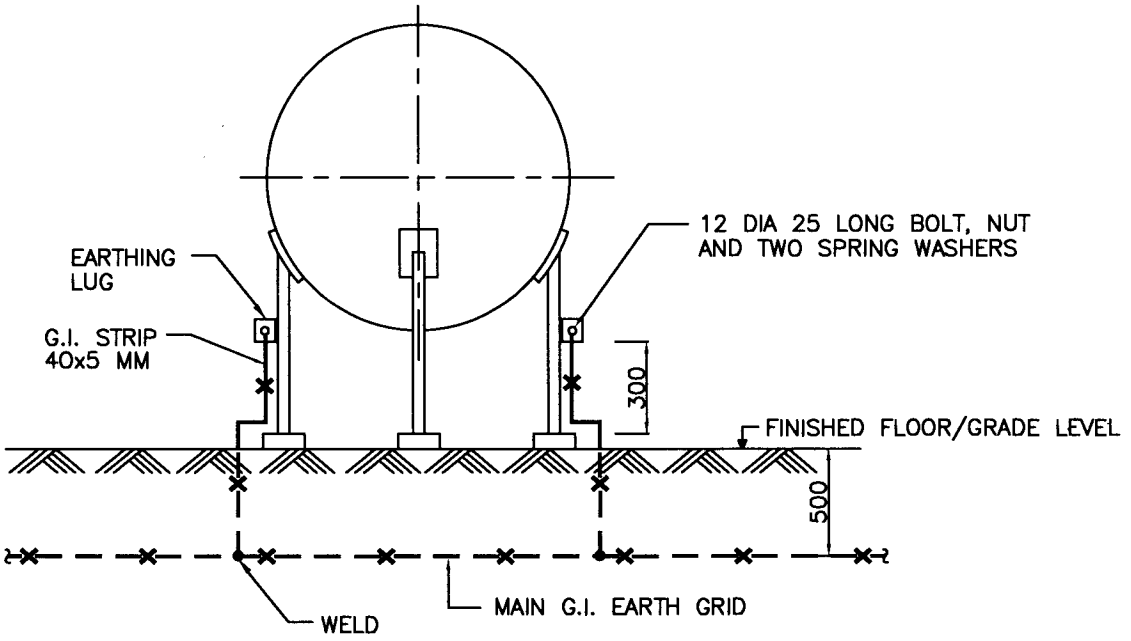
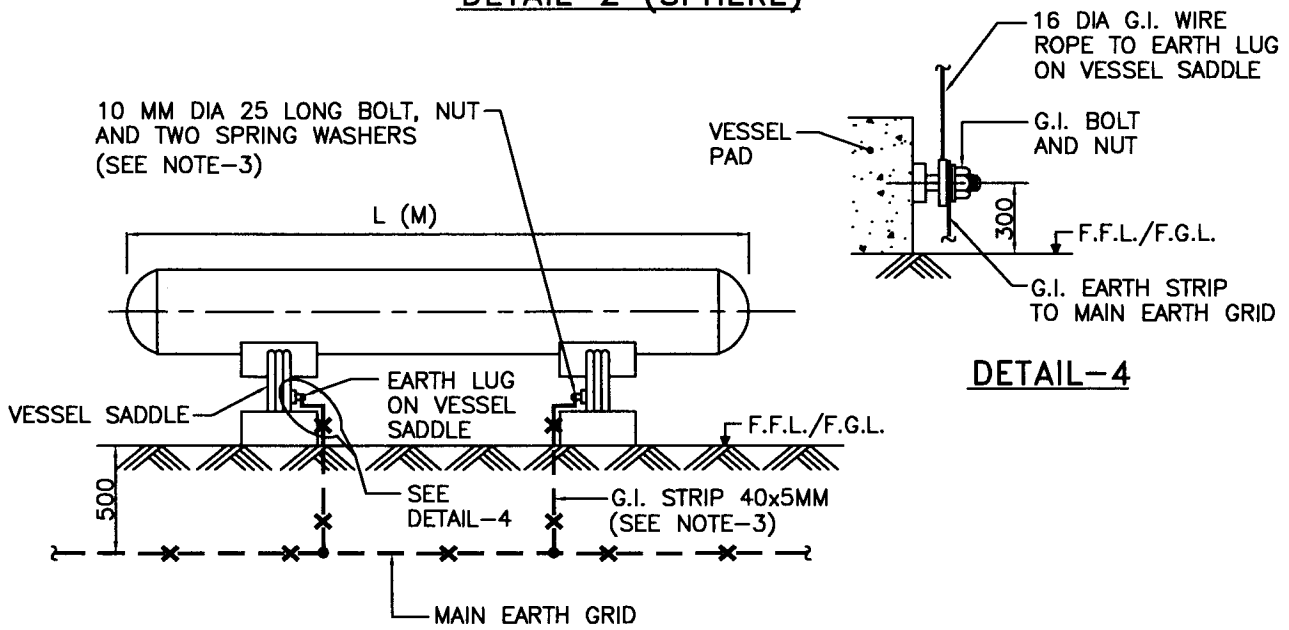


DETAIL–2 (SPHERE)



DETAIL–4

DETAIL–3 (HORIZONTAL VESSEL)

NOTES:–

1. FOR VESSELS TWO NOS. OF DIAMETRICALLY OPPSITE EARTHING LUGS WILL BE AVAILABLE ON LEG SUPPORTS OF EQUIPMENT FOR PROVIDING EARTH CONNECTION.
2. ALL VESSELS SHALL HAVE TWO EARTH CONNECTIONS IN GENERAL.
3. HORIZONTAL VESSEL OF LENGTH MORE THAN 20 METERS :–
   TWO EARTH LUGS ARE PROVIDED ON EACH SADDLE OF HORIZONTAL VESSELS, ACCORDINGLY THERE SHALL BE TWO EARTH CONNECTIONS TO THE EARTH GRID FROM EACH SADDLE.

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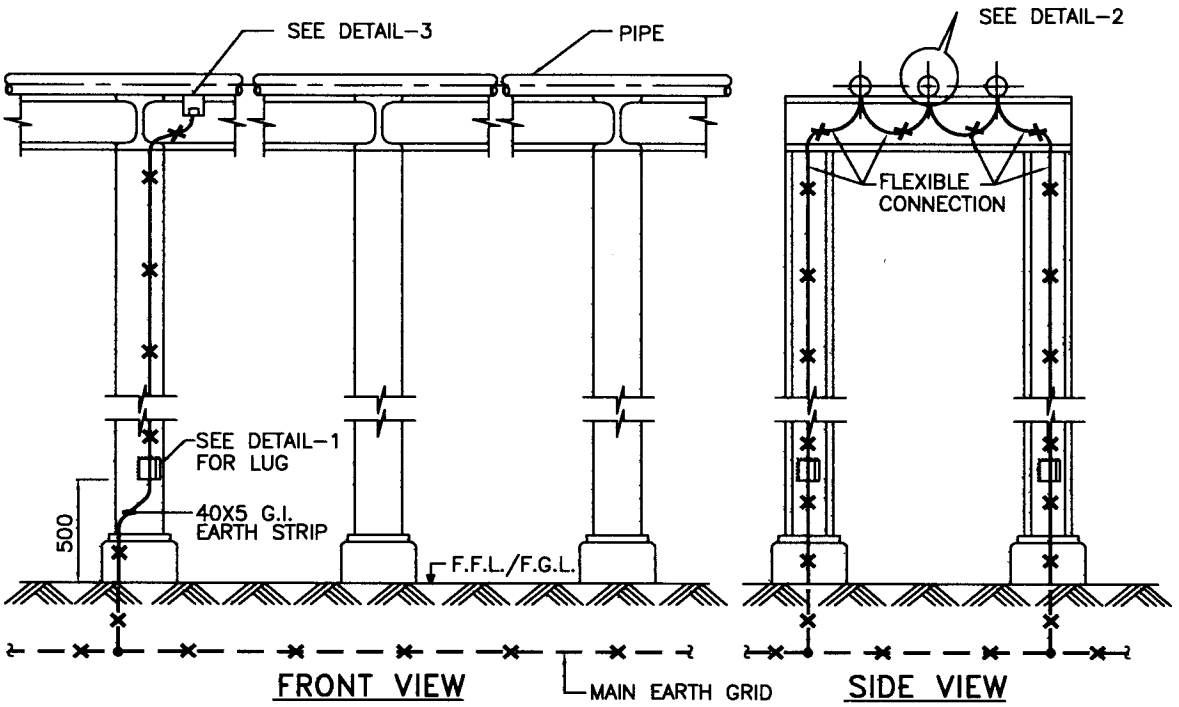

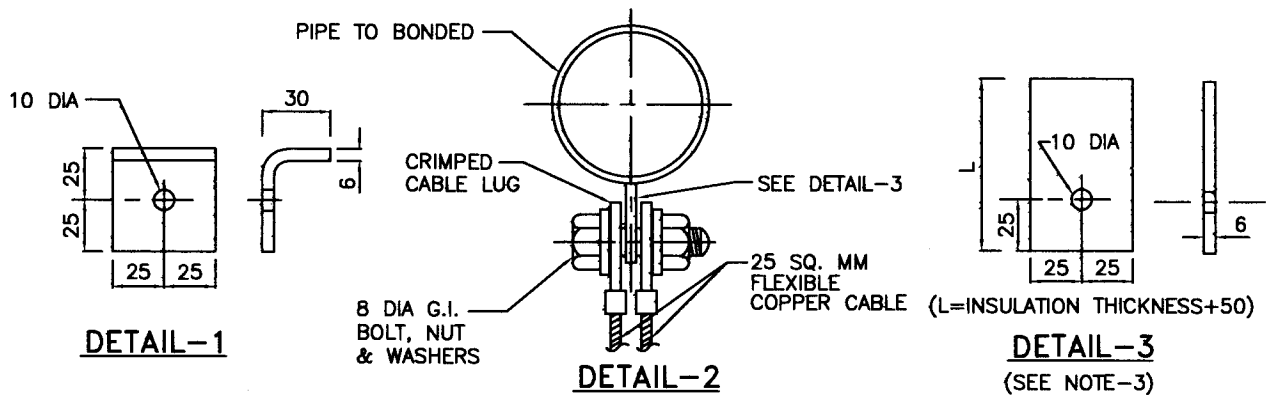

NOTES:–

1. UNLESS MENTIONED OTHERWISE ON PLANS OR JOB SPECIFICATIONS, THE PIPE LINES SHALL BE BONDED AND EARTHED ONLY AT THE ENTRY AND EXIT POINTS OF BATTERY LIMIT OF PROCESS UNIT HANDLING FLAMMABLE SUBSTANCES.
2. STEEL PIPE RACKS IN THE PROCESS UNIT AND OFFSITE AREA SHALL BE EARTHED AT MAXIMUM SPACING OF 25 METRES.
3. BEFORE HYDROTESTING OF PIPELINES, PIPING CONTRACTOR SHALL WELD A PLATE (AS SHOWN IN DETAIL–3) OF SUITABLE MATERIAL TO SUIT PIPELINE MATERIAL.
4. SUPPLY OF FLEXIBLE COPPER CABLE, LUGS, BOLTS, NUTS AND WASHERS ETC. AND MAKING CONNECTIONS SHALL BE DONE BY ELECTRICAL CONTRACTOR.

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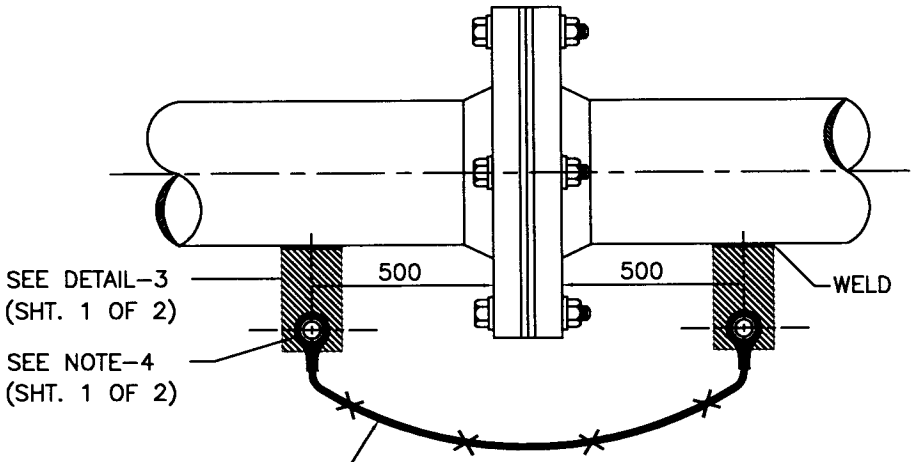
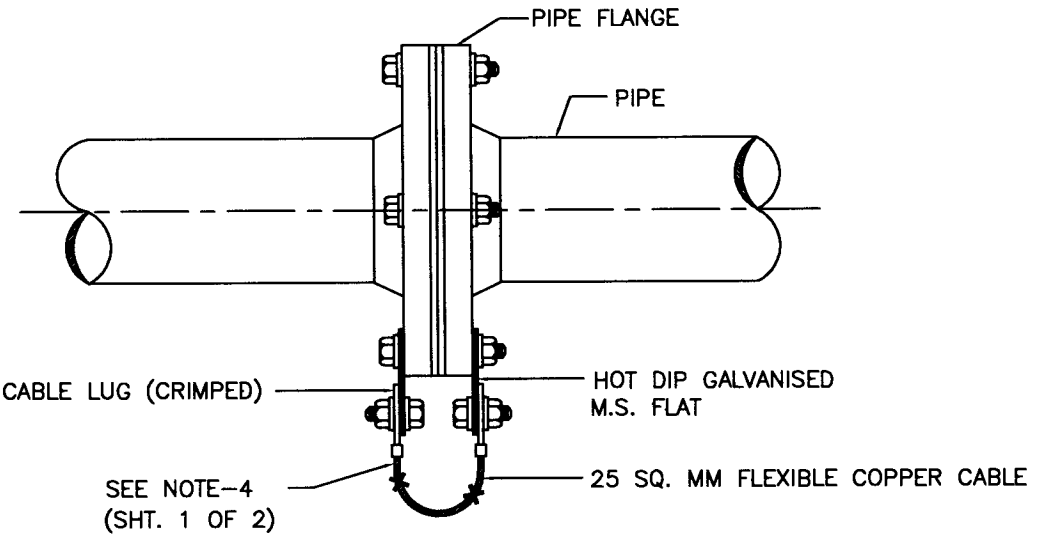
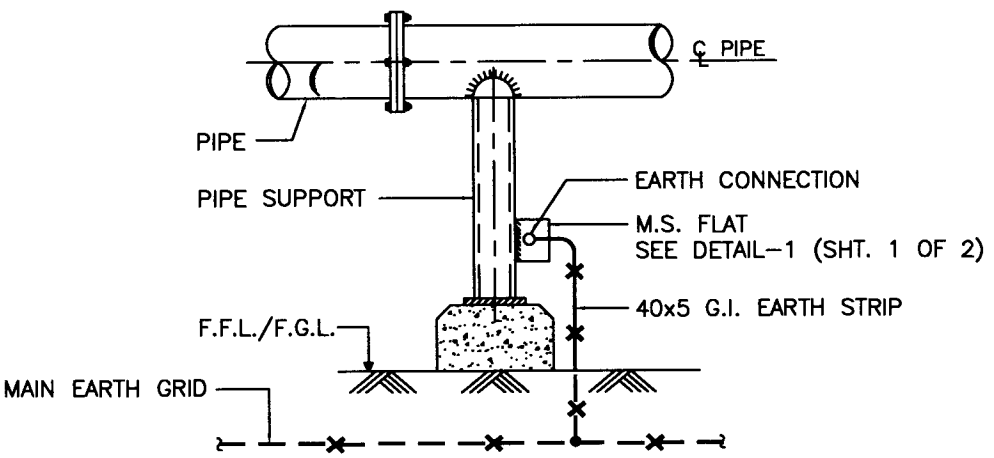


ARRANGEMENT–1



ARRANGEMENT–2

(APPLICABLE WHERE WELDED FLAT ARE
NOT AVAILABLE AS PER ARRANGEMENT–1)



ARRANGEMENT–3

(APPLICABLE WHEREVER PIPE SUPPORTS ARE WELDED
ON BOTH SIDES OF FLANGES / VALVES ETC.)

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TYPE OF EQUIPMENT	EARTH CONDUCTOR SIZE (SEE NOTE-1)
LV MOTORS UPTO 3.7KW	8 SWG SOLID G.I. WIRE
LV MOTORS FROM 5.5KW TO 30KW & WELDING RECEPTACLES	10 MM (3/8") DIA G.I. WIRE ROPE
LV MOTORS ABOVE 30KW INCLUDING MV MOTORS	16 MM (5/8") DIA G.I. WIRE ROPE/ 40x5 MM G.I. STRIP
BUILDING COLUMNS	40 x 5 G.I. STRIP
STORAGE TANKS (VERTICAL & HORIZONTAL)	40 x 5 G.I. STRIP
LOADING RACKS	40 x 5 G.I. STRIP
VESSELS & HEAT EXCHANGERS	40 x 5 G.I. STRIP
SMALL EQUIPMENT & INSTRUMENTS	8 SWG SOLID G.I. WIRE
LIGHTING, POWER & INSTRUMENT PANELS	10 MM (3/8") DIA G.I. WIRE ROPE
MAIN EARTH BUS / LV, MV, HV & EHV SWITCH GEAR INTERCONNECTIONS/ POWER TRANSFORMER	AS SPECIFIED
EHV, HV & MV SUB-STATIONS	AS SPECIFIED
PUSH BUTTON STATIONS	8 SWG SOLID G.I. WIRE
STREET LIGHT POLES	10 MM (3/8") DIA G.I. WIRE ROPE
LIGHTING TRANSFORMER	16 MM (5/8") DIA G.I. WIRE ROPE
PIPE RACK	40 X 5 G.I. STRIP
BONDING OF PIPE	25 SQ. MM INSULATED FLEXIBLE CU. CABLE
LIGHTNING PROTECTION	25 X 3 MM G.I. EARTH STRIP
CABLE TRAYS	40 X 5 G.I. STRIP

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TYPE OF EQUIPMENT	ALUMINUM CABLE (SEE NOTE-1&2)	COPPER CABLE (SEE NOTE-1&2)
LV MOTORS UPTO 3.7KW	16 SQ MM	10 SQ MM
LV MOTORS FROM 5.5KW TO 30KW	16 SQ MM	10 SQ MM
LV MOTORS ABOVE 30KW TO 55KW	25 SQ MM	16 SQ MM
LV MOTORS ABOVE 55KW TO 160KW	70 SQ MM	50 SQ MM
MV MOTORS	120 SQ MM	95 SQ MM
STORAGE TANKS (VERTICAL & HORIZONTAL)	70 SQ MM	50 SQ MM
VESSELS & HEAT EXCHANGERS	25 SQ MM	16 SQ MM
LIGHTING, POWER & INSTRUMENT PANELS	10 SQ MM	10 SQ MM
PUSH BUTTON STATIONS	10 SQ MM	10 SQ MM
STREET LIGHT POLES & FLOOD LIGHT MAST	16 SQ MM	10 SQ MM
PIPE RACK	25 SQ MM	16 SQ MM
WELDING RECEPTACLES	25 SQ MM	16 SQ MM

NOTE:-

1. TYPE OF EARTH CONNECTIONS TO INDIVIDUAL EQUIPMENT (I.E. WIRE ROPE / STRIP OR CABLE) FROM NEAREST EARTH PLATE / GRID SHALL BE SELECTED AS SPECIFIED ELSEWHERE. CABLE/WIRE ROPE CONNECTIONS SHALL BE MADE USING CRIMP TYPE OF LUGS.

2. EARTHING CABLE SHALL BE SINGLE CORE PVC INSULATED GREEN COLOR/GREEN WITH YELLOW COLOR STRIPE OUTER SHEATH.

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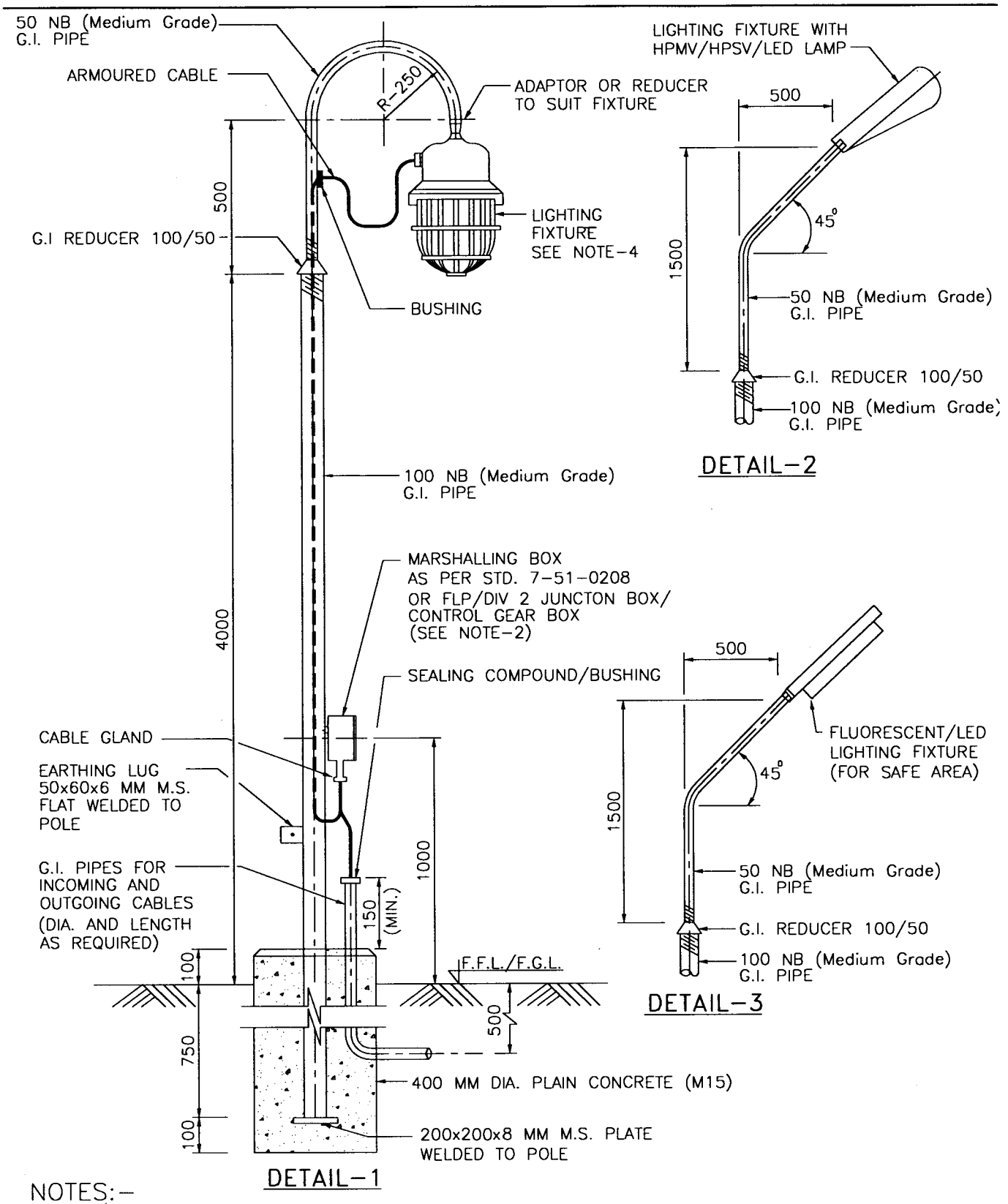

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. MARSHALLING BOX/JUNCTION BOX AND G.I. PIPES FOR CABLES SHALL BE LOCATED FACING CABLE TRENCH SIDE.
3. ALL G.I. PIPES SHALL BE MEDIUM GRADE.
4. LIGHTING FIXTURE CAN BE WELL GLASS/DOME GLASS/FLAT GLASS TYPE BASED ON TYPE OF LAMP.

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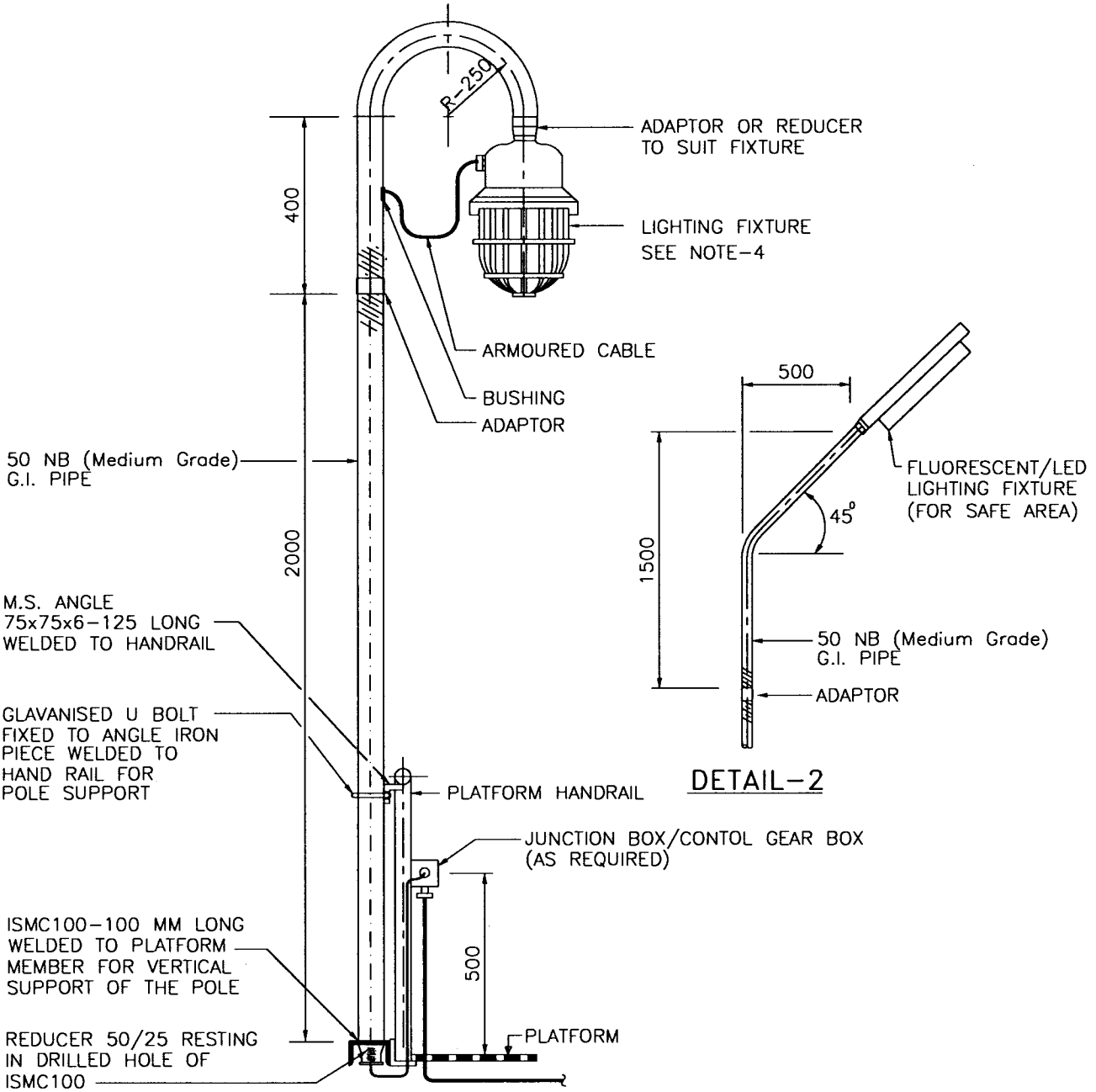

DETAIL-2

DETAIL-1

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. FOR TYPE OF FIXTURE REFER LAYOUT DRAWING / LIGHTING FIXTURE SCHEDULE.
3. ALL G.I. PIPES SHALL BE MEDIUM GRADE.
4. LIGHTING FIXTURE CAN BE WELL GLASS/DOME GLASS/FLAT GLASS TYPE BASED ON TYPE OF LAMP.

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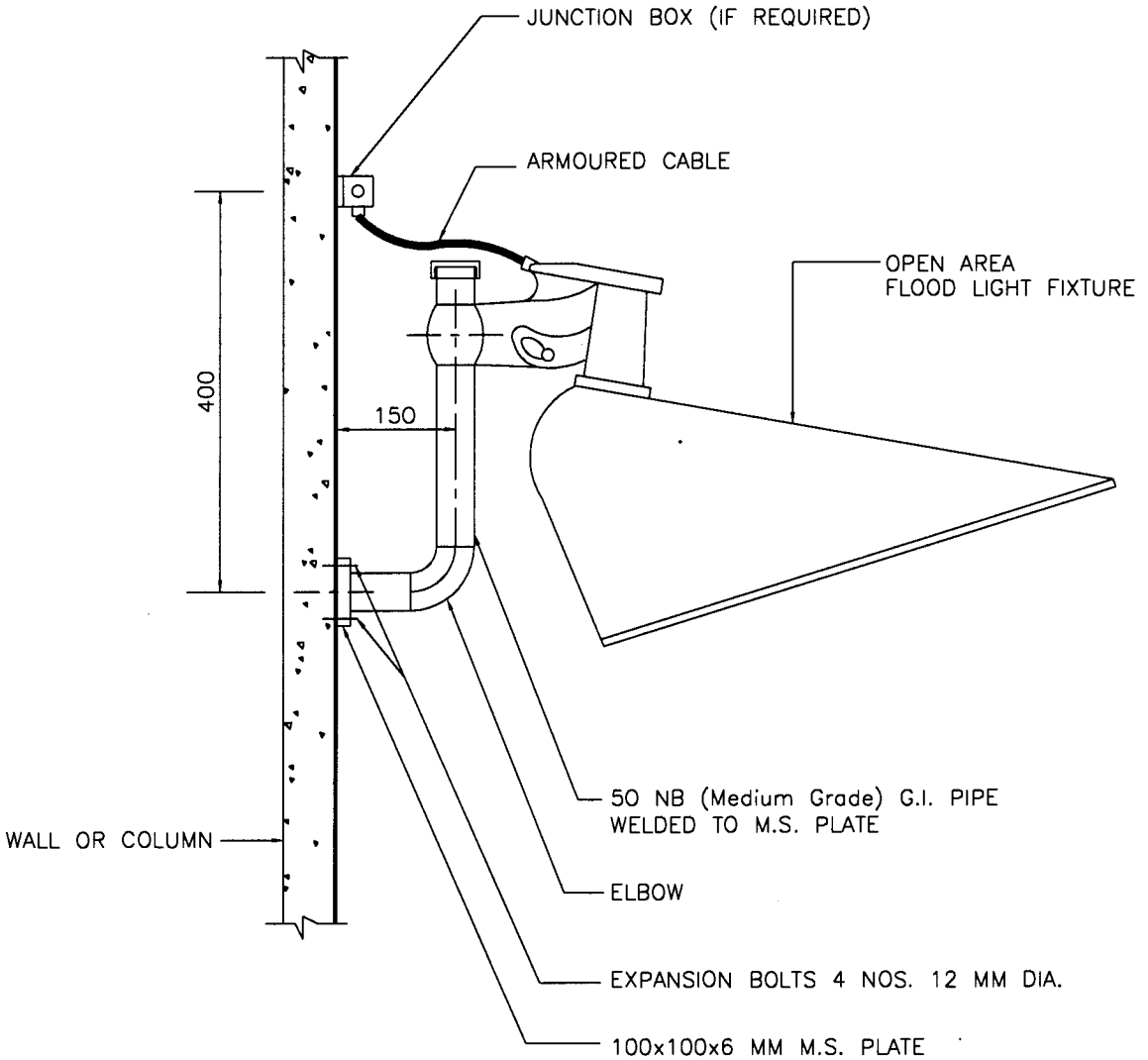

NOTES:–

1. ALL DIMENSIONS ARE IN MM.

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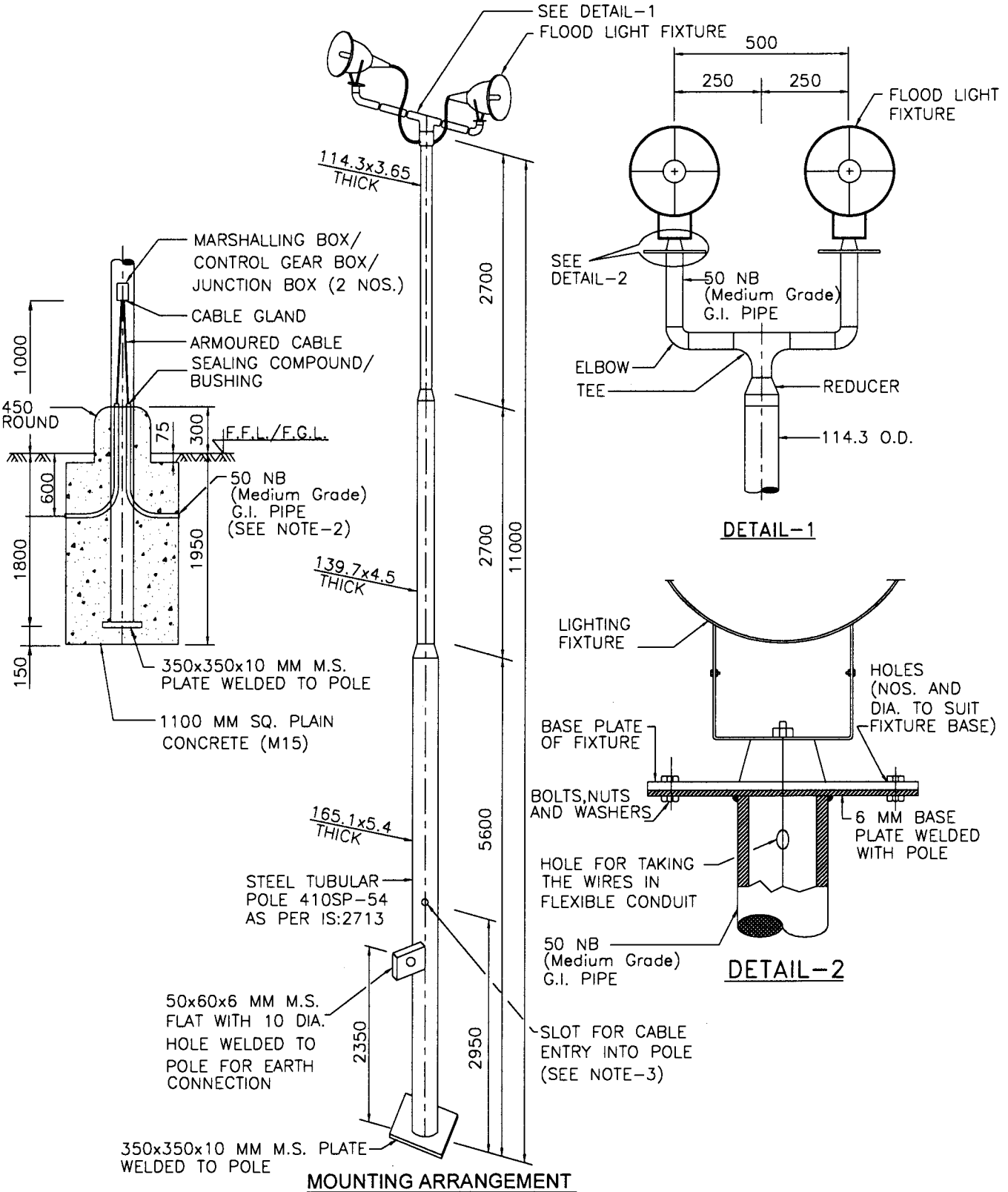

MOUNTING ARRANGEMENT FOR SAFE AREA FIXTURES

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. MINIMUM TWO AND MAXIMUM THREE NUMBERS OF SLEEVES SHALL BE PROVIDED AS PER PLAN DRAWING.
3. 2 NOS. 25 DIA. HOLES SHALL BE POVIDED ON OPPOSITE ENDS FOR FIXING OF MARSHALLING BOX ON ONE END AND CONTROL GEAR BOX/JUNCTION BOX ON OTHER END.

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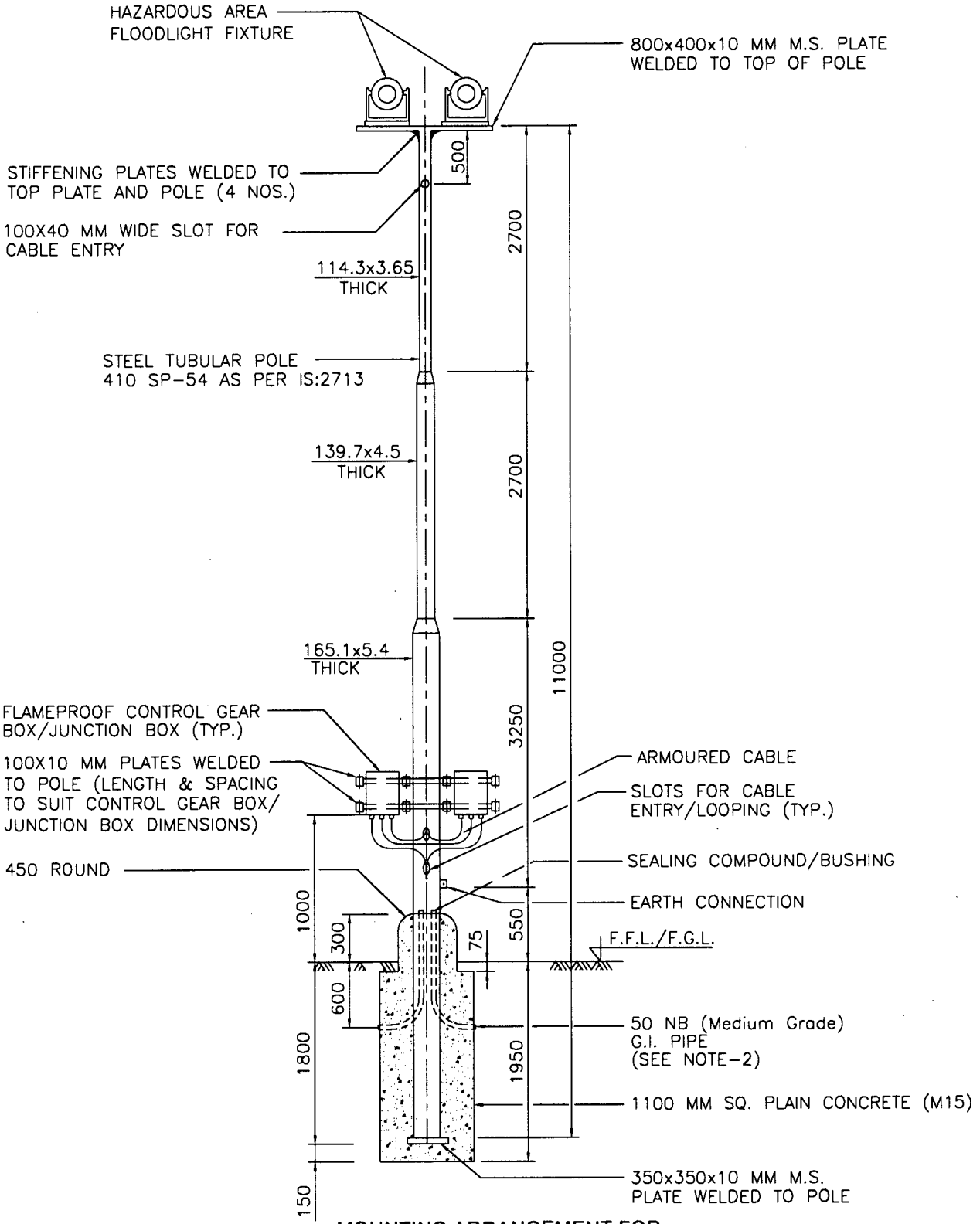

MOUNTING ARRANGEMENT FOR HAZARDOUS AREA FIXTURES

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. MINIMUM TWO AND MAXIMUM THREE NUMBERS OF SLEEVES SHALL BE PROVIDED AS PER PLAN DRAWING.

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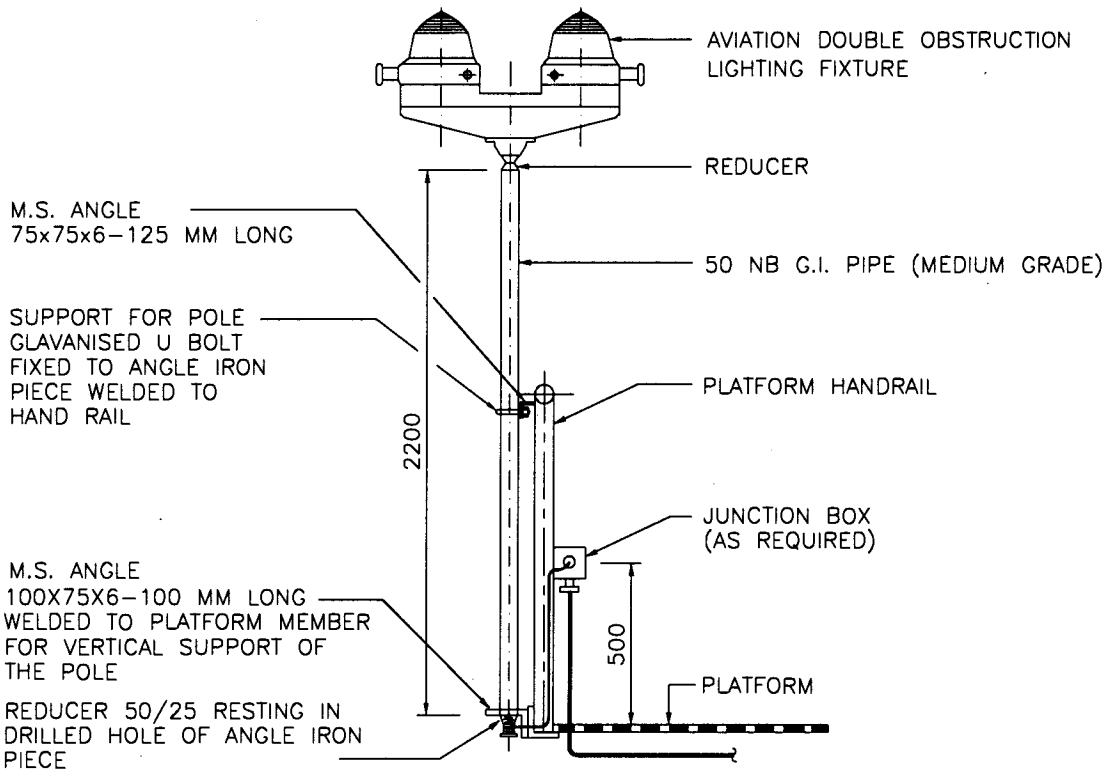
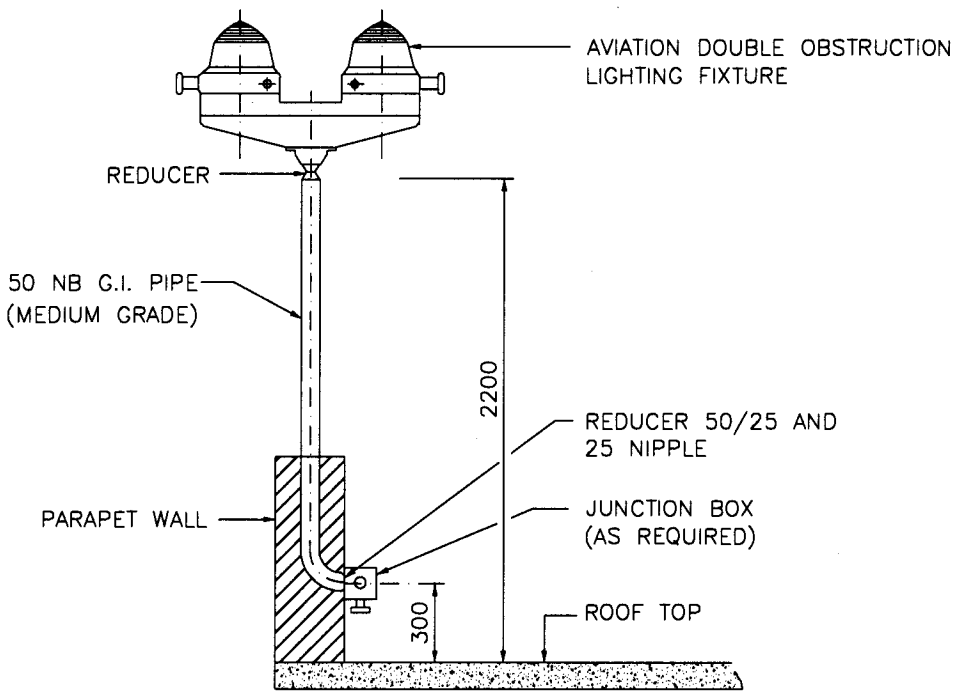


MOUNTED ON TOP OF STRUCTURE PLATFORM
DETAIL–1



MOUNTED ON TOP OF BUILDING PARAPET WALL
DETAIL–2

NOTES:–

1. ALL DIMENSIONS ARE IN MM.

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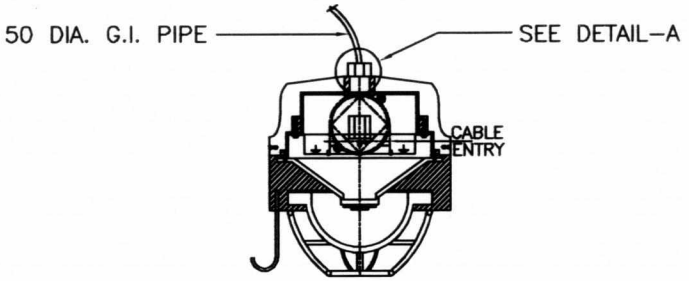
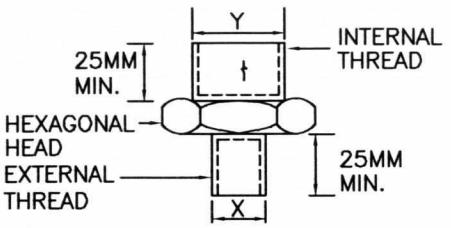


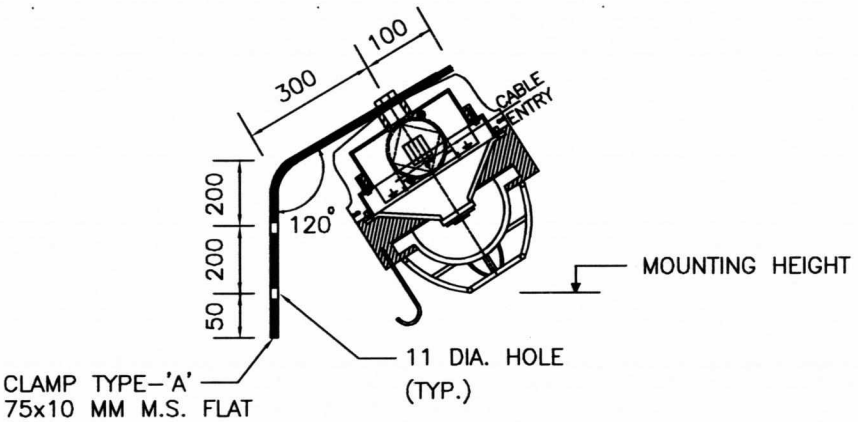
DETAIL–1
POLE MOUNTED



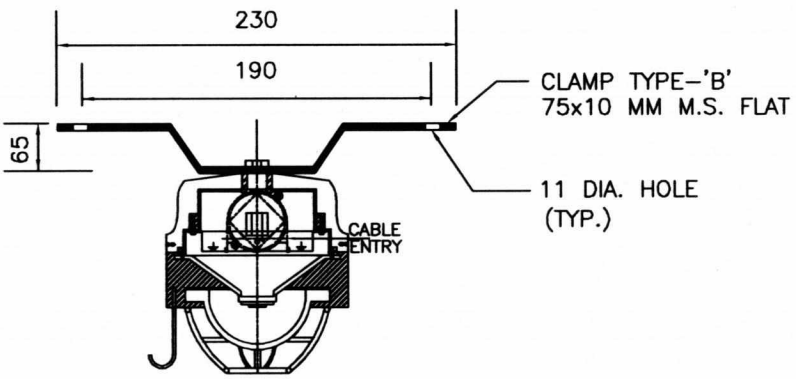
DETAIL–A
(ADAPTOR)

DIMENSIONS	
X	Y
*TO SUIT 19 DIA.	TO SUIT 50 DIA.

* ALTERNATIVELY SIZE TO SUIT FIXTURE



DETAIL–2
BRACKET MOUNTED



DETAIL–3
CEILING MOUNTED

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. SUPPORT ACCESSORIES VIZ THE BRACKET, CEILING ADAPTOR SHALL BE PAINTED WITH EPOXY BASED PAINT.

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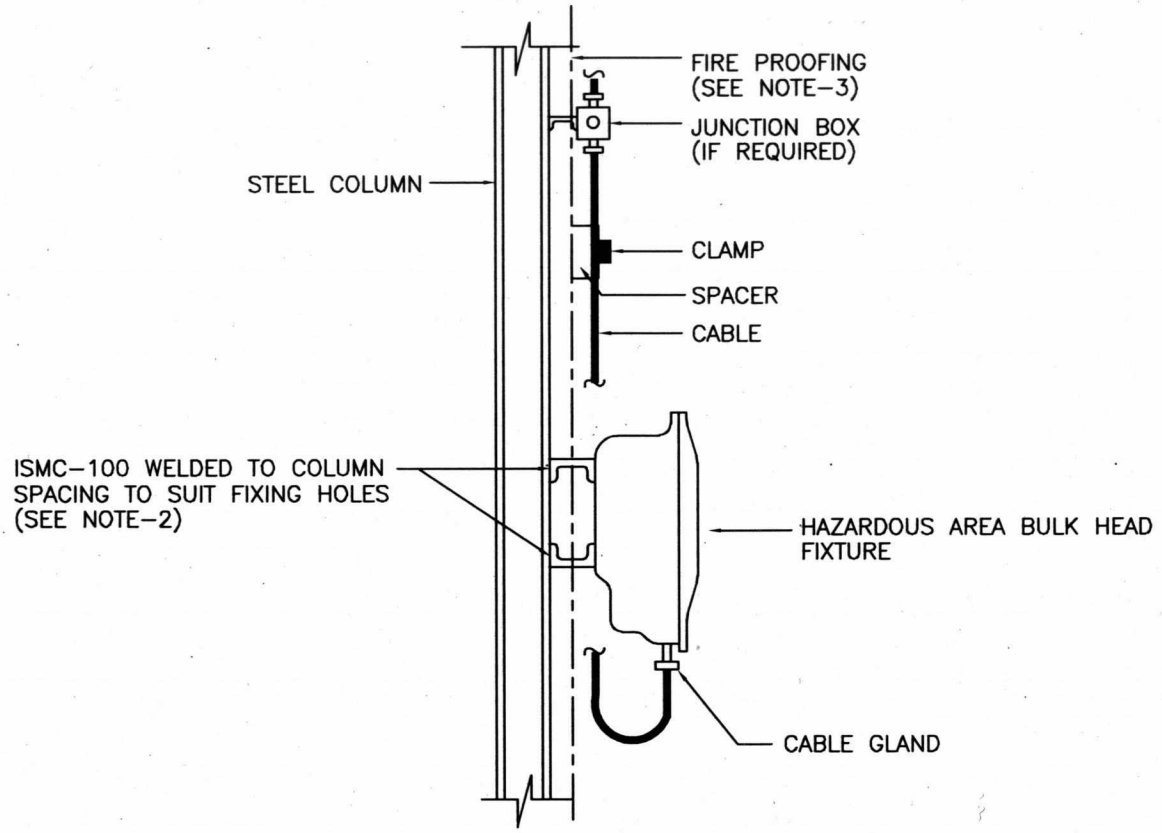
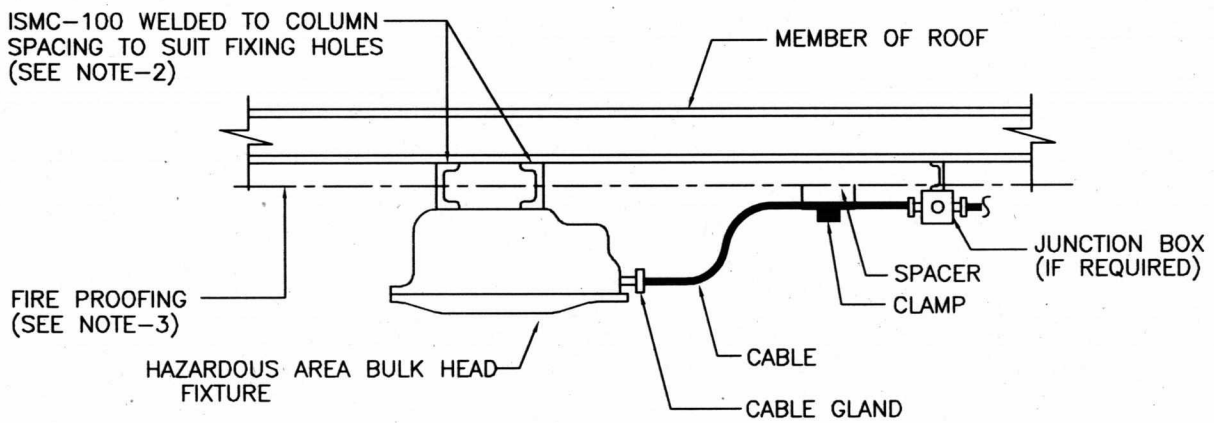


DETAIL–1
COLUMN MOUNTED



DETAIL–2
CEILING MOUNTED

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. USE ANCHOR BOLTS FOR INSTALLATION OF FIXTURES ON CONCRETE COLUMNS.
3. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED FIXTURE/ JUNCTION BOX AND CABLE/CONDUIT SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED ANGLE IRON FRAME / DISTANCE BRACKET.

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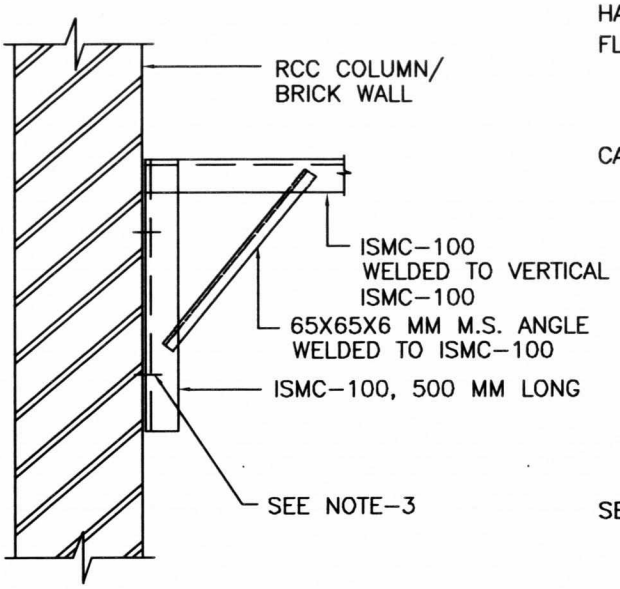
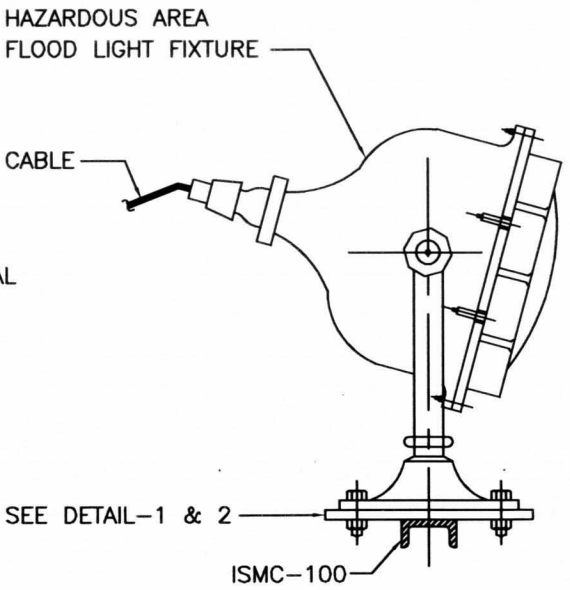
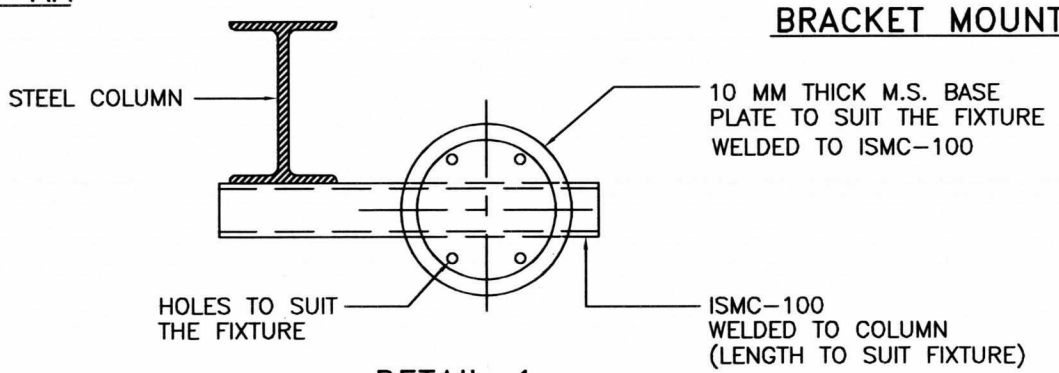


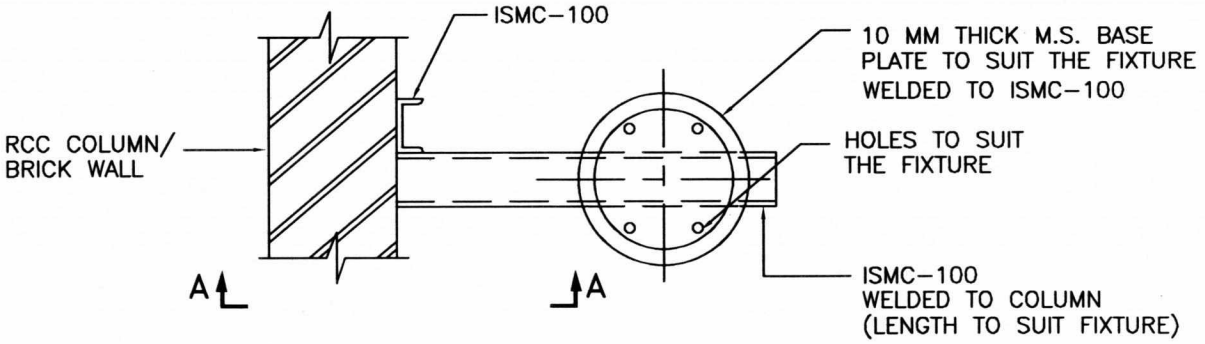
VIEW–AA



ELEVATION
BRACKET MOUNTED



DETAIL–1
MOUNTED ON STEEL COLUMN



DETAIL–2
MOUNTED ON RCC COLUMN/BRICK WALL

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED FIXTURE/ JUNCTION BOX AND CABLE/CONDUIT SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED ANGLE IRON FRAME / DISTANCE BRACKET.
3. SUPPORT FOR FLOOD LIGHT FIXTURE SHALL BE SUITABLY FIXED TO RCC COLUMN/ BRICK WALL BY USING ANCHOR FASTENER.

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					Approved by	
6	15.09.22	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
5	22.02.18	UPDATED & ISSUED AS STANDARD	BP	VKS/HK	BRB	RN
4	17.07.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	DM

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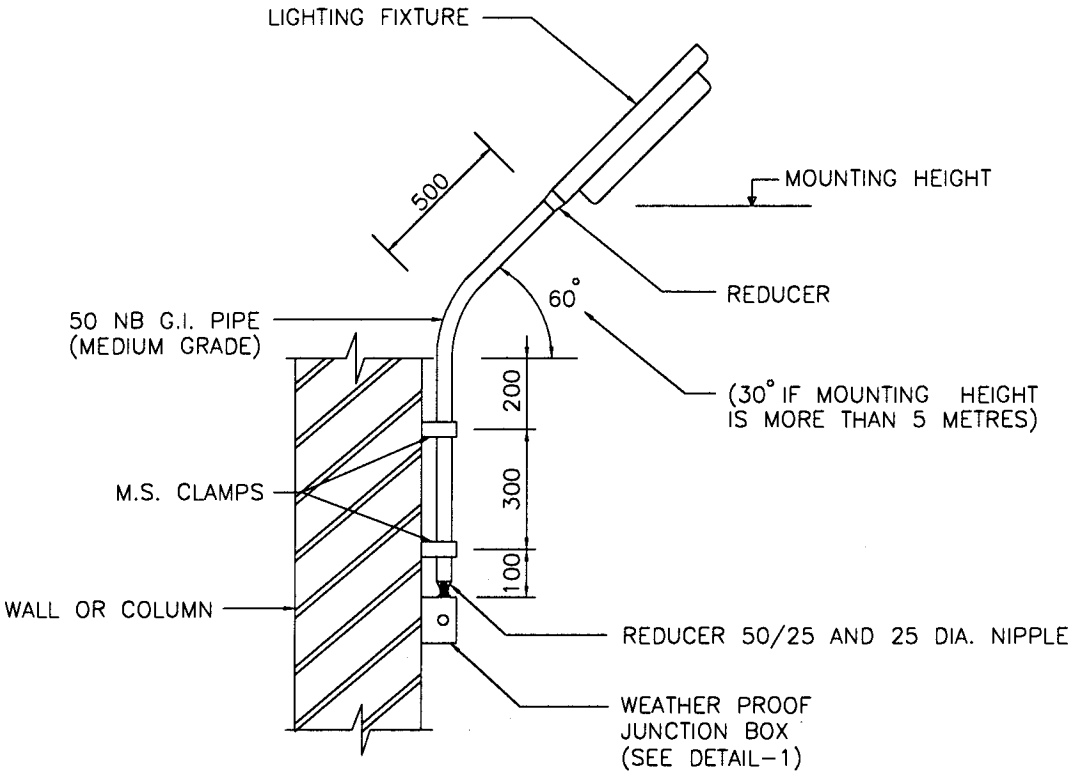
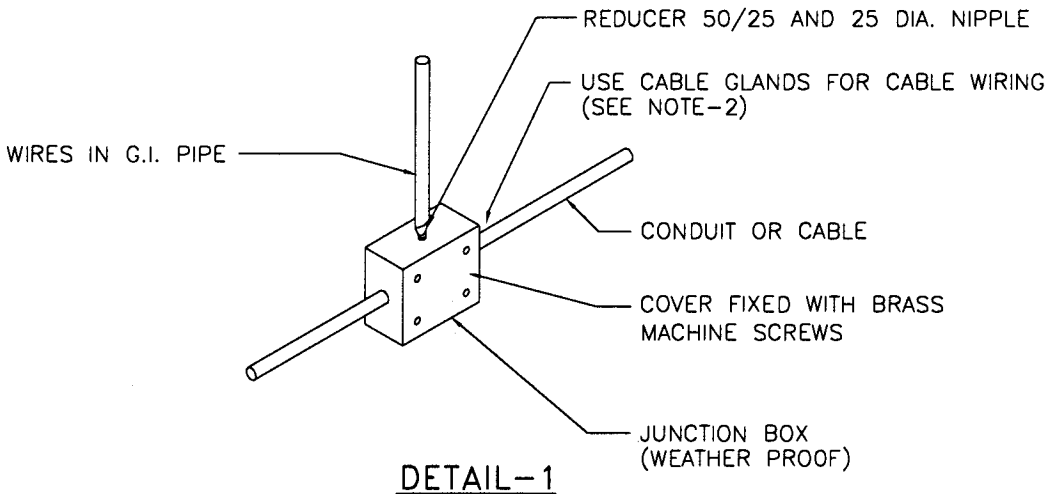


MOUNTED ON WALLS OR COLUMNS



DETAIL-1

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. PROPER SEALING SHALL BE ENSURED TO PREVENT INGRESS OF WATER.
3. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED FIXTURE/ JUNCTION BOX AND CABLE/CONDUIT SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED ANGLE IRON FRAME / DISTANCE BRACKET.

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6	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	SA	SM
5	22.02.18	UPDATED & ISSUED AS STANDARD	BP	VKS/HK	BRB	RN

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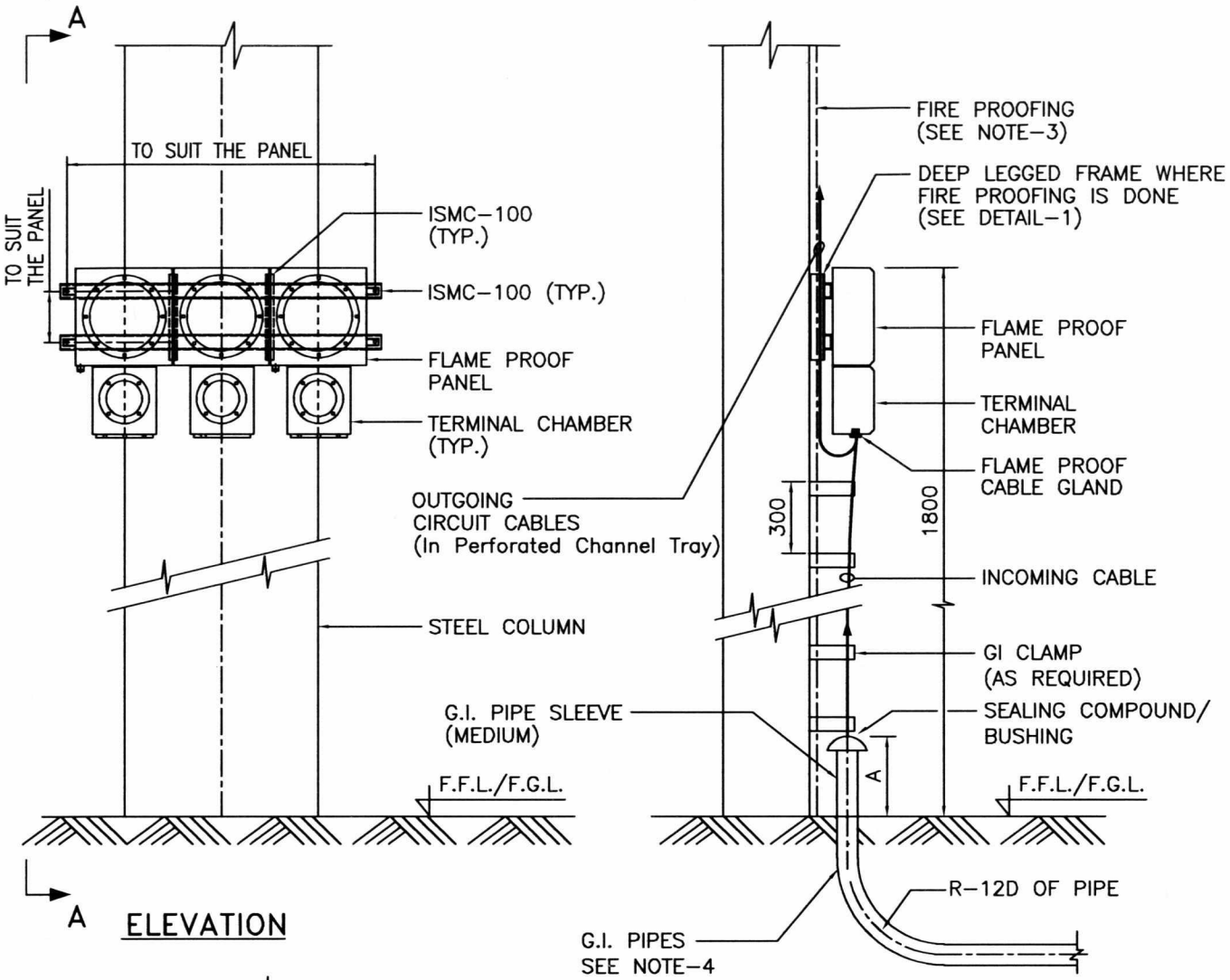

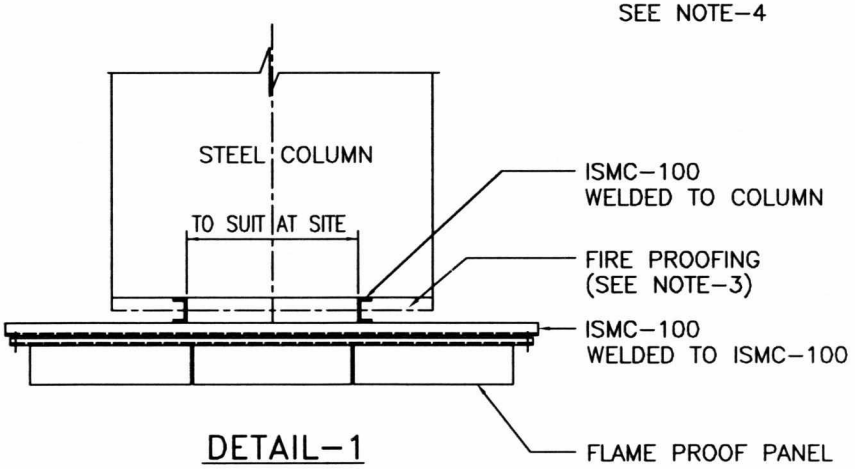

NOTES:–

A= { 150 MM (MIN.) FOR INDOOR LOCATIONS. / 300 MM (MIN.) FOR OUTDOOR LOCATIONS.

1. ALL DIMENSIONS ARE IN MM.
2. THE SUPPORT STRUCTURES SHALL BE PAINTED WITH SAME PAINT, AS FOLLOWED FOR CORRESPONDING STRUCTURE.
3. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED, FLAME PROOF PANEL AND CABLE SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED CHANNEL FRAME / DISTANCE BRACKET.
4. QUANTITY AND SIZE OF PIPE SLEEVES SHALL BE AS PER LAYOUT DRAWINGS.

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6	25.08.23	UPDATED & ISSUED AS STANDARD	SONU	VKS/HK	MKS	SM
5	16.07.18	UPDATED & ISSUED AS STANDARD	RSD	VKS/HK	BRB	RKT
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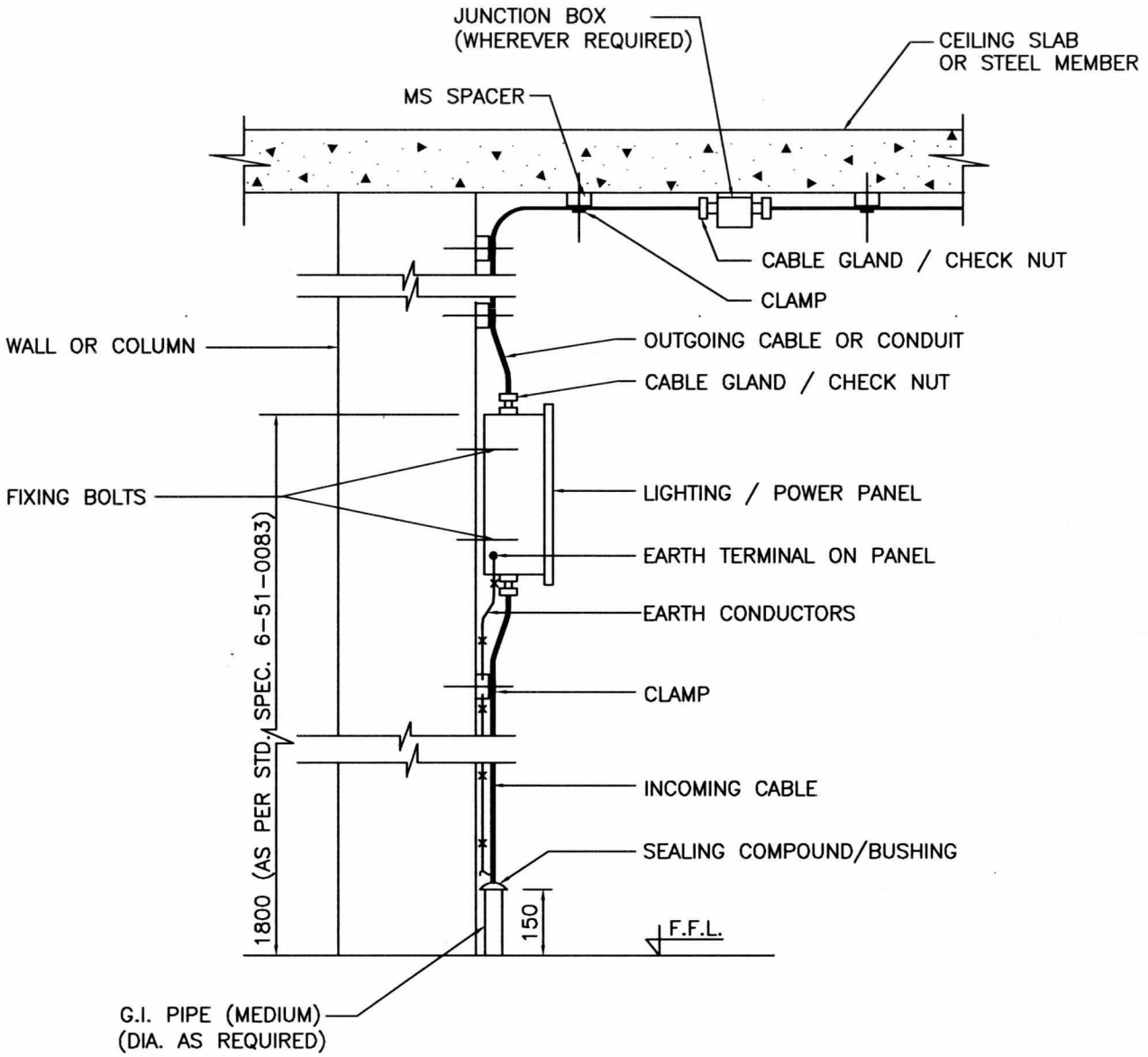

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED FIXTURE/ PANEL/ JUNCTION BOX AND CABLE/CONDUIT SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED ANGLE IRON FRAME / DISTANCE BRACKET.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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4	17.07.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	DM

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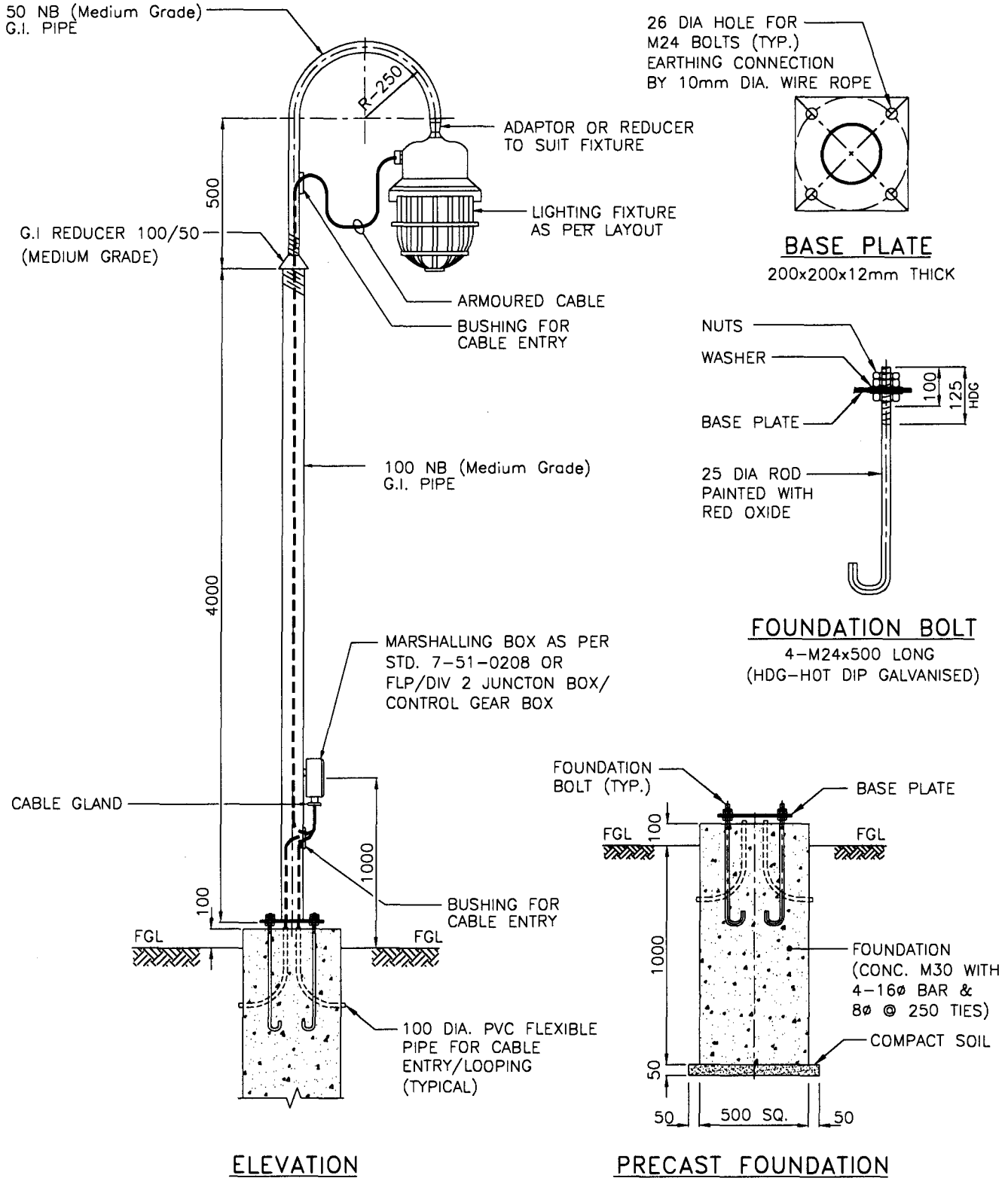

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE LIGHTING POLE AND ACCESSORIES DETAILS SHOWN HERE ARE INDICATIVE ONLY. ACTUAL DESIGN & ARRANGEMENT SHALL BE AS PER MANUFACTURER'S DETAILS.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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1	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	SA	SM
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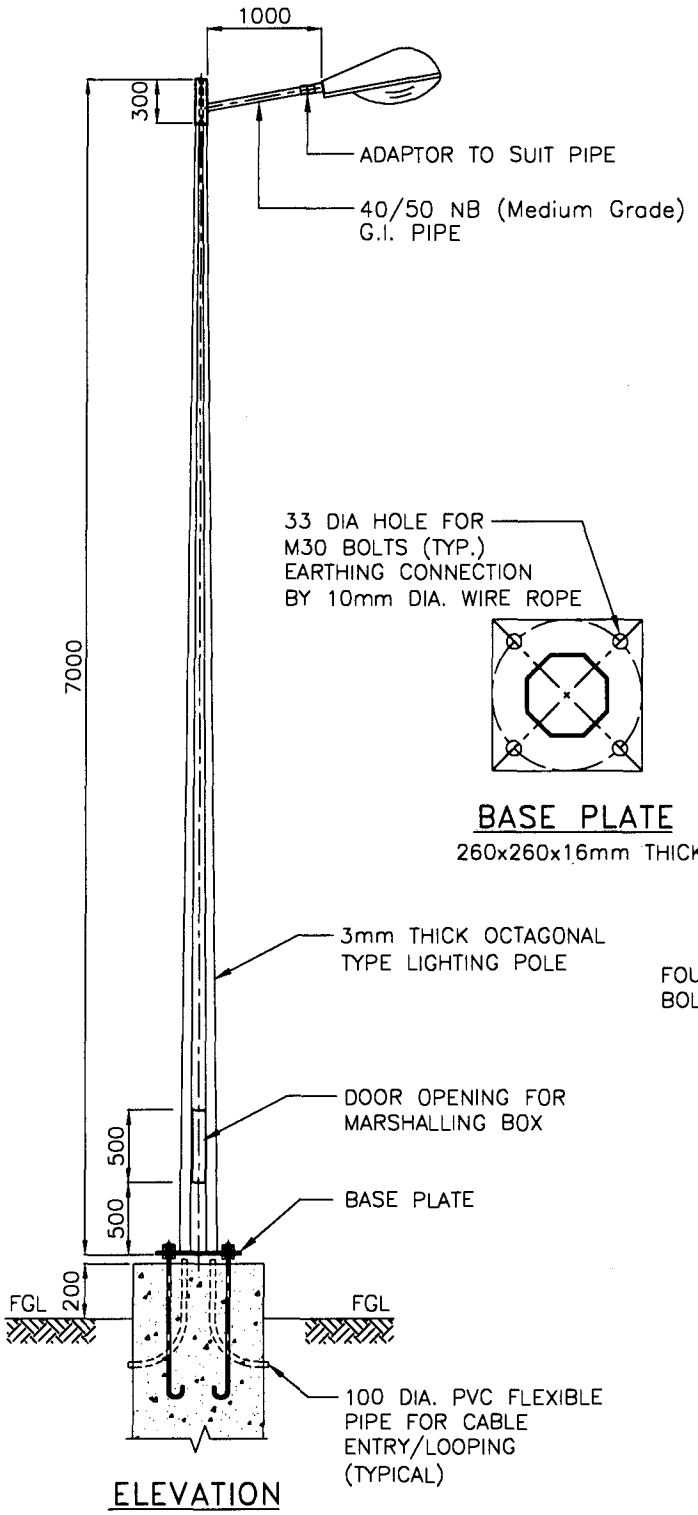
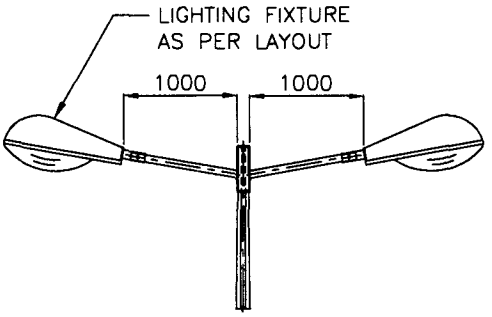


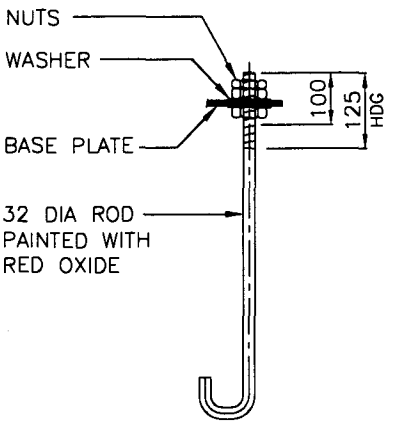
ELEVATION



ARRANGEMENT FOR TWO FIXTURES

BASE PLATE

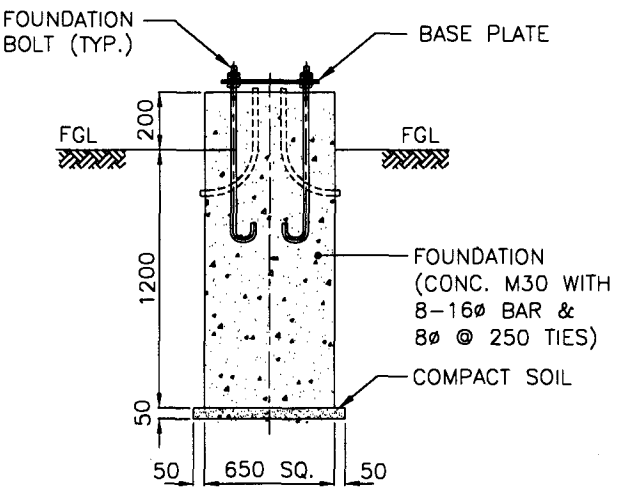
260x260x16mm THICK



FOUNDATION BOLT

4–M30x750 LONG

(HDG–HOT DIP GALVANISED)



PRECAST FOUNDATION

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE LIGHTING POLE AND ACCESSORIES DETAILS SHOWN HERE ARE INDICATIVE ONLY. ACTUAL DESIGN & ARRANGEMENT SHALL BE AS PER MANUFACTURER'S DETAILS.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
1	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HR	SA	SM
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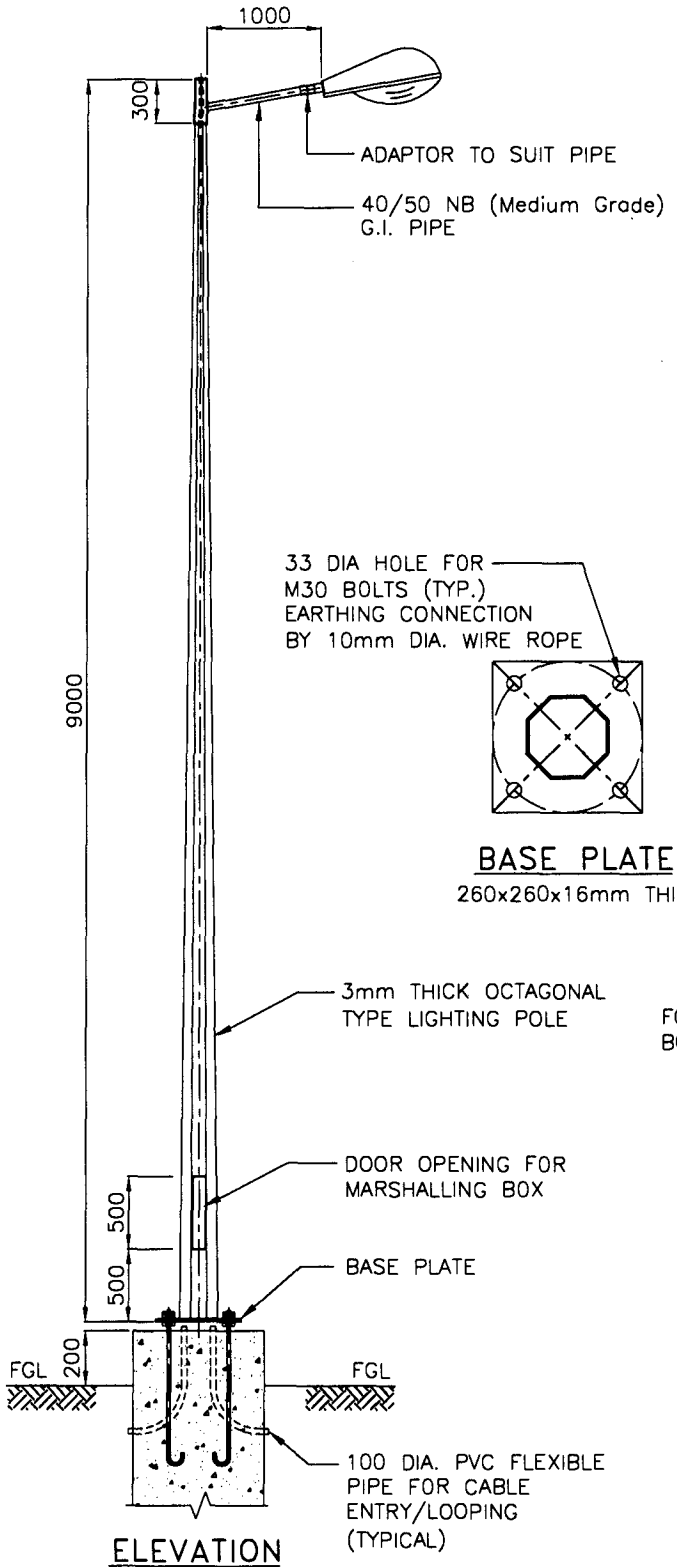
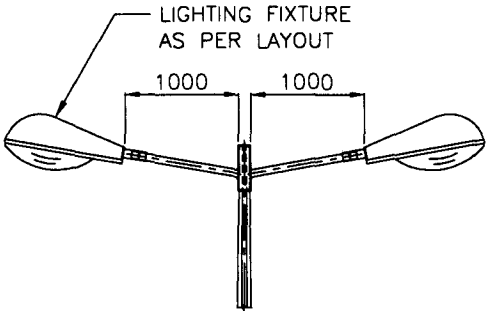


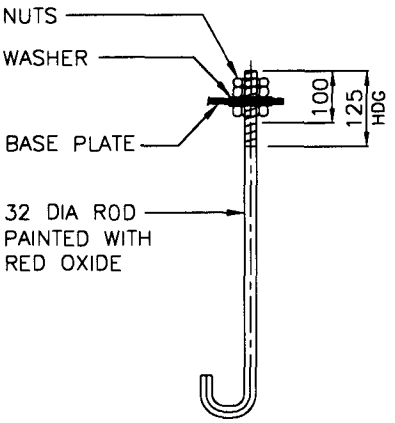
ELEVATION



ARRANGEMENT FOR TWO FIXTURES

BASE PLATE

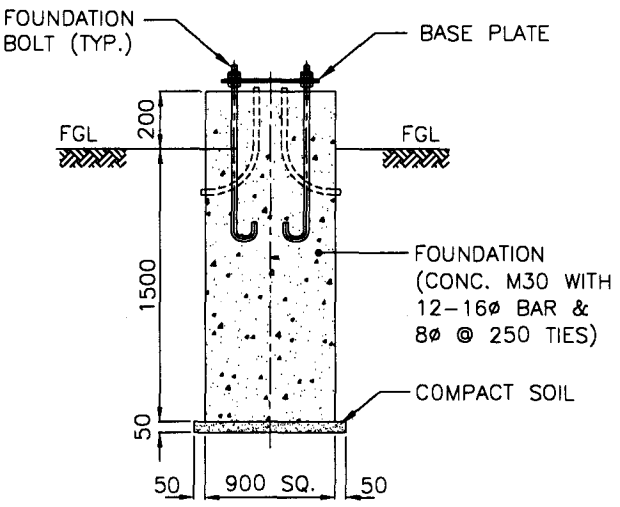
260x260x16mm THICK



FOUNDATION BOLT

4–M30x750 LONG

(HDG–HOT DIP GALVANISED)



PRECAST FOUNDATION

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE LIGHTING POLE AND ACCESSORIES DETAILS SHOWN HERE ARE INDICATIVE ONLY. ACTUAL DESIGN & ARRANGEMENT SHALL BE AS PER MANUFACTURER'S DETAILS.

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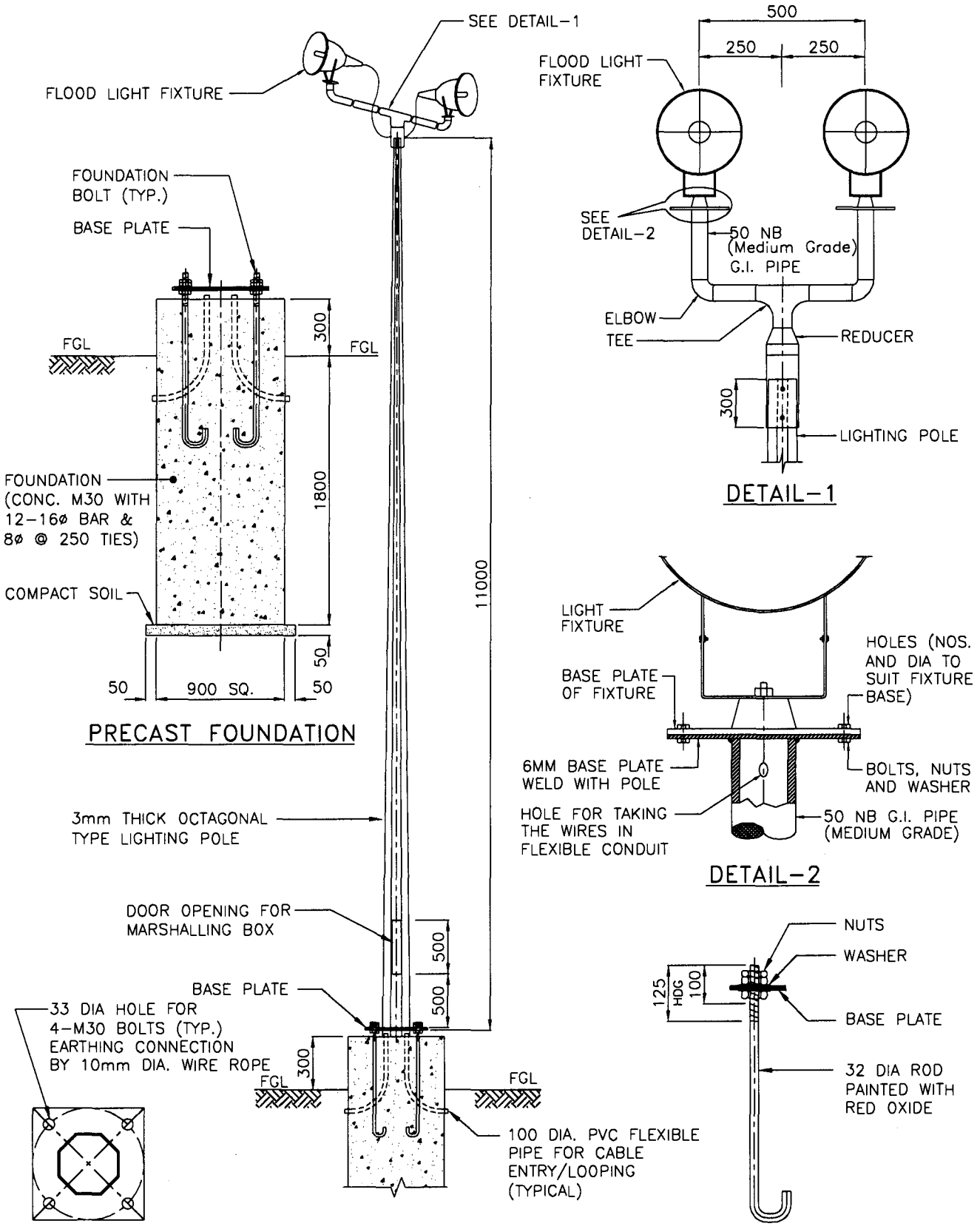

PRECAST FOUNDATION

DETAIL-1

DETAIL-2

BASE PLATE
350x350x16mm THICK

MOUNTING ARRANGEMENT FOR SAFE AREA LIGHTING FIXTURE

FOUNDATION BOLT
4-M30x900 LONG
(HDG-HOT DIP GALVANISED)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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1	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	SA	SM
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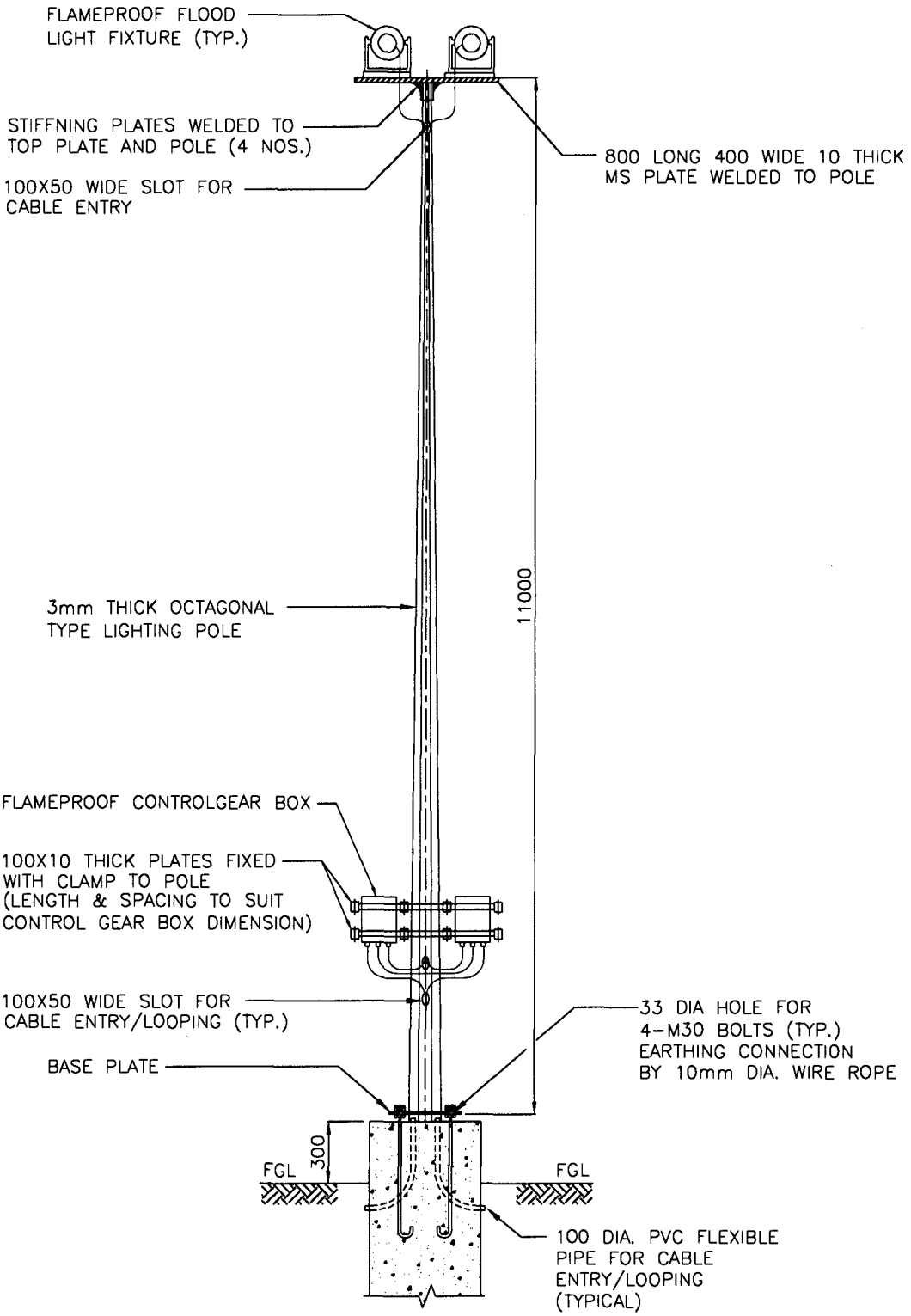

MOUNTING ARRANGEMENT FOR HAZARDOUS AREA LIGHTING FIXTURE

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE LIGHTING POLE AND ACCESSORIES DETAILS SHOWN HERE ARE INDICATIVE ONLY. ACTUAL DESIGN & ARRANGEMENT SHALL BE AS PER MANUFACTURER'S DETAILS.
3. 2 NOS. 25 DIA. HOLES SHALL BE PROVIDED ON OPPOSITE SIDE FOR FIXING OF MARSHALLING BOX ON ONE END AND CONTROL GEAR BOX ON OTHER END.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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1	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	SA	SM
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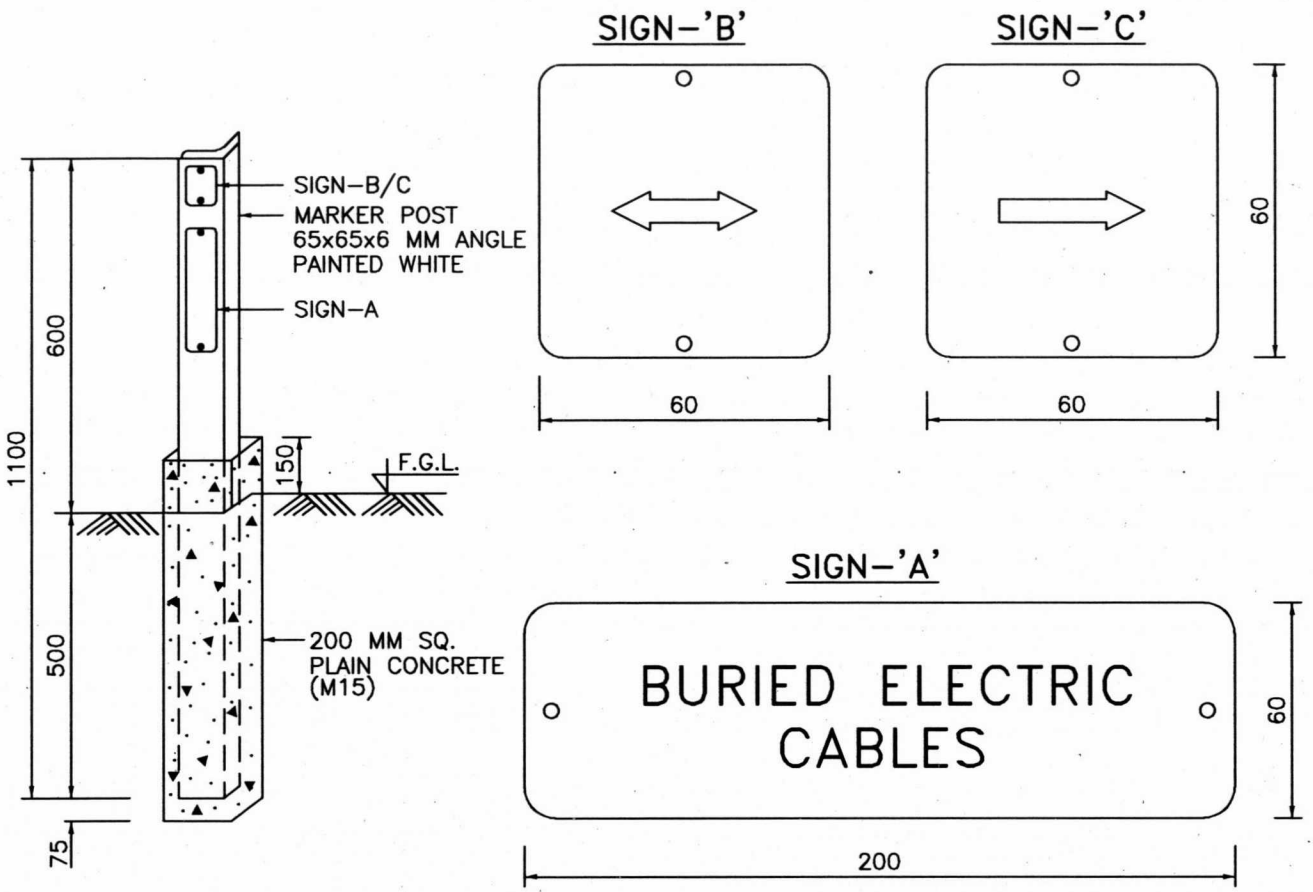
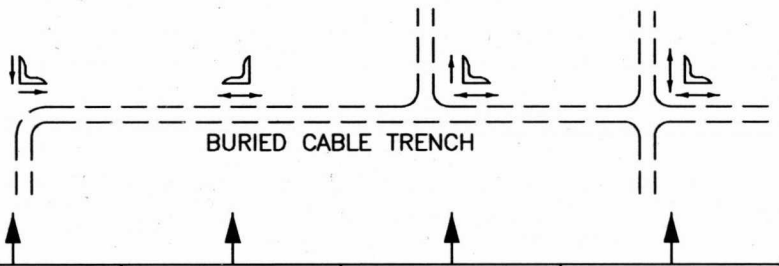


TYPICAL ARRANGEMENT OF MARKER

(SEE NOTE–2)



	ANGLE 65x65x6 1100 MM LONG	ANGLE 65x65x6 1100 MM LONG	ANGLE 65x65x6 1100 MM LONG	ANGLE 65x65x6 1100 MM LONG
ASSEMBLY CONSISTING OF	SIGN.–A–1 NO. SIGN.–C–2 NOS.	SIGN.–A–1NO. SIGN.–B–1NO.	SIGN.–A–1NO. SIGN.–B–1NO. SIGN.–C–1NO.	SIGN.–A–1NO. SIGN.–B–2NOS.

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. TRENCHES SHALL BE MARKED AT ALL DIRECTION CHANGES, INTERSECTIONS AND STRAIGHT RUNS.
3. SIGN BOARDS SHALL BE MADE OF 14 GAUGE ENAMELLED STEEL PLATE. WHITE LETTERING SHALL BE ON JADE GREEN BACKGROUND.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	15.09.22	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
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4	21.11.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	SC

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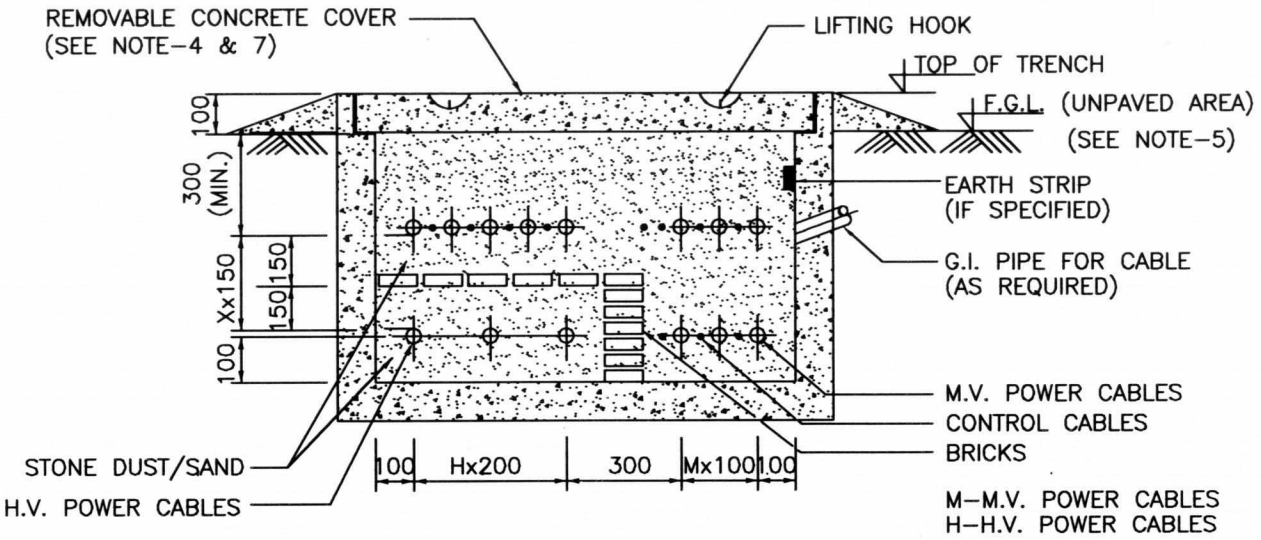
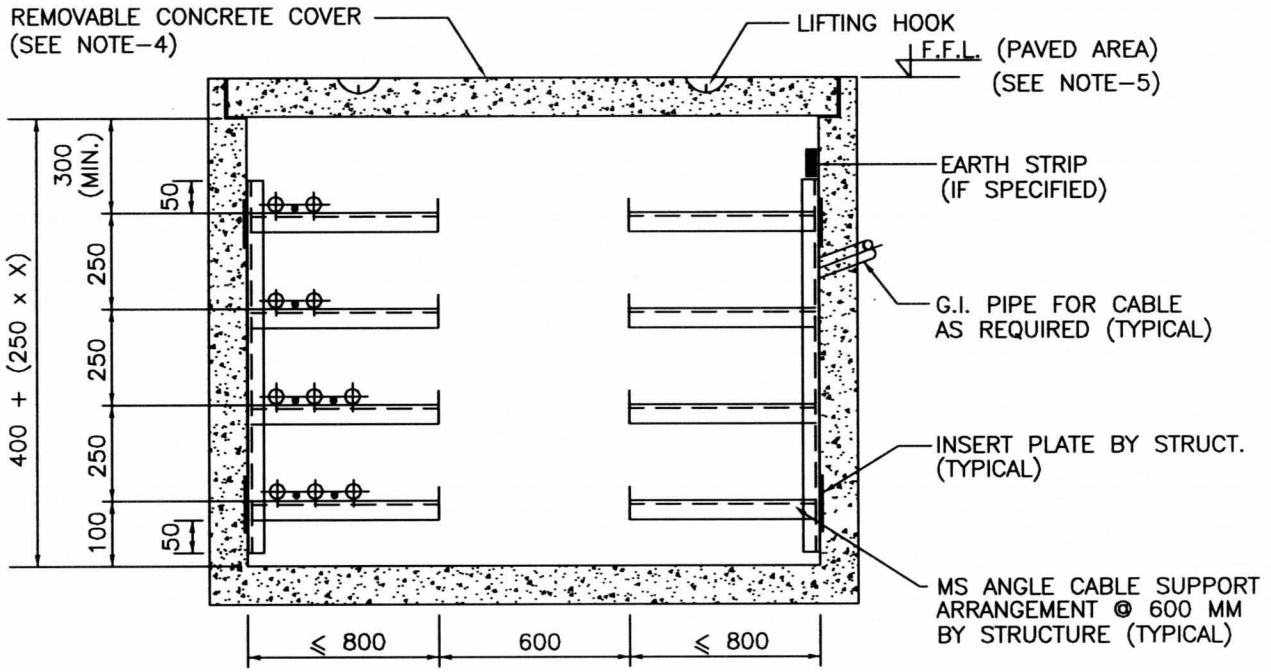


TYPICAL SECTION OF RCC CABLE TRENCH WITHOUT RACKS



TYPICAL SECTION OF RCC CABLE TRENCH WITH RACKS

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. WIDTH OF RACKS ON ONE SIDE OR BOTH SIDES SHALL BE DECIDED AS PER JOB REQUIREMENT.
3. THE EXACT HEIGHT OF OPENING IN TRENCH WALL FOR G.I. PIPE FOR TAKING CABLE SHALL BE SUITABLY DECIDED AT SITE.
4. THE REMOVABLE CONCRETE COVERS SHALL BE SEALED WITH MASTIC ASPHALT FILLER / BITUMEN TO PREVENT INGRESS OF WATER / HYDROCARBONS IN CABLE TRENCH.
5. TOP OF THE TRENCH SHALL BE 100 MM ABOVE FINISHED GRADE LEVEL (F.G.L.) IN CASE OF UNPAVED AREAS AND SHALL BE FLUSHED WITH FINISHED FLOOR LEVEL (F.F.L.) IN CASE OF PAVED AREAS.
6. MINIMUM GAP OF 250MM SHALL BE PROVIDED BETWEEN FA / COMMUNICATION / TELEPHONE CABLES AND ALL OTHER POWER / CONTROL CABLES.
7. INSTEAD OF REMOVABLE CONCRETE COVER, PCC/LEAN CONCRETE SHALL BE PROVIDED IF SPECIFIED IN JOB SPECIFICATION. THE THICKNESS OF PCC SHALL BE MININUM 100mm OR AS SPECIFIED IN STRUCTURAL SPECIFICATION.

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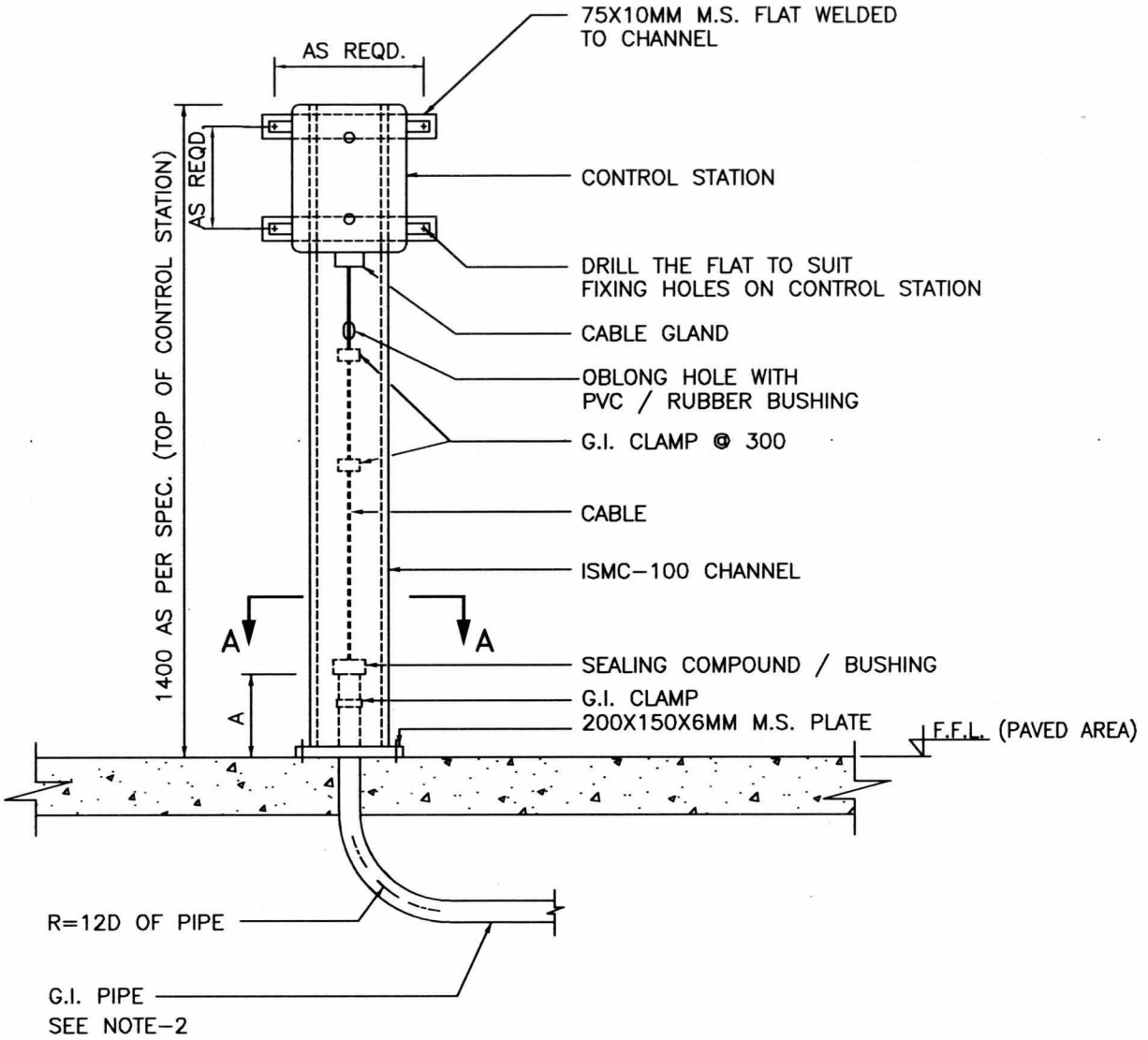
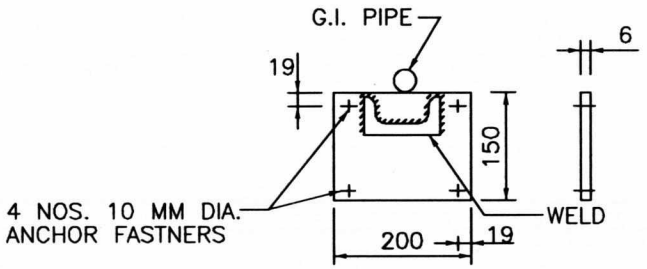


A= { 150 MM (MIN.) FOR INDOOR LOCATION
300 MM (MIN.) FOR OUTDOOR LOCATION



SECTION-AA

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. SIZE OF PIPE SLEEVE SHALL BE AS PER LAYOUT DRAWINGS.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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6	15.09.22	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
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4	21.11.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	SC

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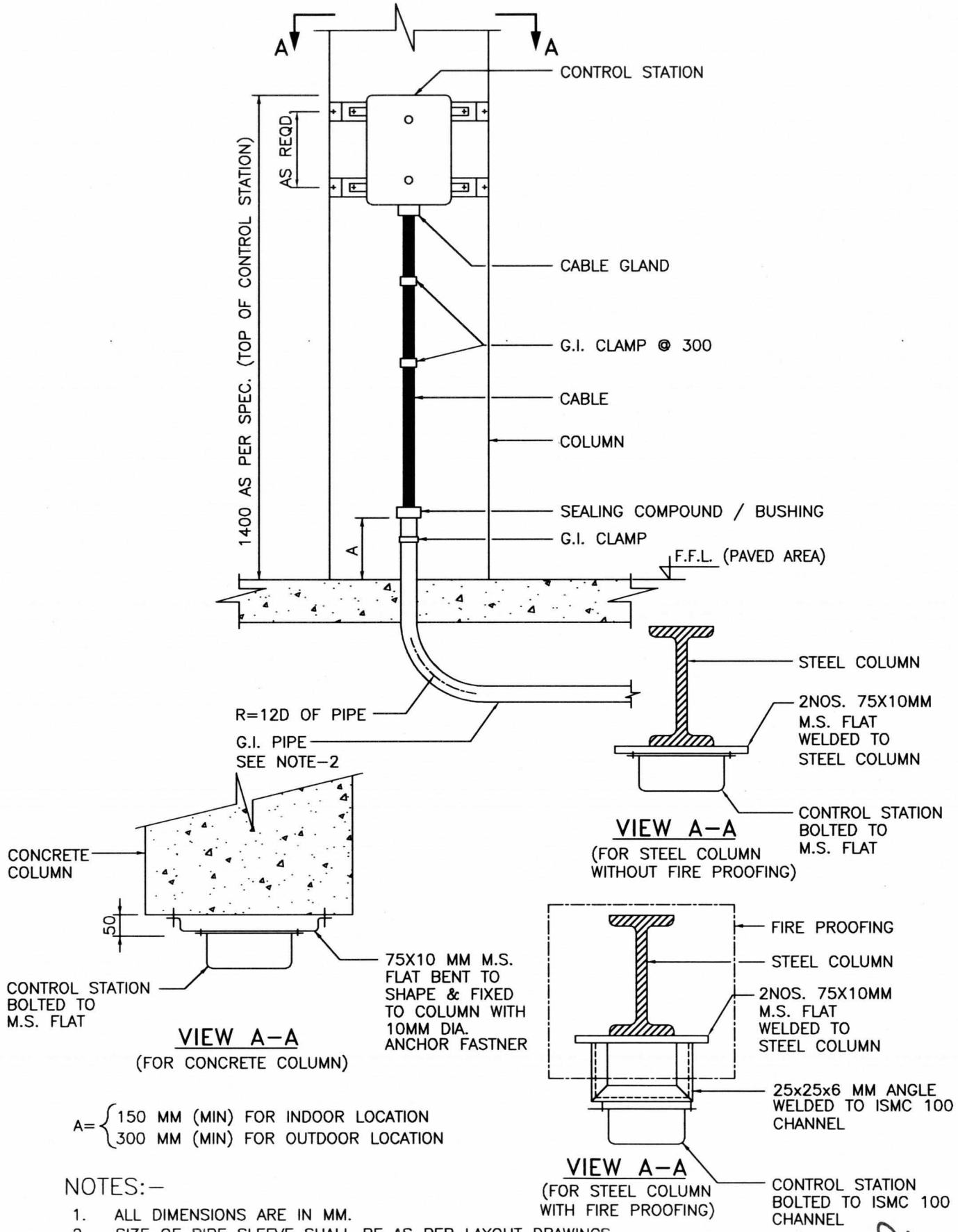
INSTALLATION DETAILS FOR CONTROL STATION ON CONCRETE / STEEL COLUMN IN PAVED AREA



A= { 150 MM (MIN) FOR INDOOR LOCATION
300 MM (MIN) FOR OUTDOOR LOCATION

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. SIZE OF PIPE SLEEVE SHALL BE AS PER LAYOUT DRAWINGS.

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4	21.11.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	SC

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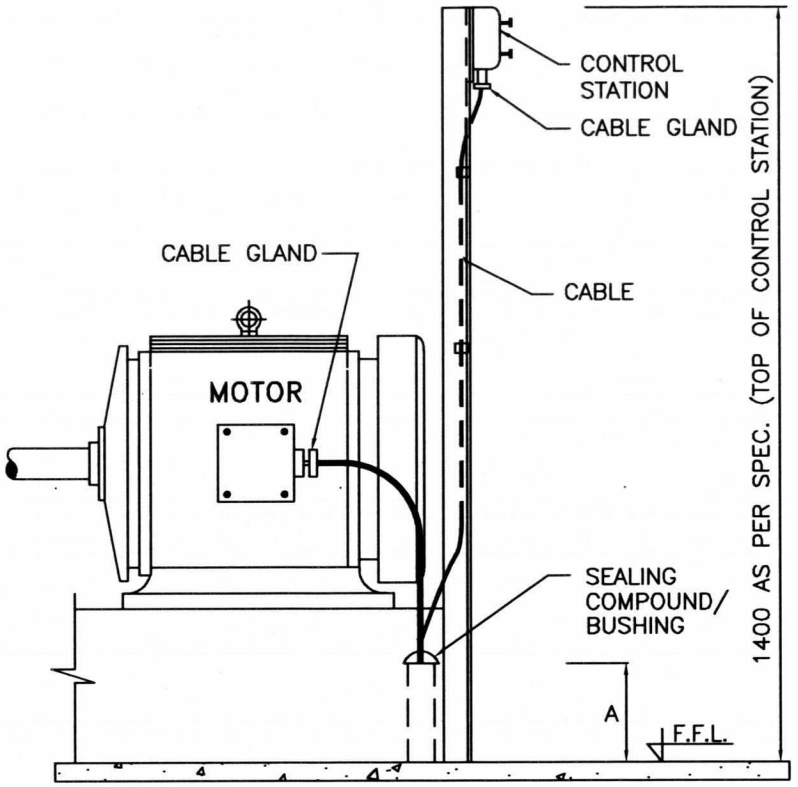
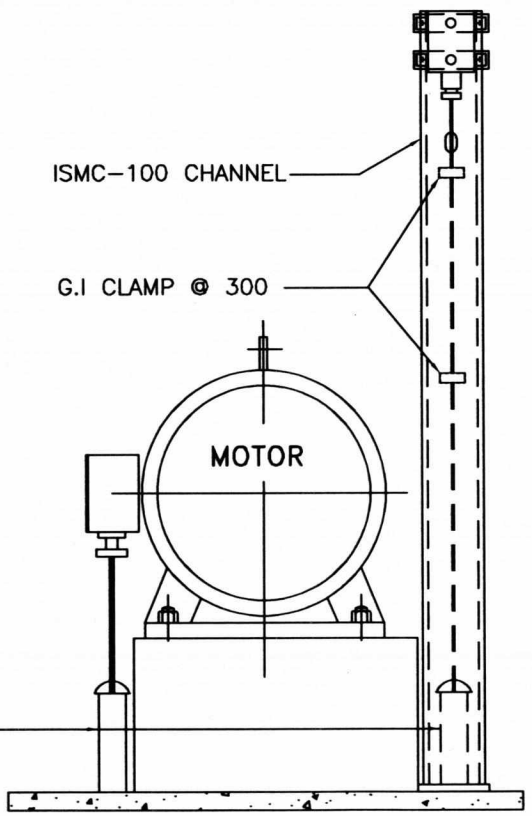


CABLE TO MOTOR TERMINAL BOX (SIDE ENTRY)



A = 150 MM (MIN.) FOR INDOOR LOCATIONS
300 MM (MIN.) FOR OUTDOOR LOCATIONS

CABLE TO MOTOR TERMINAL BOX (BOTTOM ENTRY)

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. QUANTITY AND SIZE OF PIPE SLEEVE SHALL BE AS PER LAYOUT DRAWINGS.

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6	15.09.22	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
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4	21.11.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	SC

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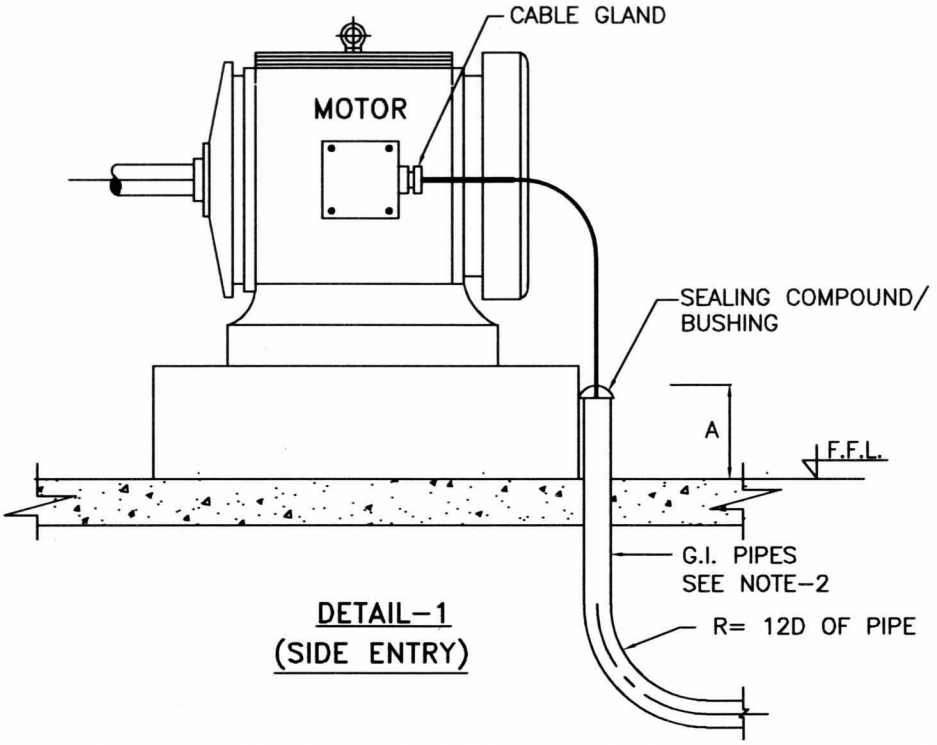
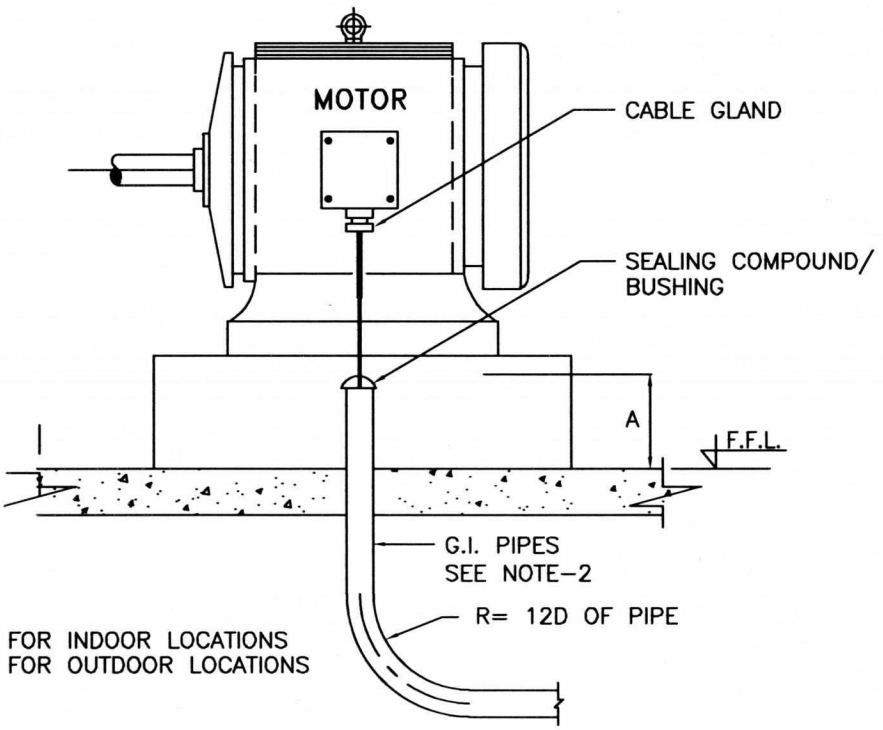


DETAIL-1
(SIDE ENTRY)



A = 150 MM (MIN.) FOR INDOOR LOCATIONS
300 MM (MIN.) FOR OUTDOOR LOCATIONS

DETAIL-2
(BOTTOM ENTRY)

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. QUANTITY AND SIZE OF PIPE SLEEVE SHALL BE AS PER LAYOUT DRAWINGS.
3. UNDER NORMAL CONDITION DETAIL-1 SHALL BE FOLLOWED. ONLY IN EXCEPTIONAL CASES DETAIL-2 SHALL BE FOLLOWED.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	15.09.22	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
5	14.03.18	REAFFIRMED & ISSUED AS STANDARD	RSD	VKS/HK	BRB	RN
4	21.11.13	REVISED & REISSUED AS STANDARD	BP	FA/SA	UAP/JMS	SC

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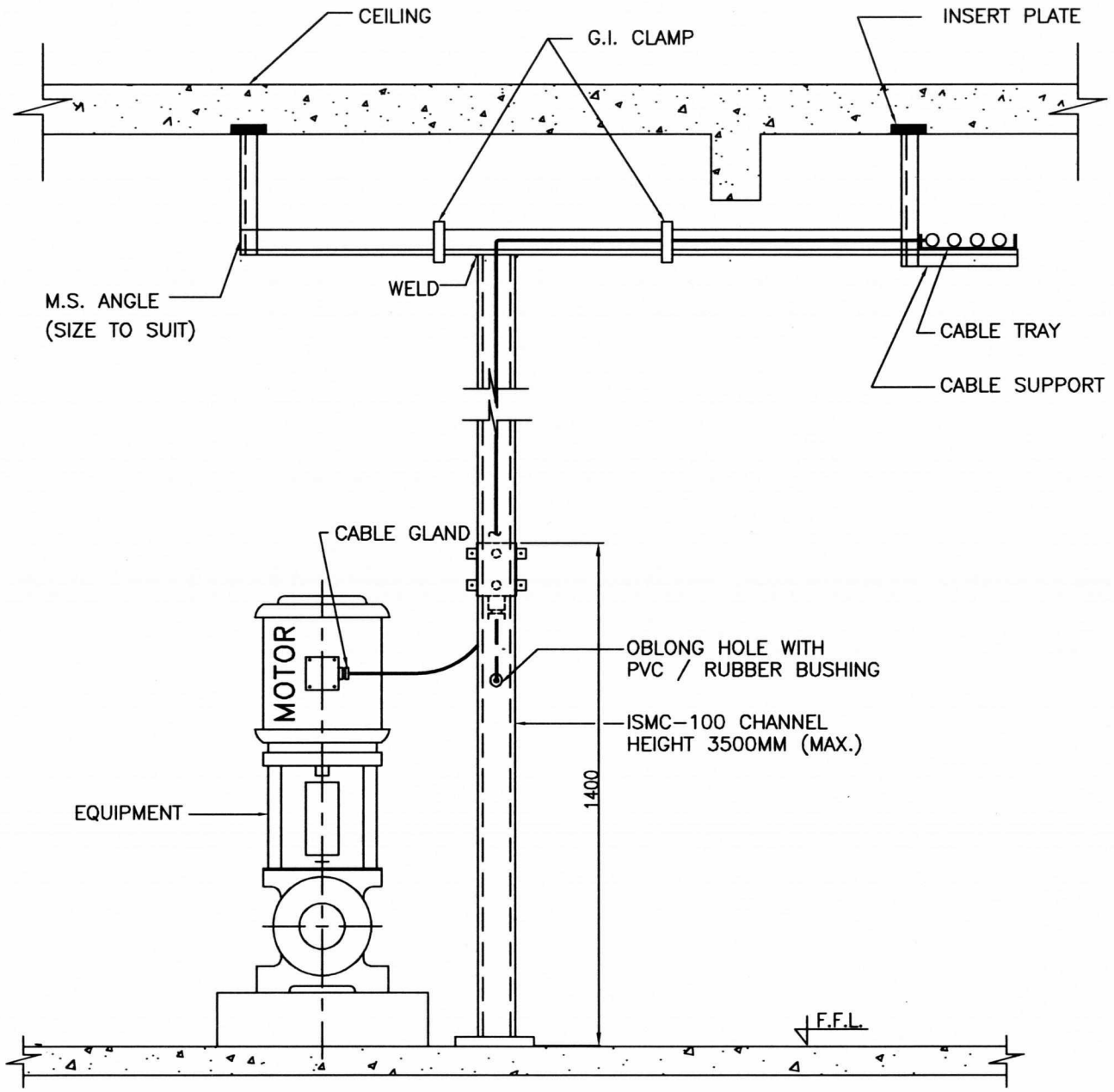

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. WHEREVER FEASIBLE, MAIN CABLE TRAY CAN BE ROUTED IN SUCH A WAY THAT ISMC CHANNEL CAN BE DIRECTLY WELDED TO TRAY SUPPORT.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	15.09.22	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
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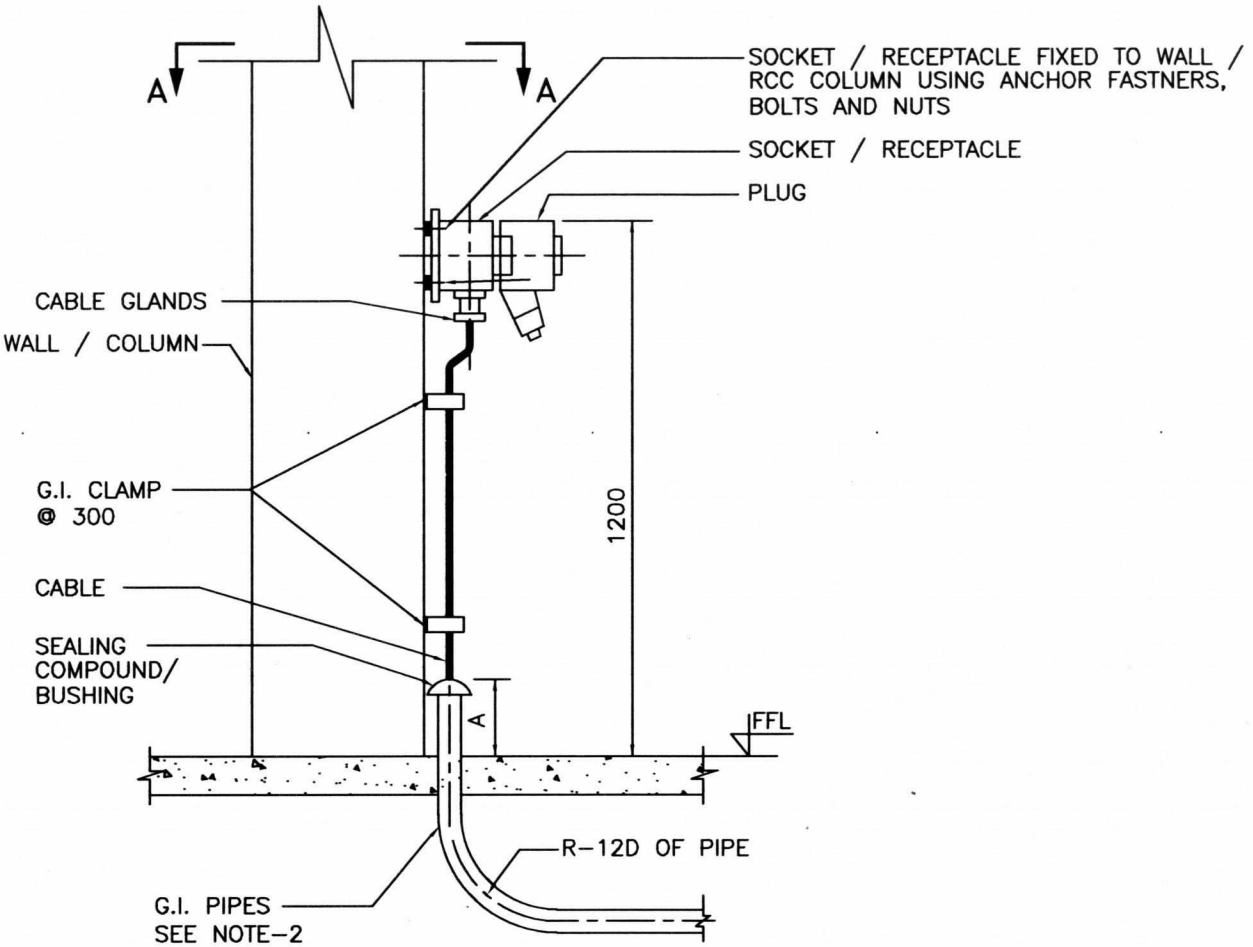
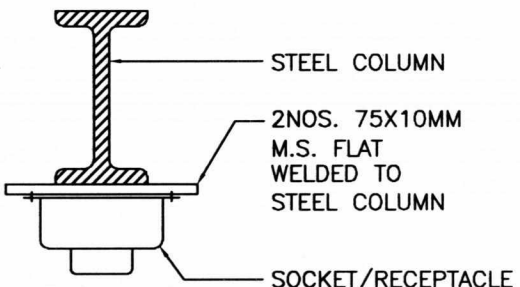
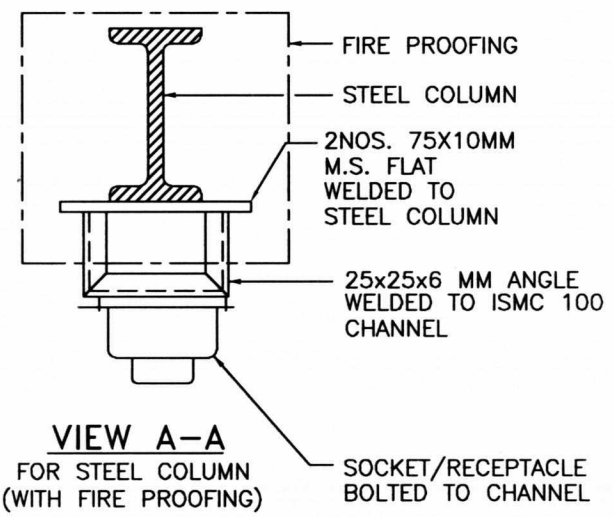




VIEW A-A
(FOR STEEL COLUMN WITHOUT FIRE PROOFING)

A = 150 MM (MIN.) FOR INDOOR LOCATIONS.
300 MM (MIN.) FOR OUTDOOR LOCATIONS.



VIEW A-A
FOR STEEL COLUMN (WITH FIRE PROOFING)

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. QUANTITY AND SIZE OF PIPE SLEEVES SHALL BE AS PER LAYOUT DRAWINGS.
3. WHERE STEEL STRUCTURES ARE ENCOUNTERED, SOCKET / RECEPTACLE SHALL BE MOUNTED ON SUITABLE ANGLE IRON FRAME WELDED TO STEEL STRUCTURE.
4. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED SOCKET / RECEPTACLE AND CABLE SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED ANGLE IRON FRAME / DISTANCE BRACKET.

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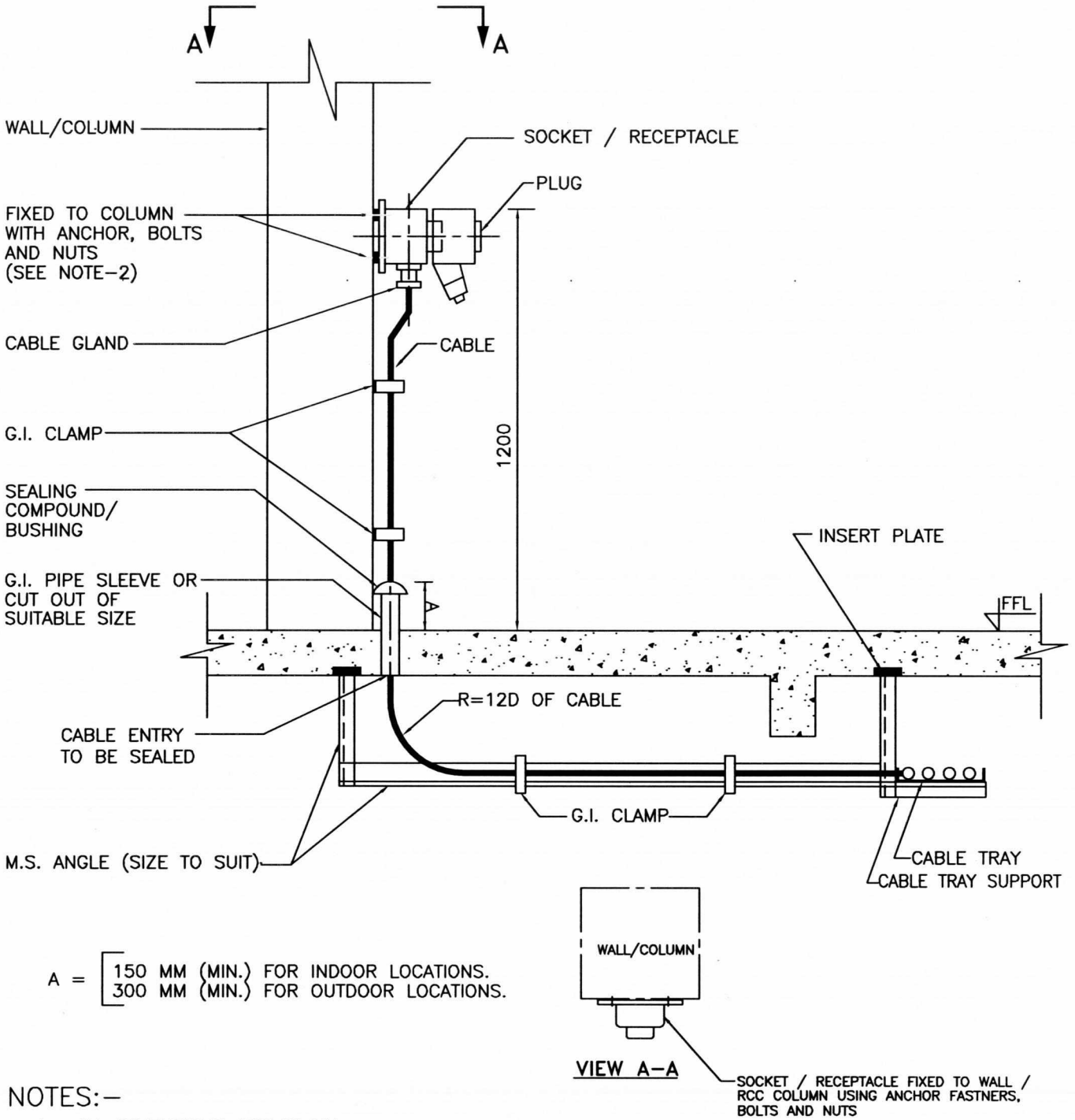

A = 150 MM (MIN.) FOR INDOOR LOCATIONS.
300 MM (MIN.) FOR OUTDOOR LOCATIONS.

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. WHERE STEEL STRUCTURES ARE ENCOUNTERED, SOCKET / RECEPTACLE SHALL BE MOUNTED ON SUITABLE ANGLE IRON FRAME WELDED TO STEEL STRUCTURE.
3. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED SOCKET / RECEPTACLE AND CABLE SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED ANGLE IRON FRAME / DISTANCE BRACKET.
4. QUANTITY AND SIZE OF PIPE SLEEVES SHALL BE AS PER LAYOUT DRAWINGS.

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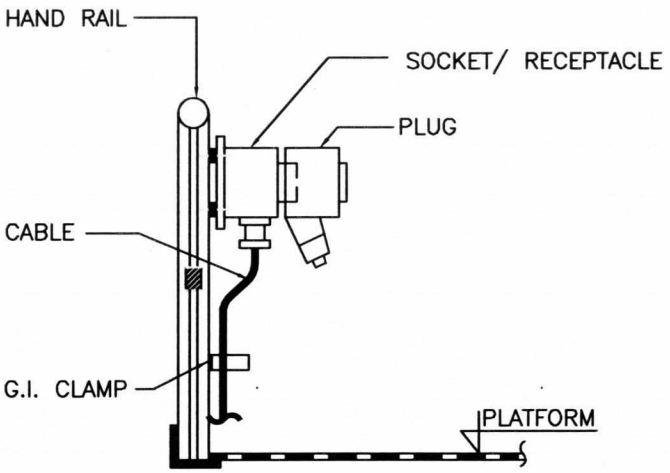

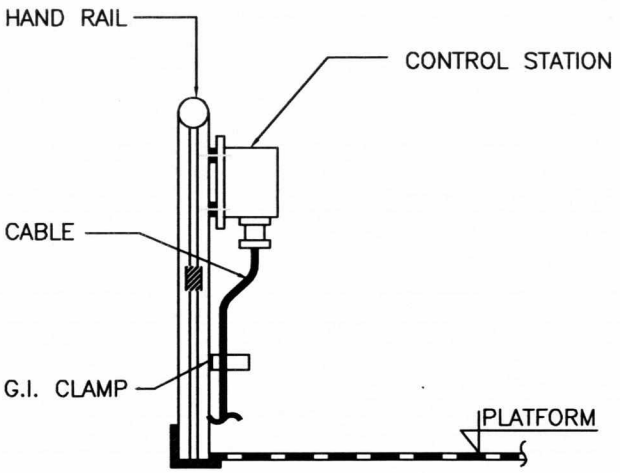

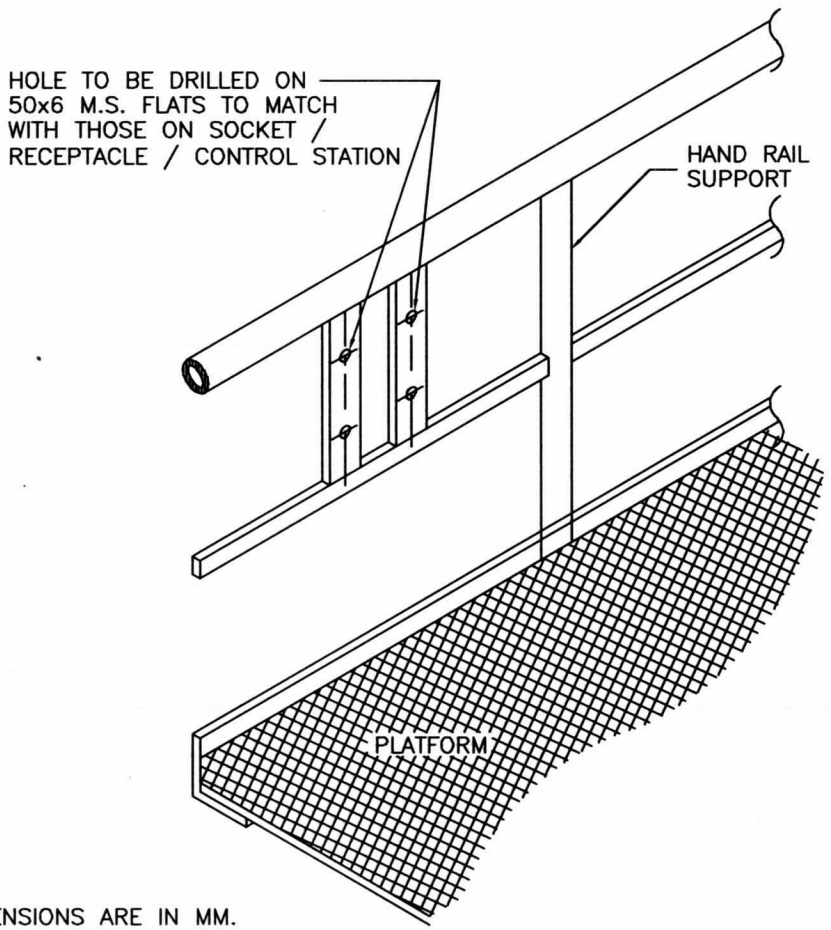

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. CABLE SHALL NOT BE ROUTED ALONG HAND RAIL.

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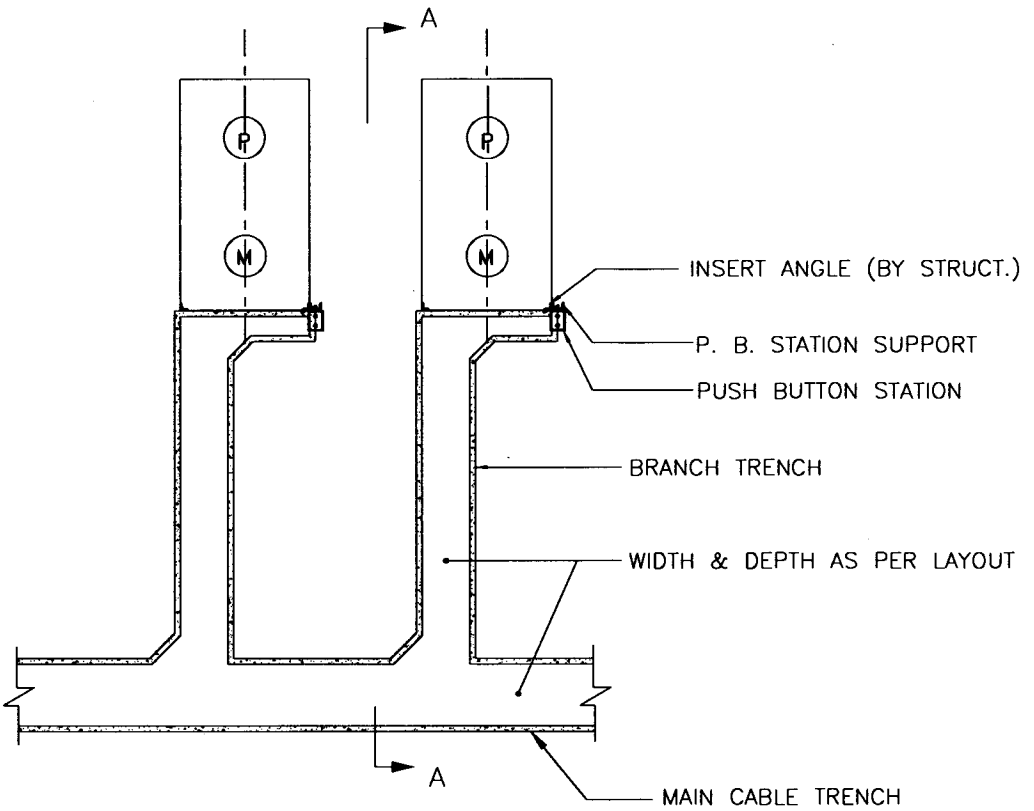
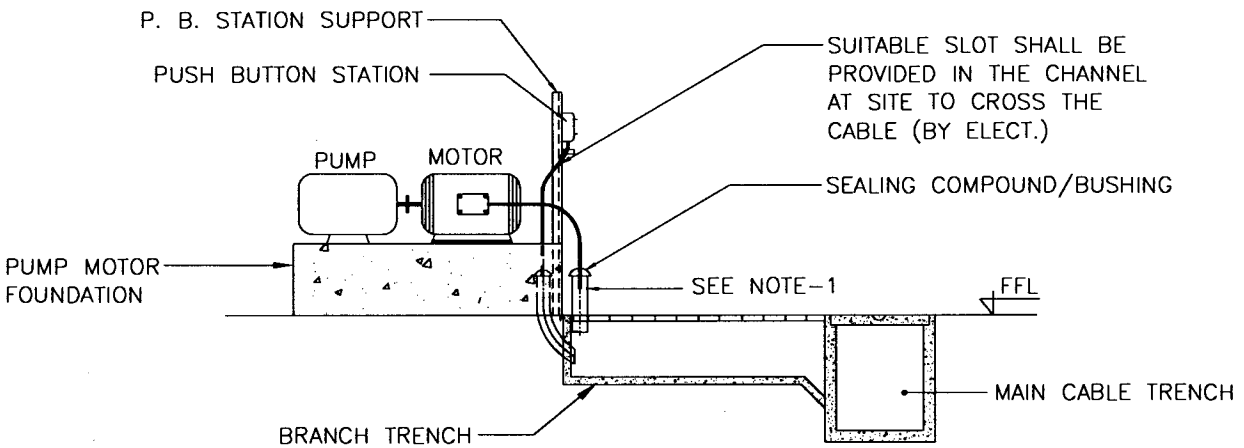


PLAN



SECTION A-A

NOTES:-

1. CABLE SHALL BE LAID IN SUITABLE SIZE OF G.I. PIPES .
2. CABLE TRENCH SHALL BE FILLED WITH SAND AFTER LAYING OF CABLES IN HAZARDOUS AREA (BY THE ELECTRICAL CONTRACTOR).

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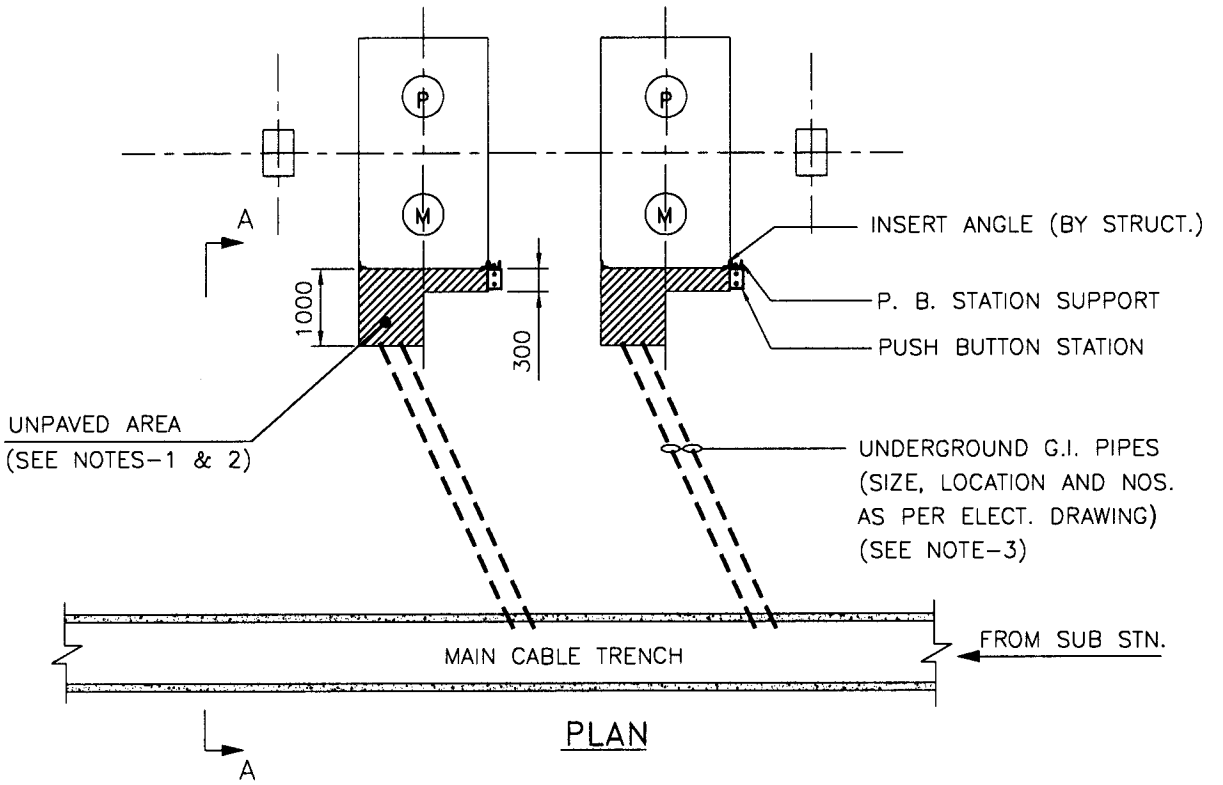
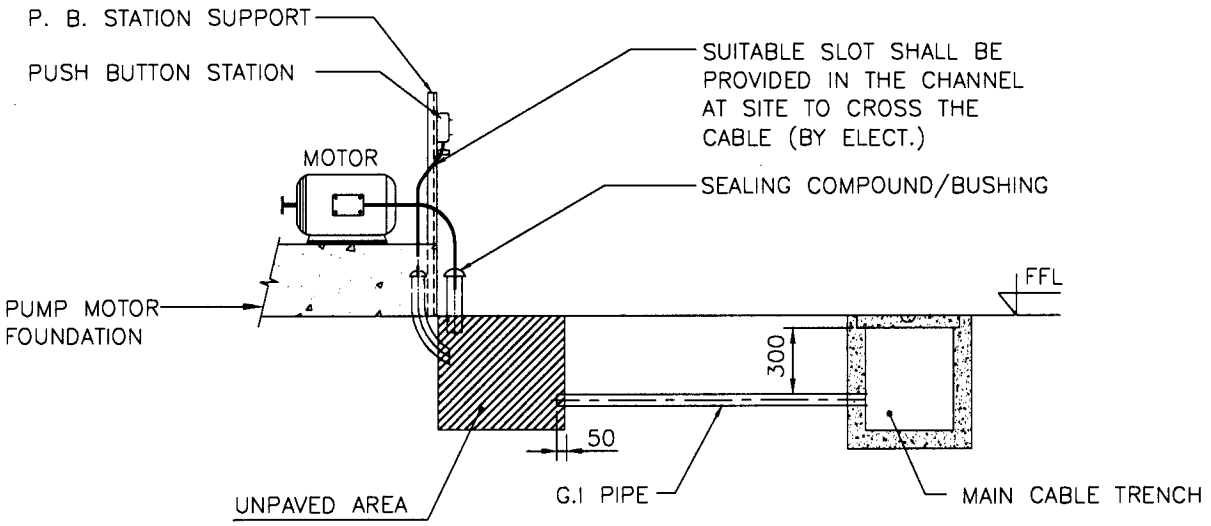


PLAN



SECTION A-A

NOTES:-

1. AREA SHOWN AS HATCHED NEAR EACH PUMP MOTOR FOUNDATION SHALL BE LEFT UNPAVED BY PAVEMENT CONTRACTOR.
2. CABLES LAYING & SAND / LEAN CONCRETE FILLING IN THIS UNPAVED AREA SHALL BE DONE BY ELECTRICAL CONTRACTOR.
3. CIVIL CONTRACTOR SHALL PROVIDE G.I PIPES AND PLUG BOTH ENDS OF THE PIPES WITH PVC BUSHINGS.

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ELECTRICAL POWER IS THE MAINSTAY OF ANY CONSTRUCTION ACTIVITY. AT THE SAME TIME IT REQUIRES UTMOST CARE IN IT'S UTILISATION TO AVOID ACCIDENTS DUE TO ELECTRICAL SHOCK, FIRE INCIDENTS OR ELECTRIC SHORT CIRCUITS. EXPOSURE OF ELECTRICAL INSTALLATION TO ADVERSE ENVIRONMENTAL CONDITIONS INCREASE THE RISK OF SUCH ACCIDENTS. HENCE IT IS NECESSARY TO TAKE EXTRA PRECAUTIONS FOR SUCH INSTALLATIONS TO ENSURE SAFETY OF PERSONNEL AND EQUIPMENT. THIS STANDARD ADDRESSES THE SAFETY MEASURES REQUIRED TO BE ADOPTED FOR THE ELECTRICAL INSTALLATIONS BY ALL CONTRACTORS DURING CONSTRUCTION PHASE.

1. ALL ELECTRICAL CONNECTIONS/WORK FOR ELECTRICAL INSTALLATIONS SHALL BE CARRIED OUT AS PER PROVISIONS OF THE LATEST REVISION OF THE FOLLOWING CODES AND STANDARDS IN ADDITION TO THE REQUIREMENTS OF STATUTORY AUTHORITIES AND CEA REGULATIONS–2010.
   OISD–STD–173 : FIRE PREVENTION AND PROTECTION SYSTEM FOR ELECTRICAL INSTALLATIONS.
   OISD–STD–192 : SAFETY PRACTICE DURING CONSTRUCTION.
   SP–30 (BIS) : NATIONAL ELECTRIC CODE.
   THE INSTALLATION SHALL HAVE APPROVAL FROM CONCERNED STATUTORY AUTHORITIES.
2. ALL ELECTRICAL CONNECTIONS SHALL BE DONE BY AN ELECTRICIAN WITH VALID LICENCE AND TO THE SATISFACTION OF ENGINEER–IN–CHARGE.
3. ONE COMPETENT LICENCED ELECTRICIAN SHALL BE MADE AVAILABLE BY CONTRACTOR AT SITE ROUND THE CLOCK TO ATTEND TO THE NORMAL/EMERGENCY JOBS.
4. ALL SWITCH BOARDS/WELDING MACHINES SHALL BE KEPT IN WELL VENTILATED & COVERED SHED. THE SHED SHALL BE ELEVATED TO AVOID WATER LOGGING. 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.
5. FIRE EXTINGUISHERS AND INSULATING MATS SHALL BE PROVIDED IN ALL POWER DISTRIBUTION CENTERS.
6. TEMPORARY ELECTRICAL EQUIPMENT SHALL NOT BE EMPLOYED IN HAZARDOUS AREAS WITHOUT OBTAINING SAFETY PERMIT.
7. PROPER HOUSE KEEPING SHALL BE DONE AROUND THE ELECTRICAL INSTALLATIONS.
8. ALL TEMPORARY INSTALLATIONS SHALL BE TESTED BEFORE ENERGISING, TO ENSURE PROPER EARTHING, BONDING, SUITABILITY OF PROTECTION SYSTEM, ADEQUACY OF FEEDERS/CABLES ETC.
9. ALL WELDERS SHALL USE HAND GLOVES IRRESPECTIVE OF HOLDER VOLTAGE.
10. MULTILINGUAL (ENGLISH, HINDI 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.
11. OPERATION OF EARTH LEAKAGE DEVICE SHALL BE CHECKED REGULARLY BY PORTABLE ELCB/RCCB TESTER.
12. THE FOLLOWING DESIGN FEATURES SHALL BE ENSURED FOR ALL ELECTRICAL INSTALLATIONS DURING CONSTRUCTION PHASE.

12.1 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.

12.2 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.

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4	07.12.21	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	PG	SM
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2	02.03.12	REAFFIRMED & ISSUED	BP	RKS/RSC	UAP/JMS	DM

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12.3 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. THE EARTH LEAKAGE DEVICE SHALL HAVE AN OPERATING CURRENT NOT EXCEEDING 30 mA.

12.4 ALL CONNECTIONS TO THE HANDTOOLS/WELDING RECEPTACLES SHALL BE TAKEN THROUGH PROPER SWITCHES, SOCKETS AND PLUGS.

12.5 ALL SINGLE PHASE SOCKETS SHALL BE MINIMUM 3 PIN TYPE ONLY. ALL UNUSED SOCKETS SHALL BE PROVIDED WITH SOCKET CAPS.

12.6 ONLY 3 CORE (P+N+E) OVERALL SHEATHED FLEXIBLE CABLES WITH MINIMUM CONDUCTOR SIZE OF 1.5 MM^2 COPPER SHALL BE USED FOR ALL HAND TOOLS.

12.7 ONLY METALLIC DISTRIBUTION BOXES WITH DOUBLE EARTHING SHALL BE USED AT SITE. NO WOODEN BOXES SHALL BE USED.

12.8 ALL POWER CABLES SHALL BE TERMINATED WITH COMPRESSION TYPE NICKEL PLATED BRASS CABLE GLANDS. LUGS OF COPPER/ALUMINIUM/BIMETALLIC MATERIAL, AS APPLICABLE SHALL BE USED FOR MULTISTRAND WIRES/CABLES HAVING MUTISTRAND/SOLID CONDUCTOR.

12.9 CABLES SHALL BE FREE FROM ANY INSULATION DAMAGE.

12.10 CABLES SHALL BE LAID IN UNDERGROUND AT A MINIMUM DEPTH OF 750 MM, FOR LV & CONTROLS AND 900MM FOR HV CABLES COVERED WITH SAND, BRICK AND SOIL FOR ENSURING MECHANICAL PROTECTION. CABLES SHALL NOT BE LAID IN WATER LOGGED 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 CROSSING.

12.11 UNDER GROUND CABLES SHALL NOT BE ALLOWED TO CROSS THE ROADS WITHOUT PIPE SLEEVE.

12.12 ALL CABLE JOINTS SHALL BE DONE WITH PROPER JOINTING KIT. NO TAPED/TEMPORARY JOINTS SHALL BE USED.

12.13 AN INDEPENDENT EARTHING FACILITY SHOULD PREFERABLY BE ESTABLISHED WITHIN THE TEMPORARY INSTALLATION PREMISES. ALL APPLIANCES AND EQUIPMENT SHALL BE ADEQUATELY EARTHED. IN CASE ARMOURED CABLES ARE USED, THE ARMOUR SHALL BE BONDED TO THE EARTHING SYSTEM.

12.14 ALL CABLES AND WIRE ROPE USED FOR EARTH CONNECTIONS SHALL BE TERMINATED THROUGH LUGS OF TINNED COPPER/ALUMINIUM/ BIMETALLIC MATERIAL, AS APPLICABLE.

12.15 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.

12.16 SEPARATE CORE SHALL BE PROVIDED FOR NEUTRAL. EARTH/STRUCTURES SHALL NOT BE USED AS A NEUTRAL IN ANY CASE.

12.17 ON/OFF POSITION OF ALL SWITCHES SHALL BE CLEARLY DESIGNATED/PAINTED FOR EASY ISOLATION IN EMERGENCY.

13. ALL INSULATIONS AND ELECTRICAL INSTALLATIONS SHALL BE INSPECTED BY ENGINEER-IN-CHARGE ATLEAST ONCE IN A MONTH.

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4	07.12.21	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	PG	SM
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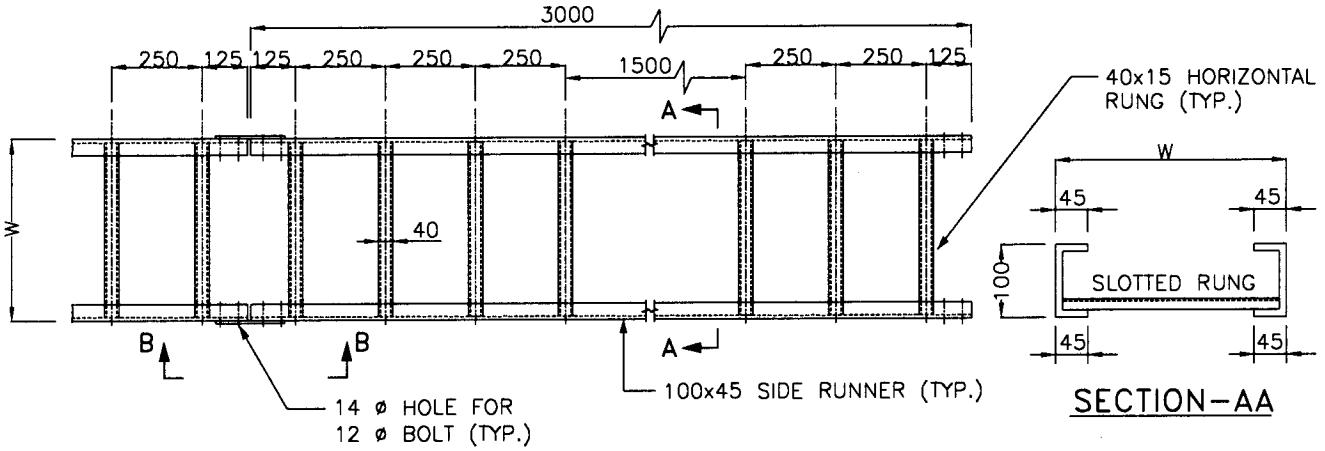
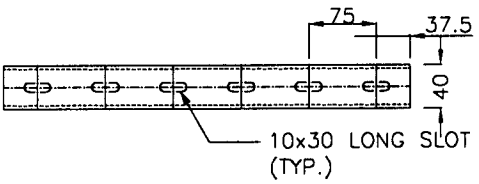
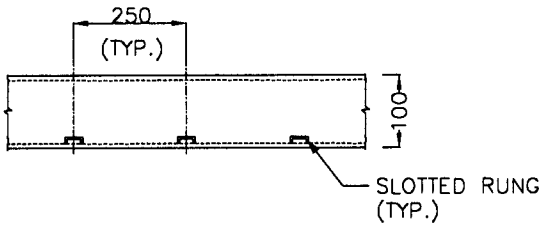


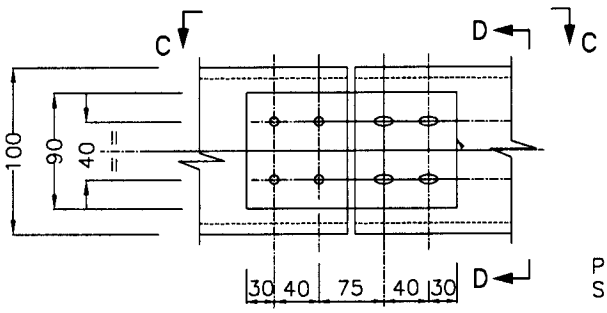
LADDER TYPE CABLE TRAY
(W=300/450/600/750/1000)



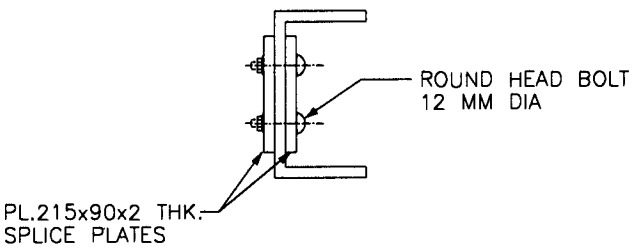
SLOTTED RUNG



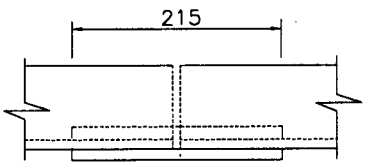
SIDE RUNNER



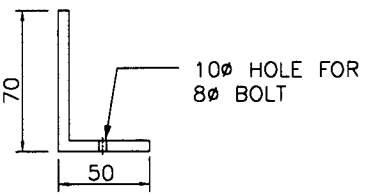
VIEW B–B



SECTION D–D



VIEW C–C



BARRIER PLATE
(100 MM LONG)

NOTES:–

1. 12 DIA ROUND HEAD BOLT WITH WASHERS & NUTS CONFORMING TO IS 1367 SHALL BE USED FOR FIXING OF SPLICE PLATE.

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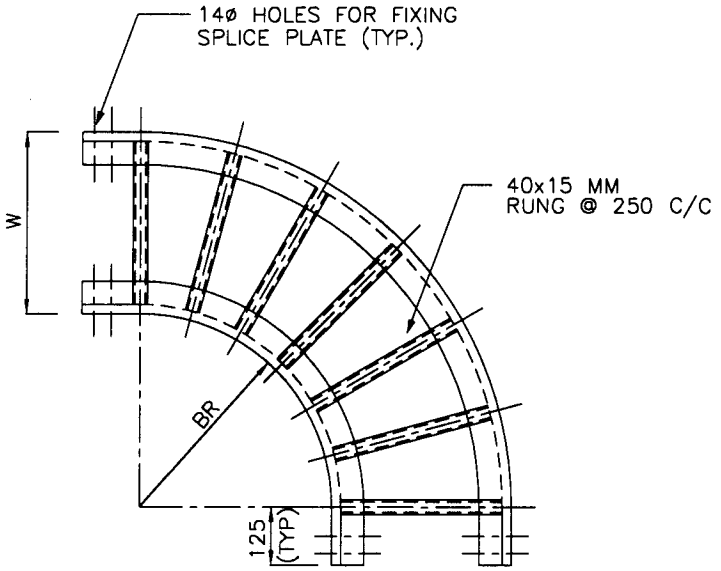
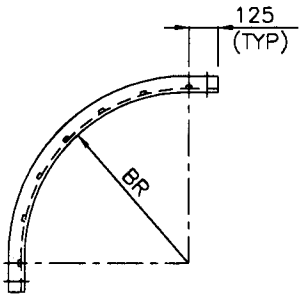
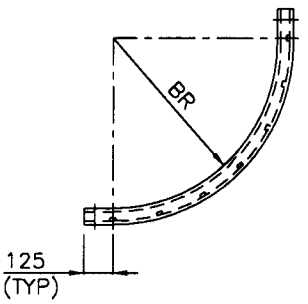


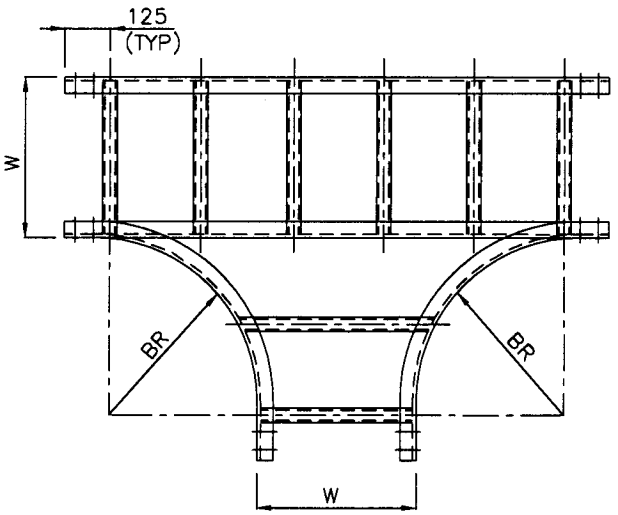
HORIZONTAL BEND



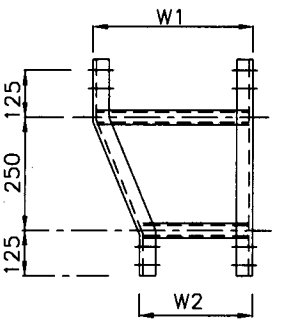
VERTICAL OUTSIDE BEND



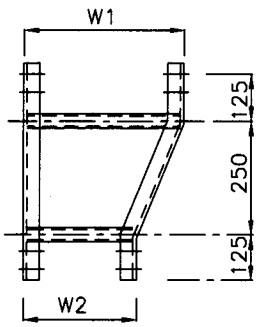
VERTICAL INSIDE BEND



'T' JOINT



LEFT HAND REDUCER



RIGHT HAND REDUCER

W – WIDTH OF CABLE TRAY (300/450/600/750/1000 MM)
W1 – WIDTH OF CABLE TRAY ON ONE SIDE
W2 – WIDTH OF CABLE TRAY ON OTHER SIDE
BR – BENDING RADIUS (750/1000/1250/1600/2000 MM)

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3	10.07.17	REAFFIRMED & ISSUED AS STANDARD	BP	FA/HK	BRB	RN

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GENERAL NOTES:-

1. THE CABLE TRAYS AND ACCESSORIES SHALL COMPLY WITH LATEST EDITION OF INDIAN STANDARDS IS: 1367(PART-13), IS:2629, IS:5986.
2. THE CABLE TRAYS SHALL BE LADDER TYPE PREFABRICATED, HOT DIP GALVANIZED. THE LADDER TYPE TRAYS SHALL CONSIST OF SIDE RUNNERS & HORIZONTAL RUNGS AS PER DETAILS SHOWN IN PAGE 1 & 2.
3. THE LADDER TYPE TRAYS AND ACCESSORIES SHALL HAVE RIGID WELDED CONSTRUCTION AND SHALL BE FABRICATED OUT OF 2 mm THICK HOT ROLLED SHEET STEEL. THE RUNGS SHALL BE WELDED TO THE SIDE RUNNERS.
4. SIDE RUNNERS SHALL BE 100 x 45 mm CHANNEL INCLUDING FOR HOIZONTAL & VERTICAL BENDS WITH THE FLANGES FACING INSIDE. RUNGS SHALL BE 40 x 15 mm SLOTTED CHANNEL TYPE.
5. CABLE TRAYS SHALL BE SUITABLE FOR A CABLE WEIGHT OF 75 kg PER METRE OF RUNNING LENGTH OF TRAY AND SHALL BE SUPPORTED AT 3 m INTERVALS. IN ADDITION, TRAYS SHALL BE SUITABLE FOR A POINT LOAD OF 70 kg (EQUIVALENT WEIGHT OF A MAN WORKING ON THE CABLE TRAY).
6. EACH SIDE RUNNER CHANNELS SHALL BE CONNECTED AT ENDS USING 2 SPLICE PLATES ONE ON EACH SIDE AS SHOWN IN PAGE 1.
7. THE SIDE RUNNER WILL ALSO HAVE SUITABLE HOLES AT EVERY METRE FOR CLEATING EARTHING STRIP. SUITABLE THREADED HOLES SHALL BE PROVIDED ON THE RUNNER TOP AND BOTTOM FOR SUPPORTING AND FIXING TRAY COVERS WITH SCREWS AT EVERY METRE.
8. HOT DIP GALVANIZING SHALL BE DONE AFTER FABRICATION AS PER THE RELEVANT INDIAN STANDARD SPECIFICATIONS. THE AMOUNT OF GALVANIZING SHALL BE MINIMUM 610 g/m^2.
9. THE TYPE OF CONSTRUCTION SHALL BE SUCH AS TO FACILITATE EASY HANDLING, ASSEMBLY AND INSTALLATION AT SITE. FOR THE CONSTRUCTION OF CABLE TRAYS THE STANDARD STRAIGHT LENGTH OF CABLE TRAY SHALL BE 3 METERS UNLESS OTHERWISE SPECIFIED.
10. SPLICE PLATE OF CABLE TRAYS SHALL BE PLACED NOT MORE THAN 750 MM FROM SUPPORT ANGLE.
11. THE WORKMANSHIP SHALL BE SUCH AS TO ENSURE EASY LAYING OF CABLES WITHOUT CAUSING DAMAGE TO CABLES. ALL SURFACES SHALL BE FREE FROM DEFECTS SUCH AS BURRS, SHARP EDGES ETC.
12. THE HARDWARE SHALL CONFORM TO THE RELEVANT INDIAN STANDARD SPECIFICATIONS AND SHALL BE ABLE TO WITHSTAND THE MAXIMUM LOADING CONDITIONS AS REQUIRED. ALL HARDWARE AND FITTINGS SHALL BE STAINLESS STEEL SS-304. HARDWARE SHALL INCLUDE BOLTS, NUTS, WASHERS ETC.
13. THE BENDS, TEES, REDUCERS AND DROPPERS SHALL HAVE A BENDING RADIUS AS DESCRIBED IN THE SCHEDULE OF RATES.
14. THE FOLLOWING TESTS FOR THE AMOUNT OF ZINC COATING SHALL BE CARRIED OUT:
    - THICKNESS OF GALVANIZED COATING BY ELCOMETER.
    - MASS OF GALVANIZED COATING BY STRIPPING TEST.
    - DETERMINATION OF UNIFORMITY OF GALVANIZED COATING.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
4	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	SA	SM
3	10.07.17	REAFFIRMED & ISSUED AS STANDARD	BP	FA/HK	BRB	RN

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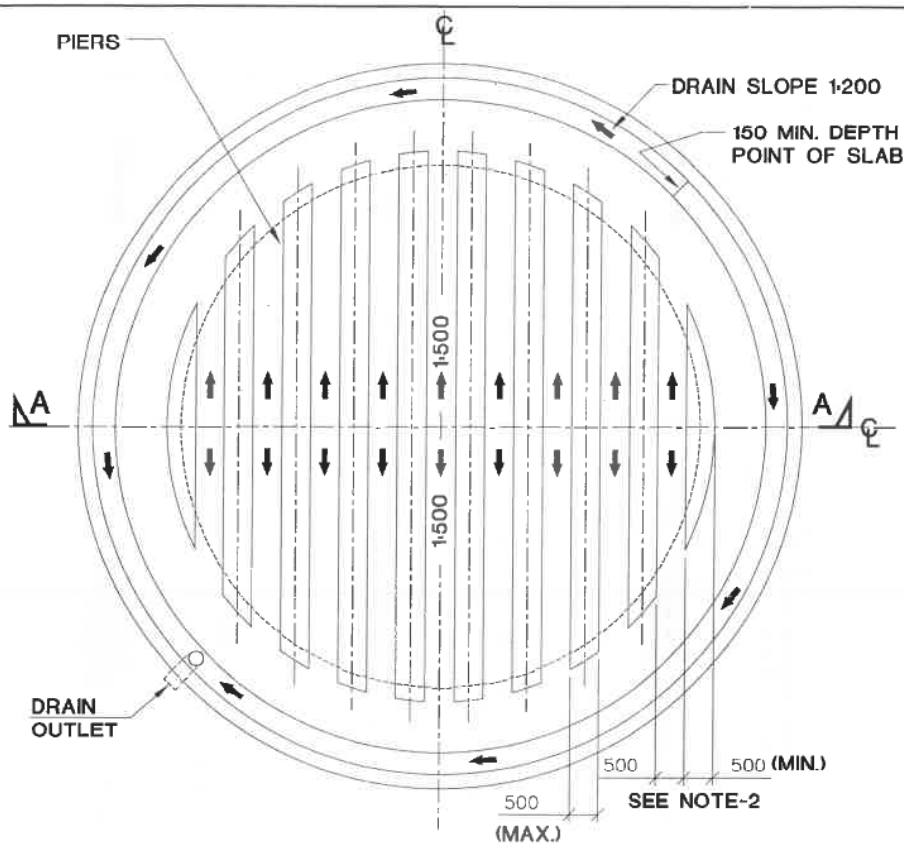
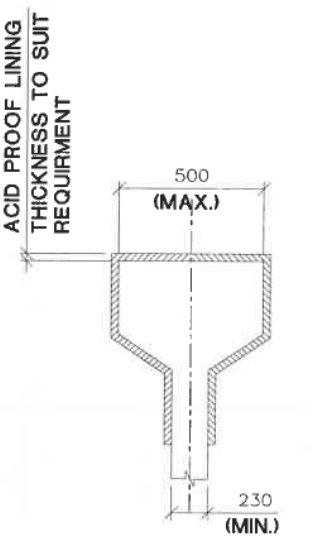
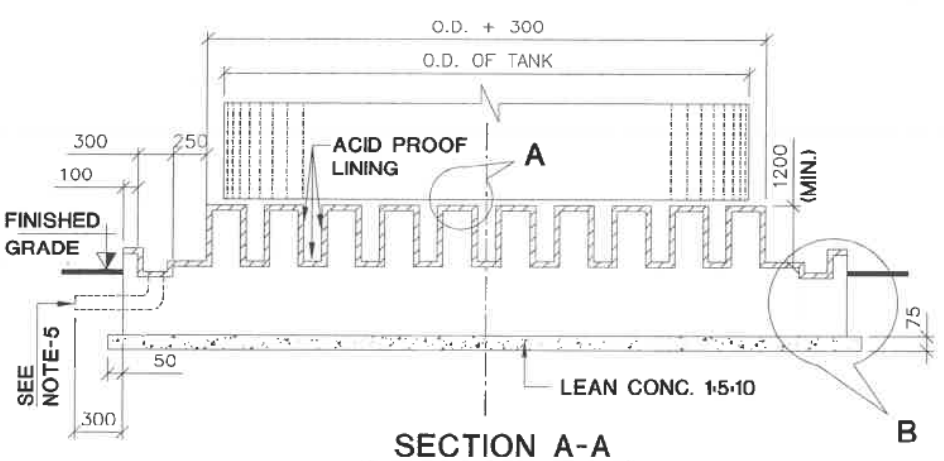


PLAN

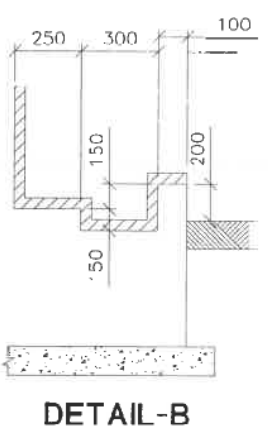


DETAIL-A

(ALTERNATIVE)



SECTION A-A



DETAIL-B

NOTES :-

1. CLEAR DISTANCE BETWEEN INNER EDGES OF PIERS SHALL SUIT TANK FLOOR PLATE THICKNESS.
2. SPACE PIERS TO AVOID LONGITUDINAL WELD SEAMS IN TANK FLOOR PLATE DIRECTLY OVER THEM.
3. PROVIDE CUTOUTS 200 WIDE 100 DEEP IN PIERS UNDER TRANSVERSE WELDED JOINTS IN FLOOR PLATE TO SUIT TANK FABRICATION DRAWING.
4. CONCRETE GRADE SHALL BE AS PER GENERAL NOTES OF THE PROJECT BUT NOT LOWER THAN M20.
5. DRAIN OUTLET PIPE SHALL BE OF HDPE. THE OUTLET SHALL BE CONNECTED TO THE ACID SEWERAGE SYSTEM.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	09.04.24	REVISED AND ISSUED AS STANDARD	EMMANUEL	DEEPAK	ANURAG SINHA	MAINAK NANDI
6	06.06.18	REAFFIRMED AND ISSUED AS STANDARD	CS	AVM	R.SRIVASTAVA	RK TRIVEDI

Approved by

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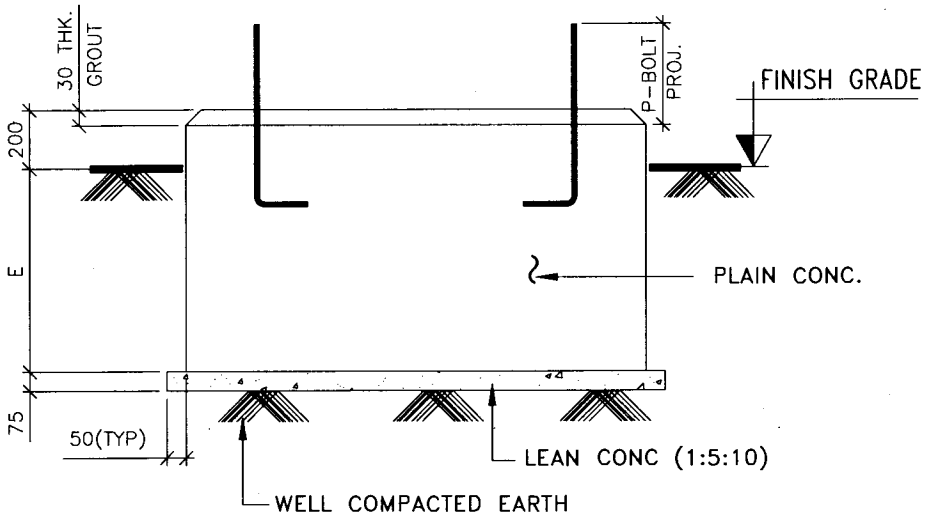
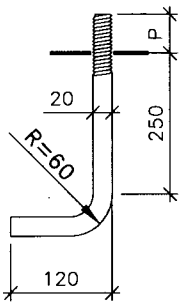
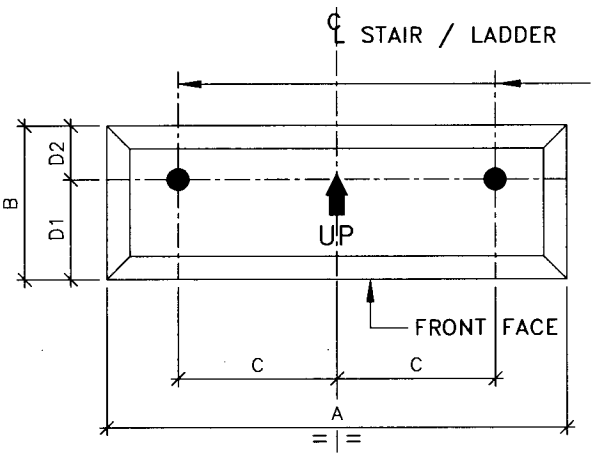


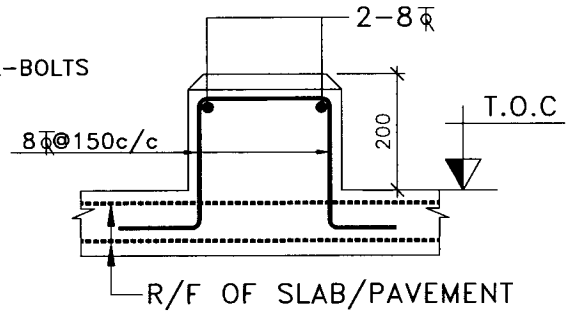
PEDESTAL FOR UNPAVED AREA



DET. OF L-BOLT



PLAN



PEDESTAL ON CONC. PAVEMENT/R.C.C. SLAB

S.NO.	ITEM	WIDTH	A	B	C	D1	D2	P	E	NUT	REMARKS
1	LADDER	450	750	300	280	200	100	90	500	SINGLE	
2	STAIR	750	1100	310	421	160	150	90	600	SINGLE	FOR STRINGER BEAM MC150
3	STAIR	750	1100	355	421	255	100	90	600	SINGLE	FOR STRINGER BEAM MC200

NOTES:-

1. IN CASE OF PEDESTAL OVER PILE CAP/RCC FOUNDATION, DIMENSION 'E' TO SUIT ACCORDINGLY BUT NOT TO EXCEED VALUES GIVEN IN ABOVE TABLE.
2. CONCRETE GRADE SHALL BE AS PER GENERAL NOTES OF THE PROJECT BUT NOT LOWER THEN M20.
3. REBARS GRADE SHALL BE AS PER GENERAL NOTES OF THE PROJECT.
4. M20 L-BOLT AS PER DETAIL GIVEN ABOVE SHALL BE PROVIDED.
5. ANCHOR BOLT GRADE, NUTS, WASHERS & THREADING SHALL BE AS PER STANDARD NO. 7-68-0417.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
			JITENDER GUPTA	ANKUR SHARMA	ANURAG SINHA	S. MAZUMDAR
8	08.07.21	REVISED AND ISSUED AS STANDARD				
7	16.09.16	REAFFIRMED AND ISSUED AS STANDARD	B.S SHARMA	R.B SHARMA	RAJAN JI SRIVASTAVA	R.NANDA

Approved by

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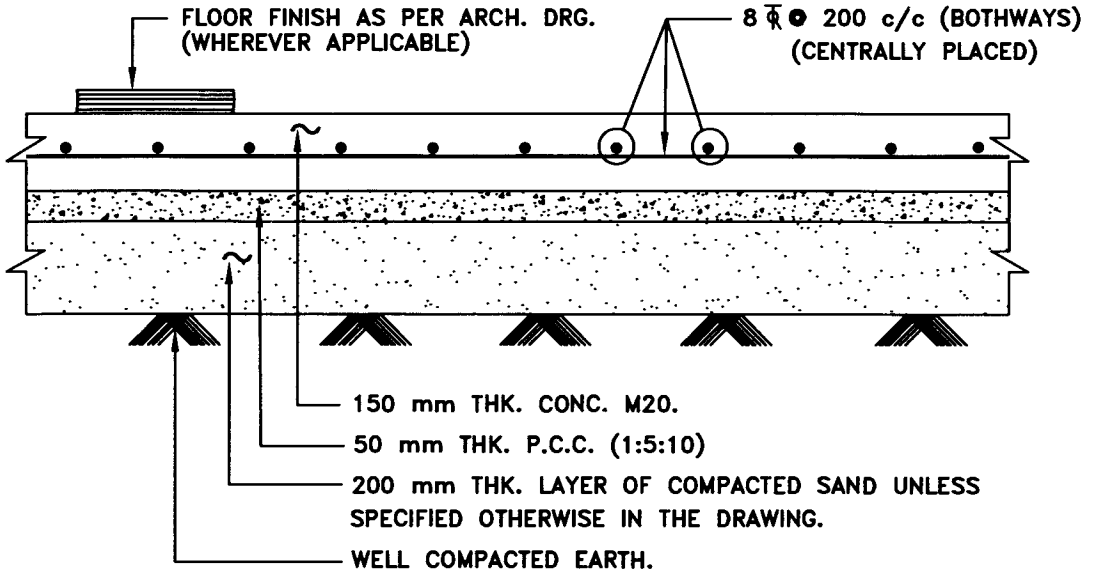
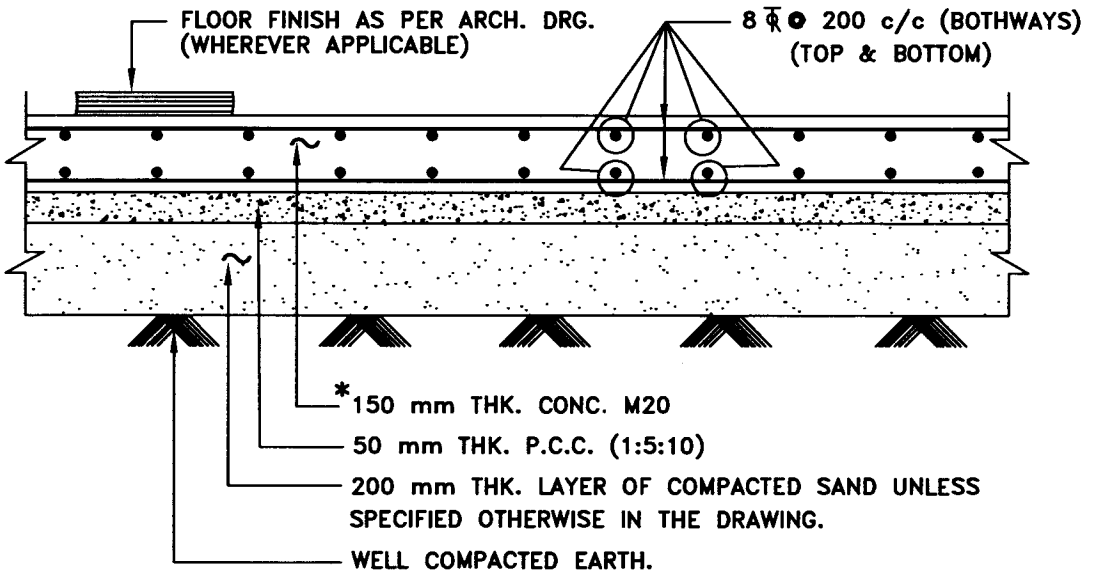


TYPE – I

(FOR PLANT BUILDINGS, SUB–STATION, CONTROL ROOM, PUMP HOUSE, UTILITY COMPRESSOR HOUSE, PARKING AREA, STORE & PORCH)



TYPE – II

(FOR WAREHOUSE, WORKSHOP, CEMENT GODOWN, FIRE STATION & PROCESS COMPRESSOR HOUSE)

*(FLOOR THICKNESS SHALL BE 150 mm FOR CLEAR COVER UPTO 40 mm AND FLOOR THICKNESS SHALL BE 200 mm FOR CLEAR COVER MORE THAN 40 mm)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Approved by Stds. Bureau Chairman
6	12.04.22	REVISED AND RE–ISSUED AS STANDARD	OM PRAKASH	V. GOEL	ANURAG SINHA	SANJAY MAZUMDAR
5	20.10.16	REAFFIRMED AND ISSUED AS STANDARD	NARENDER KUMAR	V. GOEL	R. SRIVASTAVA	RAKESH NANDA
4	27.06.11	REAFFIRMED AND ISSUED AS STANDARD	SUSHMA	P.K.MITTAL	S.CHATURVEDI	D.MALHOTRA

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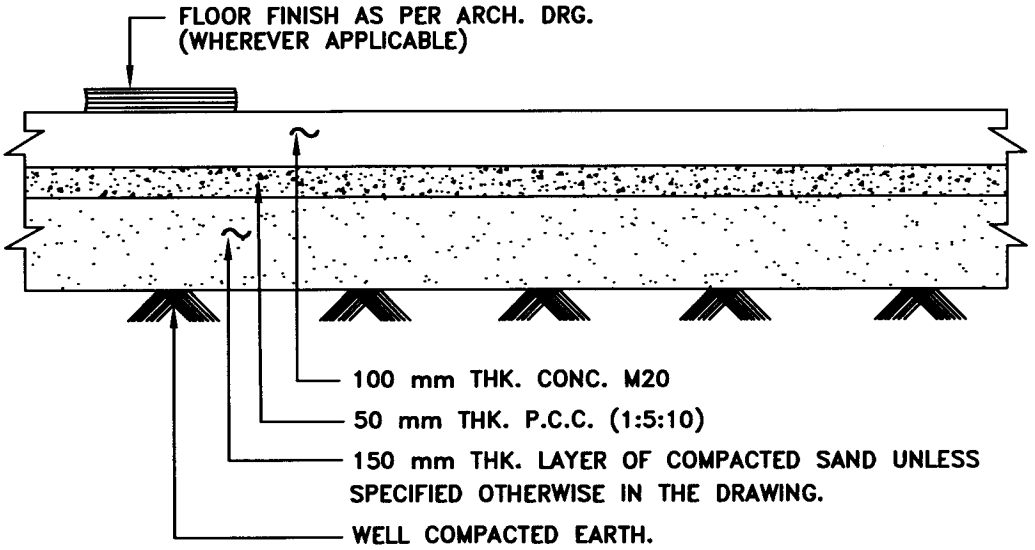

TYPE – III

(FOR NON–PLANT BUILDINGS VIZ. ADMINISTRATION, LABORATORY, CANTEEN TIME OFFICE, GATE HOUSE, TRAINING CENTRE, GUEST HOUSE, SITE OFFICE, RESIDENTIAL BUILDINGS ETC.)

NOTES :–

1. ALL DIMENSIONS ARE IN mm.
2. STRUCTURAL CONCRETE SLAB SHALL BE CAST IN ALTERNATE PANELS AND NO DIMENSION OF THE PANEL SHALL EXCEED 4.5 m.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	12.04.22	REVISED AND RE–ISSUED AS STANDARD	OM PRAKASH	V. GOEL	ANURAG SINHA	SANJAY MAZUMDAR
5	20.10.16	REAFFIRMED AND ISSUED AS STANDARD	NARENDER KUMAR	V. GOEL	R. SRIVASTAVA	RAKESH NANDA
4	27.06.11	REAFFIRMED AND ISSUED AS STANDARD	SUSHMA	P.K.MITTAL	S.CHATURVEDI	D.MALHOTRA

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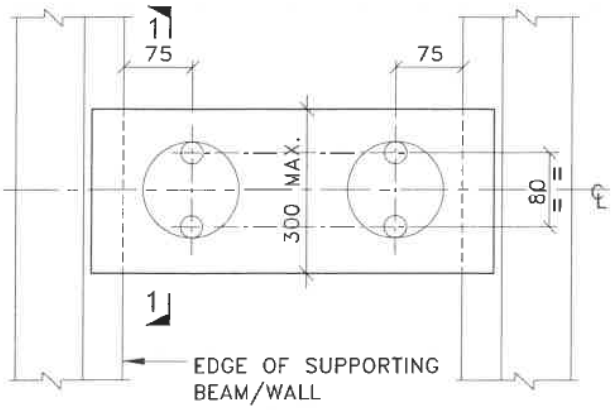
STANDARD LIFTING HOOKS IN PRECAST SLABS AND CHEQ. PLATES



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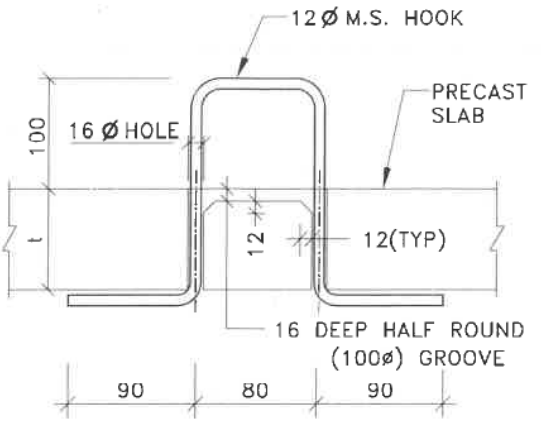
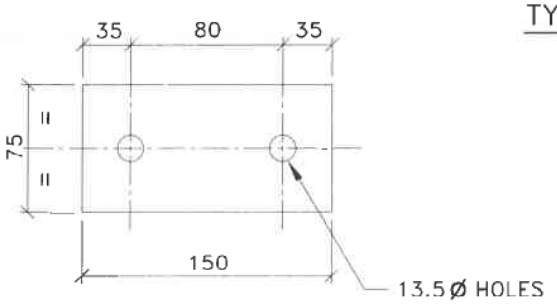
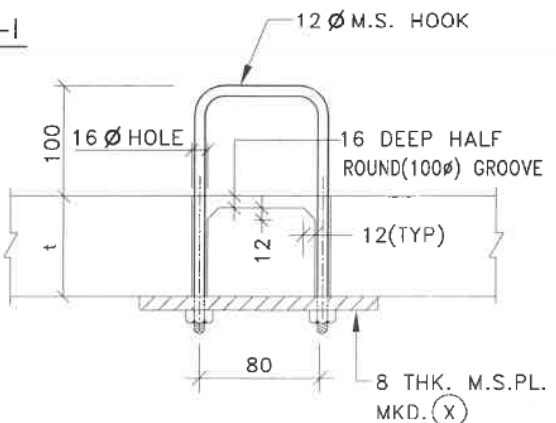


SECTION:1–1

TYPE–I

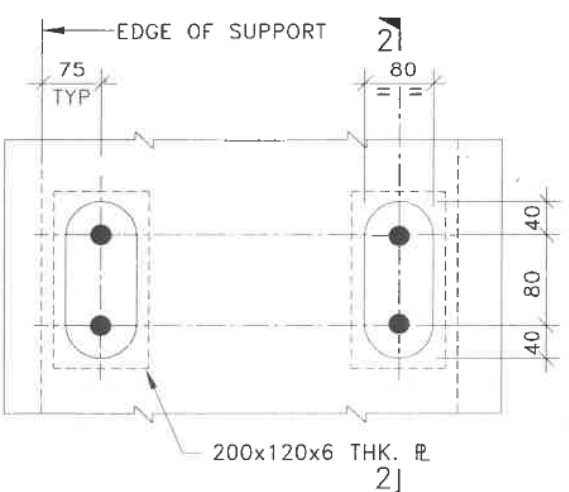


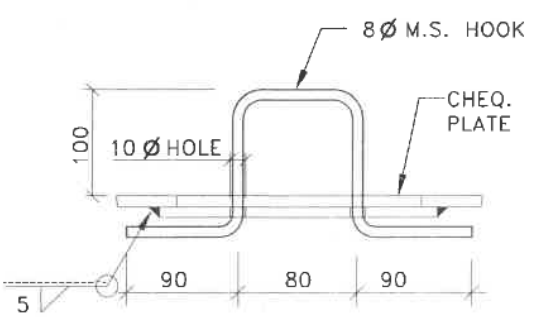
DETAIL OF M.S. PLATE MKD. (X)



SECTION:1–1

TYPE–II





SECTION:2–2

TYPE–III

(FOR CHEQ. PLATE ONLY)

NOTES:

1. ALL DIMENSIONS ARE IN mm
2. FOR PRECAST SLABS GENERALLY LIFTING HOOK TYPE–I SHALL BE USED UNLESS TYPE–II IS SPECIFIED IN THE DRAWING.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	28.03.24	REVISED AND ISSUED AS STANDARD	SN	AD/MM	ANURAG SINHA	MAINAK NANDI
6	27.08.18	REAFFIRMED AND ISSUED AS STANDARD	KKS	A. SINHA	R. SRIVASTAVA	R. K. TRIVEDI

Approved by

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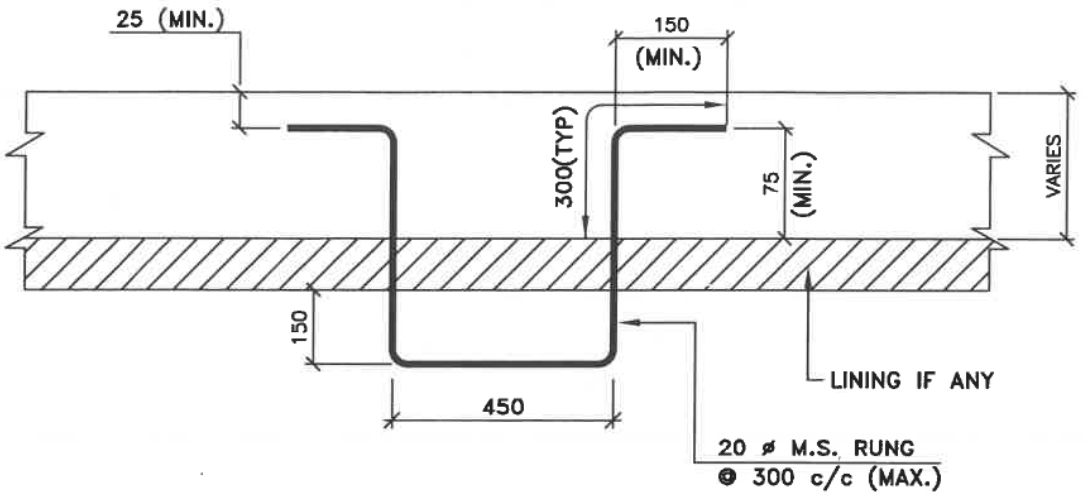
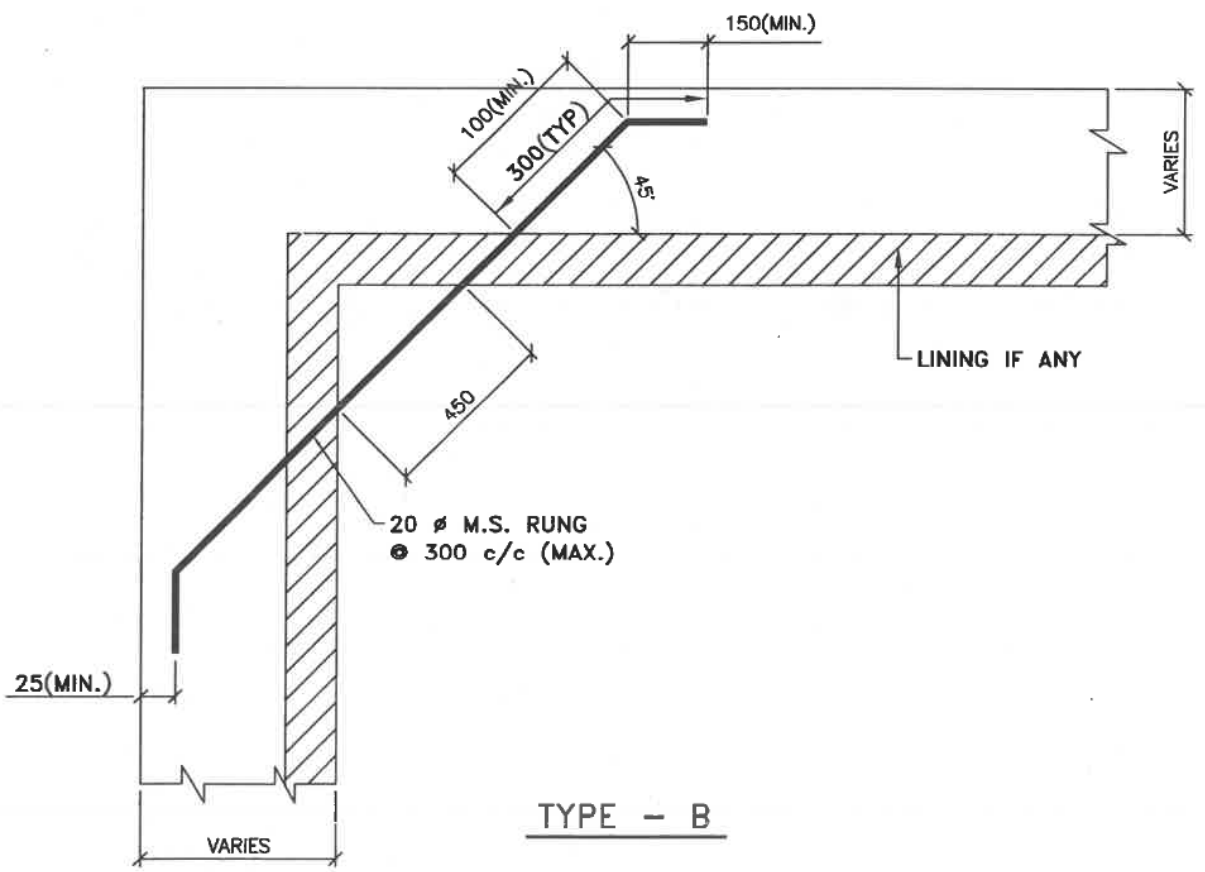


TYPE – A



TYPE – B

NOTES :–

1. ALL DIMENSIONS ARE IN mm.
2. FIRST RUNG SHALL BE AT 300 mm FROM TOP.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
8	28.03.24	REAFFIRMED AND ISSUED AS STANDARD	SN	AD/MM	ANDREAS SINHA	MAHAK KANDI
7	18.06.18	REAFFIRMED AND ISSUED AS STANDARD	ANNU	VIKRAM GUPTA	RAHUL SRIVASTAVA	R K TRIVEDI

Approved by

Signature Not Verified
Digitally signed by MD MAZHER ALI
Date: 2026.04.09 18:11:34 IST
Location: eProcure-EPROC

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