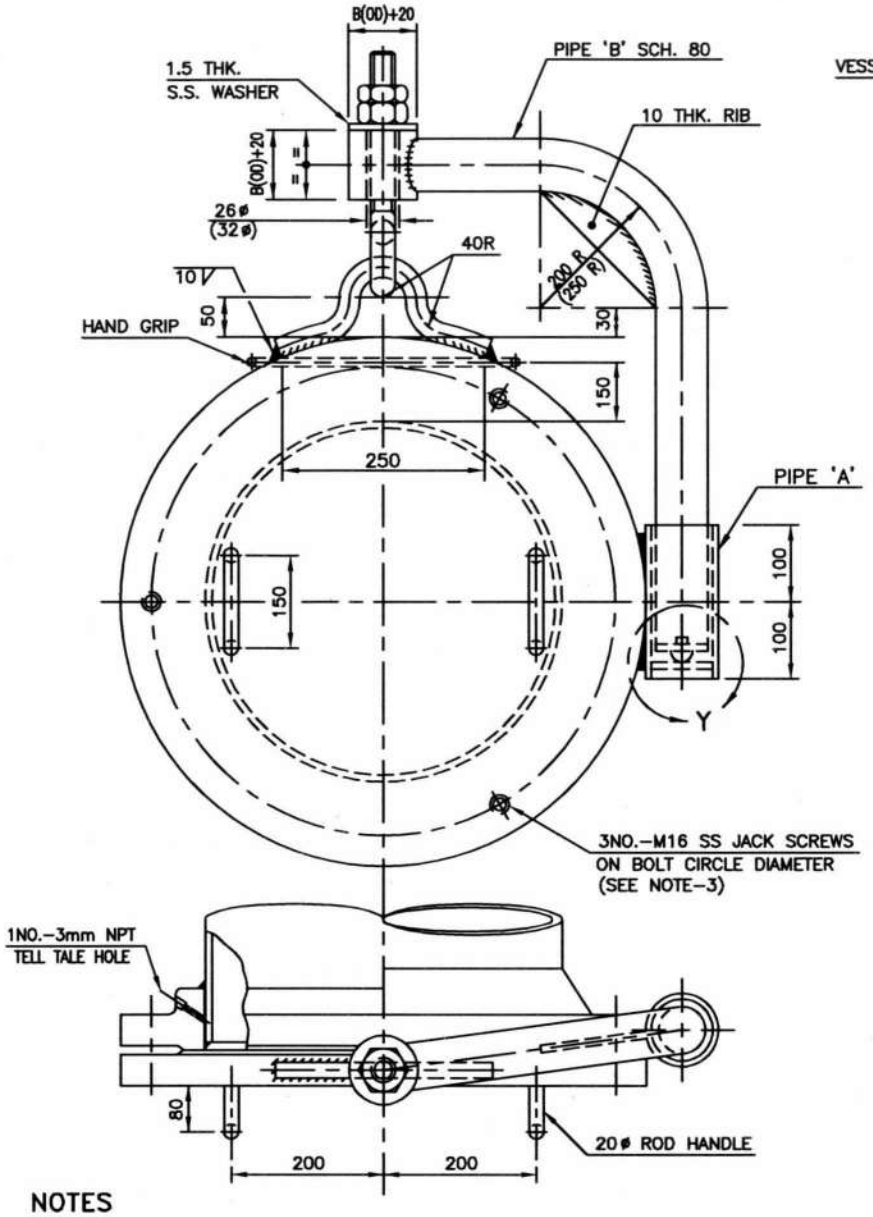
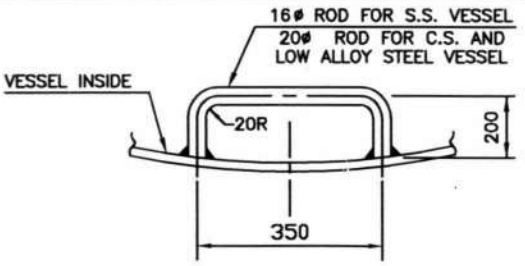
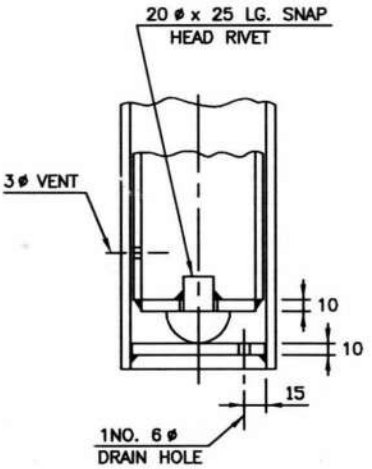
MANHOLE WITH DAVIT





DETAIL OF HAND GRIP



DETAIL 'Y'

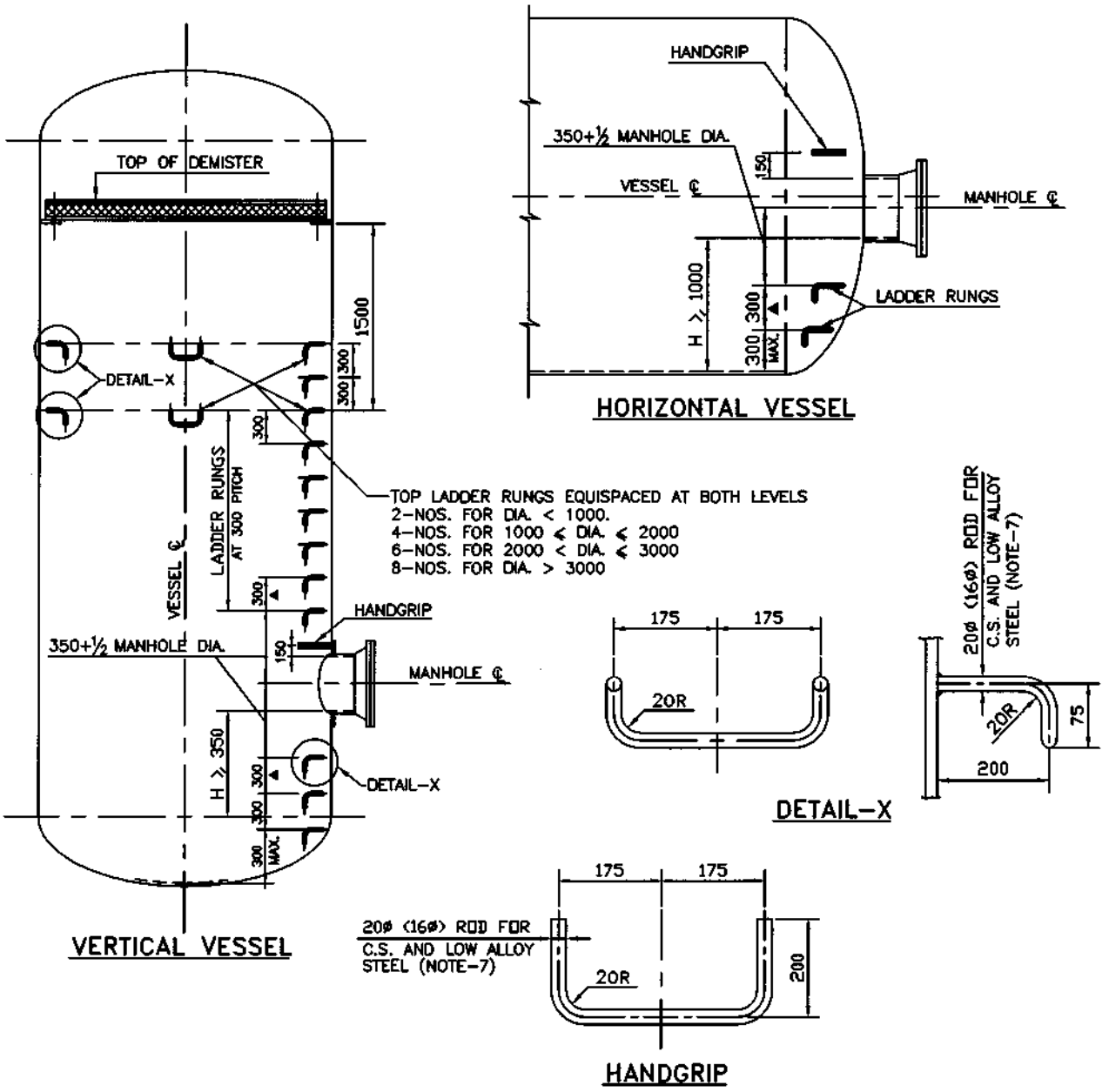
CLASS	SIZE (NB)	A (NB)	B (NB)
150	400	50 NB SCH. 80	40
	450	50 NB SCH. 80	40
	500	65 NB SCH. 40	50
	600	65 NB SCH. 40	50
300	400	65 NB SCH. 40	50
	450	65 NB SCH. 40	50
	500	65 NB SCH. 40	50
	600	90 NB SCH. 40	80
600	400	80 NB SCH. 40	65
	450	90 NB SCH. 40	80
	500	125 NB SCH. 80	100
	600	125 NB SCH. 80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

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

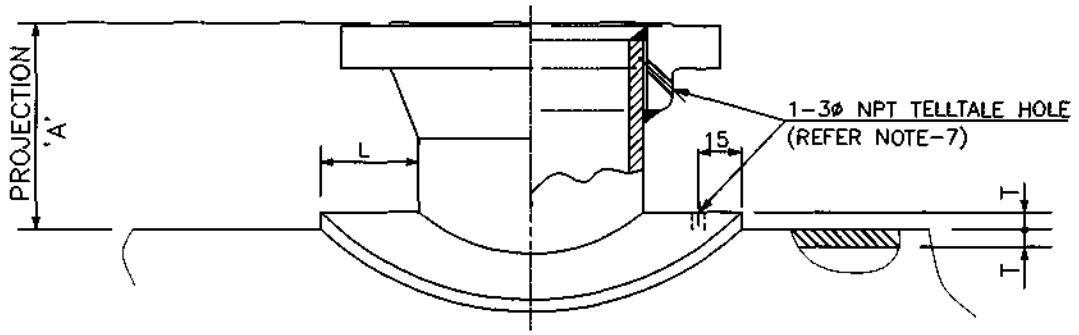
Approved by



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
					Approved by	
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



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"	219.0	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
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
7	23 01 2020	REAFFIRMED AND REISSUED AS STANDARD	DP	TR	KJH	RKT
6	07 06 2013	REVISED AND REISSUED AS STANDARD	NIKHIL	KA	RKT/SC	DM
5	23 05 2011	REAFFIRMED AND REISSUED AS STANDARD	POREL	RKT		

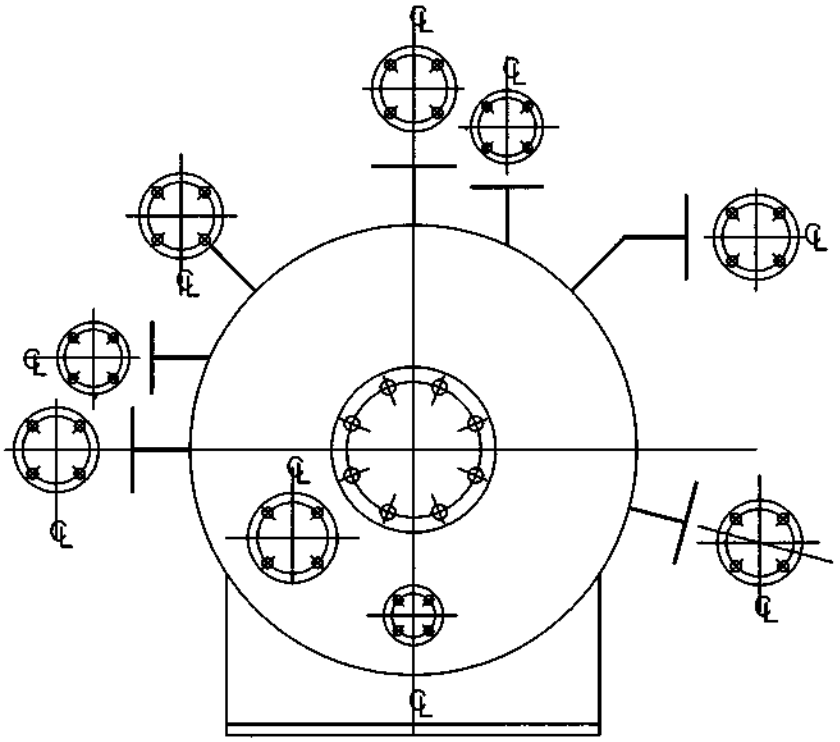
Approved by

NOTES

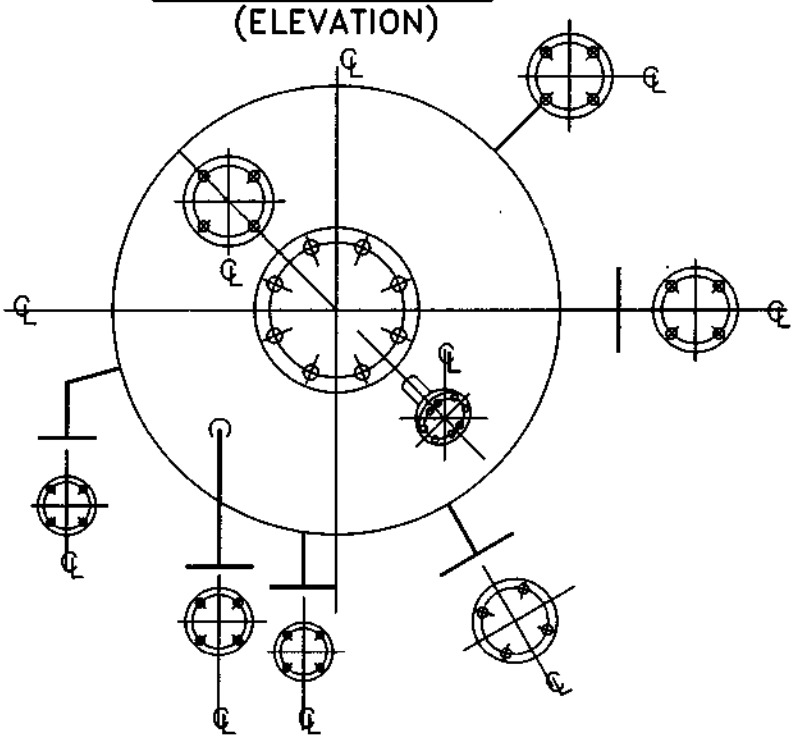
1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
3. ⊛ WIDTH IS MINIMUM AND SHALL BE CHECKED AGAINST CODE REQUIREMENT. CHECK REINFORCEMENT REQUIREMENT FOR ALL EXTERNAL PIPING LOADING ALSO.
4. NOZZLE PROJECTIONS ARE BASED ON INSULATION THICKNESS 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 400mm MINIMUM FROM OUTSIDE.
   b) FOR HORIZONTAL VESSELS, PROJECTION OF NOZZLES ON TOP SIDE OF SHELL SHALL BE 300mm 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.

Rev No	Date	Purpose	Prepared by	Checked by	Stds Committee Convenor	Stds Bureau Chairman
7	23 01 2020	REAFFIRMED AND REISSUED AS STANDARD	DP	KK	KJH	RKT
6	07 06 2013	REVISED AND REISSUED AS STANDARD	NIKHIL	KA	RKT/SC	DM
5	23 05 2011	REAFFIRMED AND REISSUED AS STANDARD	POREL	RKT		

Approved by

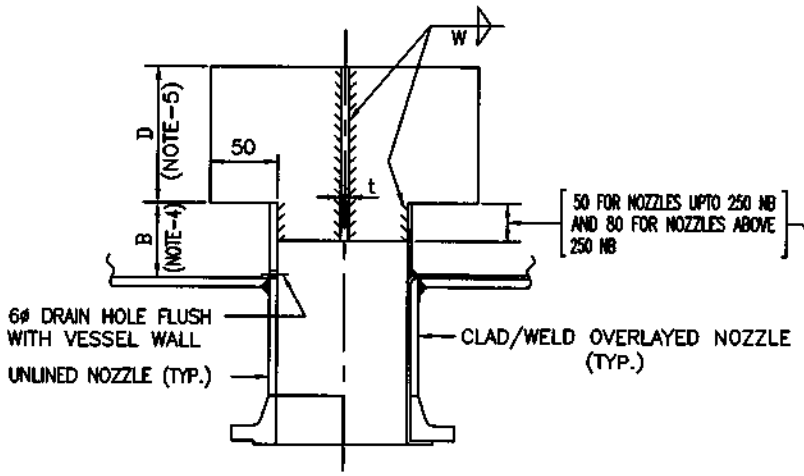


HORIZONTAL VESSEL
(ELEVATION)

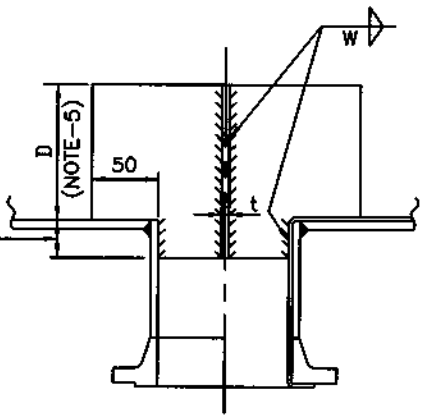


VERTICAL VESSEL
(PLAN)

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

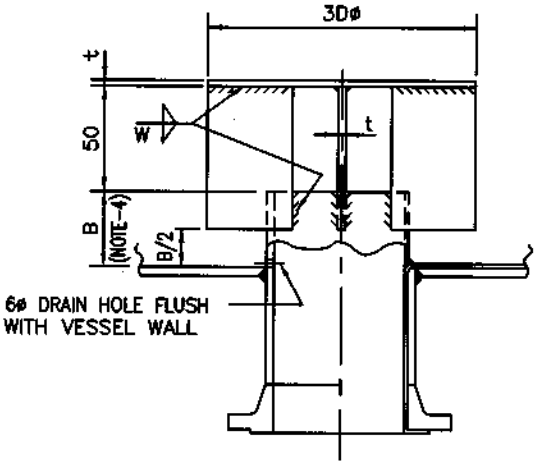


TYPE – 1A

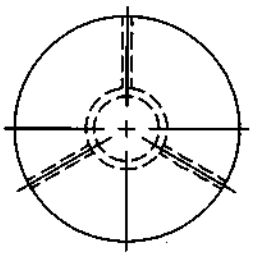


TYPE – 2A

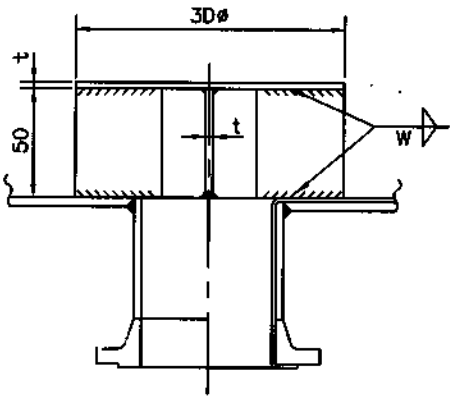
FOR NOZZLE NB ≥ 100



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

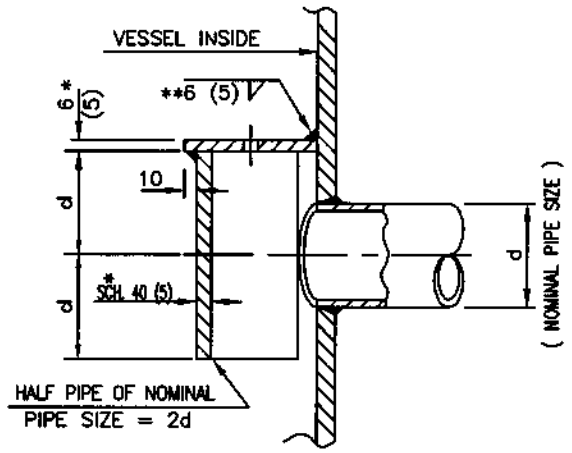
NOTES

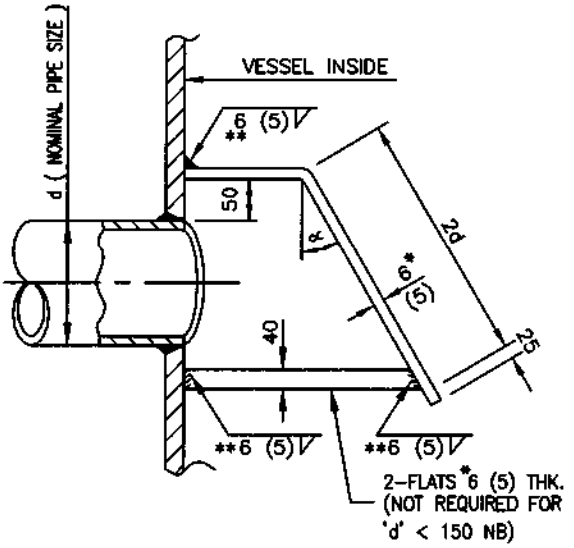
1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
3. a) FOR ALLOY LINED VESSELS, THE BAFFLE MATERIAL SHALL BE SAME AS ALLOY LINING.
   b) FOR CONCRETE LINED VESSELS, THE BAFFLE MATERIAL SHALL BE ALLOY AS SPECIFIED IN ENGINEERING DRAWING.
4.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

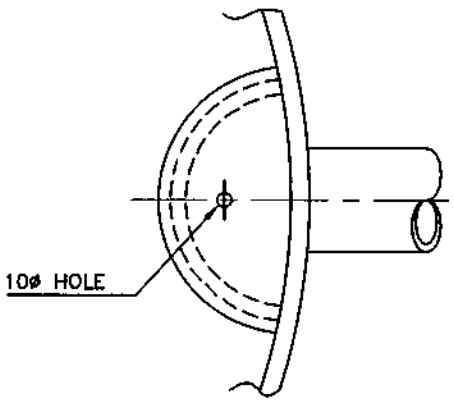
Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	TK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

Approved by

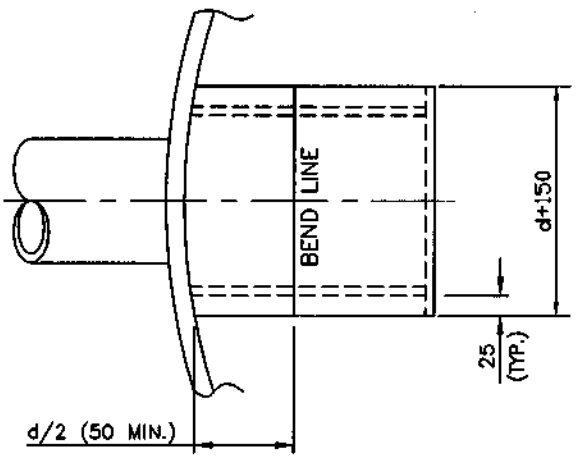
INLET DEFLECTOR BAFFLE







TYPE–1



TYPE–2

NOTES

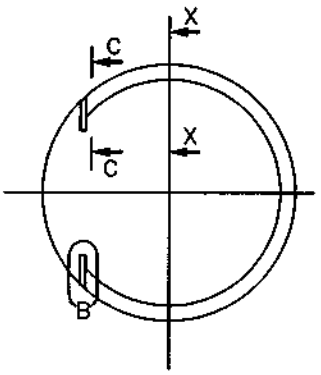
1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. ∝ = 30° UNLESS OTHERWISE STATED (TO BE ADJUSTED TO PREVENT BLOWING INTO SEAL PAN).
3. MATERIALS SHALL BE AS PER ENGINEERING DRAWING.
4. IN CASE OF CONFLICT ENGINEERING DRAWING SHALL GOVERN.
5. DIMENSIONS IN BRACKETS ARE FOR STAINLESS STEEL.

* 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.

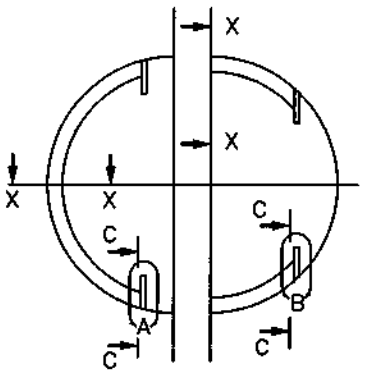
Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	TK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

Approved by



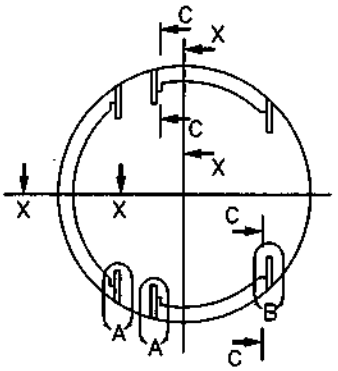
SIDE DOWNCOMER

SINGLE PASS TRAY

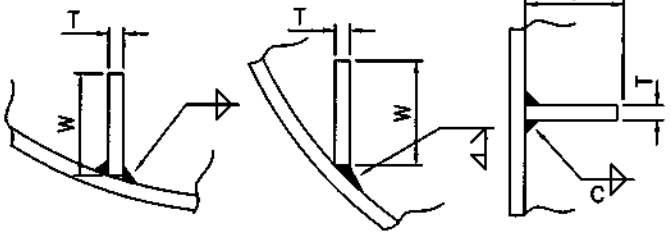


CENTRAL DOWNCOMER SIDE DOWNCOMER

DOUBLE PASS TRAY

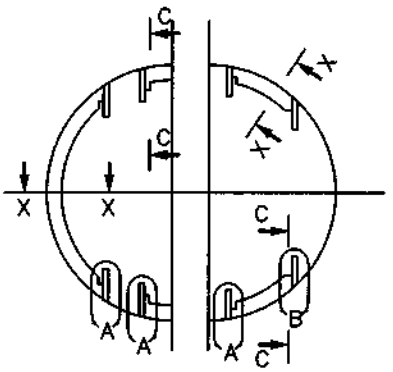


THREE PASS TRAY



DETAIL – A DETAIL – B SECTION–XX

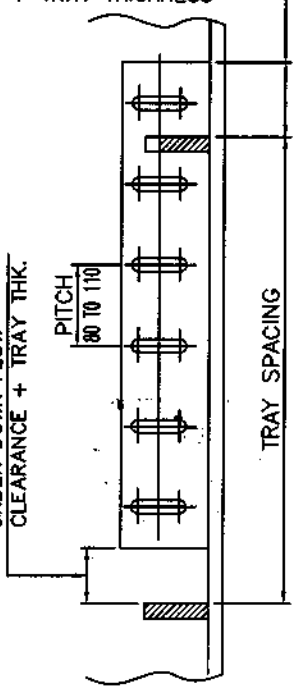
SUPP. RING THICKNESS MM	FILLET SIZE–C MM
UPTO 12	6
ABOVE 12 –UPTO 16	10
ABOVE 16	0.7 T



CENTER & OFFCENTER DOWNCOMER FOUR PASS TRAY

VESSEL I/D.	BOLTING BAR (WXT) **		SUPPORT RING (SXT) **
UPTO 1200	85 X 6	SIDE DOWNCOMER FOR SINGLE PASS AND MULTI PASS TRAYS	40 X 6 *
1201 TO 2000	110 X 6		50 X 6
2001 TO 3000	125 X 6		65 X 6
3001 TO 4500	150 X 10		75 X 10
4501 TO 6000	175 X 10		90 X 10
6001 TO 7500	200 X 10		90 X 10
7501 TO 9000	200 X 10		100 X 10
9001 TO 12000	225 X 10		110 X 10
12001 TO 14000	225 X 10		125 X 10
UPTO 1200	–	CENTRE AND OFF CENTRE DOWNCOMERS FOR MULTI PASS TRAYS	–
1201 TO 2000	125 X 6		50 X 6
2001 TO 3000	150 X 6		65 X 6
3001 TO 4500	175 X 10		75 X 10
4501 TO 6000	200 X 10		90 X 10
6001 TO 7500	225 X 10		90 X 10
7501 TO 9000	235 X 10		100 X 10
9001 TO 12000	280 X 10		110 X 10
12001 TO 14000	305 X 10		125 X 10

EXIT WEIR HEIGHT + TRAY THICKNESS



SECTION –CC

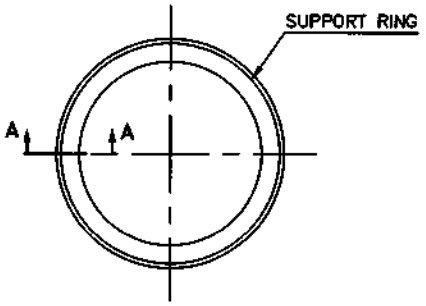
NOTES :

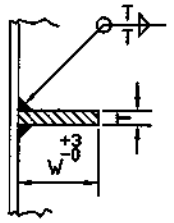
1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. THIS STANDARD IS FOR THE PURPOSE OF QUOTATION / INFORMATION ONLY.
**3. FINAL DETAIL, SIZES OF TRAY SUPPORT RING, BOLTING BAR ETC. SHALL BE AS PER TRAY DRAWING.
4. INDICATED THICKNESS OF TRAY SUPPORT RINGS AND BOLTING BARS IS MINIMUM TO WHICH TWICE THE CORROSION ALLOWANCE IS TO BE ADDED.
*5. SUPPORT RING WIDTH SHALL BE 50mm WHEREVER VESSEL CORROSION ALLOWANCE IS 6mm OR MORE.
6. MATERIAL OF CONSTRUCTION SHALL BE AS PER ENGG. DRAWING.

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	BM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

Approved by

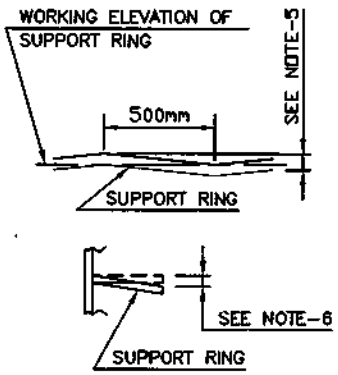
SUPPORT RING SIZES FOR PACKED TOWER'S INTERNALS





SECTION AA

TOWER INTERNAL DETAILS		INSIDE DIAMETER OF TOWER								
		250 TO 500	501 TO 900	901 TO 1600	1601 TO 3000	3001 TO 4500	4501 TO 7500	7501 TO 9000	9001 TO 12000	12001 TO 14000
TYPE OF INTERNALS	MATERIAL OF CONSTRUCTION	SIZE OF SUPPORT RING (W X T) **								
PACKING SUPPORT PLATE	METAL	* 25 X 4	* 35 X 6	50 X 6	65 X 6	75 X 10	90 X 10	100 X 10	110 X 10	125 X 10
	CERAMIC	30 X 4	50 X 6	65 X 6	–	–	–	–	–	–
LIQUID DISTRIBUTOR	METAL	* 25 X 4	* 35 X 6	50 X 6	65 X 6	75 X 10	90 X 10	100 X 10	110 X 10	125 X 10
	CERAMIC	30 X 4	50 X 6	65 X 6	–	–	–	–	–	–
REDISTRIBUTOR	METAL	* 25 X 4	* 35 X 6	50 X 6	65 X 6	75 X 10	90 X 10	100 X 10	110 X 10	125 X 10
BED LIMITER	METAL	* 45 X 4	* 45 X 6	50 X 6	65 X 6	75 X 10	90 X 10	100 X 10	110 X 10	125 X 10



NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. INDICATED THICKNESS OF SUPPORT RING IS MINIMUM TO WHICH TWICE THE CORROSION ALLOWANCE IS TO BE ADDED.
3. THIS STANDARD IS FOR PURPOSE OF QUATATION & INFORMATION ONLY. SIZE AND THICKNESS SHALL BE CHECKED FOR THE LOAD APPLIED (SUPPORTED INTERNALS + DIFFERENTIAL PRESSURE).

** 4. FINAL SIZE OF THE RING SHALL BE AS SPECIFIED ON ENGINEERING DRAWING FOR INTERNALS.

5. SUPPORT RING SHALL NOT HAVE WAVINESS EXCEEDING 1.5 mm FOR ANY 500 mm OF CIRCUMFERENTIAL LENGTH.
6. INCLINATION OF SUPPORT RING OVER ITS WIDTH SHALL NOT EXCEED 0.75 mm.

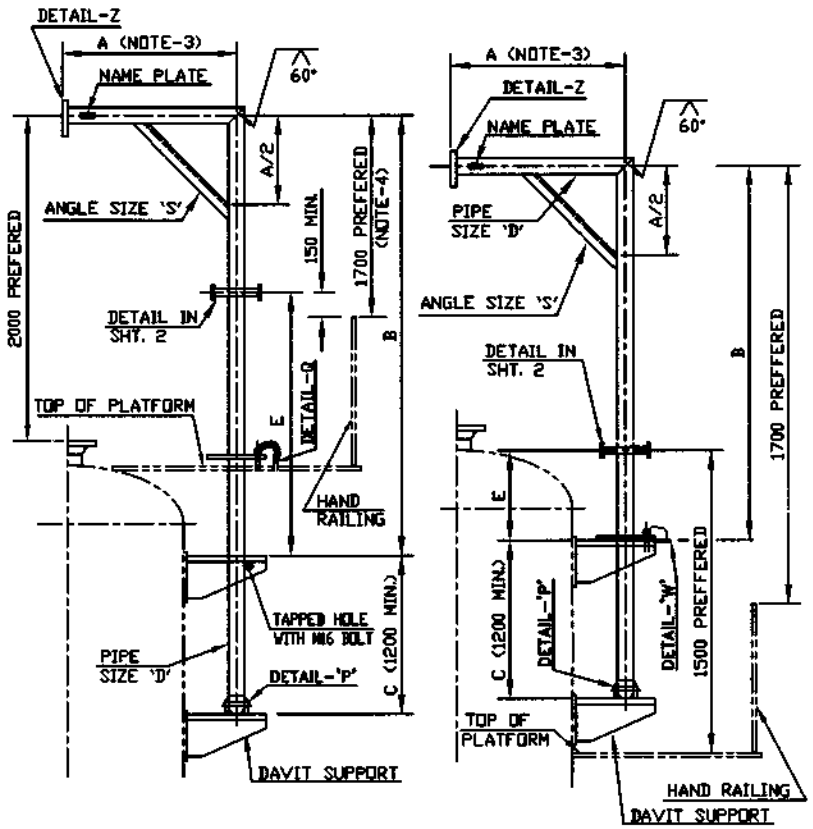
* 7. SUPPORT RING WIDTH SHALL BE MIN. 50MM WHEREVER VESSEL CORROSION ALLOWANCE IS 6.0MM OR MORE.

8. MATERIAL OF CONSTRUCTION SHALL BE AS PER ENGG. DRAWING.

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

Approved by

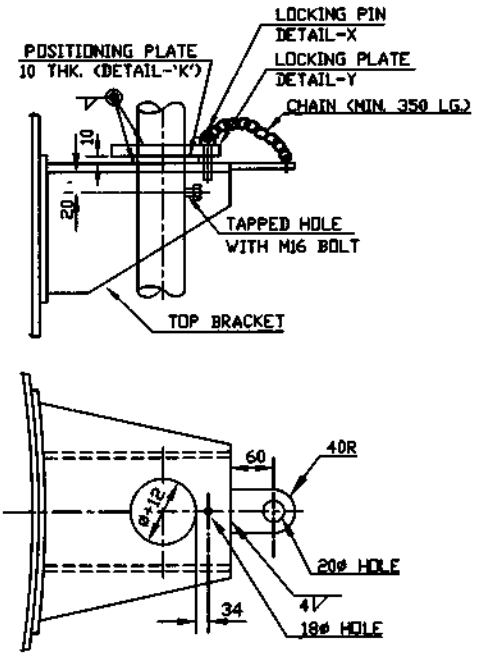
PIPE DAVIT



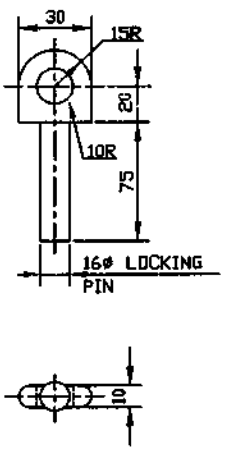
(TYPE-1)
DEVIT FOR TOP MOUNTED PLATFORM

(TYPE-2)
DEVIT FOR SIDE MOUNTED PLATFORM

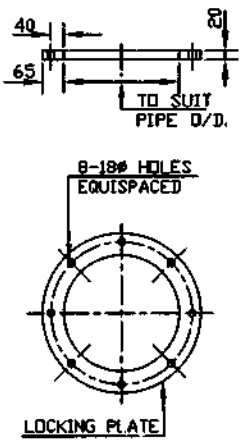
A (MAX) (mm)	B (mm)	CAPACITY (kgs.)	PIPE SIZE D	ANGLE SIZE S	R1	R2	r	t
1000	≤4000 (NOTE-13)	500	100NBxSCH.160	75x75x6	75	60	10	20
		1000	150NBxSCH.80	100x100x8	110	60	12	25
2000		500	150NBxSCH.80	100x100x8	110	60	10	20
		1000	200NBxSCH.80	150x150x10	140	60	12	25
3000		500	200NBxSCH.80	150x150x10	140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



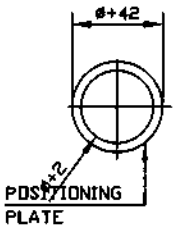
DETAIL – W



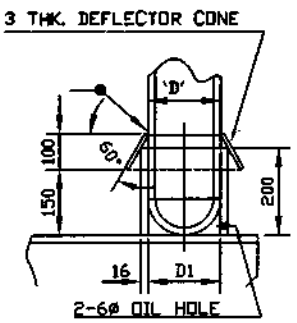
DETAIL–X



DETAIL–Y

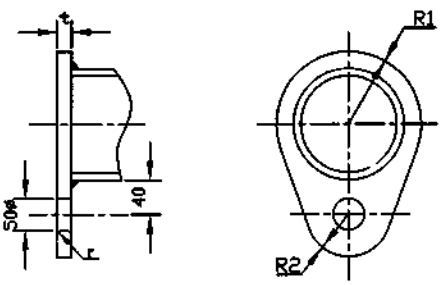


DETAIL–K



D (NB)	D1
100	120
150	175
200	225

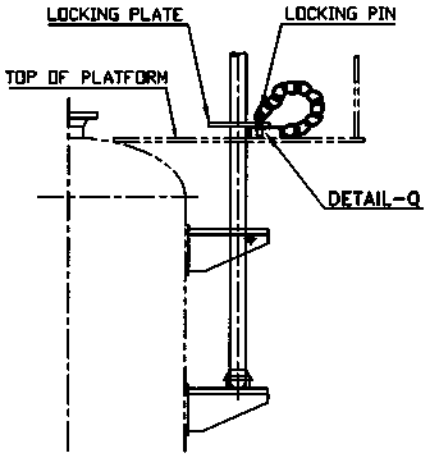
DETAIL–P



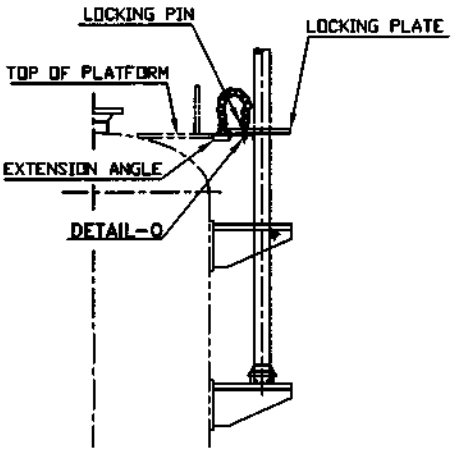
DETAIL–Z (DAVIT EYE)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
8	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	SK	NK	SM
7	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

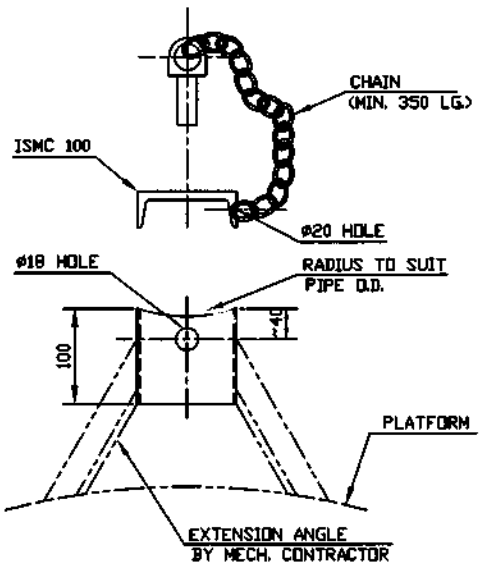
Approved by



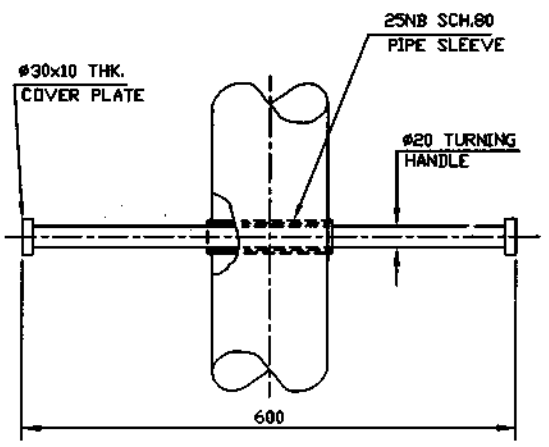
LOCKING ARRANGEMENT OF DAVIT PIPE
PASSING THROUGH PLATFORM



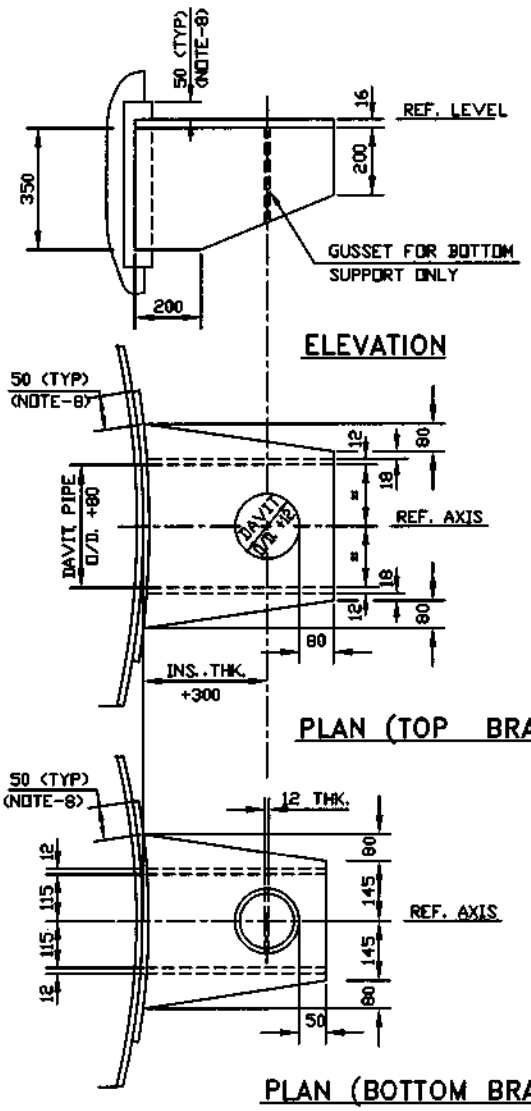
LOCKING ARRANGEMENT OF DAVIT PIPE
PASSING THROUGH SIDE OF PLATFORM



DETAIL – Q

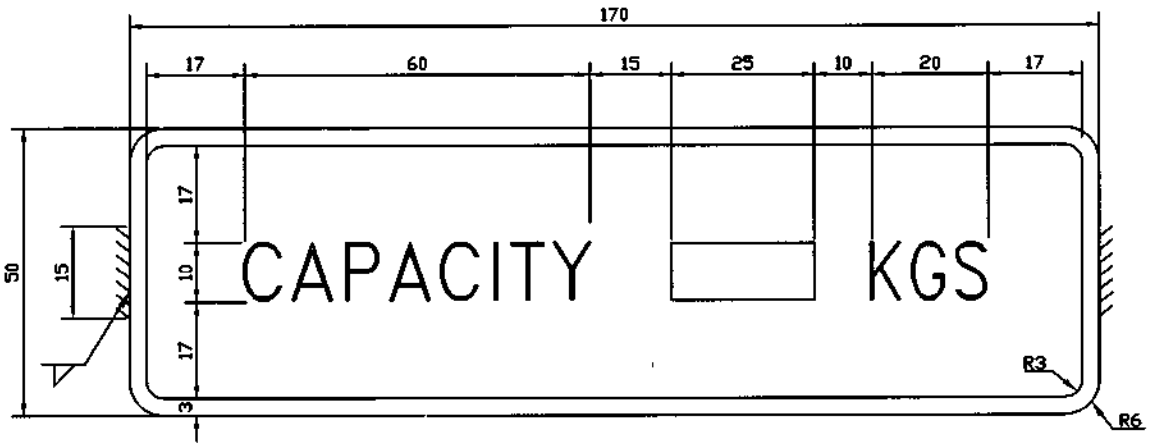


TURNING HANDLE DETAIL



DAVIT SUPPORTS

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL		NK	SM
7	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN



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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8	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	FK	NK	SM
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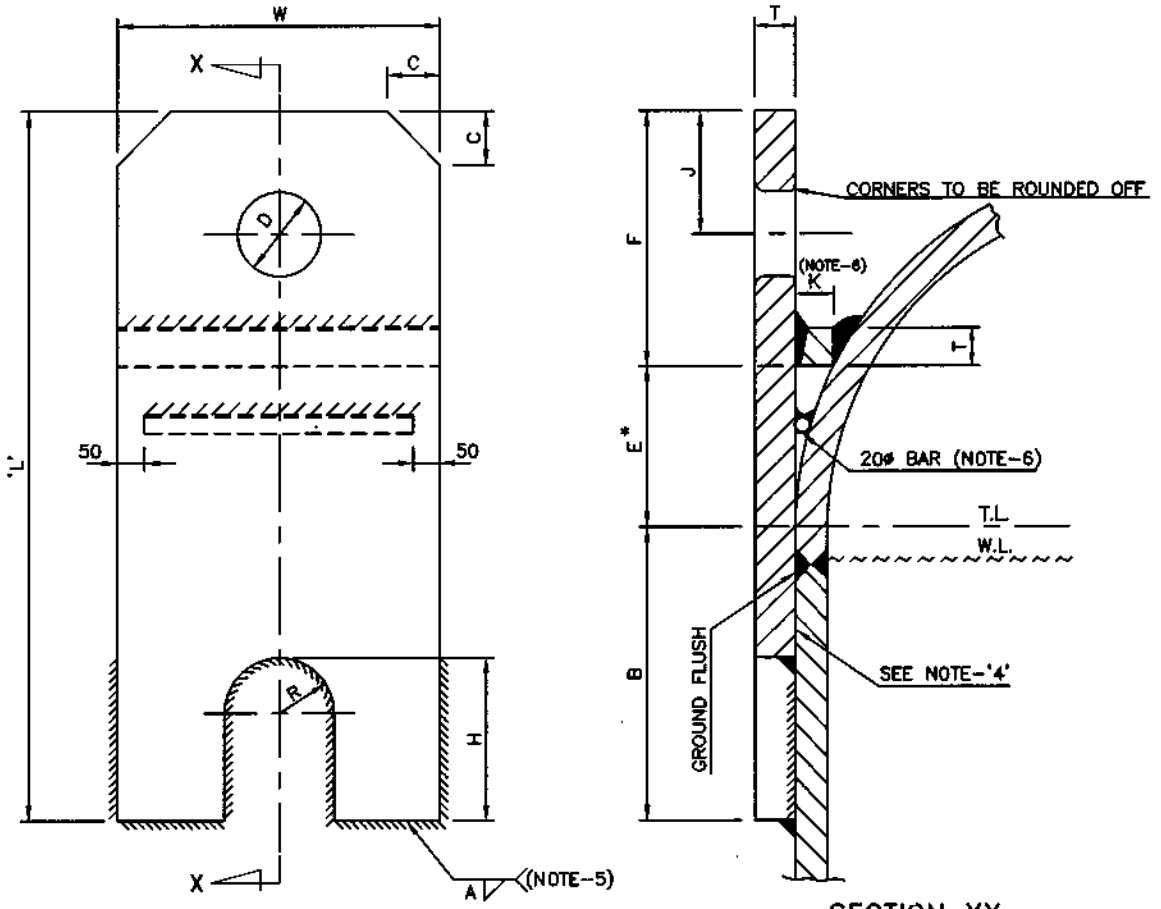


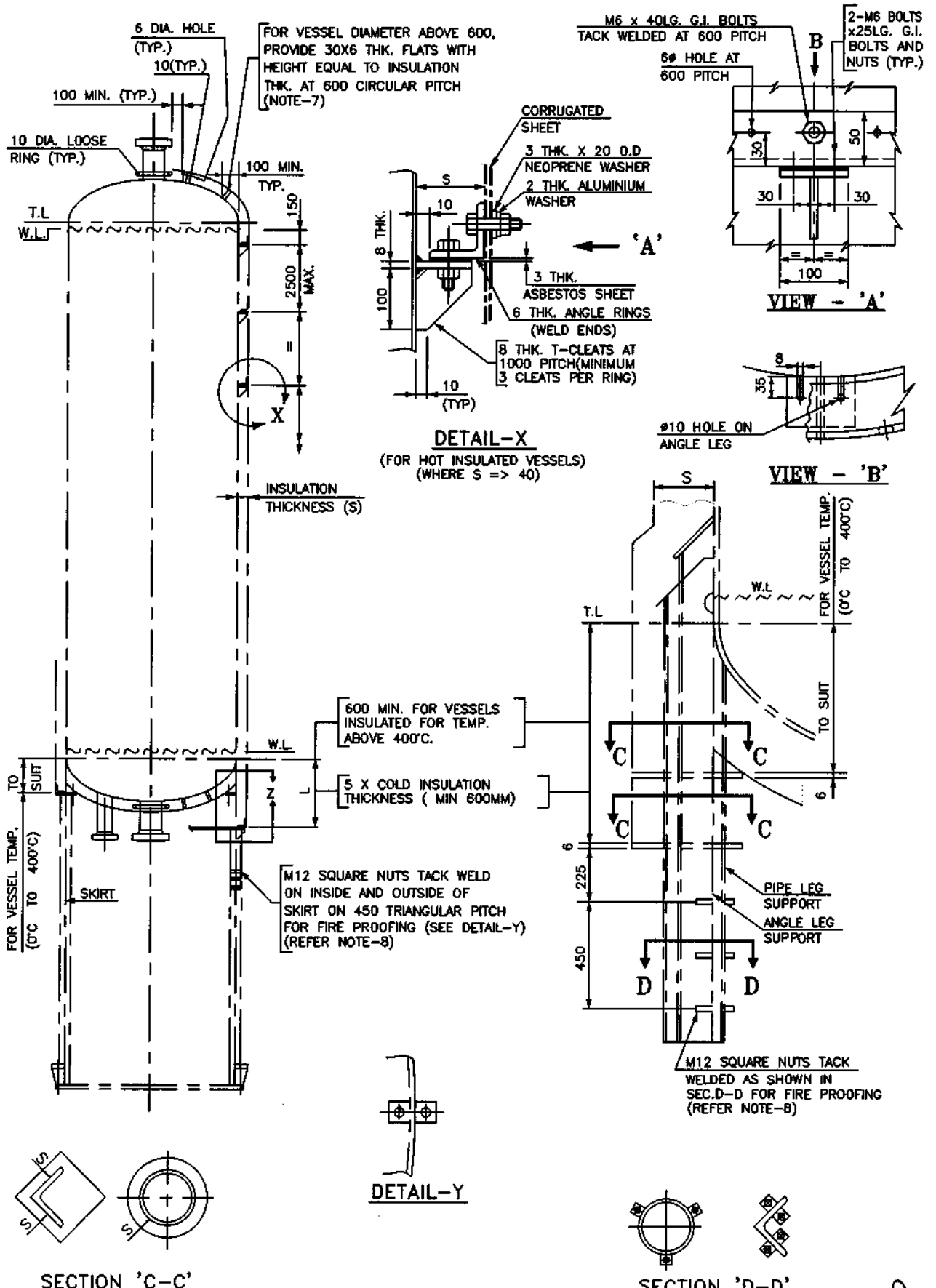
SECTION XX

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

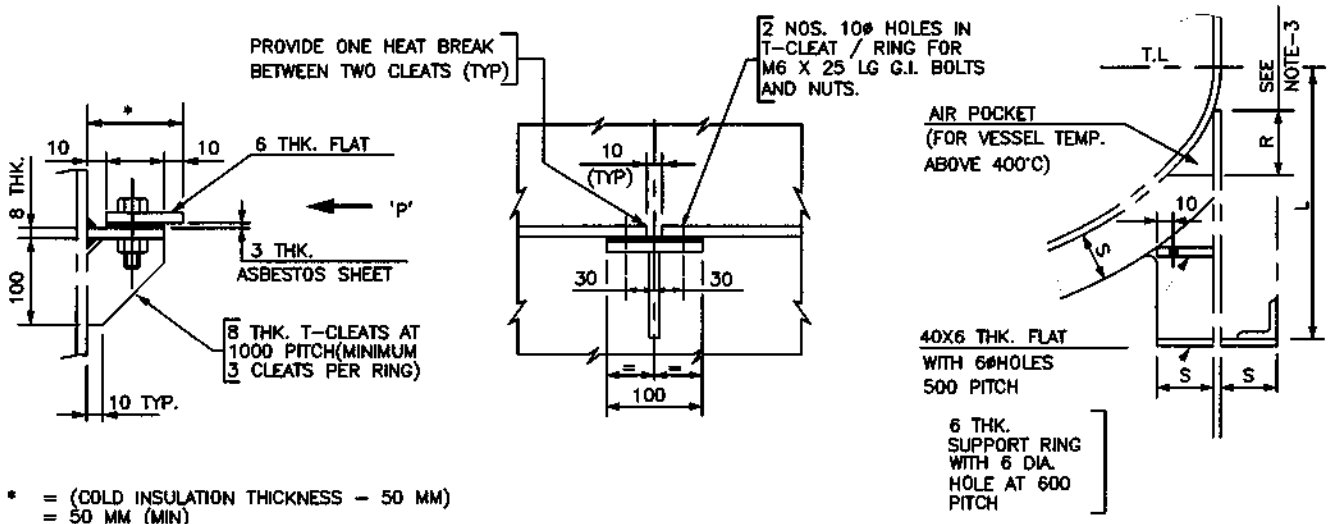
1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
*2. DIMENSION 'E' IS TO BE DETERMINED BY THE SHAPE OF HEAD IN CONJUNCTION WITH DIMENSION 'K'.
3. DETAIL, DIMENSIONS AND NOTES GIVEN IN ENGINEERING DRAWING TAKE PRECEDENCE OVER THOSE SHOWN HERE.
4. FOR THIN WALLED EQUIPMENTS, DESIGNER SHALL ANALYSE 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.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
9	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL		NK	SM
8	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN



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	KSM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

Approved by

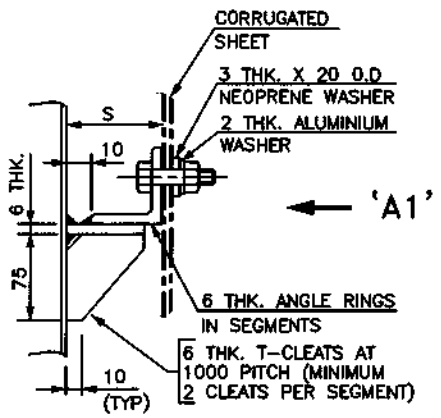


* = (COLD INSULATION THICKNESS – 50 MM)
= 50 MM (MIN)

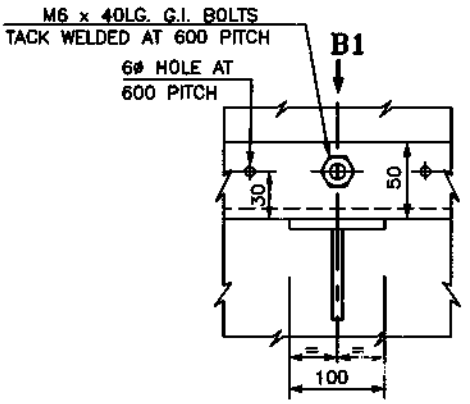
VIEW – 'P'

DETAIL – 'Z'

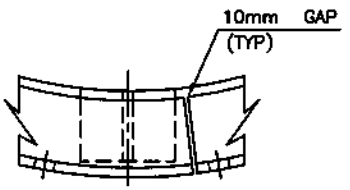
DETAIL–X
(FOR COLD INSULATED VESSELS)



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



VIEW – 'A1'

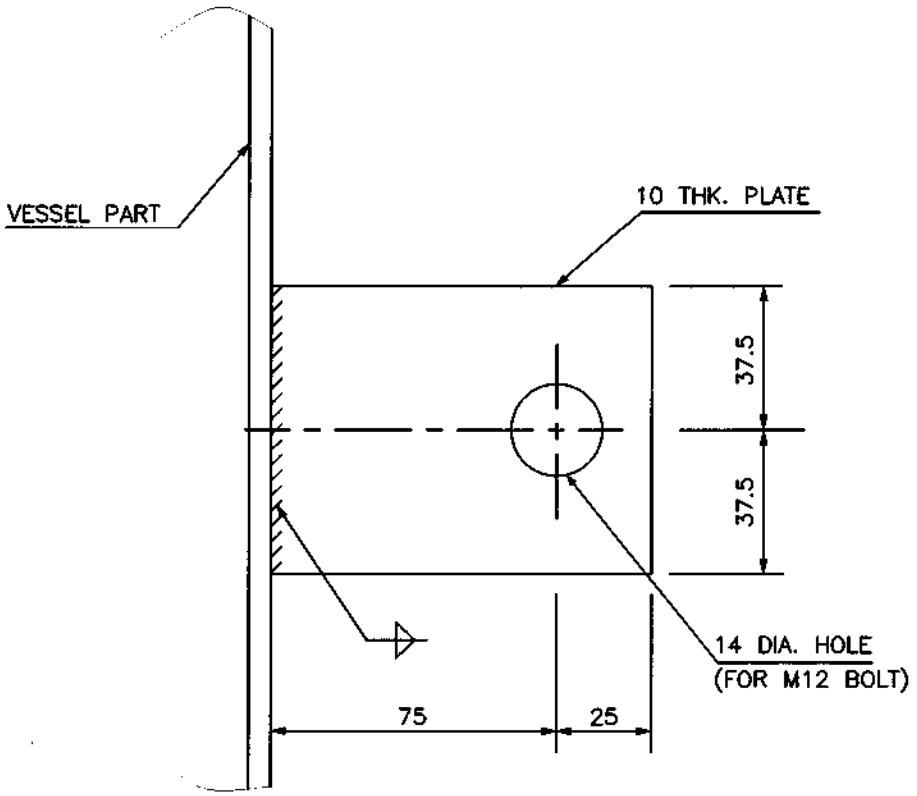


VIEW – 'B1'

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
					Approved by	
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	TR	NK	RN
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN



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.

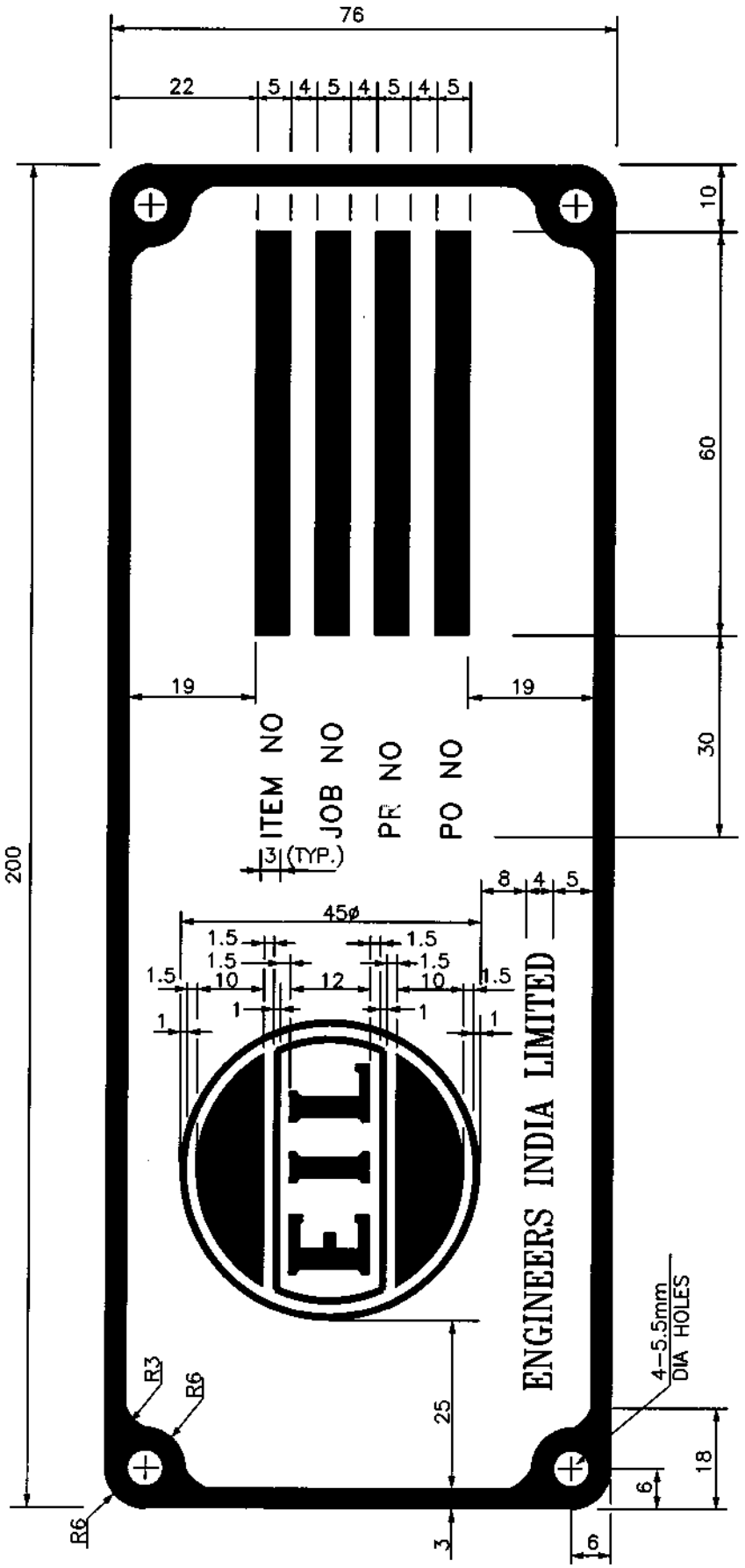
(c) FOR SPHERE, TOTAL 4–NOS. OF EARTHING LUGS SHALL BE PROVIDED PREFERABLY ON DIAMETRICALLY OPPOSITE AND EQUALLY SPACED LEGS. (SPHERES ARE USUALLY PROVIDED WITH LEGS IN NUMBERS WHICH ARE MULTIPLE OF 4 FOR THE SYMMETRY)

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
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	SK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

Approved by

NAME PLATE



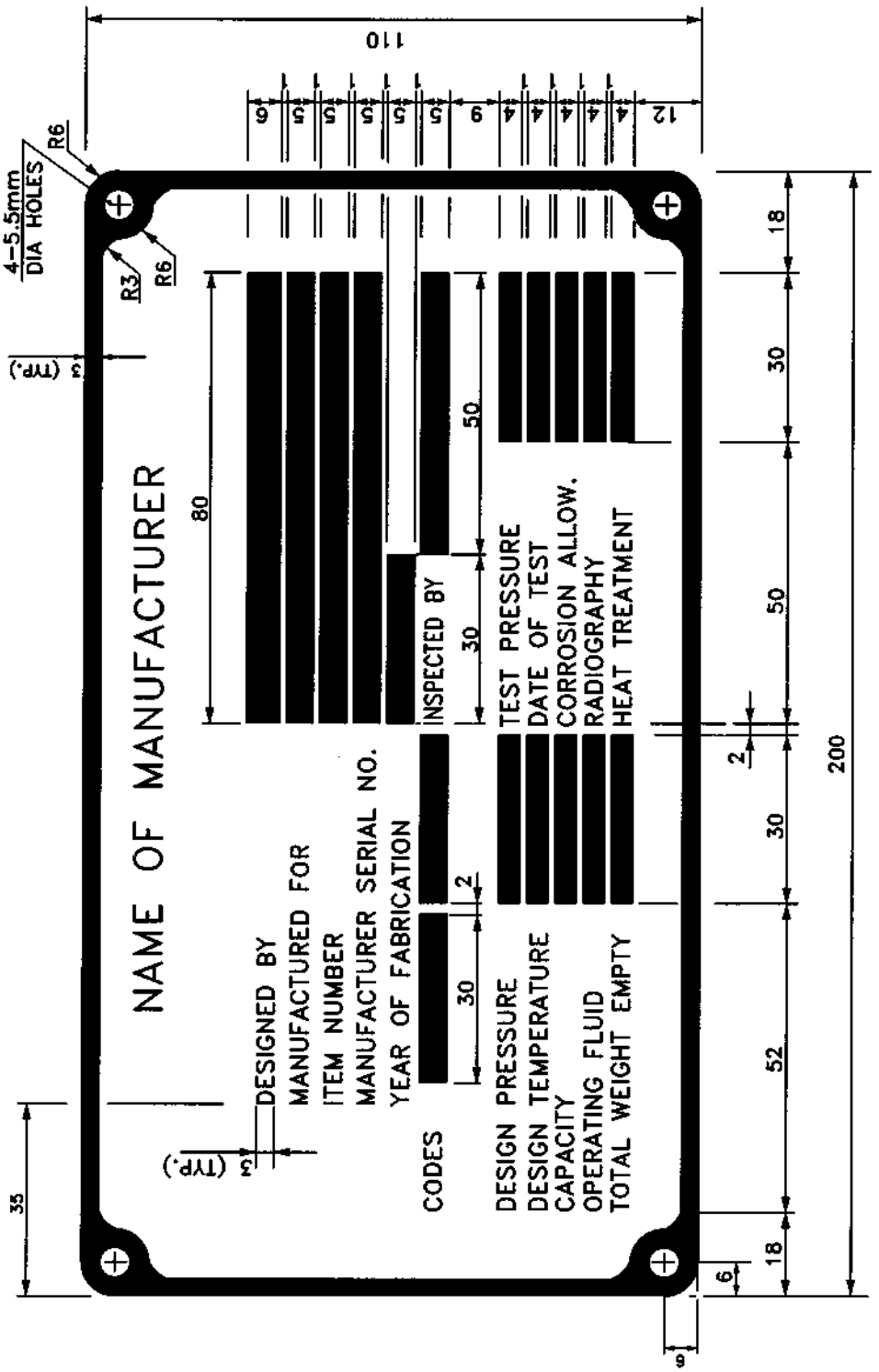
NOTES

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	PK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

Approved by

MANUFACTURER NAME PLATE



NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
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5. REFER STANDARD 7-12-029 FOR BRACKET DETAIL OF NAME PLATE.
6. NAME PLATE SHALL BE OF STAINLESS STEEL OF 2mm THICK.

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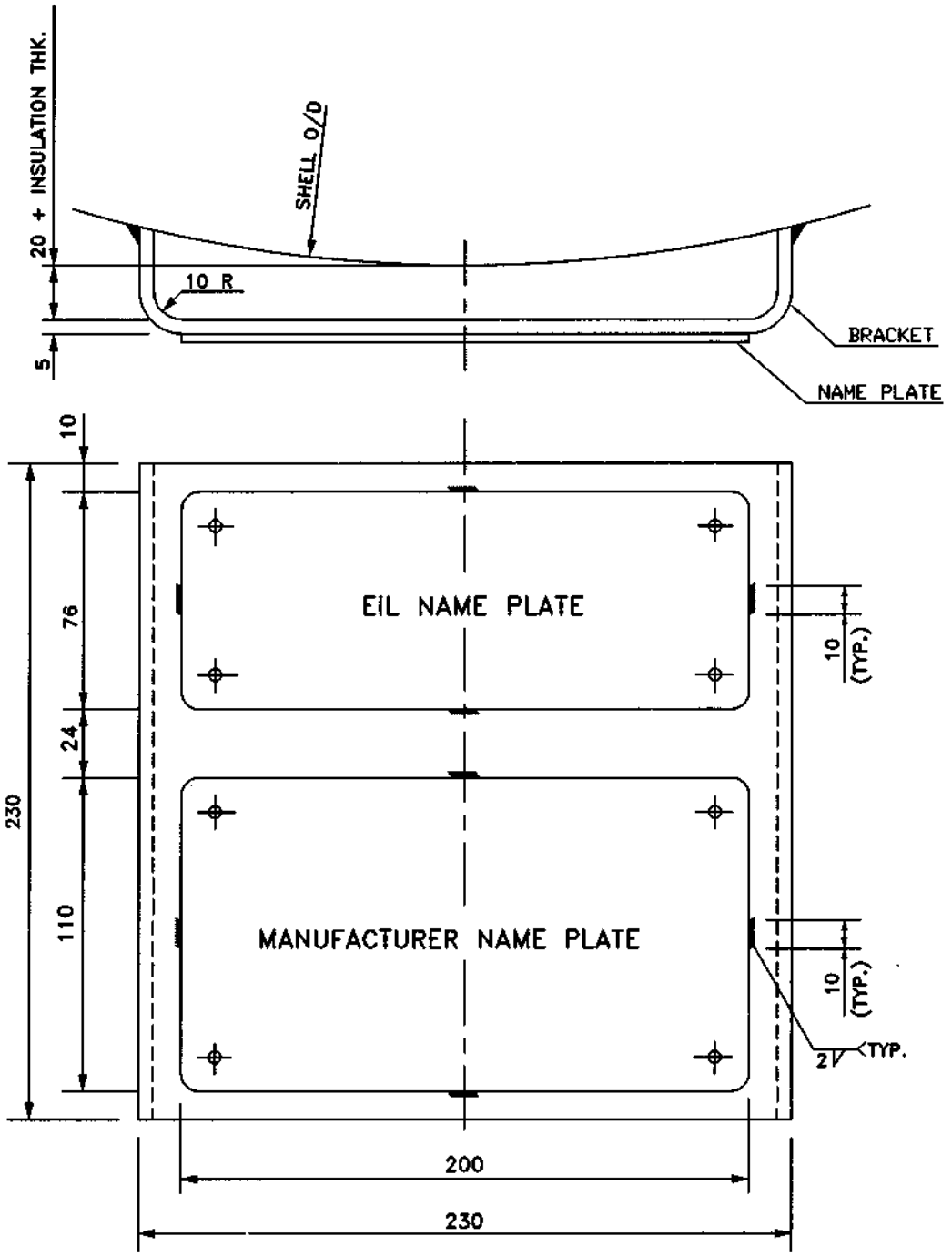
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	FK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN

Approved by

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
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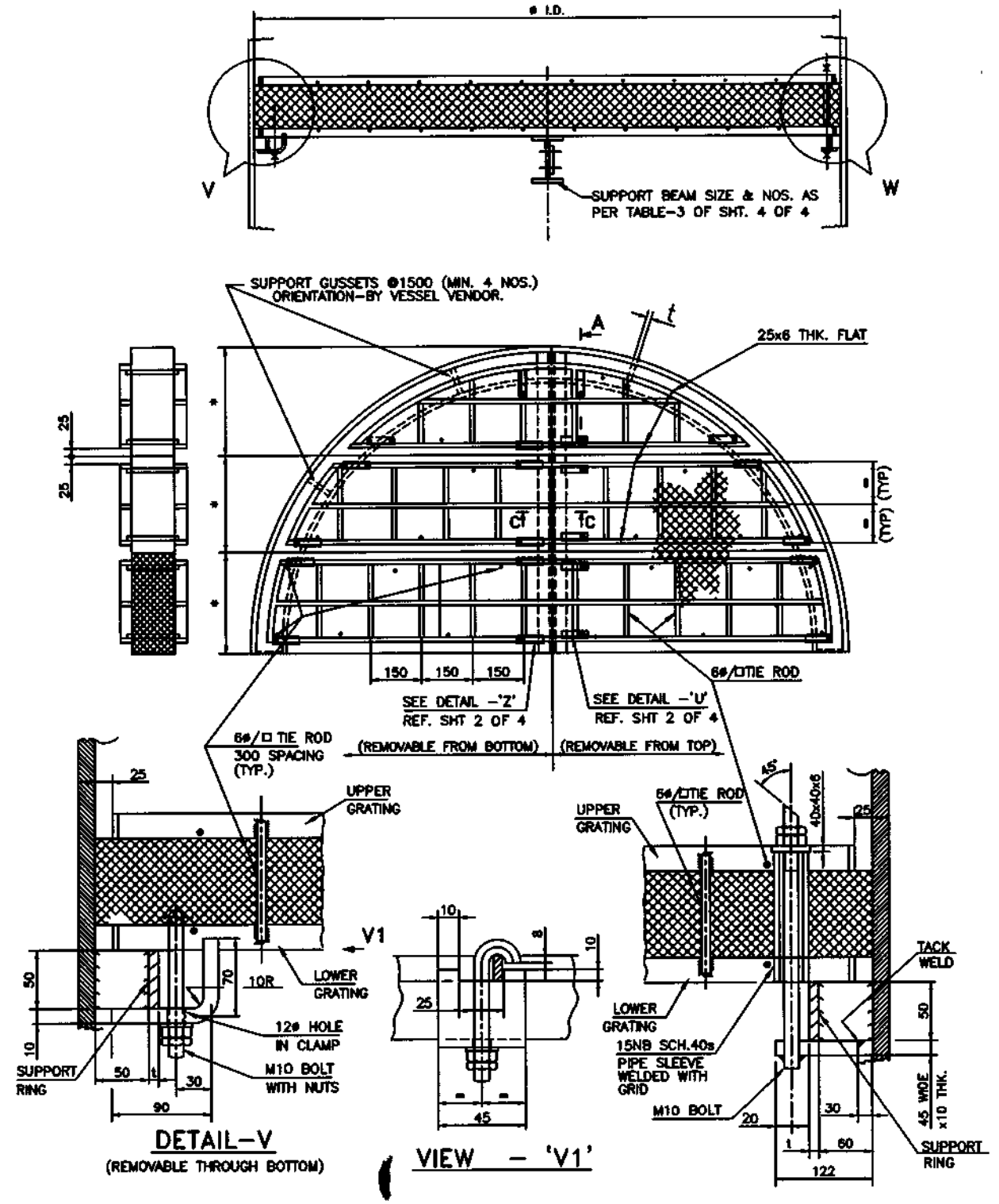
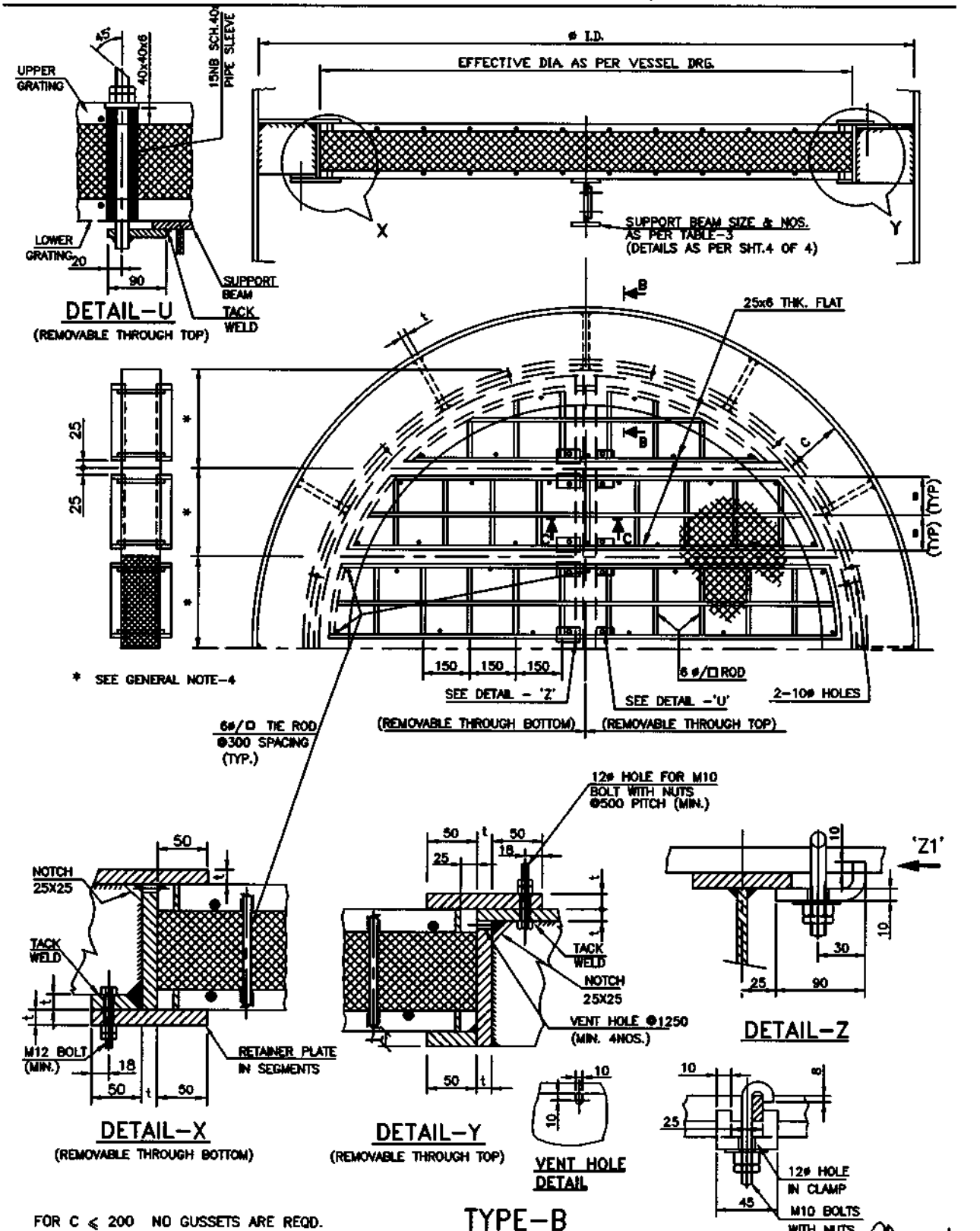
7	18.01.2022	REAFFIRMED AND REISSUED AS STANDARD	NIKHIL	VK	NK	SM
6	31.10.2016	REAFFIRMED AND REISSUED AS STANDARD	JIT SINGH	SK/KJH	RKT	RN



* SEE GENERAL NOTE-4

TYPE-A

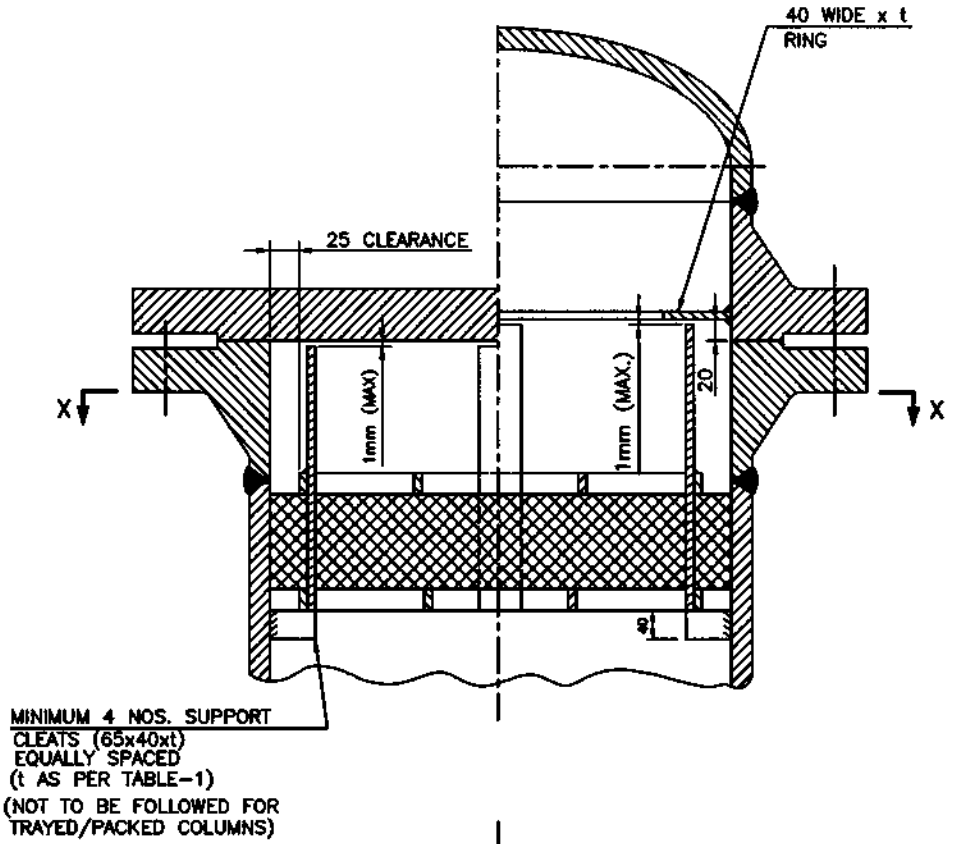
Rev No	Date	Purpose	Prepared by	Checked by	Stds Committee Convenor	Stds Bureau Chairman
					Approved by	
5	20 06 2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
4	01 10 2013	REVISED AND REISSUED AS STANDARD	GCP	TK	RKT	SC
3	27 01 2009	REAFFIRMED AND REISSUED AS STANDARD	VPR	RKG	AKM	SKG

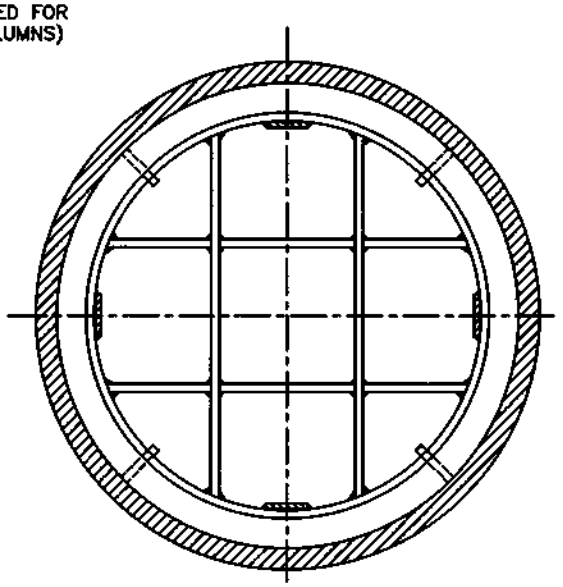


FOR C ≤ 200 NO GUSSETS ARE REQD.
FOR C > 200 MINIMUM 4 GUSSETS SHALL BE PROVIDED. ø1250 (MIN. 4 NOS.)

TYPE-B

Rev No	Date	Purpose	Prepared by	Checked by	Stds Committee Convenor	Stds Bureau Chairman
					Approved by	
5	20 06 2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
4	01 10 2013	REVISED AND REISSUED AS STANDARD	GCP	TK	RKT	SC
3	27 01 2009	REAFFIRMED AND REISSUED AS STANDARD	VPR	RKG	AKM	SKG





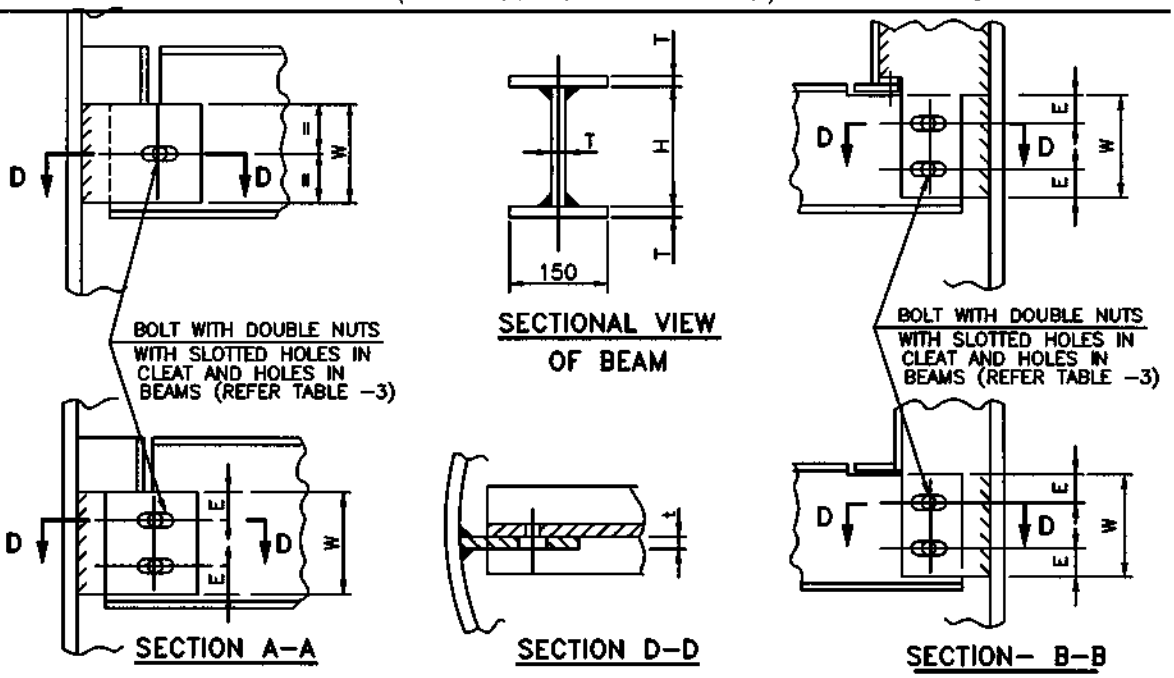
SECTION X-X

TYPE-C

NOTES

1. THIS TYPE IS APPLICABLE FOR VESSELS WITH REMOVABLE COVERS.
2. GRATING FRAME AND HOLD DOWN BARS TO BE MADE FROM 25 X 6 THK. PLATE.

Rev No	Date	Purpose	Prepared by	Checked by	Stds Committee Convenor	Stds Bureau Chairman
					Approved by	
5	20 06 2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
4	01 10 2013	REVISED AND REISSUED AS STANDARD	GCP	TK	RKT	SC
3	27 01 2009	REAFFIRMED AND REISSUED AS STANDARD	VPR	RKG	AKM	SKG



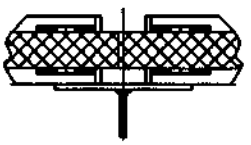
TABLE–1

CORROSION ALLOWANCE	SUPPORT CLEAT/RING THICKNESS (t)			
	CARBON & LOW ALLOY		STAINLESS STEEL⊕	
	UPTO 3000 #	ABOVE 3001 #	UPTO 3000 #	ABOVE 3001 #
0	6	10	6	10
1.5	10	14		
3.0	12	16		
6.0	18	22		

⊕ IF CORROSSION ALLOWANCE IS SPECIFIED IN VESSEL DRG. THEN ADD 2xCA

TABLE–2

CORROSION ALLOWANCE	MIN. FILLET WELD SIZE
0	6
1.5	8
3.0	10
6.0	12



SECTION– C–C
(REFER NOTE–4)

TABLE–3

VESSEL I.D.(D)/ DEMISTER EFFECTIVE DIA.	NO. OF SUPPORT BEAM	T						BOLT SIZE	SLOTTED HOLE	HOLE SIZE (ø)	NO OF BOLT		E	W
		H	CARBON STEEL AND LOW-ALLOY STEEL CORROSSION ALLOWANCE				S. STEEL (ADD 2xC.A.)				TYPE–A	TYPE–B		
			0.0	1.5	3.0	6.0								
UPTO 1800	–													
1801 < 3600	1	150	6	10	12	18	6	M16	18X30	20	1	2	30	90
3601 < 5400	2	200						M16	18X30	20	2		35	125
5401 < 7200	3	300						M20	22X36	24			50	175
7201 < 9000	4	400						M24	26X40	28			50	325

GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. DEMISTER TYPE AND MATERIAL SHALL BE AS PER VESSEL DRAWING.
3. ALL INTERNAL BOLTS SHALL BE STAINLESS STEEL, OTHER MATERIALS SHALL BE AS PER VESSEL DRAWING.
4. WIDTH AND LENGTH OF EACH DEMISTER PIECE SHALL BE DECIDED BY VENDOR. HOWEVER THE WIDTH OF EACH PIECE SHALL BE SUCH THAT THE SAME CAN PASS THROUGH THE MANHOLE. THE LENGTH OF EACH PIECE SHALL NOT EXCEED 2.5 M.
5. ANY DETAIL SHOWN IN VESSEL DRAWING SHALL BE GIVEN PREFERENCE TO THAT OF STANDARD.
6. WIDTH OF SUPPORTING RING SHALL BE DECIDED BY VENDOR BASED ON LOADINGS.
7. DEMISTER PAD SHALL BE SUPPLIED SUITABLY OVER SIZED FOR SNUG FITTING.

Rev No	Date	Purpose	Prepared by	Checked by	Stds Committee Convenor	Stds Bureau Chairman
					Approved by	
5	20 06 2019	REAFFIRMED AND REISSUED AS STANDARD	DP	TK	KJH	RKT
4	01 10 2013	REVISED AND REISSUED AS STANDARD	GCP	TK	RKT	SC
3	27 01 2009	REAFFIRMED AND REISSUED AS STANDARD	VPR	RKG	AKM	SKG

आपूर्तिकर्ताओं से प्रलेखन अपेक्षाओं हेतु विनिर्देश

SPECIFICATION FOR DOCUMENTATION REQUIREMENTS FROM SUPPLIERS

Rev. No	Date	Purpose	Prepared by	Checked by	Approved by: Standards Committe Convener	Approved by: Standards Bureau Chairman
2	12.06.20	General Revision	QMS Standards Committee	QMS Standards Committee	SKB	SKS
1	12.03.15	General Revision	QMS Standards Committee	QMS Standards Committee	MPJ	SC
0	04.06.09	Issued as Standard Specification	QMS Standards Committee	QMS Standards Committee	SCT	ND

Abbreviations:

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

QMS Standards Committee

Convener: Mr. S.K. Badlani

Members:
Mr. Sanjay Mazumdar (Engg.)
Mr. R.K. Singh (SCM)
Mr. B. Biswas (SCM)
Mr. Ravindra Kumar (Const.)
Mr. Vinod Kumar (CQA)
Mr. Swapnil Vaishnav (Projects)

CONTENTS

Attachments

Format for completeness of Final Documentation : Format No. 3-78-0004

1.0 SCOPE

This specification establishes the Documentation Requirements from Suppliers.

All documents / data against the PO / PR / MR shall be developed and submitted to EIL / Owner by the suppliers for review / records, in line with this specification.

2.0 DEFINITIONS

2.1 Supplier

For the purpose of this specification, the word "SUPPLIER" means the person(s), firm, company or organization who has entered into a contract with EIL / Owner for delivery of some products (including service). The word is considered synonymous to bidder, contractor or vendor.

2.2 Owner

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

3.0 REFERENCE DOCUMENTS

6-78-0001	Specification for Quality Management System Requirements from Bidders

4.0 DOCUMENTATION REQUIREMENTS

4.1 Order Acknowledgement and Assigning Project Manager

After placement of order, Supplier shall acknowledge order through V-Portal within 7 days of receipt of FOA / PO. Supplier shall assign a Project Manager for that order though online portal and provide requisite details. Project Manager details shall include e-mail address, mailing address, mobile/telephone nos., fax nos. and name of Project Manager. All the system generated emails pertaining to that order shall be sent to the assigned Project Manager.

4.2 Documents / Data to be submitted by the Supplier

4.2.1 The Supplier shall submit the documents and data against the PO / PR / MR as per the list given in respective PO / PR / MR.

4.2.2 Review of the supplier drawings / documents by EIL would be only to review the compatibility with basic designs and concepts and in no way absolve the supplier of his responsibility / contractual obligation to comply with PR requirements, applicable codes, specifications and statutory rules / regulations. Any error / deficiency noticed during any stage of manufacturing / execution / inspection/ installation shall be promptly corrected by the supplier without any time and cost implications, irrespective of comments on the same were received from EIL during the drawing review stage or not.

4.2.3 Unless otherwise specified, submission of documents for Review / Records shall commence as follows from the date of Fax of Intent / Letter of Intent / Fax of Acceptance (FOA) / Letter of Acceptance (LOA):

QMS	- 1 week
Document Control Index	- 2 weeks
Other Documents / Drawings	- As per approved Document Control Index

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

4.3 Style and Formatting

4.3.1 All Documents shall be in ENGLISH language and in M.K.S System of units.

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

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

4.4 Review and Approval of Documents by Supplier

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

4.5 Document Category

4.5.1 **Review Category**

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

Review Code 1	-	No comments. Proceed with Manufacture / Fabrication as per the document.
Review Code 2	-	Proceed with Manufacture / Fabrication as per commented document. Revised document required.
Review Code 3	-	Document does not conform to basic requirements as marked. Resubmit for review.
R	-	Document is retained for Records. Proceed with Manufacturing / Fabrication as per PR / Tender requirements.
V	-	Void

4.6 Methodology for Submission of Documents to EIL/Owner

4.6.1 Document Control Index (DCI)

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

4.6.2 Submission of Drawings / Documents / Data

Drawings / documents, data and DCI shall be uploaded on the EIL Vendor Portal as per approved DCI. The detailed guidelines for uploading documents on EIL Vendor Portal are available on following URL

http://edocx.eil.co.in/vportal

4.6.3 Statutory Approvals

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

4.6.4 Manufacturing Schedule

Supplier shall prepare manufacturing schedule for the order, with key milestone activities (such as document submission, sub ordering, manufacturing, Inspection, dispatches, etc) to meet delivery as per FOA / PO terms. Supplier shall submit manufacturing schedule to concerned Regional Procurement Office (RPO) of EIL / Owner for review within 2 weeks from date of FOA / PO.

4.6.5 Schedule and Progress Reporting

Supplier shall submit monthly progress (MPR) report and updated procurement, engineering, manufacturing status, Inspection and dispatch status (schedule vs. actual) and highlight constraints, if any, along with action plan for mitigation, to the concerned Regional Procurement Office (RPO) of EIL / Owner by 1st week of every month., First MPR shall be submitted within 2 weeks from FOA / LOA. In case of exigencies, EIL / Owner can ask for report submission as required on weekly / fortnightly / adhoc basis depending upon supply status and supplier shall furnish such reports promptly without any price implication. Format for progress report shall be submitted by the Supplier during kick off meeting or within 2 weeks of receiving FOA / LOA, whichever is earlier.

4.7 Inspection and Testing

4.7.1 Quality Assurance Plan / Inspection and Test Plan

If Inspection and test plans (ITP) are attached with MR / PR same shall be followed along with additional tests requirement (if any) mentioned in MR/ PR. However for cases wherein EIL Standard ITPs not available / have not been attached with MR / PR, Supplier shall submit within one week of receiving FOA / LOA, the Quality Assurance Plan for inspection & testing at various stages of production, quality control records for critical bought out items / materials and site assembly & testing as may be applicable to the specific order and obtain approval from concerned Regional procurement Office of EIL / third party inspection agency, as applicable.

For Package equipment contracts, the supplier shall prepare a list of items / equipment and their inspection categorization plan for all items included in the scope of supply immediately after receipt of order and obtains approval for the same from EIL. The items shall be categorized into different categories depending upon their criticality for the scope of inspection of TPIA and / or EIL.

4.7.2 **Inspection Requisition:**

Supplier shall perform internal inspection as per ITP/ approved QAP at their works based on approved documents / drawings. Upon satisfactory internal inspection, supplier shall raise inspection call to concerned Regional Procurement Office (RPO) of EIL / TPIA / Owner with advance notice as per contract along with Internal test reports.

All changes w.r.t. PR shall be recorded through agreed variations or Concessions & Deviations. Conflict, if any, between PR / Job specifications and approved drawings, shall be brought to the notice of EIL / owner by the supplier / contractor. Decision of EIL / owner will be binding on the supplier and to be complied without time and cost implications.

Identified bought out items/ raw material shall be procured under TPIA as per ITP.

4.7.3 **Inspection Release Note (IRN)/ Inspection Certificate (IC)**

IRN / IC shall be issued by EIL Inspector / third party inspection agency on successful inspection, review of test reports / certificates as per specifications & ITP / agreed quality plan (as applicable) and only after all the drawings / documents as per DCI are submitted and are accepted under review code-1 or code R. Supplier shall ensure that necessary documents / manufacturing and test certificates are made available to EIL / TPIA as and when desired.

Note 1: Non fulfilling above requirement shall result into appropriate penalty or with- holding of payment as per conditions of PO / PR / MR.

Note 2: For items where IRN/IC is issued by TPIA, supplier to ensure that following as a minimum must be mentioned by TPIA in IRN / IC

a) PR document number
b) List of drawings / documents with EIL approval code
c) Tests witnessed, documents reviewed
d) Compliance statement by TPIA that product meets the requirement as specified in EIL PR, standard specifications, Inspection Test Plan / QAP and approved documents.

4.8 Transportation Plan

Transportation Plan for Over Dimensional Consignments (ODC), if any, shall be submitted within 2 weeks of receiving FOA / LOA, for approval. Consignment with parameters greater than following shall be considered as over dimensional.

Dimensions: 4 meters width x 4 meters height x 20 meters length

Weight : 32 MT

Dimensions and weight provided above are inclusive of all nozzles, attachments, transportation saddles etc.

Physical Rout survey for ODC movement shall be submitted to EIL within 8 weeks of receiving FOA / LOA.

4.9 Dispatch Details

Upon receipt of IRN / IC from EIL inspector / TPIA, supplier shall dispatch items within 2 days. Supplier shall submit dispatch details to concerned RPO of EIL / Owner within a day of dispatch. Dispatch details shall include Lorry Receipt (LR) number / Dispatch Number, Transporter Name, Date of dispatch, Packing list, Invoice copy etc.

4.10 Final Documentation

4.10.1 Supplier shall prepare final documents in line with VDR (Vendor Document Requirements) attached with PR/Tender. A copy of final document along with filled in Format for Completeness of Final Documentation (Format No. 3-78-0004) to be submitted to EIL Inspector / TPIA for review & approval within 2 weeks from dispatch. Upon receipt of EIL/TPIA endorsement on Completeness of Final Documents, supplier shall submit soft / hard copies of Final documents to EIL / Owner in requisite quantity as per PO / PR details, along with covering letter. A copy of covering letter to be submitted to the concerned Regional Procurement Office (RPO) of EIL/Owner.

4.10.2 **As Built Drawings**

Minor Shop changes made by Supplier after approval of drawings under 'Code 1' by EIL and deviations granted through online system ,if any, shall be marked in hard copies of drawings which shall then be stamped 'As-built' by the supplier. These 'As-built' drawings shall be reviewed and stamped by EIL Inspector / TPIA. Supplier shall prepare scanned images files of all marked – up 'As – built' drawings. Simultaneously Supplier shall incorporate the shop changes in the native soft files of the drawings also.

4.10.3 **Packing / Presentation of Final Documents**

Final Documents shall be legible photocopies in A4, A3 size only. Drawings will be inserted in plastic pockets (both sides transparent, sheet thickness minimum 0.1 mm) with an extra strip of 12 mm wide for punching so that drawings are well placed.

Final Documentation shall be bound in Hard board Plastic folder(s) of size 265 mm x 315 mm ($10^1/_2$ inch x $12^1/_2$ inch) and shall not be more that 75 mm thick. It may be of several volumes and each volume shall have a volume number, index of volumes and index of contents of that particular volume. Where number of volumes are more, 90mm thickness can be used. Each volume shall have top PVC sheet of minimum 0.15 mm thick duly fixed and pressed on folder cover and will have 2 lever clip. In case of imported items documents, 4 lever clip shall also be accepted. All four corners of folders shall be properly metal clamped. Indexing of contents with page numbering must be incorporated by supplier. Spiral/Spico bound documents shall not be acceptable. As mentioned above, books should be in hard board plastic folders with sheets punched and having 2/4 lever clips arrangement.

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

4.10.4 **Submission of Soft Copies**

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

In addition to hard copies, Supplier shall submit soft copies of all the final drawings and documents in pen drive or any other specified medium with proper identification tag, all text documents prepared on computer, scanned images of all important documents (not available

as soft files), all relevant catalogues, manuals available as soft files (editable copies of drawings/text documents, while for catalogues / manuals / proprietary information and data, PDF files can be furnished).

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

4.10.5 **Completeness of Final Documentation**

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

COMPLETENESS OF FINAL DOCUMENTATION

Name of Supplier/Contractor :

Customer :

Project :

EIL's Job No. :

Purchase Order No./ Contract No. :

Purchase Requisition No./ Tender No. :

Rev. No. :

Name of the Work/ Equipment :

Tag. No. :

Supplier's / Contractor's Works Order No. :

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

Signature	: …….	Signature	: …….
Date	: …….	Date	: …….
Name	: ……..	Name	: ……..
Designation	: ……	Designation	: ……
Department	: ……	Department	: ……
	Supplier / Contractor		EIL / TPIA

Annexure-1

Final Documentation Index Sheet			
PR/PO/Tender No.		Rev. No.	
Serial No.	Document Title	Page/ Folder No.	No. of Pages

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

Supplier / Contractor

EIL / TPIA

DRAWING/DOCUMENT TRANSMITTAL SHEET

CONTRACTOR'S VENDOR'S LOGO ETC.
PL. DO NOT CHANGE LOCATION OR EXCEED THIS SPACE

PR/TENDER NO.	**:**	**JOB NO.**	**:**
CONTRACTORS/VENDOR'S NAME	**:**	**PROJECT**	**:**
EIL LOI/PO NO.	**:**	**CLIENT**	**:**
CONTRACTOR'S VENDOR'S LETTER NO.	**:**	**DATE**	**:**

S. NO.	DRAWING/DOCUMENT NO.	REV.	SHEET	TOTAL	DRAWING/DOCUMENT TITLE	CATEGORY	NO. OF COPIES	EQUIPMENT NO.

CATEGORY CODES:
R- Drawings which are required to be reviewed by EIL
I – Drawings which are to be submitted for EIL record

Comment Resolution Sheet

Job. No._____

Project Title_____

Drawing/Document No._____

Revision No._____

S. NO.	EIL Comment	Incorporated Resolution	Remarks

विक्रेता कार्यशाला में सकारात्मक सामग्री पहचान के लिए मानक विनिर्देश

STANDARD SPECIFICATION FOR POSITIVE MATERIAL IDENTIFICATION (PMI) AT SUPPLIER'S WORKS

Rev. No	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	Standards Bureau Chairman
					Approved by	
4	23.12.21	REVISED AND RE-ISSUED	HKM	CS	RK	S Majumdar
3	19.09.16.	REVISED AND RE-ISSUED	TKK	HP	RKS	RN
2	20.10.11	REVISED AND RE-ISSUED	RKS	SCG	AKC	DM
1	15.07.08	REVISED AND RE-ISSUED	NKR	SSL	SKP	VC
0	07.12.00	ISSUED AS STANDARD SPECIFICATION	AKC	AKB	AKB	MI

Abbreviations:

API	:	American Petroleum Institute
AS	:	Alloy Steel
HIC	:	Hydrogen Induced Cracking
LSTK	:	Lump Sum Turn Key
NACE	:	National Association of Corrosion Engineers
PMI	:	Positive Material Identification
RTJ	:	Ring Type Joint
Sch	:	Schedule
SS	:	Stainless Steel
TPI or TPIA	:	Third Party Inspection Agency

Inspection Standards Committee

Convenor: Mr. Rajeev Kumar

Members: Mr. Rajesh Sinha
Mr. Himangshu Pal
Mr. R. Muthuramalingam (RPO Representative)
Mr. Chandrashekhar
Mr. Avdhesh Agrawal
Mr. P V Satyanarayana (Engg. Representative)
Mr. Mahendra Mittal

CONTENTS

1.0 SCOPE

1.1 This specification applies to the requirements for Positive Material Identification (PMI) to be performed at the Supplier's works on Metallic Materials procured either directly by the Owner/EIL/ LSTK contractor or indirectly through the sub-Suppliers.

1.2 This specification covers the procedures and methodology to be adopted to assure that the chemical composition of the material is consistent with the material specifications as specified in purchase documents using 'Alloy Analyzer' at the time of final inspection before dispatch.

1.3 The scope of this specification shall include but shall not be limited to Positive Material Identification (PMI) to be performed on Materials listed below:

1.3.1 For alloy Steel materials as below:

- Alloy Steel Pipes including Clad Pipes
- Alloy Steel Flanges & Forgings
- Alloy Steel Fittings including Clad Fittings
- Alloy Steel Fasteners
- Alloy Cast & Forged steel valves
- Alloy Steel Instrumentation Items (Control Valves, Safety Valves etc.)
- Longitudinal Pipe & Fittings Welds.
- Gaskets (for Ring Type Joints)

1.3.2 For Carbon Steel materials as below:

- All Carbon Steel Piping items under NACE or HIC or H2 or Wet Hydrogen Sulfide (H_2S), Hydrofluoric acid (HF), Sulfuric acid (H_2SO_4) services etc.
- Carbon Steel flanges and valves (Rating 900# and above)
- LTCS items

Following items shall be excluded from scope of PMI examination.

- Gaskets other than for Ring Type Joints
- Internal Components of Valves

1.4 All grades of material supplies including Stainless Steels shall be liable for PMI test at site. In case of any defective materials being found at site, the Supplier shall be responsible to effect replacement of such defective materials at project site without any delays to the satisfaction of EIL site RCM (Resident Construction Manager).

2.0 REFERENCE DOCUMENTS

2.1 API Recommended Practice 578 (Third Edition, Feb 2018) - Material Verification Program for New and Existing Alloy Piping Systems.

3.0 DEFINITIONS

3.1 **Supplier:** Any Supplier or Manufacturer on whom an order is placed for the supply of referred items. This definition shall also include any sub-Supplier or manufacturer on whom a sub-order is placed by the Supplier.

3.2 **Inspection Lot:** A group of items offered for inspection covered under same size, Heat and Heat treatment lot.

3.3 **Alloy Material:** Any metallic material (including welding filler materials) that contains alloying elements such as Chromium, Nickel, Molybdenum or Vanadium, which are intentionally added to enhance mechanical or physical properties and/or corrosion resistance.

4.0 PMI EXAMINATION

4.1 The Supplier shall submit a procedure of PMI to comply with the requirements of this Specification. Approval of PMI Procedure shall be obtained from Owner / EIL / TPIA prior to commencing manufacture / inspection of product.

4.2 PMI examination of materials is independent of any certification, markings or colour coding that may exist and is aimed at verifying that the alloy used are as per specified grades.

4.3 The Supplier shall identify all incoming alloy materials and maintain full traceability of all alloy
materials, including all off-cuts. Transfer of identification marks shall be undertaken prior to cutting to ensure maintenance of identification on off-cuts.

4.4 The Supplier shall ensure that all alloy materials are segregated and stored in separately identified locations to prevent the mix up of materials of different alloy specifications or alloy material with carbon steel. Non ferro-magnetic materials shall be segregated at all times from ferro-magnetic materials.

4.5 PMI examination is subject to surveillance inspection by Owner / EIL / TPIA.

5.0 ACCEPTABLE METHODS FOR PMI

5.1 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.

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

5.3 The acceptable instruments for alloy analyzer shall be either "Portable X-Ray fluorescence" or "Optical Emission" type each capable of verifying the percentage of alloy elements within specified range.

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

5.5 The PMI instrument used shall have the sensitivity to detect the alloying elements in the specified range.

5.6 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 data of the last service shall be stated on the PMI Report Form (Sample enclosed).

5.7 Each analyzer must be calibrated according to the manufacturer's specification at the beginning and end of each shift. Instrument must be checked against known standard for each alloy type to be inspected during the shift.

5.8 Certified samples, with full traceability, of a known alloy materials shall be available for use as a random spot check on the instrument calibration.

5.9 The surfaces to be examined shall be prepared by light grinding or abrasive paper and solvent cleaner. Evidence of Arc burn resulting from examination shall be removed by light grinding or abrasive paper. No permanent marks, which are injurious to the usage of product in service, are acceptable.

5.10 Alloy Steel ring type joint Gaskets shall be inspected by using portable X-Ray fluorescence instrument.

5.11 Testing shall be done as per the procedures outlined by the manufactures of alloy analyzer being used. Modification of these procedures if any must be approved by Owner/EIL.

5.12 The persons performing PMI shall demonstrate their capabilities to the satisfaction of Owner/EIL/TPIA visiting engineer. If the Supplier has qualified operator on their rolls, he may perform the examination. Otherwise PMI examination shall be sub-contracted to an independent testing agency approved by EIL.

5.13 Whenever material is identified as not meeting requirements by the visiting engineer a rejection note shall be issued.

6.0 EXTENT OF PMI EXAMINATION

Following sampling plans shall be applicable for PMI examination of various items.

A. Flanges, Fittings Valves, RTJ Gaskets - 100% by Supplier and 10% @ random witness by EIL/TPIA

B. Pipes - 100% (for pipes procured from traders)
2 random samples drawn from each Size/Heat/Lot (for pipes procured directly from mills)

C. Fasteners -

Lot Size	**Sample Size for** EIL/TPIA	Sample size for Supplier
Upto 100	2% (Min 2)	Min 10%
101 to 500	1% (Min 3)	Min 10%
501 and above	0.5% (Min 5)	Min 10%

Note:

a. For Welded Pipes and Fittings and flanges like Fig 8, Spacer and blinds etc. PMI shall be performed on Base Metal as well as weldments.

7.0 ACCEPTANCE CRITERIA

7.1 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.

7.2 Deposited Weld Metal

For deposited weld metal using welding consumables matching with base metals, the recorded presence of characteristic elements upto 12.5% less than the minimum specified value in the

welding consumable specification and upto 12.5% more than the maximum specified value in the welding consumable specification shall be acceptable.

8.0 REJECTION CRITERIA

8.1 If PMI test results fall outside the acceptable range as specified in 7.0 above, the supplier shall obtain a quantitative check analysis performed by a laboratory acceptable to Owner / EIL / TPIA for a complete chemical analysis. Alternatively, the item can be tested with a spark analyser for verification. Results of this analysis shall be submitted to Owner / EIL / TPIA for final decision.

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

8.2 If any sample drawn to PMI test on the basis of percentage selection as per 6.0 above, fails to meet specification requirements, 100% of items of lot shall be tested for PMI by supplier. Any failure thereafter during sample check shall mean rejection of whole lot.

9.0 RECORDING AND DOCUMENTATION

The results of PMI examination shall be recorded in a Report Format as enclosed with this specification.

10.0 MARKING

10.1 All alloy materials tested by PMI shall be identified using either of the following methods by indicating "PMI OK"

a) Bar Code/Hologram Sticker
b) A low stress stamp marking

	POSITIVE MATERIAL IDENTIFICATION REPORT BULK MATERIALS								Page of
Project:			Client						Job No.
PMI Report No.			Supplier/Sub-Supplier						
Purchase Order No.			Testing Agency						
Purchase Requisition No:			PMI Location						
Bulk Item Type (as per Requisition)									
Material Specification/Grade Number of items in Lot									
Requisition Item No./ Description			Major content, Weight Percent						Remarks Accept/Reject
Element	Cr	Ni	Mo	V	Ti *	Cb/ Nb **	Mn ***		
Specified Range									
Actual observations 1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
Instrument Type / ID Last Service Date		Inspection Agency							Witnessed By

* To be reported in case of SS321 Material
** To be reported in case of SS347 Material
*** To be reported in case of LTCS Material

सीमलैस पाइपों के लिए
निरीक्षण एवं परीक्षण योजना

INSPECTION AND TEST PLAN
FOR
SEAMLESS PIPES

Rev. No.	Date	Purpose	Prepared By	Checked By	Standards Committee Convenor	Standards Bureau Chairman
					Approved By	
6	23.12.2021	REVISED AND RE-ISSUED	HKM	CS	RK	S Majumdar
5	19.09..2016	REVISED AND RE-ISSUED	TKK	HP	RKS	RN
4	17.06..2013	REVISED AND RE-ISSUED	TKK	RKS	SCG	DM
3	15.07.2011	REVISED AND RE-ISSUED	TKK	SCG	AKC	DM
2	30.06.2010	REVISED AND RE-ISSUED	RK	VKJ	SKP	ND

Abbreviations:

CEIL	:	Certification Engineers International Limited	MRT	:	Mechanical Run Test
CIMFR	:	Central Institute of Mining & Fuel Research	NDT	:	Non Destructive Testing
CE	:	Carbon Equivalent	NPSH	:	Net Positive Suction Head
DFT	:	Dry Film Thickness	PO	:	Purchase Order
DPT	:	Dye Penetrant Testing	PESO	:	Petroleum Explosive Safety Organization
DHT	:	De-hydrogen Heat Treatment	PQR	:	Procedure Qualification Record
ERTL	:	Electronics Regional Test Laboratory	PR	:	Purchase Requisition
FCRI	:	Fluid Control Research Institute	PMI	:	Positive Material Identification
HT	:	Heat Treatment	RT	:	Radiography Testing
HIC	:	Hydrogen Induced Cracking	SSCC	:	Sulphide Stress Corrosion Cracking
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IHT	:	Intermediate Heat Treatment	UT	:	Ultrasonic Testing
IC	:	Inspection Certificate	VDR	:	Vendor Data Requirement
IGC	:	Inter Granular Corrosion	WPS	:	Welding Procedure Specification
MPT/MT	:	Magnetic Particle Testing	WPQ	:	Welders Performance Qualification
MTC	:	Material Test Certificate			

Inspection Standards Committee

Convenor : Mr. Rajeev Kumar

Members:

Mr. Rajesh Sinha	Mr. Himangshu Pal	Mr. R. Muthuramalingam (RPO Representative)
Mr. Chandrashekhar	Mr. Avdhesh Agrawal	Mr. P V Satyanarayana (Engg. Representative)
Mr. Mahendra Mittal		

1.0 SCOPE

This Inspection and Test Plan covers the minimum testing requirements of Seamless Pipes.

2.0 REFERENCE DOCUMENTS

PO/PR/Standards referred therein/ Job specifications /Approved documents.

3.0 INSPECTION AND TEST REQUIREMENTS

SL. NO.	STAGE/ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/ TPIA
1.0	**Procedure**						
1.1	Hydrostatic Test, Heat Treatment, NDT and Other Procedures	Documented Procedures	100%	Procedure Documents	-	H	R
2.0	**Material Inspection**						
2.1	Raw Material Inspection	Review of MTC for Chemical, Mechanical Properties, size & steel making process, etc.	100%	Test Certificates	-	H	R
3.0	**In Process Inspection**						

SL. NO.	STAGE/ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/ TPIA
3.1	Heat Treatment	Normalizing, Tempering, Solution Annealing, Stabilization Heat Treatment etc. as applicable	100%	HT chart	-	H	R
3.2	NDT As applicable	Surface & Internal Imperfections	PR / Purchase Specification	NDT Reports	-	H	R
3.3	TPM (Identification of Test Samples)	Product analysis, Tensile ((0.2 Offset/0.5% extension under load),), Hardness, Impact, IGC and Other test as applicable	Lot as per specification	Test Reports	-	H	H (Note-1)
3.4	Product Analysis	Chemical Composition	Lot as per specification	Test Reports	-	H	R
3.5	Destructive Testing	Tensile, Hardness, Impact, IGC and Other test as applicable	Lot as per specification	Test Reports	-	H	H (Note-1)
3.6	Galvanizing (If Applicable)	Integrity of Galvanised Coating	100%	Inspection Report	-	H	R
4.0	**Final Inspection**						
4.1	Hydrostatic Testing	Leak Check	100%	Test Report	-	H	RW (Note 1)

SL. NO.	STAGE/ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/ TPIA
4.2	Visual and Dimensional Inspection (VDI)	Surface Condition, Straightness, End Finish, Bevel Angle, Root Face, Outer Dia., Thickness, Length, End Finish, Marking, End Caps etc	100%	Inspection Report	-	H	RW (Note 1)
4.3	Weight Checking as applicable	Weight	100% By Supplier	Inspection Report	-	H	-
4.4	PMI Check	Chemical Check	As Per EIL Spec. 6-81-0001	Inspection report	-	H	RW
4.5	Final Stamping	Stamping of Accepted Pipes	Stamping of Pipes which are witnessed by EIL/TPIA..Other pipes to have suppliers identification	Inspection Report	-	H	H

SL. NO.	STAGE/ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/ TPIA
5.0	**Painting**						
5.1	Rust Preventive Coating & Color Coding (As applicable)	Visual & Color Coding as applicable	100%	Inspection Report	-	W	-
6.0	**Documentation & IC**						
6.1	Documentation & Inspection Certificate(IC)	Review of Stage Inspection Reports / Test Reports & Issue of IC	100%	Supplier TC & IC	-	H	H

Legend: H- Hold (Do not proceed without approval), P-Perform, RW - Random Witness (As specified or 10% (min.1 no. of each size and type of Bulk item)), R-Review, W-Witness (Give due notice, work may proceed after scheduled date).

NOTES (As applicable):

1. Carbon Steel Pipes (Other than LTCS & Pipes for special services like NACE, H2, HIC, etc.) up to size 12" will be accepted on review of Supplier Test Certificates. Supplier Test Certificate to be reviewed by EIL/TPIA.
2. 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).
3. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred therein /Job Specification /Approved Documents.
4. For orders placed on stockist, items shall be accepted based on manufacturer's TC with EN10204 type 3.2 certification from EIL approved suppliers.

फोर्ज्ड, सीमलेस एंड वैल्डेड फिटिंगों के लिये निरीक्षण व परीक्षण योजना

INSPECTION AND TEST PLAN FOR FORGED, SEAMLESS & WELDED FITTINGS

Rev. No.	Date	Purpose	Prepared by	Checked by	Standards Committee Convener	Standards Bureau Chairman
					Approved by	
8	01 06 2019	REVISED AND RE-ISSUED	AA	RS	RKS	RKT
7	14 11 2018	REVISED AND RE-ISSUED	KC	NM	RKS	RKT
6	19 09 2016	REVISED AND RE-ISSUED	TKK	HP	RKS	DM
5	17 06 2013	REVISED AND RE-ISSUED	TKK	RKS	SCG	DM
4	15 07 2011	REVISED AND RE-ISSUED	TKK	SCG	AKC	DM

Abbreviations:

CEIL	:	Certification Engineers International Limited	MRT	:	Mechanical Run Test
CIMFR	:	Central Institute of Mining & Fuel Research	NDT	:	Non Destructive Testing
CE	:	Carbon Equivalent	NPSH	:	Net Positive Suction Head
DFT	:	Dry Film Thickness	PO	:	Purchase Order
DPT	:	Dye Penetrant Testing	PESO	:	Petroleum Explosive Safety Organization
DHT	:	De-hydrogen Heat Treatment	PQR	:	Procedure Qualification Record
ERTL	:	Electronics Regional Test Laboratory	PR	:	Purchase Requisition
FCRI	:	Fluid Control Research Institute	PMI	:	Positive Material Identification
HT	:	Heat Treatment	RT	:	Radiography Testing
HIC	:	Hydrogen Induced Cracking	SSCC	:	Sulphide Stress Corrosion Cracking
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IHT	:	Intermediate Heat Treatment	UT	:	Ultrasonic Testing
IC	:	Inspection Certificate	VDR	:	Vendor Data Requirement
IGC	:	Inter Granular Corrosion	WPS	:	Welding Procedure Specification
MPT/MT	:	Magnetic Particle Testing	WPQ	:	Welders Performance Qualification
MTC	:	Material Test Certificate			

Inspection Standards Committee

Convener: Mr. R.K. Singh

Members:

Mr. Rajesh Sinha	Mr. Himangshu Pal	Mr. Chandrashekhar
Mr. Muthuramalingam	Mr. Avdhesh Agrawal	Mr. Deepak Gupta- Project
Mr. Mahendra Mittal		

1.0 SCOPE

This Inspection and Test Plan covers the minimum testing requirements of Forged, Seamless & Welded Fittings.

2.0 REFERENCE DOCUMENTS

PO/PR/Standards referred therein/ Job specifications /Approved documents.

3.0 INSPECTION AND TEST REQUIREMENTS

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	**Procedure**						
1.1	Heat Treatment / NDT	Documented Procedures	100%	Procedure Documents	-	H	R
1.2	WPS,PQR & WPQ	Welding Parameters & Qualification	100%	WPS,PQR &WPQ	-	H	W- New R- Existing
2.0	**Material Inspection**						
2.1	Raw Material Identification (Billets, Rounds, Pipes, Coil, Plates, etc.) (*Alloy steels and Special services like NACE, H2, HIC, Wet H2S,LTCS, UOP, AXEN etc.)	Chemical and Mechanical Properties, Size & Steel making practice etc.	100%	Mill test certificate, Supplier's Inspection Report	-	H	W* / R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
3.0	**In Process Inspection**						
3.1	Forming &Welding	Forming & Welding Parameters	100%	Supplier's records	-	H	-
3.2	Ferrite Check Of SS Welds (If Applicable)	% Ferrite Check	100%	Inspection Report	-	H	R
3.3	Heat Treatment	Stress Reliving, Normalizing, Tempering, Solution Annealing, Stabilization Heat Treatment etc. as applicable	100%	HT chart / Report	-	H	R
3.4	NDT-RT As Applicable	Surface & Internal Imperfections	As per PR/Purchase Specification	RT Films & Reports	-	H	R (Films Review)
3.5	NDT – UT (as applicable)	Surface & Internal Imperfections	As per PR/Purchase Specification	UT Report	-	H	R
3.6	NDT – DPT/MPT on Bevel Ends (as applicable)	Surface & Internal Imperfections	100%	Test Report	-	H	RW
3.7	Identification of Test Samples	Product Chemical, Mechanical, Impact, IGC and Other test as applicable	Per heat, per heat treatment lot (Note-4)	Test Reports	-	H	H

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
3.8	Product Analysis	Chemical Composition	As per PR/Purchase Specification	Test Reports	-	H	R
3.9	Destructive Testing	Mechanical, Impact, IGC, Hardness and Other test as applicable	100%	Test Reports	-	H	H
3.10	Galvanizing (If Applicable)	Integrity Of Galvanized Coating	100%	Inspection Report	-	H	R
4.0	**Final Inspection**						
4.1	Visual and Dimension	Size, Thickness / Schedule, Dimensions, Surface quality, Marking, etc.	100%	Inspection Report	-	H	RW
4.2	Hardness testing on finished fittings of Alloy steels and Special services (like NACE, H2, HIC, Wet H2S, UOP, AXEN etc.) & any other services as applicable.	Hardness value of Base metal & Welds/HAZ.	Random 10%	Test Report	-	H	RW
4.3	PMI Check	Chemical Check	As Per EIL Spec. 6-81-0001	Inspection report	-	H	RW

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.4	Final Stamping	Stamping Of Accepted Fittings	Stamping of Fittings which are witnessed by EIL/TPIA.	Inspection Report	-	H	H
5.0	**Painting**						
5.1	Rust Preventive Coating & Color Coding	Visual & Color Coding as applicable	100%	Inspection Report	-	W	-
6.0	**Documentation & IC**						
6.1	Documentation & Inspection Certificate(IC)	Review of Stage Inspection Reports / Test Reports & Issue of IC	100%	Supplier TC & IC	-	H	H

Legend: H- Hold (Do not proceed without approval), P-Perform, RW - Random Witness (As specified or 10% (min.1 no. of each size and type of Bulk item)), R-Review, W-Witness (Give due notice, work may proceed after scheduled date).

NOTES (As applicable):

1. 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).
2. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred there in /Job Specification /Approved Documents.
3. For orders placed on stockiest, items shall be accepted based on manufacturer's TC with EN10204 type 3.2 certification from EIL approved suppliers.
4. Test piece marking shall be carried out from the product for each heat of raw material and for each heat treatment batch at shop floor.

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INSPECTION AND TEST PLAN FOR FLANGES, SPECTACLE BLINDS & DRIP RINGS

Rev. No.	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	Standards Bureau Chairman
					Approved by	
6	22.02.2024	REVISED AND RE-ISSUED	BBK	PW	RK	MN
5	14.11.2018	REVISED AND RE-ISSUED	KC	NM	RKS	RKT
4	17.06.2013	REVISED AND RE-ISSUED	TKK	RKS	SCG	DM
3	15.07.2011	REVISED AND RE-ISSUED	TKK	SCG	AKC	DM

Abbreviations:

CEIL	:	Certification Engineers International Limited	MRT	:	Mechanical Run Test
CIMFR	:	Central Institute of Mining & Fuel Research	NDT	:	Non Destructive Testing
CE	:	Carbon Equivalent	NPSH	:	Net Positive Suction Head
DFT	:	Dry Film Thickness	PO	:	Purchase Order
DPT	:	Dye Penetrant Testing	PESO	:	Petroleum Explosive Safety Organization
DHT	:	De-hydrogen Heat Treatment	PQR	:	Procedure Qualification Record
ERTL	:	Electronics Regional Test Laboratory	PR	:	Purchase Requisition
FCRI	:	Fluid Control Research Institute	PMI	:	Positive Material Identification
HT	:	Heat Treatment	RT	:	Radiography Testing
HIC	:	Hydrogen Induced Cracking	SSCC	:	Sulphide Stress Corrosion Cracking
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IHT	:	Intermediate Heat Treatment	UT	:	Ultrasonic Testing
IC	:	Inspection Certificate	VDR	:	Vendor Data Requirement
IGC	:	Inter Granular Corrosion	WPS	:	Welding Procedure Specification
MPT/MT	:	Magnetic Particle Testing	WPQ	:	Welders Performance Qualification
MTC	:	Material Test Certificate			

Inspection Standards Committee

Convenor: Mr. Rajeev Kumar

Members:

Mr. Chandrashekar	Mr. G Suresh	Mr. Himangshu Pal	Mr. R Muthu Ramalingam (RPO Rep.)
Mr. Avdhesh Agrawal	Mr. Mahendra Mittal	Ms. Sulakshna Hundekari (Engg.)	Mr. Anil Kumar

1.0 SCOPE

This Inspection and Test Plan covers the minimum testing requirements of Flanges, Spectacle Blinds & Drip Rings.

2.0 REFERENCE DOCUMENTS

PO/PR/Standards referred therein/ Job specifications /Approved documents.

3.0 INSPECTION AND TEST REQUIREMENTS

SL NO.	STAGE / ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	**Procedure**						
1.1	Heat Treatment, NDT, PMI , IGC, Mechanical, Chemical testing and Other Procedures	Documented Procedures	100%	Procedure Documents	-	H	R
1.2	WPS, PQR & WPQ	Welding Parameters & Qualification Record	100%	WPS, PQR & WPQ	-	H	W- New R- Existing
2.0	**Material Inspection**						
2.1	Raw Material Inspection	Chemical & Mechanical Properties	100%	Test Certificates	-	H	R

SL NO.	STAGE / ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
3.0	**In Process Inspection**						
3.1	Welding / Forging	Forging /Welding Parameters	100%	Inspection Reports	-	H	-
3.2	Heat Treatment	Stress Relieving, Normalising, Tempering, Solution Annealing, Stabilization Heat Treatment etc., as applicable	100%	HT chart	-	H	R
3.3	Identification of Test Samples	Product Chemical, Mechanical, Impact, IGC (Per heat/ Heat Treatment lot) and Other tests, as applicable	100%	Test Reports	-	H	H
3.4	Product Analysis (As applicable)	Chemical Composition	As per PR/Purchase Specification	Test Reports	-	H	R
3.5	Destructive Testing	Mechanical, Impact, IGC and Other tests, as applicable	100%	Test Reports	-	H	H
3.6	NDT as applicable	Surface & Internal Imperfections	As per PR/Purchase Specification	NDT Reports	-	H	R

SL NO.	STAGE / ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
3.7	Galvanizing (If Applicable)	Integrity of Galvanised Coating	100%	Inspection Report	-	H	R
4.0	**Final Inspection**						
4.1	Final Inspection	1. Visual 2. Dimensions 3. Hardness 4. Marking etc.,	100%	Inspection Report	-	H	H (Note-1,2)
4.2	PMI Check	Chemical Check	As Per EIL Spec. 6-81-0001	Inspection report	-	H	RW
4.3	Review of Calibration Records	Summary of Calibration Reports of all Equipments, tools and instruments used during inspection and testing	100%	Calibration Reports	-	H	R
4.4	NDE Operator Qualification records	ASNT / ISNT Level I/II/III certifications	100%	Summery	H	H	R
4.5	Final Stamping	Stamping of Accepted Items	Stamping of Items which are witnessed by EIL/TPIA.	Inspection Report	-	H	H (Note-1,2)

SL NO.	STAGE / ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
5.0	**Painting**						
5.1	Rust Preventive Coating & Color Coding	Visual & Color Coding as applicable	100%	Inspection Report	-	H	-
6.0	**Documentation & IC**						
6.1	Documentation & Inspection Certificate (IC)	Review of Stage Inspection Reports / Test Reports & Issue of IC	100%	Supplier TC & IC	-	H	H

Legend: H- Hold (Do not proceed without approval), P-Perform, RW - Random Witness (As specified or 10% (min.1 no. of each size and type of Bulk item)), R-Review, W-Witness (Give due notice, work may proceed after scheduled date).

NOTES (As applicable):

1. Non-NACE/HIC, Non-Hydrogen service & Non-LTCS, Carbon Steel (CS) Flanges, Spectacle Blinds and drip Rings up to size 24"-300 ANSI Class will be accepted based on the review of the Manufacturer's Test Certificates. Manufacturer's Test Certificate shall be as per EN 10204 Type 3.1. MTC along with backup reports to be reviewed by EIL/TPIA.

2. For cases apart from Note-1, Manufacturer's Test Certificate shall be as per EN 10204 Type 3.2 Certification, unless otherwise specified.

3. 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)

4. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred therein /Job Specification /Approved Documents.

बोल्टिंग मैटीरियल के लिए
निरीक्षण एवं परीक्षण योजना

INSPECTION AND TEST PLAN
FOR
BOLTING MATERIAL

Rev. No.	Date	Purpose	Prepared by	Checked by	Convenor Standards Committee	Chairman Standards Bureau
					Approved by	
5	23.12.2021	REVISED AND RE-ISSUED	HKM	CS	RK	S Mazumdar
4	19.09.2016	REVISED AND RE-ISSUED	TKK	HP	RKS	RN
3	17.06.2013	REVISED AND RE-ISSUED	TKK	RKS	SCG	DM
2	15.07.2011	REVISED AND RE-ISSUED	TKK	SCG	AKC	DM
1	28.09.2007	REVISED AND RE-ISSUED	PD	RB	MVKK	VC

Abbreviations:

CEIL	:	Certification Engineers International Limited	MRT	:	Mechanical Run Test
CIMFR	:	Central Institute of Mining & Fuel Research	NDT	:	Non Destructive Testing
CE	:	Carbon Equivalent	NPSH	:	Net Positive Suction Head
DFT	:	Dry Film Thickness	PO	:	Purchase Order
DPT	:	Dye Penetrant Testing	PESO	:	Petroleum Explosive Safety Organization
DHT	:	De-hydrogen Heat Treatment	PQR	:	Procedure Qualification Record
ERTL	:	Electronics Regional Test Laboratory	PR	:	Purchase Requisition
FCRI	:	Fluid Control Research Institute	PMI	:	Positive Material Identification
HT	:	Heat Treatment	RT	:	Radiography Testing
HIC	:	Hydrogen Induced Cracking	SSCC	:	Sulphide Stress Corrosion Cracking
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IHT	:	Intermediate Heat Treatment	UT	:	Ultrasonic Testing
IC	:	Inspection Certificate	VDR	:	Vendor Data Requirement
IGC	:	Inter Granular Corrosion	WPS	:	Welding Procedure Specification
MPT/MT	:	Magnetic Particle Testing	WPQ	:	Welders Performance Qualification
MTC	:	Material Test Certificate			

Inspection Standards Committee

Convenor Mr. Rajeev Kumar

Members:

Mr. Rajesh Sinha	Mr. Himangshu Pal	Mr. R. Muthuramalingam (RPO Representative)
Mr. Chandrashekhar	Mr. Avdhesh Agrawal	Mr. P V Satyanarayana (Engg. Representative)
Mr. Mahendra Mittal		

1.0 SCOPE

This Inspection and Test Plan covers the minimum testing requirements of Bolting Material.

2.0 REFERENCE DOCUMENTS

PO/PR/ Standards referred therein/ Job specifications /Approved documents.

3.0 INSPECTION AND TEST REQUIREMENTS

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	**Procedure**						
1.1	Heat Treatment & NDT Procedures	Documented Procedures	100%	Procedure Documents	-	H	R
2.0	**Material Inspection**						
2.1	Raw Material Inspection	Chemical. Mechanical properties. Steel making process, Macro Etch, etc.	100% one no. per heat per size	Mill Test Certificates/ Lab Reports	H	H	R
3.0	**In Process Inspection**						

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
3.1	Thread Rolling, Hot forging of Nuts/Bolt Heads, Machining	Process Parameters	100%	Inspection Report	-	H	-
3.2	Heat Treatment	Normalising & Tempering, Quenching & Tempering Solution Annealing, Stabilization Heat Treatment, Strain Hardening, Nitriding etc. as applicable	100%	Heat treatment process records /charts	-	H	R
3.3	NDT (as applicable)	Defects detection	100%	Test Reports	-	H	R
3.4	TPM Identification of Test Samples	Product Analysis, Proof Load Test , Stress Rupture, Tensile, Hardness, Impact, and Other test as applicable	Lot as per specification.	Test Reports	-	H	H
3.5	Chemical Testing	Chemical analysis	Lot as per specification.	Test Reports		H	H

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
3.6	Mechanical Testing	Mechanical (0.2 Offset/0.5% extension under load), Hardness, Proof Load Test for Nuts (as applicable), Stress Rupture (As Applicable), Impact and Other test as applicable	Lot as per specification.	Test Reports	-	H	H
3.7	Galvanizing (If Applicable)	Integrity of Galvanised Coating	100%	Inspection Report	-	H	R
4.0	**Final Inspection**						
4.1	Visual & Dimension	Visual Marking & Dimensions	100% by supplier & Random by EIL/ TPIA	Inspection Report	-	H	RW (Note-3)
4.2	Final Stamping	Stamping of Accepted Bolting Material	Stamping of bolting material which are witnessed by EIL/TPIA. Others to have supplier's identification.	Inspection Report	-	H	RW (Note 3)

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.3	PMI Check	Chemical Check	As Per EIL Spec. 6-81-0001	Inspection report	-	H	RW (Note 3)
5.0	**Painting**						
5.1	Rust Preventive & Color Coding (as applicable)	Visual & Color Coding as applicable	100%	Inspection Report	-	H	-
6.0	**Documentation & IC**						
6.1	Documentation & Inspection Certificate (IC)	Review of Stage Inspection Reports / Test Reports & Issue of IC	100%	Supplier TC & IC	-	H	H

Legend: H- Hold (Do not proceed without approval), P-Perform, RW - Random Witness {As specified or NOTE 3), R-Review, W-Witness (Give due notice, work may proceed after scheduled date).

Notes (as applicable):

1. 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).
2. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred therein /Job Specification /Approved Documents.
3. Final visual and dimension And PMI Check shall be checked as per below sampling plan:

Lot Size (Nos.)	Sample Size (Minimum) for EIL/TPIA	Sample size (Min) for Supplier
Upto 100	2% (Min. 2 Nos.)	10%
101 to 500	1% (Min. 3 Nos.)	10%
501 and above	0.5% (Min. 5Nos.)	10%

गास्केट्स के लिए
निरीक्षण व परीक्षण योजना

INSPECTION AND TEST PLAN
FOR
GASKETS

Rev. No.	Date	Purpose	Prepared By	Checked By	Standards Committee Convenor	Standards Bureau Chairman
					Approved by	
5	28.09.2022	REVISED AND RE-ISSUED	TKK	PTM	RK	SM
4	14.11.2018	REVISED AND RE-ISSUED	KC	NM	RKS	RKT
3	17.06.2013	REVISED AND RE-ISSUED	TKK	RKS	SCG	DM
2	15.07.2011	REVISED AND RE-ISSUED	TKK	SCG	AKC	DM
1	02.01.2008	REVISED AND RE-ISSUED	AM	SS	MVKK	VC

Abbreviations:

CEIL	:	Certification Engineers International Limited	MRT	:	Mechanical Run Test
CIMFR	:	Central Institute of Mining & Fuel Research	NDT	:	Non Destructive Testing
CE	:	Carbon Equivalent	NPSH	:	Net Positive Suction Head
DFT	:	Dry Film Thickness	PO	:	Purchase Order
DPT	:	Dye Penetrant Testing	PESO	:	Petroleum Explosive Safety Organization
DHT	:	De-hydrogen Heat Treatment	PQR	:	Procedure Qualification Record
ERTL	:	Electronics Regional Test Laboratory	PR	:	Purchase Requisition
FCRI	:	Fluid Control Research Institute	PMI	:	Positive Material Identification
HT	:	Heat Treatment	RT	:	Radiography Testing
HIC	:	Hydrogen Induced Cracking	SSCC	:	Sulphide Stress Corrosion Cracking
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IHT	:	Intermediate Heat Treatment	UT	:	Ultrasonic Testing
IC	:	Inspection Certificate	VDR	:	Vendor Data Requirement
IGC	:	Inter Granular Corrosion	WPS	:	Welding Procedure Specification
MPT/MT	:	Magnetic Particle Testing	WPQ	:	Welders Performance Qualification
MTC	:	Material Test Certificate			

Inspection Standards Committee

Convenor : Mr. Rajeev Kumar

Members:

Mr. Rajesh Sinha	Mr. Chandrashekhar	Mr. Himangshu Pal	Mr. R Muthu Ramalingam (RPO Rep.)
Mr. Avdhesh Agrawal	Mr. Mahendra Mittal	Miss Sulakshana Hundekari	

1.0 SCOPE

This Inspection and Test Plan covers the minimum testing requirements of Gaskets.

2.0 REFERENCE DOCUMENTS

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

3.0 INSPECTION AND TEST REQUIREMENTS

SL NO.	STAGE / ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	**Procedure**						
1.1	HT & Test Procedures, as applicable	Documented Procedures	100%	Procedure Documents	-	H	R
2.0	**Material Inspection**						
2.1	Raw Material Inspection	Chemical, Physical and other properties as per applicable material specification	100%	Test Certificates	H	H	-
3.0	**In Process Inspection**						
3.1	Punching & Finishing	Finish & Dimension	100%	Inspection Report	-	H	-

SL NO.	STAGE / ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
3.2	Heat Treatment for RTJ Gaskets (As applicable)	Time & Temperature	100%	HT Chart		H	R
3.3	Marking	Size, Rating, Material, Color Coding etc., as applicable	100%	Test Record	-	H	-
4.0	**Final Inspection**						
	Final Visual, Dimension & Testing	• Visual checks including marking check • Dimension check	100%	Inspection Report	-	H	R
4.1	Hardness test for RTJ Gaskets	Ring Hardness	10% (Per size/Rating/Heat /Heat treatment lot)	Test report	-	H	R
	Compressibility, Recovery, Sealability tests for Spiral Wound Gaskets	Compressibility, Recovery, Sealability	One per size/rating/lot	Test report	-	H	R

SL NO.	STAGE / ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.2	PMI Check (as applicable)	Chemical Check	As per EIL Spec: 6-81-001	Inspection Report	-	H	R
4.3	Submission of Documents/ Certificate	Performance Qualification Test (applicable for Spiral wound Gaskets)	As per ASME B16.20	Type test report	-	H	R (Note-3)
5.0	**Painting**						
5.1	Rust Preventive & Color Coding as applicable	Visual & Color Coding as applicable	100%	Inspection Report	-	H	-
6.0	**Documentation & IC**						
6.1	Documentation & IC	Review of test reports, Inspection documents & Issue of IC	100%	Supplier Records / IC	-	H	H

Legend: H- Hold (Do not proceed without approval), P-Perform, RW - Random Witness (As specified or 10% (min.1 no. of each size and type of Bulk item)), R-Review, W-Witness (Give due notice, work may proceed after scheduled date).

Notes (as applicable):

1. 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)
2. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred therein /Job Specification /Approved Documents.
3. Performance qualification test of Spiral wound gaskets shall be carried out under reputed Third Party Inspection Agency(TPIA) arranged by the supplier

कार्बन स्टील प्रैशर वेसल / कॉलम के लिए निरीक्षण व परीक्षण योजना

INSPECTION AND TEST PLAN FOR PRESSURE VESSELS/ COLUMNS CARBON STEEL

Rev. No.	Date	Purpose	Prepared by	Checked by	Convenor Standards Committee	Chairman Standards Bureau
					Approved by	
4	14.05.2020	REVISED AND RE-ISSUED	SK	CS	RKS	SKS
3	09.09.2013	REVISED AND RE-ISSUED	TKK	RKS	SCG	DM
2	15.07.2011	REVISED AND RE-ISSUED	HP	SCG	AKC	DM
1	28.09.2007	REVISED AND RE-ISSUED	PD	RB	MVKK	VC
0	10.12.2002	ISSUED FOR IMLEMENTATION	NKN	SPS	AKB	GRR

Abbreviations:

AS / CS / SS		Alloy Steel / Carbon Steel / Stainless Steel	MRT	:	Mechanical Run Test
CEIL	:	Certification Engineers International Limited	NDT	:	Non Destructive Testing
CIMFR	:	Central Institute of Mining & Fuel Research	NPSH	:	Net Positive Suction Head
CE	:	Carbon Equivalent	PO	:	Purchase Order
DFT	:	Dry Film Thickness	PESO	:	Petroleum Explosive Safety Organization
DPT	:	Dye Penetrant Testing	PQR	:	Procedure Qualification Record
DHT	:	De-hydrogen Heat Treatment	PR	:	Purchase Requisition
ERTL	:	Electronics Regional Test Laboratory	PMI	:	Positive Material Identification
FCRI	:	Fluid Control Research Institute	PWHT	:	Post Weld Heat Treatment
HT	:	Heat Treatment	RT	:	Radiography Testing
HIC	:	Hydrogen Induced Cracking	SSCC	:	Sulphide Stress Corrosion Cracking
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IHT	:	Intermediate Heat Treatment	UT	:	Ultrasonic Testing
IC	:	Inspection Certificate	VDR	:	Vendor Data Requirement
IGC	:	Inter Granular Corrosion	WPS	:	Welding Procedure Specification
MPT/MT	:	Magnetic Particle Testing	WPQ	:	Welders Performance Qualification
MTC	:	Material Test Certificate			
				:	

Inspection Standards Committee

Convenor : Mr. R K Singh

Members:

Mr. Rajesh Sinha
Mr. Chandrashekhar
Mr. Mahendra Mittal
Mr. Himangshu Pal
Mr. Avdhesh Agrawal
Mr. R. Muthuramalingam (RPO Representative)
Mr. P V Satyanarayana (Engg. Representative)

1.0 SCOPE

This Inspection and test plan covers the minimum testing requirements of Pressure vessels/ Columns carbon steel

2.0 REFERENCE DOCUMENTS

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

3.0 INSPECTION AND TEST REQUIREMENTS

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	**Procedures**						
1.1	Hydro test, heat treatment, NDT, hot forming and other Procedures	Documented procedures.	100%	Procedure documents	-	H	R
1.2	Weld Plan & NDT Plan	As per PR/ Purchase Specification/ Applicable codes	100%	Procedure documents	-	H	R
1.3	WPS/ PQR /WPQ	Documented procedures.	100%	Procedure documents	-	H	R-Existing W-New
2.0	**Materials Procurement**						

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
2.1	Plates, pipes, Forgings, Expansion Bellows, Fittings, Fasteners, Gaskets, etc (As applicable) (Note-3)	As per PR/Purchase Specification	100%	Mill TC	H	H	R
2.2	Internals like Demister, Johnson screen, support grid etc (As applicable) (Note-4)	As per PR/Purchase Specification	100%	Mill TC	H	H	R
3.0	**In process inspection**						
3.1	Materials identification for plates, pipes (pressure parts)	Review of test certificates, markings visual & dimensional inspection, identity correlation & transfer of identity	100%	Material clearance record	-	H	H
3.2	Material identification _for forgings, fittings, fasteners, gaskets (pressure parts)	Review of test certificates, markings Identity correlation.	100%	Material clearance record	-	H	R
3.3	Non pressure parts (including internals, supports etc.)	Review of test certificates	100%	Material test certificate	W	R	R
3.4	Inspection of formed components (cold or hot formed)	NDT of weld seam as applicable	100%	NDT Reports / Films	H	H	R
		NDT (dished ends and tori-cone) on inside & outside surfaces in knuckle zone and edges.	100%	Inspection report	H	H	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
		HT chart review as applicable	100%	HT Chart	W	W	R
		Test coupon as applicable	100%	Inspection report	H	H	W
		Visual & dimensional (min. thickness, profile, ovality etc) inspection	100%	Inspection report	H	H	H
3.5	Welding consumable	Chemical & mechanical properties	100%	Batch test certificates	W	R	R
3.6	Weld edge preparation & set up of pressure parts	Visual & dimensional inspection, weld edge, root gap, offset, alignment, cleanliness etc	100%	Inspection check list	-	W	-
		NDT of weld edges, as applicable	100%	NDT Reports	-	W	R
3.7	Intermediate inspection of welds	Visual, Welding Parameters, NDT	100%	Inspection report	-	W	-
4.0	**Final inspection**						
4.1	Visual and dimensional inspection (internals & externals) including welds (before PWHT as applicable)	Visual, dimensions, completeness of assembly and weld visual for reinforcement, undercuts, Surface defects, etc.	100%	Inspection report	-	H	H

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.2	PMI (AS/SS components)	Chemical check	Each component	Inspection report		W	RW
4.3	Pneumatic test of RF pads	Leak check	100%	Test report	-	W	R
4.4	Trial assembly of internals and column/vessel sections as applicable	Dimensions, completeness of assembly and alignment	100%	Inspection report	-	H	W
4.5	Inspection of completed welds	PWHT as applicable	100%	HT chart		W	R
		NDT as applicable	100%	NDT Reports / RT Films	-	W	R
4.6	Hardness check on all welds, HAZ as applicable	Hardness	100%	Inspection report	-	W	RW
4.7	Production test coupon as applicable	Production test coupon testing	As per spec/drg.	Inspection report	-	H	H
4.8	Hydrostatic test	Leak check	100%	Test report	-	H	H
5.0	**Template Inspection**						
5.1	Foundation Template & Gauge plate inspection	Visual & Dimensions, Orientation markings	100%	Inspection report	-	H	H
6.0	**Painting**						

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
6.1	Final painting	Visual inspection (after surface preparation and final painting for workmanship, uniformity) DFT check	100%	Inspection report	-	H	-
7.0	**Documentation and IC**						
7.1	Final stamping, review of inspection documents and issue of IC	Verifying stamping details and review of inspection documents	100%	IC / Inspection reports	-	H	H
7.2	Final documents as per PR	Verification & compilation of inspection & test records for submission to customer	100%	Final dossier	-	H	H

Legend: H- Hold (Do not proceed without approval), P-Perform, RW - Random Witness (As specified or 10% (min.1 no. of each size and type of Bulk item)), R-Review, W-Witness (Give due notice, work may proceed after scheduled date).

NOTES (As applicable):

1. 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)
2. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred there in /Job Specification /Approved Documents.
3. Third Party Certifications shall be as per EN 10204 Type 3.2 for CS Plates (NACE/H2/HIC), Forgings, Fittings and Expansion Bellows and TPIA shall be arranged by supplier. Certifications shall be as per EN 10204 Type 3.1 for Pipes, CS Plates (non-NACE/H2/HIC), Gaskets and Fasteners.
4. Inspection of Internals shall be as per EIL Std ITP no. 6-81-0060.
5. For EPC jobs, all inspection shall be carried out by TPIA, unless notified otherwise.

एस एस प्रैशर वेसल / कॉलम / रिएक्टरके लिए
निरीक्षण व परीक्षण योजना

INSPECTION AND TEST PLAN
FOR
STAINLESS STEEL PRESSURE VESSELS / COLUMNS

Rev. No.	Date	Purpose	Prepared by	Checked by	Convenor Standards Committee	Chairman Standards Bureau
					Approved by	
4	14.05.2020	REVISED AND RE-ISSUED	SK	CS	RKS	SKS
3	09.09-2013	REVISED AND RE-ISSUED	TKK	RKS	SCG	DM
2	15.07.2011	REVISED AND RE-ISSUED	HP	SCG	AKC	DM
1	15.07.08	REVISED AND RE-ISSUED	NKR	SSL	SKP	VC
0	19.07.02	ISSUED FOR IMPLEMENTATION	NKN	SPS	AKB	GRR

Abbreviations:

AS/CS/SS	:	Alloy Steel / Carbon Steel / Stainless Steel	MRT	:	Mechanical Run Test
CEIL	:	Certification Engineers International Limited	NDT	:	Non Destructive Testing
CIMFR	:	Central Institute of Mining & Fuel Research	NPSH	:	Net Positive Suction Head
CE	:	Carbon Equivalent	PO	:	Purchase Order
DFT	:	Dry Film Thickness	PESO	:	Petroleum Explosive Safety Organization
DPT	:	Dye Penetrant Testing	PQR	:	Procedure Qualification Record
DHT	:	De-hydrogen Heat Treatment	PR	:	Purchase Requisition
ERTL	:	Electronics Regional Test Laboratory	PMI	:	Positive Material Identification
FCRI	:	Fluid Control Research Institute	PWHT	:	Post Weld Heat Treatment
HT	:	Heat Treatment	RT	:	Radiography Testing
HIC	:	Hydrogen Induced Cracking	SSCC	:	Sulphide Stress Corrosion Cracking
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IHT	:	Intermediate Heat Treatment	UT	:	Ultrasonic Testing
IC	:	Inspection Certificate	VDR	:	Vendor Data Requirement
IGC	:	Inter Granular Corrosion	WPS	:	Welding Procedure Specification
MPT/MT	:	Magnetic Particle Testing	WPQ	:	Welders Performance Qualification
MTC	:	Material Test Certificate			

Inspection Standards Committee

Convenor : Mr. R.K. Singh

Members:

Mr. Rajesh Sinha
Mr. Chandrashekhar
Mr. Mahendra Mittal
Mr. Himangshu Pal
Mr. Avdhesh Agrawal
Mr. R. Muthuramalingam (RPO Representative)
Mr. P V Satyanarayana (Engg. Representative)

1.0 SCOPE

This Inspection and Test Plan covers the minimum testing requirements of Pressure vessels/ Columns stainless steel

2.0 REFERENCE DOCUMENTS

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

3.0 INSPECTION AND TEST REQUIREMENTS

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	**Procedures**						
1.1	Hydro test, heat treatment, NDT, hot forming, and other Procedures	Documented procedures.	100%	Procedure Documents	-	H	R
1.2	Weld Plan & NDT Plan	As per PR/ Purchase Specification/ Applicable codes	100%	Procedure documents	-	H	R
1.3	WPS/ PQR /WPQ	Documented procedures.	100%	Procedure documents	-	H	R-Existing W-New
2.0	**Materials Procurement**						
2.1	Plates, pipes, Forging, Fittings, Expansion Bellow, Fasteners, Gaskets etc. (as applicable) (Note-3)	As per PR / Purchase specification	100%	Mill test certificates and TPI reports	H	H	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
2.2	Internals like Demisters, Johnson screens, support grids, Diffusers etc. (as applicable) (Note 4)	As per PR/Purchase Specification	100%	Mill TC and TPI reports	H	H	R
3.0	**In process inspection**						
3.1	Materials identification for plates, pipes (pressure parts)	Review of test certificates, markings visual & dimensional inspection, identity correlation & transfer of identity	100%	Material clearance record	-	H	H
3.2	Material identification for forgings, fittings, fasteners, gaskets (pressure parts)	Review of test certificates, markings identity correlation	100%	Material clearance record	-	H	R
3.3	Non pressure parts (including internals, supports etc.)	Review of test certificates	100%	Material test certificate	W	R	R
3.4	Inspection of formed components (Cold or hot formed)	NDT of weld seam as applicable	100%	NDT report/RT films	W	W	R
		NDT (dished ends and tori-cone) on inside & outside surfaces in knuckle zone and edges	100%	Inspection report	W	W	R
		Solution Annealing, as applicable	100%	HT chart	W	W	R
		Hardness check, as applicable	As per requirement	Inspection report	W	W	R
		Test coupon Tensile, IGC, Micro etching as applicable	100%	Inspection report	W	W	W

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
		Visual & dimensional (min. thickness, profile, ovality etc) inspection	100%	Inspection report	H	H	H
3.5	Welding consumable	Chemical & mechanical properties including IGC	100%	Batch test certificates	W	R	R
3.6	Weld edge preparation & set up of pressure parts	Visual & dimensional inspection, weld edge, root gap, offset, alignment, cleanliness etc	100%	Inspection check list	-	W	R
		DPT of weld edges as applicable for cracks, laminations or segregations	100%	Inspection check list	-	W	R
3.7	Intermediate Inspection of Welds	Visual, Welding parameters, NDT	100%	Inspection report	-	W	R
4.0	**Final inspection**						
4.1	Visual and dimensional inspection (internals & externals) including welds	Visual, dimensions, completeness of assembly and weld visual for reinforcement, undercuts, surface defects etc.	100%	Inspection report	-	H	H
4.2	PMI	Chemical check	Each component and weld	Inspection report	-	W	RW
4.3	Pneumatic test of RF pads	Leak check	100%	Test report	-	W	R
4.4	Trial assembly of internals and column/vessel sections as applicable	Dimensions, completeness of assembly and alignment	100%	Inspection report	-	H	H

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.5	Inspection of completed welds	PWHT as applicable	100%	HT chart	-	W	R
		Hardness test as applicable	100%	Inspection report	-	W	R
		Production test coupon testing including IGC and micro etching as applicable	100%	Inspection report	-	H	H
		NDT as applicable	100%	NDT report/RT films	-	W	R
4.6	Water Quality Check	Chloride Content	100%	Inspection report	-	H	R
4.7	Hydrostatic test	Leak check	100%	Test report	-	H	H
4.8	Pickling/ passivation (inside and outside surface) , drying of equipment	Visual inspection for cleanliness	100%	Inspection report	-	W	R
4.9	Ferroxyl test/ Copper Sulphate Test, as applicable	Fe pick up check	100%	Inspection report	-	W	RW
4.10	Drying and Nitrogen Purging (as applicable)	Visual, Gas Pressure	100%	Inspection report	-	W	-
5.0	**Template Inspection**						
5.1	Foundation Template and Gauge plate, as applicable	Visual & Dimensions, Orientation markings	100%	Inspection report	-	H	H

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
6.0	**Painting**						
6.1	Final painting (As applicable)	Visual inspection (after surface preparation and final painting for workmanship, uniformity) DFT check	100%	Inspection report	-	H	-
7.0	**Documentation and IC**						
7.1	Final stamping, review of inspection documents and issue of IC	Verifying stamping details and review of inspection documents	100%	Name plate/ rub-off and inspection reports	-	H	H
7.2	Final documents as per PR	Verification & compilation of inspection & test records for submission to customer	100%	Q.C. dossier	-	H	H

Legend: H- Hold (Do not proceed without approval), P-Perform, RW - Random Witness (As specified or 10% (min.1 no. of each size and type of Bulk item)), R-Review, W-Witness (Give due notice, work may proceed after scheduled date).

NOTES (as applicable):

1. 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)
2. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred there in /Job Specification /Approved Documents.
3. Third Party Certifications shall be as per EN 10204 Type 3.2 for Plates, Forgings, Fittings and Expansion Bellows; and TPIA shall be arranged by supplier. Certifications shall be as per EN 10204 Type 3.1 for Pipes, CS Plates, Gaskets and Fasteners.
4. Inspection of Internals shall be as per relevant EIL Std ITP's attached with PR; if not attached with PR, separate ITP's shall be submitted for EIL approval.
5. For EPC jobs, all inspection shall be carried out by TPIA, unless notified otherwise.

ट्रे एवं टावर इंटर्नलों के लिए
निरीक्षण व परीक्षण योजना

INSPECTION AND TEST PLAN
FOR
TRAYS AND TOWER INTERNALS

Rev. No.	Date	Purpose	Prepared by	Checked by	Convenor Standards Committee	Chairman Standards Bureau
					Approved by	
3	14.05.2020	REVISED AND RE-ISSUED	SK	CS	RKS	SKS
2	18.06.13	REVISED AND RE-ISSUED	TKK	RKS	SCG	DM
1	02.01.08	REVISED AND RE-ISSUED	AM	RB	MVKK	VC
0	19.07.02	ISSUED FOR IMPLEMENTATION	NKN	SPS	AKB	SB

Abbreviations:

AS/CS/SS	:	Alloy Steel / Carbon Steel / Stainless Steel	MTC	:	Material Test Certificate
CEIL	:	Certification Engineers International Limited	MRT	:	Mechanical Run Test
CIMFR	:	Central Institute of Mining & Fuel Research	NDT	:	Non Destructive Testing
CE	:	Carbon Equivalent	NPSH	:	Net Positive Suction Head
DFT	:	Dry Film Thickness	PO	:	Purchase Order
DPT	:	Dye Penetrant Testing	PESO	:	Petroleum Explosive Safety Organization
DHT	:	De-hydrogen Heat Treatment	PQR	:	Procedure Qualification Record
ERTL	:	Electronics Regional Test Laboratory	PR	:	Purchase Requisition
FCRI	:	Fluid Control Research Institute	PMI	:	Positive Material Identification
HT	:	Heat Treatment	RT	:	Radiography Testing
HIC	:	Hydrogen Induced Cracking	SSCC	:	Sulphide Stress Corrosion Cracking
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IHT	:	Intermediate Heat Treatment	UT	:	Ultrasonic Testing
IC	:	Inspection Certificate	VDR	:	Vendor Data Requirement
IGC	:	Inter Granular Corrosion	WPS	:	Welding Procedure Specification
MPT/MT	:	Magnetic Particle Testing	WPQ	:	Welders Performance Qualification

Inspection Standards Committee

Convenor: Mr. R.K. Singh

Members:

Mr. Rajesh Sinha	Mr. Himangshu Pal	Mr. R. Muthuramalingam (RPO Representative)
Mr. Chandrashekhar	Mr. Avdhesh Agrawal	Mr. P V Satyanarayana (Engg. Representative)
Mr. Mahendra Mittal		

1.0 SCOPE:

This Inspection and Test Plan covers the minimum testing requirements of Trays and Tower Internals.

2.0 REFERENCE DOCUMENTS:

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

3.0 INSPECTION AND TEST REQUIREMENTS:

S. NO	STAGE/ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	**Procedures**						
1.1	Leak Test, NDT, WPS/ PQR and other Procedures (as applicable)	Documented Procedures	100%	Inspection Report	-	H	R (existing) W (for new WPS/PQR)
2.0	**Materials Procurement**						
2.1	Plates/Sheets/Coils, Pipes, Fittings Fasteners With Lock Nuts, Gaskets, Welding Consumable etc.	Chemical Analysis Mechanical Properties, Condition, Finish, Bend Test, Hardness Check, Heat Treatment, IGC Visual & Dimensional Inspection	100%	Mill Test Certificates	W	H	R

S. NO	STAGE/ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
3.0	**IN PROCESS**						
3.1	Slitting, Shearing Punching, Bending (Deck Plates, Down Comers, Weir Plates, etc.)	Visual { Finish -Smooth, True, Clean, Free From Burs) & Dimensional Accuracy	100%	Inspection Report	-	H	-
3.2	Bubble Caps, Valves, 'U' Clamps	Visual(Finish-Smooth, True, Clean, Free From Burs) & Dimensional Accuracy	100%	Inspection Report	-	H	-
3.3	Heat Treatment Of Bubble Caps (As applicable)	As per specification	100%	HT Chart	-	W	R
3.4	Inspection Of One Type Of Component Of Each Type	Dimensions, Completeness Of Assembly. Visual Inspection Of Welds.	100%	Inspection Report	-	H	RW
3.5	Inspection of Completed Welds	Visual Inspection For Reinforcement, Undercuts, Surface Defects Etc.	100%	Inspection Check List	-	W	RW
		DPT Of Welds	100%	Inspection Check List	-	W	R

S. NO	STAGE/ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.0	**Final Inspection**						
4.1	Mock Assembly of Each Type of Trays, Down Comers, Chimney Trays, Seal Pans, Trial Assembly of Support Beams etc.	Dimensions, Completeness Of Assembly. Visual Inspection Of Welds, etc.	One Assembly/Each Type Of Tray	Inspection Report	-	H	H
4.2	PMI (As applicable)	Chemical Check	As Per EIL Spec.	Inspection Report	-	W	RW
4.3	Leak Test for Seal Pan, Chimney And Bubble Cap Trays, Distributors, etc.	Check For Leakage Rate	100%	Inspection Report	-	H	H
4.4	Pickling & Passivation (As applicable)	Visual Inspection & Surface Finish.	100%	Inspection Report	-	W	R
4.5	Final Marking	Marking / Etching On Each Individual Tray/Component	100%	Report	-	W	R
4.6	Packing	Visual Inspection	100%	Inspection Report	-	W	-
5.0	**Documentation & IC**						
5.1	Documentation & Inspection Certificate(IC)	Review of Stage Inspection Reports / Test Reports & Issue of IC	100%	Manufacturer TC & IC	-	H	H

S. NO	STAGE/ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
5.2	Final Document submission	Compilation of Inspection reports, drawings, etc as per VDR / PR	100%	Final data folder /Completeness certificate	-	H	H

Legend: H- Hold (Do not proceed without approval), P-Perform, RW - Random Witness (As specified or 10% (min.1 no. of each size and type of Bulk item)), R-Review, W-Witness (Give due notice, work may proceed after scheduled date).

NOTES (As applicable):

1. 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)
2. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred there in /Job Specification /Approved Documents.
3. For EPC jobs, all inspection shall be carried out by TPIA, unless notified otherwise.

वायरमेष डेमिस्टर के लिए
निरीक्षण व परीक्षण योजना

INSPECTION AND TEST PLAN
FOR
WIRE MESH DEMISTERS

Rev. No.	Date	Purpose	Prepared by	Checked by	Convenor Standards Committee	Chairman Standards Bureau
					Approved by	
4	14.05.2020	REVISED AND RE-ISSUED	SK	CS	RKS	SKS
3	20.11.13	REVISED AND RE-ISSUED	TKK	RKS	SCG	SC
2	30.06.10	REVISED AND RE-ISSUED	HP	SCG	AKC	DM
1	02.01.08	REVISED AND RE-ISSUED	AM	SS	MVKK	VC
0	12.12.02	ISSUED FOR IMPLEMENTATION	NKN	SPS	AKB	SB

Abbreviations:

CEIL	:	Certification Engineers International Limited	MRT	:	Mechanical Run Test
CIMFR	:	Central Institute of Mining & Fuel Research	NDT	:	Non Destructive Testing
CE	:	Carbon Equivalent	NPSH	:	Net Positive Suction Head
DFT	:	Dry Film Thickness	PO	:	Purchase Order
DPT	:	Dye Penetrant Testing	PESO	:	Petroleum Explosive Safety Organization
DHT	:	De-hydrogen Heat Treatment	PQR	:	Procedure Qualification Record
ERTL	:	Electronics Regional Test Laboratory	PR	:	Purchase Requisition
FCRI	:	Fluid Control Research Institute	PMI	:	Positive Material Identification
HT	:	Heat Treatment	RT	:	Radiography Testing
HIC	:	Hydrogen Induced Cracking	SSCC	:	Sulphide Stress Corrosion Cracking
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IHT	:	Intermediate Heat Treatment	UT	:	Ultrasonic Testing
IC	:	Inspection Certificate	VDR	:	Vendor Data Requirement
IGC	:	Inter Granular Corrosion	WPS	:	Welding Procedure Specification
MPT/MT	:	Magnetic Particle Testing	WPQ	:	Welders Performance Qualification
MTC	:	Material Test Certificate			

Inspection Standards Committee

Convenor: Mr. R.K. Singh

Members:

Mr. Rajesh Sinha
Mr. Chandrashekhar
Mr. Mahendra Mittal
Mr. Himangshu Pal
Mr. Avdhesh Agrawal
Mr. R. Muthuramalingam (RPO Representative)
Mr. P V Satyanarayana (Engg. Representative)

1.0 SCOPE:

This Inspection and Test Plan covers the minimum testing requirements of Wire Mesh Demisters.

2.0 REFERENCE DOCUMENTS:

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

3.0 INSPECTION AND TEST REQUIREMENTS:

S. No.	Stage/Activity	Characteristics	Quantum of Check	Record	Scope of Inspection		
					Sub Supplier	Supplier	EIL/TPIA
1.0	**Procedures**						
1.1	NDT Procedure (as applicable)	Documented Procedures	100%	Procedure documents	-	H	-
1.2	WPS, PQR,WPQ (as applicable)	Welding Procedures Qualification	100%	WPS/PQR/ WPQ Records	-	H	W- New, R - Existing
2.0	**Materials Procurement**						
2.1	Wires, Plates, fasteners with lock nuts, washers, clamps, gaskets, foils etc.	Chemical , Physical , HT and other properties (as applicable)	100%	Mill test certificates	H	H	-
3.0	**In process inspection**						

S. No.	Stage/Activity	Characteristics	Quantum of Check	Record	Scope of Inspection		
					Sub Supplier	Supplier	EIL/TPIA
3.1	Materials identification (Wires, plates, fasteners with lock nuts, washers, clamps, gaskets, foils etc. including support members)	Review of test certificates markings. visual & dimensional inspection identification, correlation etc.	100%	Material clearance record	-	H	-
3.2.	Inspection of Welds	Visual inspection for reinforcement, undercuts, surface defects etc.	100%	NDT Report	-	W	-
4.0	**Final inspection**						
4.1	Trial assembly of Individual Demister along with grid and support beams in a manner comparable with actual installation.	Dimensions, Ovality, Straightness, Camber and completeness of assembly	100%	Inspection Report	-	H	-
4.2	Final Inspection	1. Visual 2. Dimensions 3. Flange finish 4. Match Marking 5. Bulk density	100%	Inspection Report	-	W	R
4.3	PMI (For AS/SS components)	Chemical check	As per purchase specification	Inspection report	-	W	R

S. No.	Stage/Activity	Characteristics	Quantum of Check	Record	Scope of Inspection		
					Sub Supplier	Supplier	EIL/TPIA
5.0	**Pickling and passivation**						
5.1	Pickling & Passivation (as applicable)	Visual inspection	100%	Inspection report		W	-
6.0	**Documentation**						
6.1	Compilation of stage inspection reports	Review of inspection documents & Issue of MTC	100%	MTC	-	H	R
6.2	Issue of IC (as applicable)	Inspection Certificate	100%	Inspection Certificate	-	H	H

Legend: H- Hold (Do not proceed without approval), P-Perform, RW - Random Witness (As specified or 10% (min.1 no. of each size and type of Bulk item)), R-Review, W-Witness (Give due notice, work may proceed after scheduled date).

NOTES (As applicable):

1. 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)
2. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred there in /Job Specification /Approved Documents.
3. For EPC jobs, all inspection shall be carried out by TPIA, unless notified otherwise.

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

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

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

Abbreviations:

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

Construction Standards Committee

Convenor: Sh John Paul V, ED(Construction)

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

CONTENTS

1.0 SCOPE

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

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

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

2.0 REFERENCES

The document should be read in conjunction with following:

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

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

3.1 Management Responsibility

3.1.1 HSE Policy & Objectives

The Contractor should have a documented and duly approved HSE policy &objectives to demonstrate commitment of their organization to ensure health, safety and environmental aspects in their line of operations.
The Contractor's senior management shall provide strong visible leadership and continuously demonstrate commitment to develop, operate and maintain, review and continually improve a HSE culture at site which empowers individuals to take responsibility for their safety and embrace and accept nothing but responsible HSE behaviour.
Contractor shall refer in clause No. 3.3.23 for Key Performance Indicator (KPI).

3.1.2 Management System

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

3.1.3 Indemnification

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

3.1.4 **Deployment &Qualifications of Safety Personnel**

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

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

(i) Safety Observer/Steward: Contractor shall depute one Safety Observer/Steward for every 100 workers or part thereof

(ii) Safety Supervisor: In addition to above(i), contractor shall depute one Safety Supervisor for every 250 workers or part thereof

(iii) Safety Engineer: In addition to above (i&ii), one safety engineer/ officer for every 1000 workers or part thereof.

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

a) Safety Steward/Observer

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

b) Safety Supervisor

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

c) Safety Officer / Safety Engineer

Safety Officer/Engineer should possess following qualification & experience:

(i) Recognized degree in any branch of Engg. or Tech. or Architecture with practical experience of working in a building or other construction work in supervisory capacity for a period of not less than two years, **or** possessing recognized diploma in any branch of Engg. or Tech with practical experience of working in a building or other construction work in supervisory capacity for a period of not less than five years.

(ii) Recognized degree or one year diploma in Industrial safety(from any Indian Institutes recognized by AICTE or State Council of Tech. Education of any Indian State/Union territory) with at least one paper in construction safety (as an elective subject).

(iii) Preferably have adequate knowledge of the language spoken by majority of the workers at the construction site.

Alternately

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

d) HSE In-Charge

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

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

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

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

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

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

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

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

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

3.1.5 Implementation, Inspection/Monitoring

a) The Contractor shall be fully responsible for planning, reporting, implementing and monitoring all HSE requirements and compliance of all laws & statutory requirements.

b) The Contractor shall also ensure that the HSE requirements are clearly understood & implemented conscientiously by their site personnel at all levels at site.

c) The Contractor shall ensure physical presence of their field engineers / supervisors, during the continuation of their contract works / site activities including all material transportation activities. Physical absence of experienced field engineers / supervisors of Contractor at critical work spot during the course of work may invite halting / stoppage of work.

d) The Contractor shall regularly review inspection report internally and implement all practical steps / actions for improving the status continuously.

e) Contractor skilled workmen like riggers, scaffold erectors, welders, crane operators etc. should have sufficient past experience and skill on the relevant job.

f) The Contractor shall ensure important safety checks right from beginning of works at every work site locations and to this effect format No. HSE-10 "Daily Safety Check List" shall be prepared by field engineer & duly checked by safety personnel for conformance.

g) The Contractor shall carry out inspection to identify various unsafe conditions of work sites/machinery/equipment's as well as unsafe acts on the part of workmen/supervisor/engineer while carrying out different project related works.

h) Adequate records for all inspections shall be maintained by the Contractor and the same shall be furnished to EIL/Owner, whenever sought.

i) To demonstrate involvement/commitment of site management of Contractor, at least one Monthly Safety Walk through in a month shall be carried out by Contractor's head of site (along with his area manager/field engineers)and a report shall be furnished to EIL/Owner as per format No: HSE-1" Safety walk through report" followed by compliance for unsatisfactory remarks.

j) As a general practice lifting tools/tackles, machinery, accessories etc. shall be inspected, tested and examined by competent person(approved by concerned State authorities) before being used at site and also at periodical interval (e.g. during replacement, extension, modification, elongation/reduction of machine/parts, etc.) as per relevant statutes. Hydraulic Mobile Crane, cranes, lifting machinery, mobile equipment's/ machinery/ vehicles, etc. shall be inspected regularly by only competent / experienced personnel at site and requisite records for such inspections shall be maintained by contractor. Contractor shall also maintain records of maintenance of all other site machinery (e.g. generators, rectifiers, compressors, cutters, etc.) & portable tools/equipment's being used at project related works (e.g. drills, abrasive wheels, punches, chisels, spanners, etc.).The Contractor shall not make use of arbitrarily fabricated 'derricks' at project site for lifting/ lowering of construction materials.

k) Site facilities /temporary. installations, e.g. batching plant, cement godown, DG-room, temporary electrical panels/distribution boards, shot-blasting booth, fabrication yards, etc. and site welfare facilities, like labour colonies, canteen/pantry, rest-shelters, motor cycle/bicycle-shed, First-aid centers, urinals/toilets, etc. should be periodically inspected by Contractor (preferably utilizing HR/Admin. personnel to inspect site welfare facilities) and records to be maintained.

3.1.6 **Behaviour Based Safety**

a) The contractor shall develop a system to implement Behavior-Based Safety (BBS) through which work groups can identify, measure and change the behaviors of employees and workers towards construction safety aspects.

b) The BBS process shall include the following:
- Identify the behaviors critical to achieve required safety performance.
- Communicate the behaviors and how they are performed correctly byall
- Observe the work force and record safe/at risk behaviors. Intervene with workers to give positive reinforcement when unsafe behaviors are observed. Provide coaching/correction when at risk behaviors are observed
- Collect and record observation data
- Summarize and analyze observation data
- Communicate observation data and analysis results to all employees
- Provide recognition or celebrate when safe behavior improvements occur
- Change behaviors to be observed or change activators or change consequences as appropriate.
- Communicate any changes to workforce

c) Contractor through its own HSE committee shall implement the above process.

d) The necessary procedures and Monthly reporting formats shall be developed by the contractor for approval by EIL/Owner.

e) The HSE committee of contractor shall observe individual's behavior for safe practices adapted for utilization/execution of work for followings a minimum:-
- PPE
- Tools & equipment's
- Hazard Identification & control
- House keeping
- Confined space entry
- Hot works
- Excavation
- Loading & unloading
- Work at height
- Stacking & storage
- Ergonomics

f) EIL/Owner and Contractor's site staff at all levels shall monitor the behavior of contractor employees that create and/or contribute to the unsafe situations at work place.

g) Contractor shall arrange Behavior Based safety (BBS) training of their employees at site on yearly basis.

3.1.7 **Awareness and Motivation**

a) The Contractor shall promote and develop awareness on Health, Safety and Environmental protection among all personnel working for the Contractor.

b) The contractor shall display safety statistics board at all prominent location .Also shall provide dedicated notice board for displaying of safety alerts or any other safety related notices for awareness site workforces.

c) Regular awareness programs and fabrication shop/work site meetings at least on monthly basis shall be arranged on HSE activities to cover hazards/risks involved in various operations during construction.

d) Contractor's workmen & supervisory staff shall participate in common Tool Box Meeting as & when organized/required at site to avoid any incident/accident or occupational disease arising out of multidisciplinary jobs/activities being performed by various contracting agencies in the same location at different elevation.

e) Contractor to motivate & encourage the workmen & supervisory staff by issuing/ awarding them with tokens/ gifts/ mementos/ monetary incentives/ certificates etc. The motivational program shall be organized on regular basis.

f) Contractor shall assess & recognize the behavioral change of its site engineers / supervisors periodically and constantly motivate / encourage them to implement HSE practices at project works

g) Life Saving Rules (refer Appendix-I for details) are to be displayed at prominent location of site.

3.1.8 **Fire Prevention & First-Aid**

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

a) The Contractor shall arrange installation of fire protection measures such as adequate number of steel buckets with sand & water and adequate number of appropriate portable fire extinguishers (Refer Appendix-C for details) to the satisfaction of EIL/Owner.

b) The Contractor shall arrange EMERGENCY MOCK DRILL like fire, bomb threat, gas leakage, earth quake, etc. at each site at least once in three months, involving site workmen and site supervisory personnel & engineers. The Contractor shall maintain record of such mock drills at project site.

c) The contractor shall require to tie-up with the hospitals located in the neighborhood for attending medical emergency.

3.1.9 **Documentation**

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

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

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

3.1.10 **Audit**

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

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

a) Internal HSE audits regularly on six monthly basis by engaging internal qualified auditors (viz. safety officers/Construction personnel having 5years experience in construction safety and Lead Auditor Course: OHSAS 18001/ISO 45001 certification).However, minimum two internal HSE audit will have to be conducted irrespective of time period of the contract.

b) External HSE audits regularly on yearly basis by engaging authorized auditing agencies (viz. National Safety Council etc.)or qualified external auditors (viz safety officers/Construction personnel having 10years experience in construction safety and Lead Auditor Course: OHSAS 18001/ISO 45001certification). However, minimum one external HSE audit will have to be conducted irrespective of time period of the contract.

c) EIL/Owner may participate in Opening and closing meeting of external audits and provide inputs to the external auditor. Outcome of external audit shall be discussed during HSE Meeting with EIL/Owner.

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

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

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

3.1.11 **Meetings**

i. The Contractor shall ensure participation of his top most executive at site (viz. Resident Construction Manager / Resident Engineer/ Project Manager / Site-in-Charge) along with safety officer in Safety Committee/HSE Committee meetings arranged by EIL/Owner usually on monthly basis or as and when called for. In case Contractor's top most executive at site is not in a position to attend such meeting, he shall inform EIL/Owner in writing before the commencement of such meeting indicating reasons of his absence and nominate his representative – failure to do so may invite very stringent penalization against the specific Contractor, as deemed fit as per Contract. The obligation of compliance of any observations during the meeting shall be always time bound. The Contractor shall always assist EIL/Owner to achieve the targets set by them on HSE management during the project implementation.

ii. In addition, the Contractor shall also arrange internal HSE meetings chaired by his top most executive at site on fortnightly basis and maintain records. Such internal HSE meetings shall essentially be attended by field engineers / supervisors including safety personnel of the Contractor and its associates. Records of such internal HSE meetings shall be maintained by the Contractor for review by EIL/Owner or for any HSE Audits.

iii. Agenda of internal HSE meeting should broadly cover: -

a) Confirmation of record notes /minutes of previous meeting
b) Discussion on outstanding subjects of previous points / subjects, if any
c) Incidents / Accidents (of all types) at project site, if any
d) Current topics related to site activities / subjects of discussion
e) House keeping
f) Behavioral Safety
g) Information / views / deliberations of members / site sub-contractors
h) Report from Owner / Client
i) Status of Safety awareness, Induction programs & Training programs

The time frame for such HSE meeting shall be religiously maintained by one and all.

3.1.12 **Intoxicating drinks & drugs and smoking**

a) The Contractor shall ensure that his staff members & workers (permanent as well casual) shall not be in a state of intoxication during working hours and shall abide by any law relating to consumption & possession of intoxicating drinks or drugs in force.

b) The Contractor shall not allow any workman to commence any work at any locations of project activity who is/are influenced / effected with the intake of alcohol, drugs or any other intoxicating items being consumed prior to start of work or working day.

c) Awareness about local laws on this issue shall form part of the Induction Training and compulsory work-site discipline.

d) The Contractor shall ensure that all personnel working for him comply with "No-Smoking" requirements of the Owner as notified from time to time. Cigarettes, lighters, auto ignition tools or appliances as well as intoxicating drugs, dry tobacco powder, etc. shall not be allowed inside the project / plant complex.

e) Smoking shall be permitted only inside smoking booths, if any, exclusively designated & authorized by the Owner/EIL.

3.1.13 **Penalty**

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

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

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

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

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

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

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

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

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

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

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

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

3.1.14 **Accident/ Incident investigation**

All accidents/incidents shall be informed to EIL/Owner at least telephonically by Contractor immediately and in writing within 24 hours on Format No. HSE-2 as applicable, by Contractor. Thereafter, a Supplementary Accident/Incident investigation Report on Format No. HSE-3 shall be submitted to EIL/Owner within 72 hours. Near Miss incident(s), Dangerous accidents/incident shall also be reported on Format No. HSE-4 within24 hours. The accident/ incident shall be investigated by a team of Contractor's senior Site personnel (involving Site-in-Charge or at least by his deputy) for establishing root-cause and recommending corrective & preventive actions. Findings shall be documented and suitable actions taken to avoid recurrences shall be communicated to EIL/Owner. Owner/EIL shall have the liberty to independently investigate such occurrences and the Contractor shall extend all necessary help and cooperation in this regard. EIL/Owner shall have the right to share the content of this report with the outside world.

3.2 House Keeping

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

a) All surplus earth and debris are removed/disposed-off from the working areas to designated location(s).

b) Unused/surplus cables, steel items and steel scrap lying scattered at different places within the working areas are removed to identify location(s).

c) All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from work place to identified location(s).

d) Roads shall be kept clear and materials like pipes, steel, sand, boulders, concrete, chips and bricks etc. shall not be allowed on the roads to obstruct free movement of men & machineries.

e) Fabricated steel structural, pipes & piping materials shall be stacked properly.

f) Water logging on roads shall not be allowed.

g) No parking of trucks/trolleys, cranes and trailers etc. shall be allowed on roads, which may obstruct the traffic movement.

h) Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas.

i) Protective measures to be ensured with projected rebar by suitable means.

j) Trucks carrying sand, earth and pulverized materials etc. shall be covered while moving within the plant area/ or these materials shall be transported with top surface wet.

k) The contractor shall ensure that the atmosphere in plant area and on roads is free from particulate matter like dust, sand, etc. by keeping the top surface wet for ease in breathing.

l) At least two exits for any unit area shall be assured at all times – same arrangement is preferable for digging pits/ trench excavation/ elevated work platforms/ confined spaces etc.

m) Welding cables and the power cable must be segregated and properly stored and used. The same shall be laid away from the area of movement and shall be free from obstruction.

n) Upkeep/cleaning of site to be carried out on regular basis by the contractor. Contractor shall earmark the area for waste/scrap disposal and ensure that all waste/scrap arising out of the day's work is properly disposed to the earmarked area.

o) Hazardous waste shall be segregated and shall be kept separately at designated place.

p) Contractor shall present the status of housekeeping in HSE meeting.

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

3.3 HSE Measures

3.3.1 Construction Hazards

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

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

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

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

3.3.2 Accessibility

h) The Contractor shall provide safe means of access(in sufficient numbers)& efficient exit to any working place including provisions of suitable and sufficient scaffolding at various stages during all operations of the work for the safety of his workmen and EIL/Owner.

i) The Contractor shall implement use of all measures including use of "life line", "fall-arresters", "retractable fall arresters", "safety nets" etc. during the course of using all safe accesses& exits, so that in no case any individual remains at risk of slip & fall during their travel.

j) A ladder or step- ladder must have a level and firm footing, in case of use of fixed ladders, sufficient foot hold and hand hold to be provided.

k) The access to operating plant / project complex shall be strictly regulated. Any person or vehicle entering such complex shall undergo identification check, as per the procedures in force / requirement of EIL/Owner.

l) Accessibility to 'confined space' shall be governed by specific system / regulation, as established at project site.

3.3.3 Personal Protective Equipment (PPEs)

a) The Contractor workmen shall be permitted entry inside the project premises only with proper PPEs.

b) The Contractor shall ensure that all their staff, workers and visitors including their sub-contractor(s) have been issued (records to be kept) & wear appropriate PPEs like nape strap type safety helmets preferably with head &sweat band with ¾" cotton chin strap (made of industrial HDPE), High ankle safety shoes with steel toe cap and antiskid sole, Coverall, full body harness (CE marked and conforming to EN361), protective goggles, gloves, ear muffs, respiratory protective devices, etc. All these gadgets shall conform to applicable IS Specifications/CE or other applicable international standards. The Contractor shall implement a regular regime of inspecting physical conditions of the PPEs being issued / used by the workmen of their own & also its sub-agencies and the damaged / unserviceable PPEs shall be replaced forthwith.

c) Owner/EIL may issue a comprehensive color scheme for helmets to be used by various agencies. The Contractor shall follow the scheme issued by the owner/EIL and shall choose colour other than white (for Owner) or blue (for EIL). All HSE personnel shall preferably wear dark green band on their helmet or green color safety helmet so that workmen can approach them for guidance during emergencies.HSE personnel shall preferably wear such dresses with fluorescent stripes, which are noticeable during night, when light falls on them.

d) Florescent jackets with respective company logo to be worn by the contractor workmen with different color coding for categories like supervisor and workmen.

e) Workers required using or handling alkalies, acid or other similar corrosive substance at site shall be provided with appropriate protective equipment, in accordance with MSDS.

f) For shot blasting, the usage of protective face shield and helmets, gauntlet and protective clothing is mandatory. Such protective clothing should conform relevant IS Specification.

g) For off-shore jobs/contracts, contractor shall provide PPEs (new) of all types to EIL & Owner's personnel, at his (contractor's) cost. All personnel shall wear life jacket at all time.

h) An indicative list of HSE standards/codes is given under **Appendix-A**.

i) Contractor shall ensure procurement & usage of following safety equipment's/ accessories (conforming to applicable IS mark / CE standard) by their staff, workmen & visitors including their subcontractors all through the span of project construction / pre-commissioning/ Commissioning:-

i. PPEs (Helmet with company name/logo, Safety Goggles, Coverall, Ear-muff, Face Shield, Hand Gloves, High Ankle Safety Shoes, Gum Boot etc.)
ii. Barricading tape / warning signs
iii. Rechargeable Safety torch (flame-proof)
iv. Safety nets (with tie-chords)
v. Fall arresters
vi. Emergency Man-basket/rescue kit for height works
vii. Portable ladders (varying lengths)
viii. Life-lines (steel wire-rope, dia. not less than 8.0 mm)
ix. Full body double lanyard Safety harness with Rebar/ladder hook or scaffolding hook.
x. Lanyard
xi. Karabiner
xii. Retractable fall arresters (various length)
xiii. Portable fire extinguishers (DCP type) – 5 kg&10 kg capacity
xiv. Portable Multi Gas detector
xv. Sound level meter
xvi. Digital lux meter
xvii. Fire hoses & flow nozzles
xviii. Fire blankets/ Fire retardant cloth (with eyelets)
xix. Flame retardant/Flame resistant coverall-based on hazard identification & risk assessment, if required.

3.3.4 **Working at height**

a) The Contractor shall issue permit for working (PFW) at height after verifying and certifying the checkpoints as specified in the attached permit (Format No. HSE-6). He shall also undertake to ensure compliance to the conditions of the permit during the currency of the permit including adherence of personal protective equipment's. Contractor's Safety Officer shall verify compliance status of the items of permit document after implementation of action is completed by Contractor's execution / field engineers at work site. HIRAC for specific works at height duly commented by EIL/Owner, shall be kept attached with particular Permit for Work (PFW) at site for ready reference & follow-up.

b) Such PFW shall be initially issued for one single shift or expected duration of normal work and extended further for balance duration, if required. EIL/Owner can devise block-permit system at any specific area, in consultation with project specific HSE Committee to specify the time-period of validity of such PFW or its renewal. This permit shall be applicable in areas where specific clearance from Owner's operation Deptt./Safety Deptt. is not required. EIL / Owner's field Engineers/Safety Officers/Area Coordinators may verify and counter sign this permit (as an evidence of verification) during the execution of the job.

c) All personnel shall be medically examined & certified by registered doctor, confirming their 'medical fitness(Vertigo or epilepsy must be covered under test report)for working at height. Contractor shall develop the model for conducting vertigo test. The fitness examination shall be done once in six months. Sticker for "PASS FOR HEIGHT WORK" shall be pasted on the safety helmet of the site personnel.

d) In case work is undertaken without taking sufficient precautions as given in the permit, EIL/Owner Engineers may exercise their authority to cancel such permit and stop the work till satisfactory compliance/rectification is arranged made. Contractors are expected to maintain a register for issuance of permit and extensions thereof including preserving the

used permits for verification during audits etc.

e) The Contractor shall arrange (at his cost) and ensure use of Fall Arrester Systems by his workers. Fall arresters are to be used while climbing/descending tall structures or vessels / columns etc. These arresters should lock automatically against the anchorage line, restricting free fall of the user. The device is to be provided with a double security opening system to ensure safe attachment or release of the user at any point of rope. In order to avoid shock, the system should be capable of keeping the person in vertical position in case of a fall. All the fall arrest systems should be cleaned after use and stored in a clean &dry area. Defective Safety Harness, lanyards & life line must be discarded from workplace and record to be maintained.

f) The Contractor shall ensure that Full body harnesses with double lanyards conforming EN361 and having authorized CE marking is used by all personnel while working at height. The lanyards and life lines should have enough tensile strength to take the load of the worker in case of a fall. One end of the lanyard shall be firmly tied with the harnesses and the other end with life line. The harness should be capable of keeping the workman vertical in case of a fall, enabling him to rescue himself.

g) The Contractor shall provide Roof Top Walk Ladders for carrying out activities on sloping roofs in order to reduce the chances of slippages and falls.

h) The Contractor shall ensure that a proper Safety Net System is used wherever the hazard of fall from height is present. The safety net, preferably a knotted one with mesh ropes conforming to IS 5175/ ISO 1140 shall have a border rope & tie cord of minimum 12mm dia. The Safety Net shall be located not more than 6.0 meters below the working surface extending on either side upto. sufficient margin to arrest fall of persons working at different heights.

i) In case of accidental fall of person on such Safety Net, the bottom most portion of Safety Net should not touch any structure, object or ground.

j) Grade separators shall be provided in Pipe-rack/Tech-structures to arrest falling objects like welding spatters, welding rods, nuts, bolts, tools etc. and to facilitate U/G and A/G works simultaneously.

k) Beam Clamps may be used for construction of localized temporary working platforms sheds for welding booths etc. at height in all types of steel structure due to faster installation and requirement of less scaffolding materials.

l) Hanging Platform, manufactured by Standard HSE equipment vendors must be encouraged for painting of Buildings etc.

m) All the tools used at height (like spanner, screw driver etc.) shall be provided with securing arrangement like back-pack/waist pouch to prevent accidental slippage from worker hand.

n) The Contractor shall install temporary lightening arrester in tall structures during construction to save human life and to avoid damage to equipment's& machineries. During the possibility of a thunderstorm, all the work at height where a person can be exposed to lightning shall be stopped.

o) To the extent possible use Roller arrangement to shift overhead pipes from one end to other in Pipe Racks Area.

p) Providing of steel scaffold stair tower system with landings at regular intervals as and when required for height work.

q) The Contractor shall ensure positive isolation while working at different levels like in the pipe rack areas. The working platforms with toe boards & hand rails shall be sufficiently strong & shall have sufficient space to hold the workmen and tools& tackles including the equipment's required for executing the job. Such working platforms shall have mid-rails, to enable people work safely in sitting posture.

3.3.5 Scaffoldings& Barricading

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

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

b) The Contractor shall ensure that the scaffolds used during construction activities shall be strong enough to take the designed load. Main Contractor shall always furnish duly approved construction-design details of scaffold &SWL (from competent designers) free of charge, before they are being installed/ constructed at site. Owner/EIL reserves the right to ask the Contractor to submit certification and or design calculations from his Head Office/ Design/Engineering expert regarding load carrying capacity of the scaffoldings. All steel tubing, couplers and fittings used for scaffolding shall conform to IS 3696 or an acceptable equivalent. Only metallic scaffold boards shall be allowed to use. Steel tubes shall be free from cracks, splits. Surface flaws & other defects. All couplers & fittings shall be properly oiled and maintained. Nuts shall have a free running fit on their bolts. Bolts with worn or damaged thread shall be replaced.

c) All scaffolds shall be inspected by a competent Scaffolding Inspector (person with scaffolding related experience in construction field and having a training of scaffolding supervisor from a institute/agency like National Safety Council etc.). He shall paste a GREEN tag (duly signed by competent Scaffolding Inspector) on each scaffold found safe and a RED tag (duly signed by competent Scaffolding Inspector) on each scaffold found unsafe. Scaffolds with GREEN tag only shall be permitted to be used and Scaffolds with RED ones shall immediately be made inaccessible. Work being found continuing on scaffolds with RED tag shall be considered unauthorized work by Contractor and may invite penalization from EIL/Owner. For every 120-125 m^2 /m^3 area / volume or its parts thereof minimum one TAG shall be provided.

d) The Contractor shall ensure positive barricading (indicative as well as protective) of the excavated, radiography, heavy lift, high pressure hydrostatic & pneumatic testing and other such areas. Sufficient warning signs shall be displayed along the barricading areas.

e) Scaffolding shall be constructed using foot seals or base plates only. Base plates shall be used below each standard on surface .Sole plate of timber shall be used beneath the base plate to achieve greater load distribution.

3.3.6 **Electrical installations**

a) All electrical installations/ connections shall be carried out as per the provisions of latest revision of following codes/standards, in addition to the requirements of Statutory Authorities and IE/applicable international rules& regulations:

- OISD STD 173 : Fire prevention & protection system for electrical installations
- SP 30 (BIS) : National Electric Code

b) All electrical installations shall be approved by the concerned statutory authorities.

c) All temporary electrical installations / facilities shall be regularly checked by the licensed/competent electricians of the Contractor and appropriate records shall be maintained in format no: HSE-12" Inspection of temporary electrical booth/installation at project construction site". Such inspection records are to be made available to EIL/Owner, whenever asked for.

3.3.6.1 The Contractor shall meet the following requirements:

a. Shall make Single Line Diagram (SLD) for providing connection to each equipment's & machinery and the same (duly approved by EIL/Owner) shall be pasted on the front face of DBs (distribution boards) or JBs (Junction boxes) at every site.(A typical Switch Board Sketch is attached as Appendix -G)

b. Ensure that electrical systems and equipment including tools & tackles used during construction phase are properly selected, installed, used and maintained as per provisions of the latest revision of the Indian Electrical/ applicable international regulations.

c. Shall deploy qualified & licensed electricians for proper & safe installation and for regular inspection of construction power distribution system/points including their earthing. A copy of the license shall be submitted to EIL / Owner for records. Availability of at least one competent (ITI qualified) / licensed electrician (by State Elec. authorities) shall be ensured at site round the clock to attend to the normal/emergency jobs.

d. All switchboards / welding machines shall be kept in well-ventilated & covered shed/ with rain shed protection. The shed shall be elevated from the existing ground level to avoid water logging inside the shed. Installation of electrical switch board must be done taking care of the prevention of shock and safety of machine.

e. No flammable materials shall be used for constructing the shed. Also flammable materials shall not be stored in and around electrical equipment / switchboard. Adequate clearances and operational space shall be provided around the equipment.

f. Fire extinguishers and insulating mats shall be provided in all power distribution centers.

g. Temporary electrical equipment shall not be employed in hazardous area without obtaining safety permit.

h. Proper housekeeping shall be done around the electrical installations.

i. All temporary installations shall be tested before energizing, to ensure proper earthing, bonding, suitability of protection system, adequacy of feeders/cables etc.

j. All welders shall use hand gloves irrespective of holder voltage.

k. Multilingual (Hindi, English and local language) caution boards, shock treatment charts and instruction plate containing location of isolation point for incoming supply, name & telephone No. of contact person in emergency shall be provided in substations and near all distribution boards / local panels.

l. ELCB tester /test meter shall be used for testing the ELCBs operation. ELCBs testing shall be carried out by using ELCB tester on monthly basis but in specific cases like heavy rain as decided by owner/EIC. Record of the testing shall be maintained.

m. Regular inspection of all installations at least once in a month. (**Ref. Format HSE-12**).

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

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

b. The outgoing feeders shall be double or triple pole switches with fuses / MCBs. Loads in a three phase circuit shall be balanced as far as possible and load on neutral should not exceed 20% of load in the phase.

c. The installation shall be adequately protected against overload, short circuit and earth leakage by the use of suitable protective devices. Fuses wherever used shall be HRC type. Use of rewirable fuses shall be strictly prohibited. ELCB/RCCB (Residual Current Circuit Breaker) must be fitted with all Electrical installation. The earth leakage devices shall have an operating current not exceeding 30 mA.

d. All connections to the hand tools / welding receptacles shall be taken through proper switches, sockets and plugs.

e. All single phase sockets shall be minimum 3 pin type only. All unused sockets shall be provided with socket caps.

f. Only 3 core (P+N+E) overall sheathed flexible cables with minimum conductor size of 1.5 mm^2 copper shall be used for all single phase hand tools.

g. Only metallic distribution boxes with double earthing shall be used at site. No wooden boxes shall be used.

h. All power cables shall be terminated with compression type cable glands. Tinned copper lugs shall be used for multi-strand wires / cables.

i. Cables shall be free from any insulation damage.

j. Minimum depth of cable trench shall be 750 mm for MV & control cables and 900 mm for HV cables. These cables shall be laid over a sand layer and covered with sand, brick & soil for ensuring mechanical protection. Cables shall not be laid in waterlogged area as far as practicable. Cable route markers shall be provided at every 25 M of buried trench route.

When laid above ground, cables shall be properly cleated or supported on rigid poles of atleast 2.1 M high. Minimum head clearance of 6 meters shall be provided at road crossings.

k. Underground road crossings for cables shall be avoided to the extent feasible. In any case no underground power cable shall be allowed to cross the roads without pipe sleeve.

l. All cable joints shall be done with proper jointing kit. No taped/temporary joints shall be used.

m. An independent earthing facility should preferably be established within the temporary installation premises. All appliances and equipment shall be adequately earthed. In case of armored cables, the armour shall be bonded to the earthing system. IS: 3043 Code for earthing practices shall be followed at project site.

n. All cables(green colour) and wire rope used for earth connections shall be terminated through tinned copper lugs.

o. In case of local earthing, earth electrodes shall be buried near the supply point and earth continuity wire shall be connected to local earth plate for further distribution to various appliances. All insulated wires for earth connection shall have insulation of green colour. Periodical check tests of all electrodes should be carried out and record shall be maintained of such checks.

p. Separate core shall be provided for neutral. Earth / Structures shall not be used as a neutral in any case.

q. ON/OFF position of all switches shall be clearly designated / painted for easy isolation in emergency.

3.3.7 Welding/ Grinding/Gas cutting

a) Contractor shall ensure that flash back arrestors conforming to BS:6158 or equivalent are installed on all gas cylinders as well as at the torch end of the gas hose, while in use.

b) All cylinders shall be mounted on trolleys and provided with a closing key. Empty & filled-up gas cylinders shall be stored separately with TAG, protecting them from direct sun or rain. Minimum 2 nos. of Portable DCP type fire extinguishers (10 kg) shall be maintained at the gas cylinder stores. Stacking & storing of compressed gas cylinders shall be arranged away from DG set, hot works, Elect. Panels / Elec. boards, etc.

c) The burner and the hose placed downstream of pressure reducer shall be equipped with Flash Back Arrester/Non Return Valve device.

d) The hoses for acetylene and oxygen cylinders must be of different colours. Their connections to cylinders and burners shall be made with a safety collar.

e) At end of work, the cylinders in use shall be closed and hoses depressurized.

f) Cutting of metals using gases, other than oxygen &acetylene, shall require written concurrence from Owner.

g) Grinding activity shall not be carried out in confined spaces without a valid work permit.

h) All grinding/cutting machines shall be guarded and fitted with Dead-Man switch and this shall not be bypassed any time.

i) All welding/grinding machines shall have effective earthing at least at distinctly isolated two points.

j) In order to help maintain good housekeeping, and to reduce fire hazard, live electrode bits shall be contained safely and shall not be thrown directly on the ground.

k) The hoses of Acetylene and Oxygen shall be kept free from entanglement & away from common pathways / walkways and preferably be hanged overhead in such a manner which can avoid contact with cranes, Hydraulic Mobile Crane or other mobile construction machinery.

l) Hot spatters shall be contained / restricted appropriately (by making use of effective fire-retardant cloth/fabric) and their flying-off as well as chance of contact with near-by flammable materials shall be stopped. The Fire retardant blanket shall be woven from ceramic yarn with eyelets.

m) The Contractor shall arrange adequate systems & practices for accumulation / collection of metal & other scraps and remnant electrodes and their safe disposal at regular interval so as to maintain the fabrication and other areas satisfactorily clean & tidy.

n) All gas cylinders must have a cylinder cap on at all times when not in use.

3.3.8 Ergonomics and tools & tackles

a) The Contractor shall assign to his workmen, tasks commensurate with their qualification, experience and state of health. Competency of the crane operator to be thoroughly checked prior to engaging in crane operation.

b) All lifting tools, tackles, equipment, trailers, trucks/dumpers, accessories including cranes shall be tested periodically by statutory/competent authority for their condition and load carrying capacity. Valid test & fitness certificates from the applicable authority shall be submitted to Owner/EIL for their review/acceptance before the lifting tools, tackles,

equipment, trailers, trucks/dumpers, accessories and cranes are used. Third party inspection certificate is mandatory for all lifting tools & tackles before put into use.

c) Load testing of Cranes by competent person must be made mandatory after each modification/alteration of crane configuration/change in boom length. All heavy equipment's including cranes must be maintained in good condition &record of such maintenance shall be maintained. Routine preventive maintenance of the crane to be carried out& record to be maintained for such preventive maintenance. Healthiness of the crane to be checked by Crane Expert on regular basis as per manufacturer guidelines.

d) HIRAC/JSA for assembly/dismantling activity of the crane to be submitted for approval of EIC.

e) No one should stand/work below the mast & boom of the crane. Mast of the crane should not be used for unintended lifts.

f) Mast of the crane to be kept in right position during dismantling activity of the crane.

g) Log book of all crane to be maintained.

h) Only authorized person shall be allowed to give signal to the operator.

i) Lifting/Loading/Unloading activities shall be carried out by the trained riggers under supervision of rigging Foreman.

j) Prior to marching/movement of the crane, obstructions free access/route to be ensured.

k) Skilled Technician to be engaged for AC gas checking and refilling of refrigerant and should follow the safe operating procedure for cranes.

l) Manufacturer's instructions to be followed without any deviation.

m) The contractor shall not be allowed to use defective equipment or tools not adhering to safety norms.

n) Adequate capacity of Chain pulley blocks with valid TPI certificate to be used for lifting/lowering/dragging/erection of piping material .

o) Colour coding system for lifting tools & tackles shall be followed on quarterly basis for a particular colour as mentioned below:

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

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

i. Wherever required the Contractor shall make use of Elevated Work Platforms (EWP) or Aerial Work Platforms (mobile or stationary) to avoid ergonomical risks and workmen shall be debarred to board such elevated platform during the course of their shifting / transportation.

ii. Contractor shall ensure installation of Safe Load Indicator (SLI) on all cranes (while in use) to minimize overloading risk. SLI shall have capability to continuously monitor and display the load on the hook, and automatically compare it with the rated crane capacity at the operating condition of the crane. The system shall also provide visual and audible warnings at set capacity levels to alert the operator in case of violations.

iii. The contractor shall be responsible for safe operations of different equipments mobilized and used by him at the workplace like transport vehicles, Tower Crane, engines, cranes, mobile ladders, scaffoldings, work tools, etc. Strictly avoid standing close to Hydraulic Mobile Crane/vehicles tyres during operation.

iv. The contractor shall deploy cranes in good working condition of maximum allowable years of service from the year of manufacture as specified below: -

20 years for cranes of 50 MT & below capacity,25 years for 51 MT to 100 MT,30 years for cranes above 101 MT.

v. In general Man basket shall not be lifted by Hydraulic Mobile Crane. Generally Crane shall be used for lifting the man basket.

vi. Tower Crane, Crane, Hydraulic Mobile Crane or equivalent, Hydraulic Rig &Boom Lift shall be inspected on fortnightly basis as per Format No. HSE-20, HSE-21, HSE-22, HSE-23 & HSE-24.

vii. The Contractor shall arrange periodical training for the operators of Hydraulic Mobile Crane, crane, excavator, mobile machinery, Tower Crane, etc. at site by utilizing services from renowned manufacturers.

viii. Hydraulic Mobile Crane or equivalent having steering control mechanism shall be permitted at construction site only for the purpose of loading/unloading. However, continuous rigger availability during marching of hydraulic crane at site shall be ensured by contractor.

3.3.9 Occupational Health

a) The contractor shall identify all operations that can adversely affect the health of its workers and issue & implement mitigation measures.

b) For surface cleaning operations, sand blasting shall not be permitted even if not explicitly stated elsewhere in the contract.

c) To eliminate radiation hazard, Tungsten electrodes used for Gas Tungsten Arc Welding shall not contain Thorium.

d) Appropriate respiratory protective devices(hood with respiratory devices) shall be used to protect workmen from inhalation of air borne contaminants like silica, asbestos, gases, fumes, etc.

e) Workmen shall be made aware of correct methods for lifting, carrying, pushing & pulling of heavy loads. Wherever possible, manual handling shall be replaced by mechanical lifting equipment's.

f) Fuelling of construction equipments/Diesel Generator set shall be carried out by hand operated pump.

g) In view of the congested working environment and associated hazards, deployment of manpower/machineries shall be in staggered manner keeping adequate safe distance between two adjacent work spot.

h) For jobs like drilling/demolishing/dismantling/steam blowing/cardboard blasting etc. where noise pollution exceeds the specified limit of 85decibels, ear muffs shall be provided to the workers. The Noise level monitoring record shall be maintained.

i) To avoid work related upper limb disorders (WRULD) and backaches, Display Screen Equipments' workplace stations shall be carefully designed & used with proper sitting postures. Power driven hand-held tools shall be maintained in good working condition to minimize their vibrating effects and personnel using these tools shall be taught how to operate them safely & how to maintain good blood circulation in hands.

j) The Contractor shall arrange health check-up(by registered medical practitioner) for all the workers at the time of induction. Health check may have to be repeated if the nature of duty assigned to him is changed necessitating health check or doubt arises about his wellness. EIL/Owner reserves the right to ask the contractor to submit medical test reports. Regular health check-ups are mandatory for the workers assigned with Welding, Radiography, Blasting, Painting, Heavy Lift and Height (>2m) jobs. All the health check-ups shall be conducted by registered Medical practitioner and records are to be maintained by the Contractor.

k) The Contractor shall arrange Medical Camps at regular intervals at work sites and labor colonies to assess health condition of workers.

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

3.3.10 Hazardous substances

a) Hazardous, inflammable and/or toxic materials such as solvent coating, thinners, anti-termite solutions, water proofing materials shall be stored in appropriate containers preferably with lids having spillage catchment trays and shall be stored in a good ventilated area. These containers shall be labeled with the name of the materials highlighting the hazards associated with its use and necessary precautions to be taken. Respective MSDS (Material Safety Data Sheet) shall be made available at site &may be referred whenever problem arises.

b) Where contact or exposure of hazardous materials are likely to exceed the specified limit or otherwise have harmful effects, appropriate personal protective Equipment's such as gloves, goggles/face-shields, aprons, chemical resistant clothing, respirator, etc. shall be used.

c) The work place shall be checked prior to start of activities to identify the location, type and condition of any asbestos materials which could be disturbed during the work. In case asbestos material is detected, usage of appropriate PPEs by all personnel shall be ensured and the matter shall be reported immediately to EIL/ Owner.

3.3.11 Slips, trips & falls

a) The contractor shall establish a regular cleaning and basic housekeeping programme that covers all aspects of the workplace to help minimize the risk of slips, trips & falls. The contractor shall take positive measures like keeping the work area tidy, storing waste in suitable containers & harmful items separately, keeping passages, stairways, entrances & exits especially emergency ones clear, cleaning up spillages immediately and replacing damaged carpet/ floor tiles, mats & rugs at once to avoid slips, trips & falls.

b) Grating removal permit system should be implemented during construction phase. So that after permanent gratings are installed on platforms and tech structure floors; removal of any gratings for whatever purpose (including for lifting piping material etc.) is required to be sanctioned by signed permit by HSE officers of both contractor and Engineer-in-charge. The spot where gratings are removed shall be hard-barricaded during course of work. The removed gratings shall be re-installed immediately after completion of work or at the time of cessation of work every day whichever is earlier and the permit shall be closed on daily basis. A register shall be maintained for recording all the grating removal permits and their closure shall be monitored on daily basis.

3.3.12 Radiation exposure

a) All personnel exposed to physical agents such as ionizing &non-ionizing radiation, including ultraviolet rays or similar other physical agents shall be provided with adequate shielding or protection commensurate with the type of exposure involved.

b) For Open Field Radiography works, requirements of Bhabha Atomic Research Centre (BARC)/ Atomic Energy Regulatory Board (AERB) shall be followed.

c) The Contractor shall implement an effective system of control (as described in the AERB regulations) at site for handling radiography-sources & for avoiding its misuse & theft.

d) The contractor shall generate the Format No: HSE-8 "Permit for radiation work" before start of work.

e) In case the radiography work has to be carried out at day time, suitable methodology to be used so that other works, people are not affected.

3.3.13 Explosives/Blasting operations

a) Blasting operations shall be carried out as per latest Explosive Rules (Indian/ International) with prior permission. The Contractor shall obtain license from Chief Controller of Explosives (CCoE) for collection, transportation, storage of explosives as well as for carrying out blasting operations.

b) The Contractor shall prepare exclusive method statement (in cognizance with statutory requirements)for rock blasting works &diffusing unfired explosives, if any, at project site before carrying out actual task. Nowhere blasting shall be carried out by the Contractor or its agency without the involvement of competent supervisor and licensed blaster.

3.3.14 Demolition/ Dismantling

a) The contractor shall adhere to safe demolishing/ dismantling practices at all stages of work to guard against unsafe working practices.

b) The contractor shall disconnect service lines (power, gas supply, water, etc.)/ make alternate arrangements prior to start of work and restore them, ifrequired as directed by EIL/ Owner at no extra cost.

c) Before carrying out any demolition/dismantling work, the contractor shall take prior approval of EIL/Owner and generate the Format No.HSE-9. For revamp jobs in operating plants where location of underground utilities is not known with certainty, the contractor shall depute an experienced engineer for supervision and shall make adequate arrangements for Fire-fighting& First-Aid during the execution of these activities.

d) The Contractor shall arrange approved HIRAC/ Method Statement for the specific demolition / dismantling task and corresponding action plan commensurate with hazards / risks associated therein. In no case any activity related to demolition / dismantling shall be carried out by the Contractor without engaging own supervision / field engineer.

3.3.15 Road Safety

a) The Contractor shall ensure adequately planned road transport safety management system.

b) The vehicles shall be fitted with reverse warning alarms & flashing lights / fog-lights and usage of seat belts shall be ensured.

c) The Contractor shall also ensure a separate pedestrian route for safety of the workers and comply with all traffic rules & regulations, including maintaining speed limit of 20 KMPH or indicated by owner for all types of vehicles / mobile machinery. The maximum allowable speed shall be adhered to.

d) In case of an alert or emergency, the Contractor must arrange clearance of all the routes, roads, access. The Contractor shall deploy sufficient number of traffic controllers at project site routes / roads/ accesses, to alert reversing movement of vehicles & machinery as well as pedestrians. Experienced drivers/operators with valid driving license (LMV/HMV)shall be allowed to drive/operate the vehicles/equipment's. The Contractor shall maintain copy of PUC,RC and Insurance etc. for all the vehicles/equipment's.

e) Dumpers, Tippers, etc. shall not be allowed to carry workers within the plant area and also to & from the labour colony to & from project sites.

f) Hydraulic Mobile Crane or equivalent)shall only be allowed for handling(loading/unloading) the materials at fabrication/ storage yards and in no case shall be allowed to transport the materials over project / plant roads.

g) The Contractor shall not deploy any such mobile machinery / Equipment's, which do not have competent operator and / or experienced banks-man/signal-man. Such machinery/equipment's shall have effective limit-switches, reverse-alarm, front& rear-end lights etc. and shall be maintained in good working order.

h) The Contractor shall not carry-out maintenance of vehicles / mobile machinery occupying space on project / plant roads and shall always arrange close supervision for such works.