

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 9
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<u>SR. NO.</u>	<u>EQUIPMENT/PACKAGE NAME</u>	<u>QUANTITY</u>
3.3.2	Vertical Indicators of each type & model	5% or 1 no. of each model whichever is more
3.3.3	Recorders for each type and model	5% or 1 no. whichever is more.
3.3.4	Consumables for continuous recorders Charts Ink capsules	25 rolls per recorder/ 25 nos per recorder/ 20 nos. per recorder / Ink Pads /Pens.
3.3.5	Consumables for multi point recorders	
(a)	Charts	5 nos. per recorder
(b)	Ink pads	5 nos. per recorder
(c)	Print mechanism/ print head assembly	10% or 5 nos. of each type whichever is more
3.3.6	Level transmitters (displacer type)	
(a)	Electronic cards / PCB's of level transmitters	10% of total quantity used or 1 for each type/rating whichever is more
(b)	Level transmitters	10% of total quantity used or 1 for each type/rating whichever is more
(c)	Electronic water level indicator	10% or 2 nos. min. whichever is more
3.3.7	PD type flow transmitters	10% of total quantity used or 1 for each type/rating whichever is more
3.4	<u>SWITCHES</u>	
3.4.1	Switches (Pressure, DP, Level, Flow, Temperature etc)	10% of each type of total nos. used in the system or minimum 1 no. of each type, model & range whichever is more

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3.5	Rotameter	10% of each type of total nos. used in the system or minimum 2 no. of each type, model & range whichever is more	
3.6	<u>SOLENOID VALVE</u>	10% of each type of total nos. used in the system or minimum 2 no. of each type, model & range whichever is more	
3.6.1	Assembly	10% of total quantity used or minimum 2 no. of each type whichever is more	
3.6.2	Coil	10% of toatal quantity used or 5 no. whichever is more	
3.7	E/P Converter	10% of each type of total nos. used in the system or minimum 2 no. of each type, model & range whichever is more	
3.8	<u>SPECIAL INSTRUMENTS</u>		
3.8.1	Nucleonic /non-nucleonic density meter, solid flow meter etc.	1 no. and spare parts as per manufacturer	
3.9	Electrical Transducers	10% of total quantity used or minium 1 no. of each type and range whichever is more	

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5.0	<u>PROCESS CONNECTION PIPING</u> (for impulse piping /tubing, sampling piping/ tubing and air supply piping as applicable)	
5.1	Valves of all types and models	10% or 2 no. of each type, class, size and model whichever is more.
5.2	2 way, 3way, 5way valve manifolds	10% or 2 no. of each type, class size and model whichever is more.
5.3	Fittings	10 nos. of each type
5.4	Purge meters	10 % of each model or 2 Nos. whichever is more
5.5	Filter regulators	10% of each model or 2 Nos. whichever is more
5.6	Impulse pipe & tubing of all type	20 mtrs each type & size
5.7	Impulse line root valve	10% of total quantity used or 4 no. whichever is more for each type and rating of each size
5.8	SS tube	40 mtrs of each type/size
5.9	Fitting for SS tube	40 nos. of each type/size

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6.0	<u>INSTRUMENTATION CABLE, INTERNAL WIRING AND ELECTRICAL FIELD</u>	
6.1	Pre fabricated cable of each type	10% of installed quantity
6.2	Pre fabricated cable connector	10% or 1 no. of each type and model, whichever is more.
6.3	Other cables	10% of each type, pair and size of actual installed quantity
7.0	<u>ELECTRICAL ACTUATORS</u>	
7.1	Actuators	10% or 1 no. of each type, model and rating, whichever is more.
7.2	Power unit for modulating actuator	10% or 2 nos. of each type, whichever is more.
7.3	DC-DC unit/power pack units	10% or 2 nos. of each type, whichever is more.
7.4	Electronic cards	10% or 5 nos. of each type, whichever is more
7.5	Brake assembly	10% or 2 nos. of each type, whichever is more..
7.6	Brake coils	10% or 2 nos. of each type whichever is more.
7.7	Position feed back transmitters	10% or 2 nos. of each type whichever is more.
7.8	Control unit	10% or 2 nos. of each type whichever is more
7.9	Torque and limit switch assembly of each unit	10% or 2 nos. of each type, whichever is more.
7.10	O-ring	1 set of each size

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7.11	Motor	1 no. of each type & rating	
7.12	Auxiliary contact	10% of total quantity used or 2 nos. whichever is more for each type and rating of each size	
7.13	Seal kit	1 set of each type & size	

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8.10	Interposing Relay	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.

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8.19	Terminal Block	10% of total quantity used in systems for each type and rating	

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9.8.5	Pressure Gauge, Pressure Switch, Temperature Gauge, Temperature Switch, Isolating Valve, Solenoid Valve, Rota Meter etc.	10% of total quantity of each item and type/rating used in the system or minimum 1(one) no. whichever is higher.
9.8.6	Annunciation System	
(a)	Each type of PCB	1(one) No. each
(b)	Lamp Box with Facia & Lamps (LED type)	5(five)Nos.
(c)	Hooter	1(one) No.
9.8.7	Auxiliary/Power Contactor, Push Button, Indicating Lamp, Fuse etc. for Chiller Unit	10% of total quantity of each type of items used in the system or minimum 2(two) nos. whichever is more.

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11.0	<u>RADAR TYPE LEVEL</u> <u>TRANSMITTER</u>	
11.1	Transmitter/Receiver	10% or 1 no. of each type transmitter/ receiver
11.2	Electronic card	10% or 1 no. of each type electronic card

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<u>SR. NO.</u>	<u>EQUIPMENT/PACKAGE NAME</u>	<u>QUANTITY</u>
12.0	<u>CONTROL VALVE</u>	
12.1	<u>NON-CRITICAL CONTROL VALVE</u>	(a) One set of spare control valve stem packing for each control valve.
		(b) Two moulded rubber diaphragms for each control valve.
		(c) 2 no. of gasket for each type/size.
		(d) 100% quantity of lubricants for gaskets for each control valve on one year consumption basis.
		(e) 2 set of limit switches for each control valve.
		(f) One (1) set of valve trims (such as plug, stem, seat ring/cage, guide bushing, stem lock pin, packing retaining ring etc) for each control valve.
		(g) One complete actuator of each type or min. 10% for each type and size whichever is more.
12.2	<u>CRITICAL CONTROL VALVE</u> (BFP RECIRCULATION VALVE, SUPERHEATER SPRAY VALVE, REHEATER SPRAY VALVE, SOOT BLOWER VALVE, PRDS STEAM PRESSURE REDUCING VALVE, FEED CONTROL VALVE)	Spares for BFP minimum recirculation valve & feed control valve are to be included in C & I package, the spares for remaining critical control valve are covered in volume II, section VIII, Annexure –A
12.2.1	Soft goods kit valve	1 set

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12.2.2	Metal seat	1	
12.2.3	Seat ring	1	
12.2.4	Spindle	1	
12.2.5	Actuator soft goods kit	1 set	
12.3	<u>COMMON SPARES AND ACCESSORIES FOR ABOVE VALVE</u>		
12.3.1	Feed back transmitter unit	10% of total quantity used or 2 nos. whichever is more for each type/rating	
12.3.2	Electronic positioner	10% of total quantity used or 2 nos. whichever is more for each type/rating	
12.3.3	Solenoid valve	10% of total quantity used or 2 nos. whichever is more for each type/rating	
12.3.4	Air filter regulator	2 nos	
12.3.5	Air lock relay	4 nos of each type	
12.3.6	Complete actuator for each type and model	1 set	
12.3.7	Volume booster	2 no each type/size	

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<u>SR. NO.</u>	<u>EQUIPMENT/PACKAGE NAME</u>	<u>QUANTITY</u>
17.0	<u>CONTROL PANEL AND LOCAL/REMOTE CONTROL DESK (AS APPLICABLE)</u>	
17.1	Recorder	1(one) No. each type and model
17.2	Bar graph indicator	10% of total quantity used in the system or minimum 1(one) no. whichever is more for each type and model.
17.3	Digital indicator	10% of total quantity used in the system or minimum 1(one) no. whichever is more for each type and model.
17.4	Mosaic/Conventional Type Push button Station	10% of total quantity used in the system or minimum 2(two) nos. whichever is more for each type and model.
17.5	Mosaic Type Push button Station with LED Indication	10% of total quantity used in the system or minimum 2(two) nos. whichever is more for each type and model.
17.6	Mosaic Type LED Indication Station	10% of total quantity used in the system or minimum 2(two) nos. whichever is more for each type and model.
17.7	Simaphore Indicator	2(two)Nos. each type
17.8	<u>ANNUNCIATION SYSTEM</u> (For offsite / Auxiliary Plants)	
17.8.1	Each type of PCB (for non-PLC driven system)	1(one) No. each

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17.8.2	Lamp Box with Facia & Lamps (LED type)	10% with minimum 2 nos.	
17.8.3	Hooter	1(one) No.	

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<u>SR. NO.</u>	<u>EQUIPMENT/PACKAGE NAME</u>	<u>QUANTITY</u>
27.0	Gauges of all types	10% of total quantity used or 1 nos. whichever is max. for each type/rating

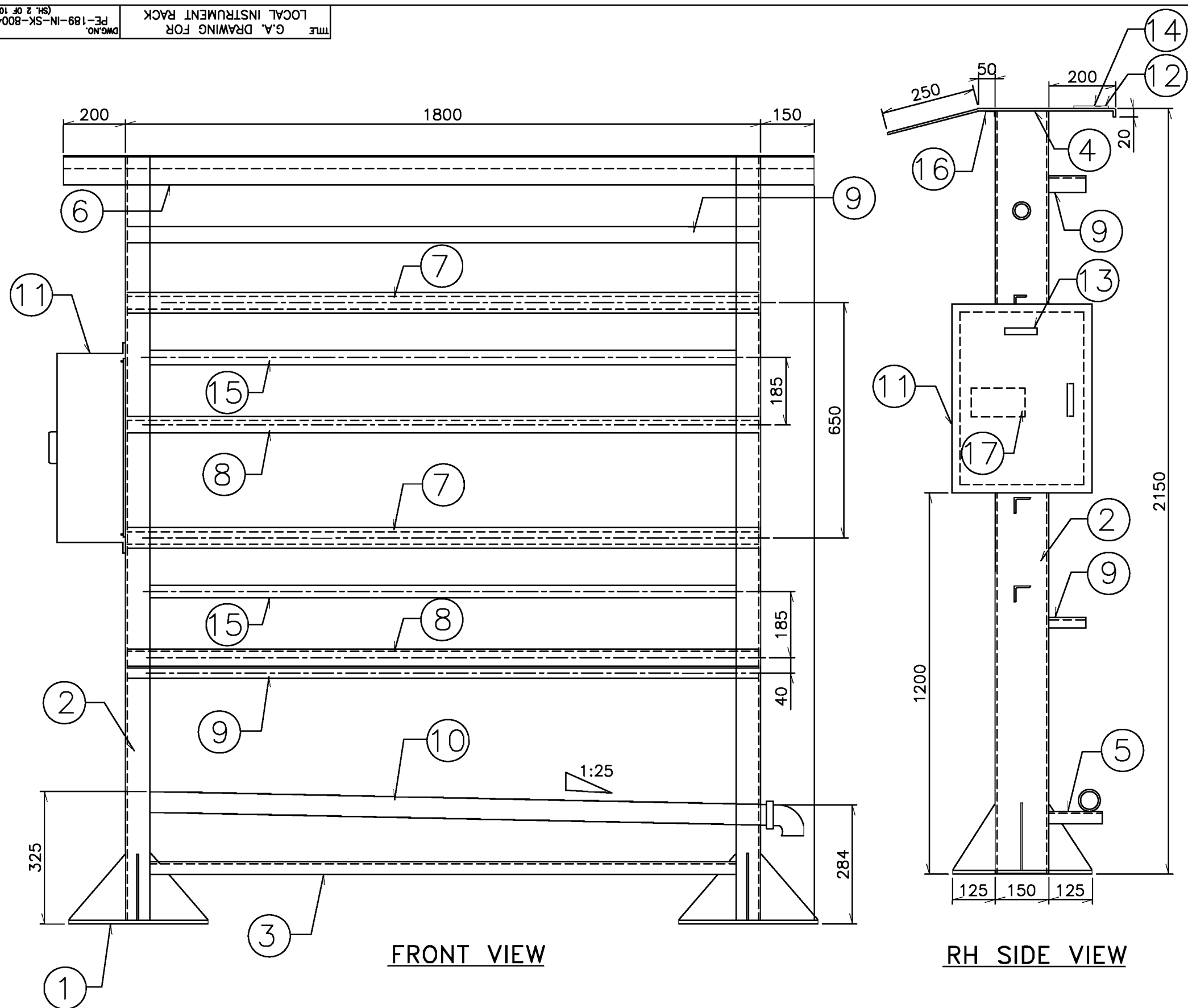
29.0	Power cylinder	
29.1	Actuator Seal Kit	2(two) nos. for each type of Power Cylinder
29.2	Gasket	2(two) nos. for each type of Power Cylinder
29.3	Complete Set of Power Cylinder	1(one) no. each type for all application
29.4	Position Transmitter complete set	10% of total quantity used in the system or minimum 2(two) nos. whichever is more for each type and model.
29.5	Power Cylinder Positioner complete Set	10% of total quantity used in the system or minimum 2(two) nos. whichever is more for each type and model.
29.6	Complete Set of Solenoid Valve for Power Cylinder	2Nos. for each type & ratings

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<u>SR. NO.</u>	<u>EQUIPMENT/PACKAGE NAME</u>	<u>QUANTITY</u>
29.7	Solenoid Coil for Pneumatic type Power Cylinder	5Nos. for each type & ratings
29.8	Position Limit Switch for Pneumatic type Power Cylinder	10Nos. for each type & ratings
29.9	Air Lock Relay	10Nos. for each type
29.10	Signal Air Booster Unit	2Nos. for each type
30.0	<u>MANDATORY SPARES NOT COVERED ABOVE</u>	Bidder to supply 10% electronic modules/ cards or any other electronic components required for system such as annunciation system for offsite/auxiliary plant, online condensate tube cleaning system, ambient air monitoring system, plant simulator.

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	1X660 MW Bhusawal STPP	SECTION: C SUB SECTION : C&I
DRAWINGS		



LEGEND:

ITEM NO.	DESCRIPTION
1.	M.S. PLATE 400 x 400 x 10
2.	ISMC 150 x 75 x 6
3.	ISMC 75 x 40 x 5
4.	CANOPY MOUNTING PLATE 5mm THICK.
5.	BRACKET FOR DRAIN PIPE.
6.	CANOPY ASSEMBLY 3.0mm THICK CRCA SHEET.
7.	GI PIPE 2" NB CLASS B FOR TRANSMITTER MOUNTING.
8.	M.S. ANGLE 40 x 40 x 5
9.	BRACKET FOR IMPULSE PIPE SUPPORT.
10.	DRAIN PIPE MATERIAL ASTM A106 GR. 'C' SIZE 2" NB SCH 80.
11.	JUNCTION BOX SIZE: 480(H) x 360(W) x 180(D).
12.	BULKHEAD M.S. PLATE 5mm THICK.
13.	COMPACT FLUORESCENT LAMP FOR RACK ILLUMINATION.
14.	XLPE GASKET IN BETWEEN BULKHEAD PLATE & CANOPY MOUNTING PLATE.
15.	PVC CABLE TRAY/ FLEXIBLE CONDUIT FOR CABLE
16.	C' CHANNEL FOR LIGHT FITTING.
17.	TAG PLATE.

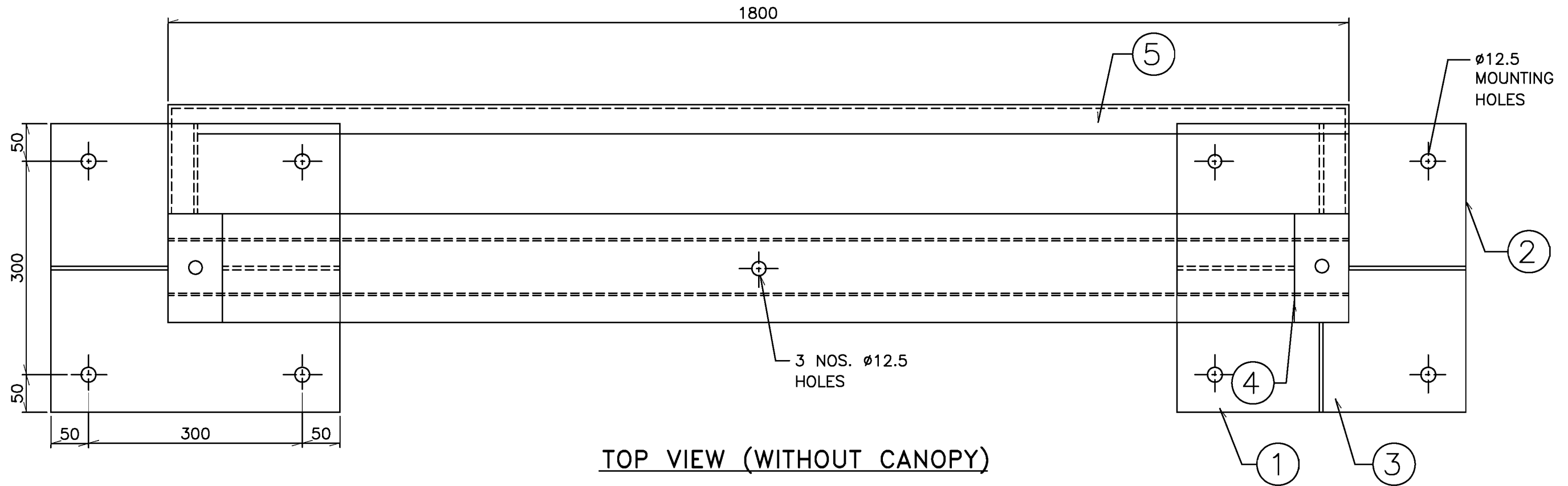
NOTES:

1. POWER SOCKET & TB SHALL BE PROVIDED IN JB.
2. COLOR: RAL 7032. OVERALL THICKNESS > 100 MICRONS.
3. TAG PLATE SHALL BE PROVIDED FOR EACH INSTRUMENT.
4. 20% TERMINALS SHALL BE PROVIDED AS SPARE.
5. ANTIVIBRATION PAD & FOUNDATION BOLTS SHALL BE PROVIDED.
6. DIMENSIONS SHOWN ARE TENTATIVE AND SHALL BE FINALIZED AT DETAILING.
7. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED.

FOR BID PURPOSE ONLY

DO NOT SCALE

ISSUE	REVISIONS	BY	CLEARED					APPD	DATE	FOR RO ISSUE ONLY			"P" (PRELIMINARY) ISSUES ARE NOT TO BE USED FOR CONSTRUCTION / FABRICATION BUT ARE ISSUED FOR LIMITED PURPOSES ONLY AS INDICATED IN THE SMALL BLOCK AT THE TOP RIGHT HAND CORNER OF THE TITLE BLOCK. CONSTRUCTION / FABRICATION WORK IS PERMITTED ON "R" (RELEASED) ISSUES ONLY. INFORMATION CONTAINED WITHIN "HOLD" IS NOT RELEASED FOR CONSTRUCTION / FABRICATION. FIELD MUST GET DESIGN OFFICE TO CLEAR "HOLDS" IN TIME BEFORE PROCEEDING WITH ANY CONSTRUCTION / FABRICATION WORK RELATED TO "HOLDS". DRAWINGS SIGNED BY PROCON ENGINEERS' AUTHORIZED REPRESENTATIVE ONLY ARE CONSIDERED VALID DRAWINGS.	 MAHARASHTRA STATE POWER GENERATION CO.LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT	PROCON ENGINEERS (DIVISION OF NIMOTO CONSULTING ENGINEERS PVT.LTD.)			
			CHEM	CIVIL	ELEC	I&C	MECH			DEPT	SIGNATURE	DATE			SCALE ~	APPROVED	DATE(RO ISSUE)	
										CHEM						DIV. INST.		DATE(CURRENT ISSUE)
										CIVIL						DR. P.N.Z.		23-08-2011
										ELEC						CH. D.J.P.	DWG.NO.	PE-189-IN-SK-8004(SH. 2 OF 10)
										I&C							ISSUE	PO
										MECH								
															G.A. DRAWING FOR LOCAL INSTRUMENT RACK			



TOP VIEW (WITHOUT CANOPY)

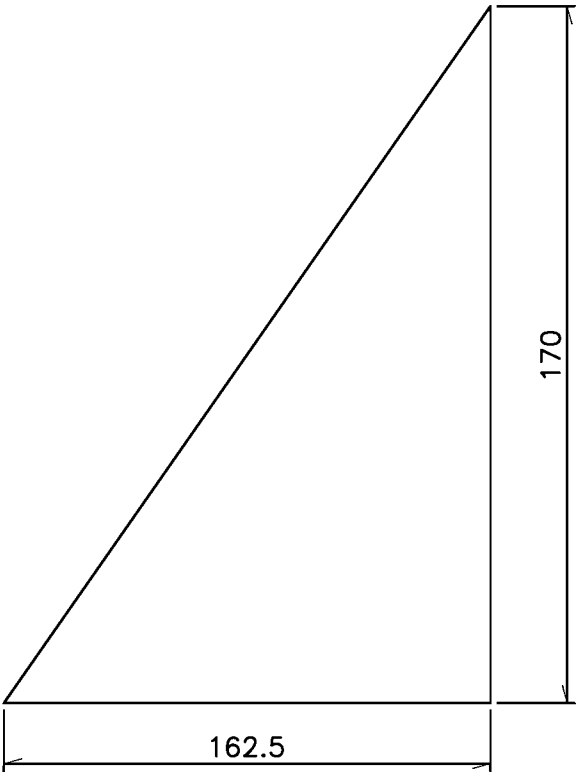
NOTES:

1. M.S. PLATE 400 x 400 x 10.
2. RIB M.S. PLATE 162.5 x 170 x 5 THICK.
3. RIB M.S. PLATE 125 x 170 x 5 THICK.
4. RIB M.S. PLATE 134 x 165 x 5 THICK.
(CANOPY MOUNTING PLATE SUPPORT)
5. BRACKET FOR IMPULSE PIPE SUPPORT.
6. ALL DIMENSIONS ARE IN mm
UNLESS OTHERWISE SPECIFIED.

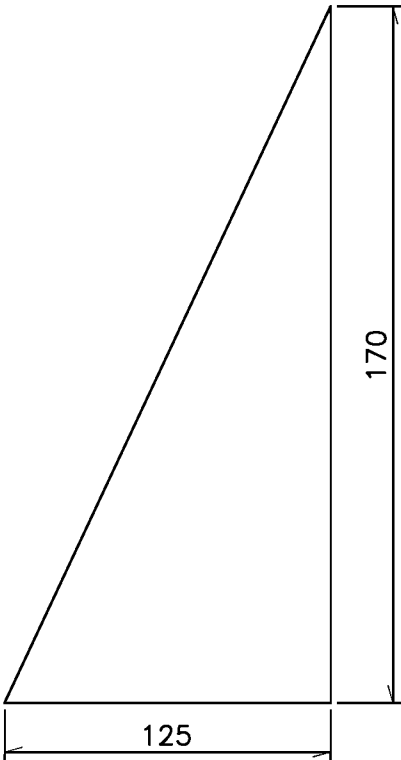
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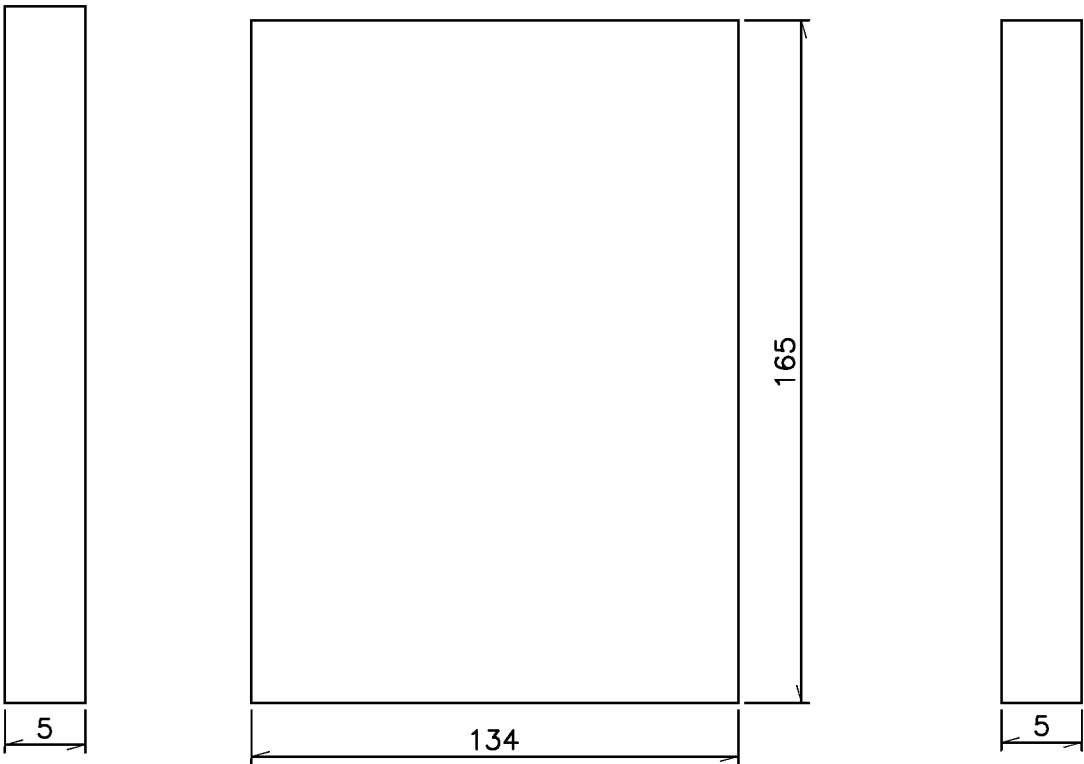
ISSUE	REVISIONS	BY	CLEARED					APPD	DATE	FOR RO ISSUE ONLY			MAHAGENCO MAHARASHTRA STATE POWER GENERATION CO.LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT VIEW OF LOCAL INSTRUMENT RACK W/O CANOPY	PROCON ENGINEERS				(DIVISION OF NIMOTO CONSULTING ENGINEERS PVT.LTD.)	
			CHEM	CIVIL	ELEC	I&C	MECH			DEPT	SIGNATURE	DATE		SCALE ~	APPROVED	DATE(RO ISSUE)			



DETAIL OF-1



DETAIL OF-2



DETAIL OF-3

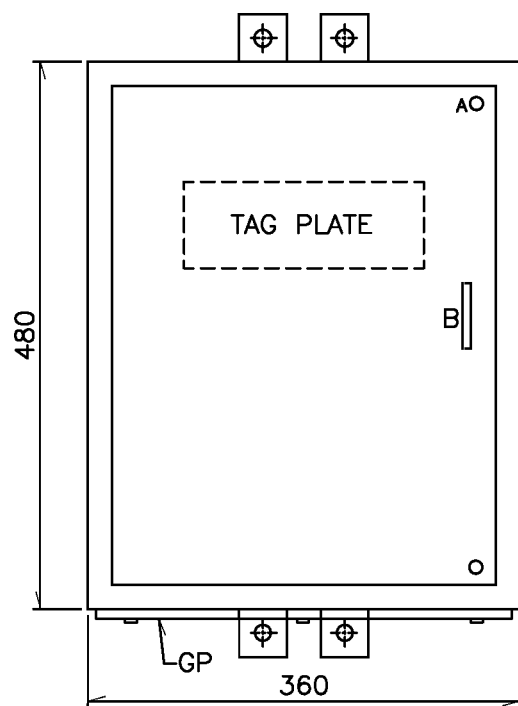
NOTES:

1. RIB M.S. PLATE 162.5 x 170 x 5 THICK.
2. RIB M.S. PLATE 125 x 170 x 5 THICK.
3. RIB M.S. PLATE 134 x 165 x 5 THICK.
4. ALL DIMENSIONS ARE IN mm
UNLESS OTHERWISE SPECIFIED.

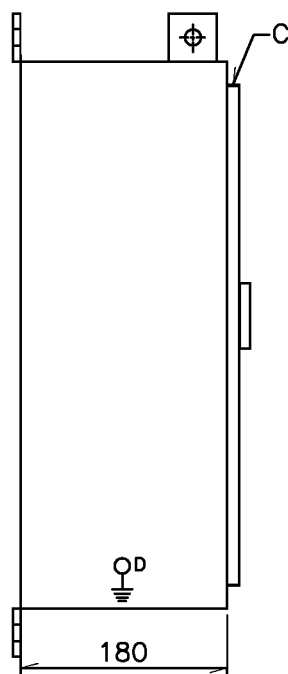
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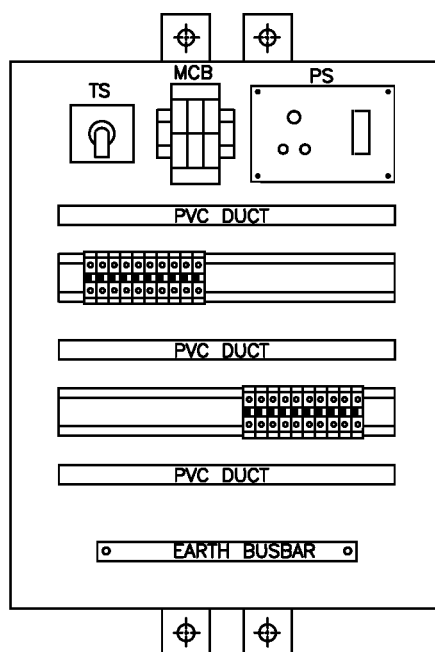
ISSUE	REVISIONS	BY	CLEARED					APPD	DATE	FOR R0 ISSUE ONLY			 MAHARASHTRA STATE POWER GENERATION CO.LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT G.A. DRAWING OF CLEATS FOR LOCAL INSTRUMENT RACK	PROCON ENGINEERS (DIVISION OF NIMOTO CONSULTING ENGINEERS PVT.LTD.)			
			CHEM	CIVIL	ELEC	I&C	MECH			CLEARED				SCALE ~	APPROVED	DATE(R0 ISSUE)	
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									MECH			DR. P.N.Z.					
												CH. D.J.P.	DWG.NO. PE-189-IN-SK-8004 (SH. 4 OF 10)	ISSUE P0			



FRONT VIEW



SIDE VIEW



INTERNAL FRONT VIEW

LEGEND:

- A - DOOR LOCK
- B - DOOR HANDLE
- C - HINGES
- D - EARTH STUD
- GP - GLAND PLATE
- PS - POWER SOCKET
- TS - TOGGLE SWITCH
- TBS - TERMINAL BLOCKS

NOTES:

1. JB WILL BE MADE OUT OF 2.0 mm CRCA SHEET.
2. PROTECTION CLASS IP-65.
3. COLOR: EXT.-RAL 7032, INT.-BRILLIANT WHITE.
4. NUTS FOR MOUNTING THE JUNCTION BOX SHALL BE PROVIDED.
5. 3 mm THICK CRCA GLAND PLATE (GP) AT BOTTOM SHALL BE PROVIDED.
6. SCREWLESS CAGE CLAMP TERMINALS SHALL BE USED.
7. EARTH BUS BAR SHALL BE OF 25x6 TINNED COPPER.
8. INSTRUMENT TAG VIS-A-VIS SERVICE AND TERMINAL DETAILS SHALL BE PRINTED ON PHENOLIC BOARD MOUNTED ON BACK SIDE OF DOOR.
9. COLOR CODE FOR POWER SUPPLY:
PHASE-RED, NEUTRAL-BLACK & EARTH - GREEN.
10. CABLE FOR PANEL LIGHTING SHALL BE 1.5 SQ.mm, 1100V GRADE.
11. SIGNAL WIRING SHALL BE 4Px0.5 SQ.mm TINNED COPPER, TWISTED PAIR, OVERALL SHIELDED 500V GRADE, FRLS PVC.
12. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED.

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ISSUE	BY	CH	DATE

PROCON ENGINEERS
(DIVISION OF NIMOTO CONSULTING ENGINEERS PVT. LTD.)

CLIENT : MAHARASHTRA STATE POWER GENERATION CO.LTD.

PROJECT : BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT

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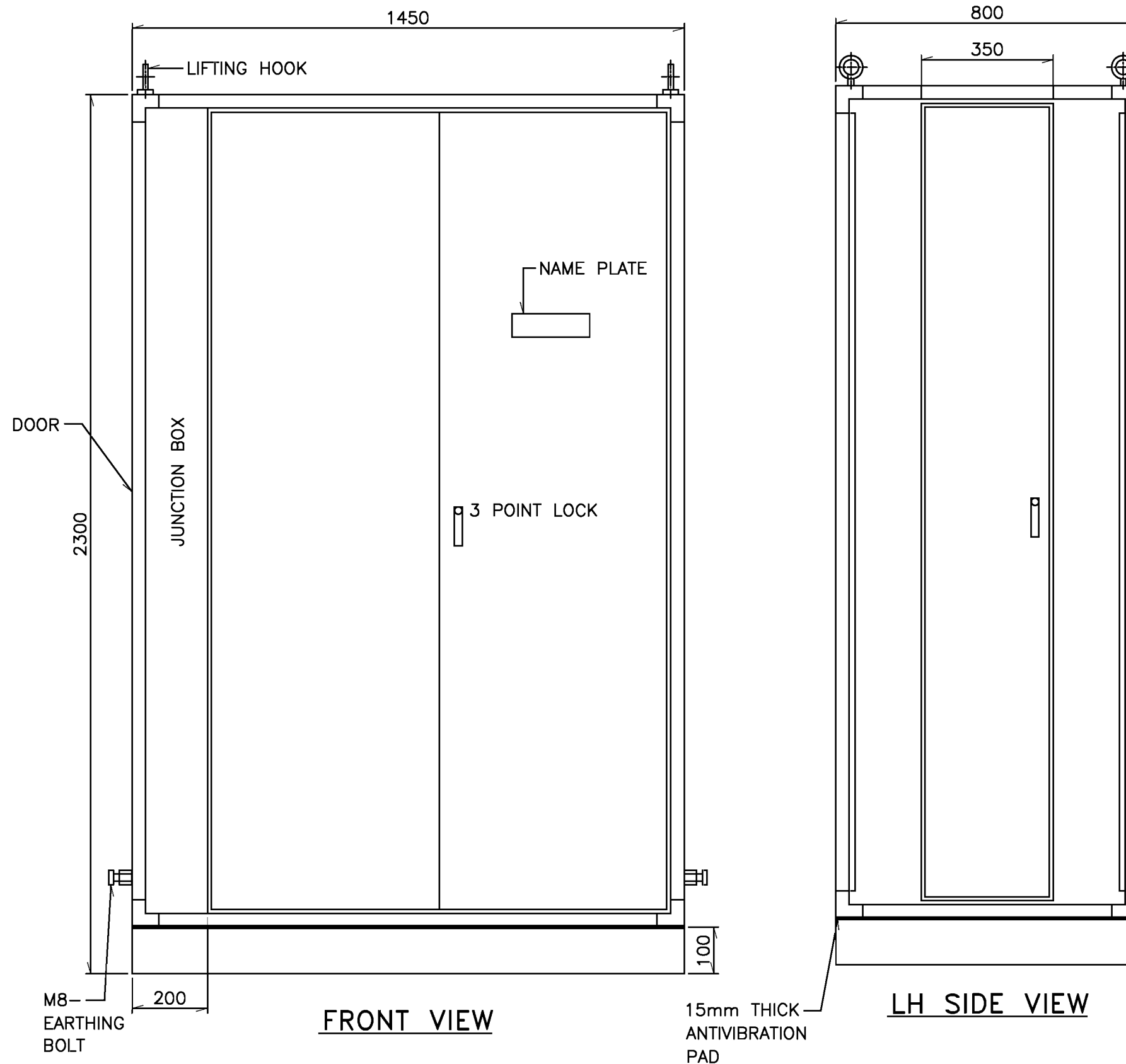
DATE : 23-08-2011

G.A. OF JB LOCAL INSTRUMENT RACK

SCALE ~	APPROVED
DIV INST.	
DR P.N.Z.	
CH D.J.P.	

DWG.NO.PE-189-IN-SK-8004 (SHEET 5 OF 10) PO

LOCAL INSTRUMENT ENCLOSURE



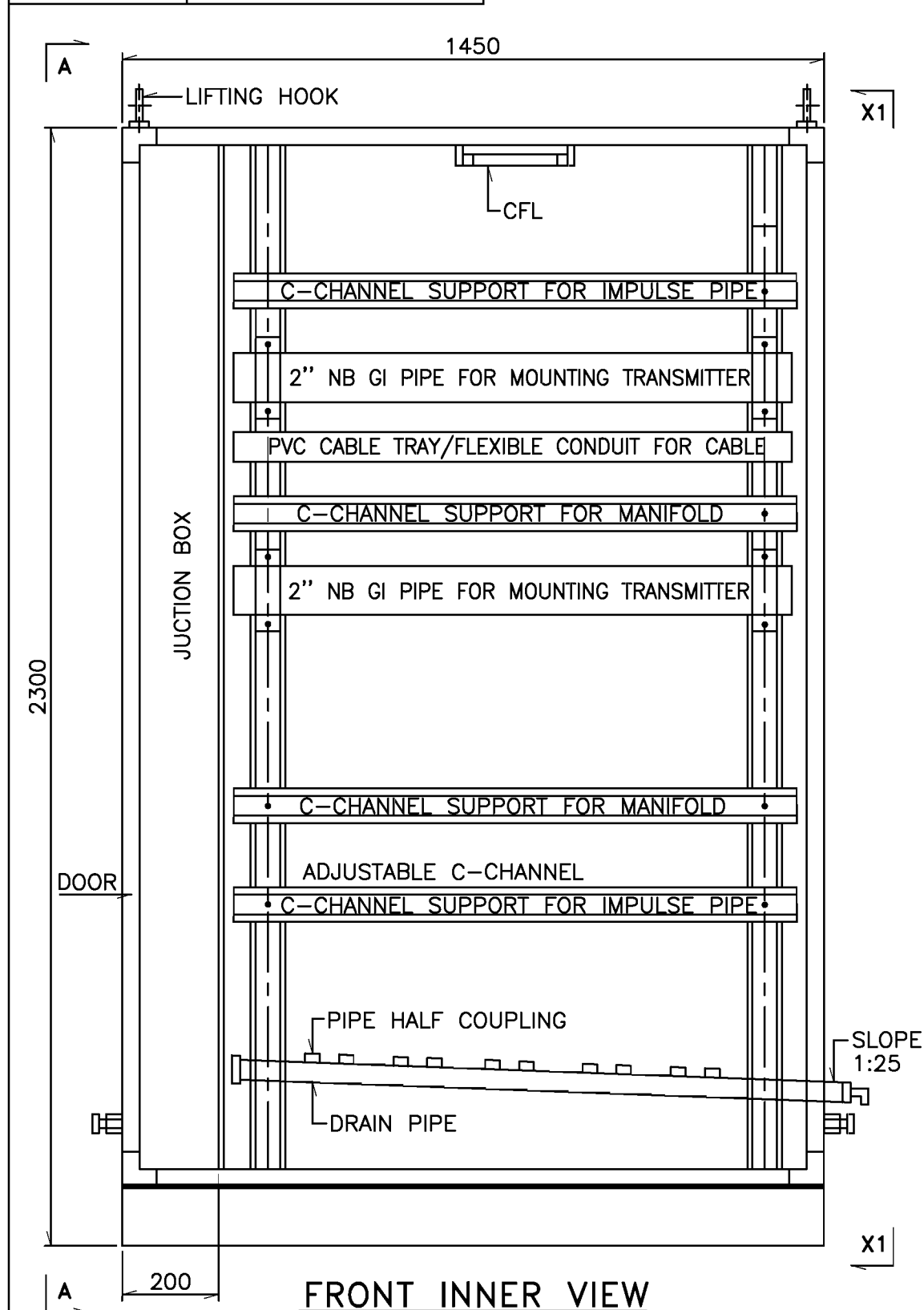
NOTES:

- DIMENSIONS SHOWN ARE TENTATIVE AND SHALL BE FINALIZED AT DETAILING.
- ALL SHEETS SHALL BE 3mm THICK CRCA SHEET.
- ALL DOORS SHALL BE FLUSH/CONCEALED TYPE.
- COLOR:
EXTERIOR : RAL 7032.
INTERIOR : BRILLIANT WHITE OVER ALL THICKNESS WILL BE > 100 MICRONS.
- BASE FRAME WILL BE MADE OUT OF ISMC 100 AND COLOR WILL BE BLACK PAINT FINISH.
- BULKHEAD PLATE FOR TOP AND BOTTOM SHALL BE 1150 x 650 x 6.
- CABLE GLAND PLATE OF THICKNESS 3mm CRCA SHEET SHALL BE PROVIDED BOTTOM OF JUCTION BOX.
- ENCLOSURE PROTECTION CLASS SHALL IP-65.
- TERMINALS INSIDE JUCTION BOX SHALL BE SCREWLESS CAGE CLAMP TYPE.
- DOORS SHALL BE PROVIDED WITH CONCEALED HINGES, THREE POINT LOCKING FOR FRONT, REAR AND SIDE DOOR HINGES SHALL BE OF STAINLESS STEEL.
- XLPE GASKET SHALL BE PROVIDED BETWEEN BULKHEAD PLATE & ENCLOSURE.
- EARTH BUSBAR 25 x 6 TINNED COPPER.
- DRAIN PIPE SLOPE SHALL BE 1:25 APPROX.
- COMMON LOCK/KEY SHALL BE PROVIDED FOR ALL LIE'S & JB'S.
- FOUNDATION BOLTS SHALL BE PROVIDED.
- TAG PLATES SHALL BE PROVIDED FOR EACH INSTRUMENTS.
- INSTRUMENT TAG VIS-A-VIS SERVICE AND TERMINAL DETAILS SHALL BE PRINTED ON PHENOLIC BOARD MOUNTED ON BACK SIDE OF JUNCTION BOX DOOR.
- 20% TERMINALS SHALL BE PROVIDED AS SPARE.
- NAME PLATE OF PANEL SHALL BE FIXED ON FRONT DOOR.
- ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED.

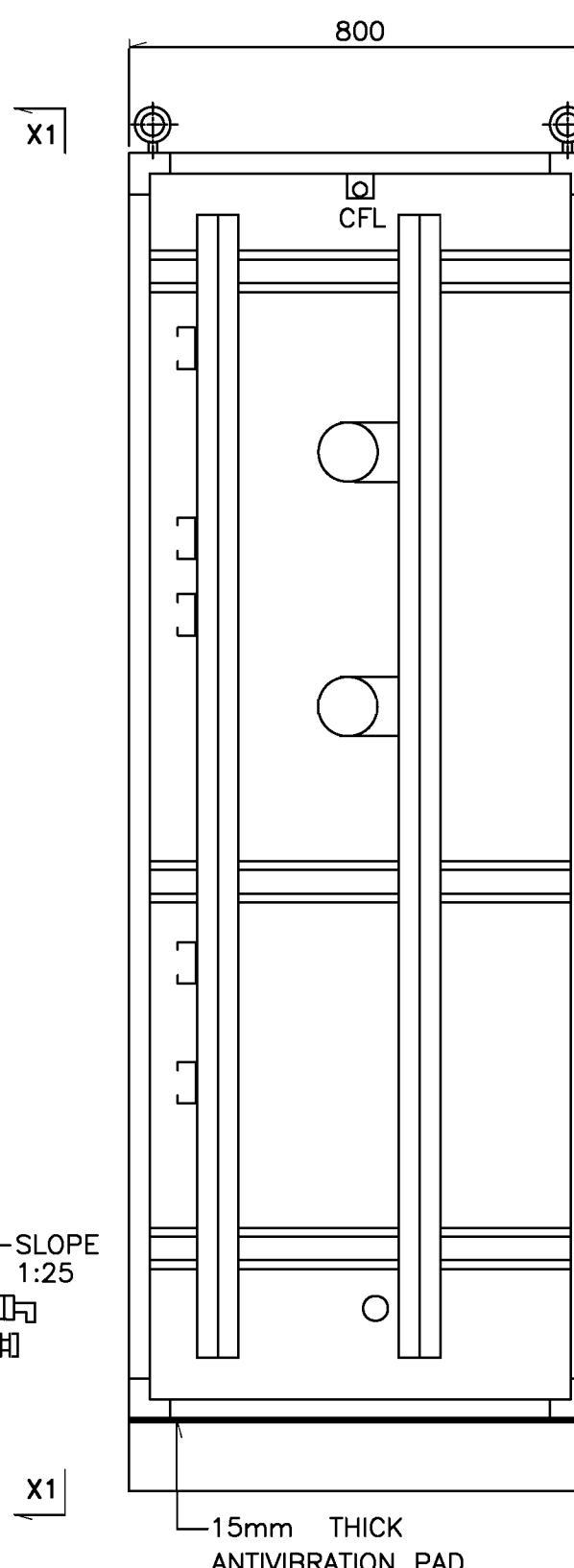
FOR BID PURPOSE ONLY

DO NOT SCALE

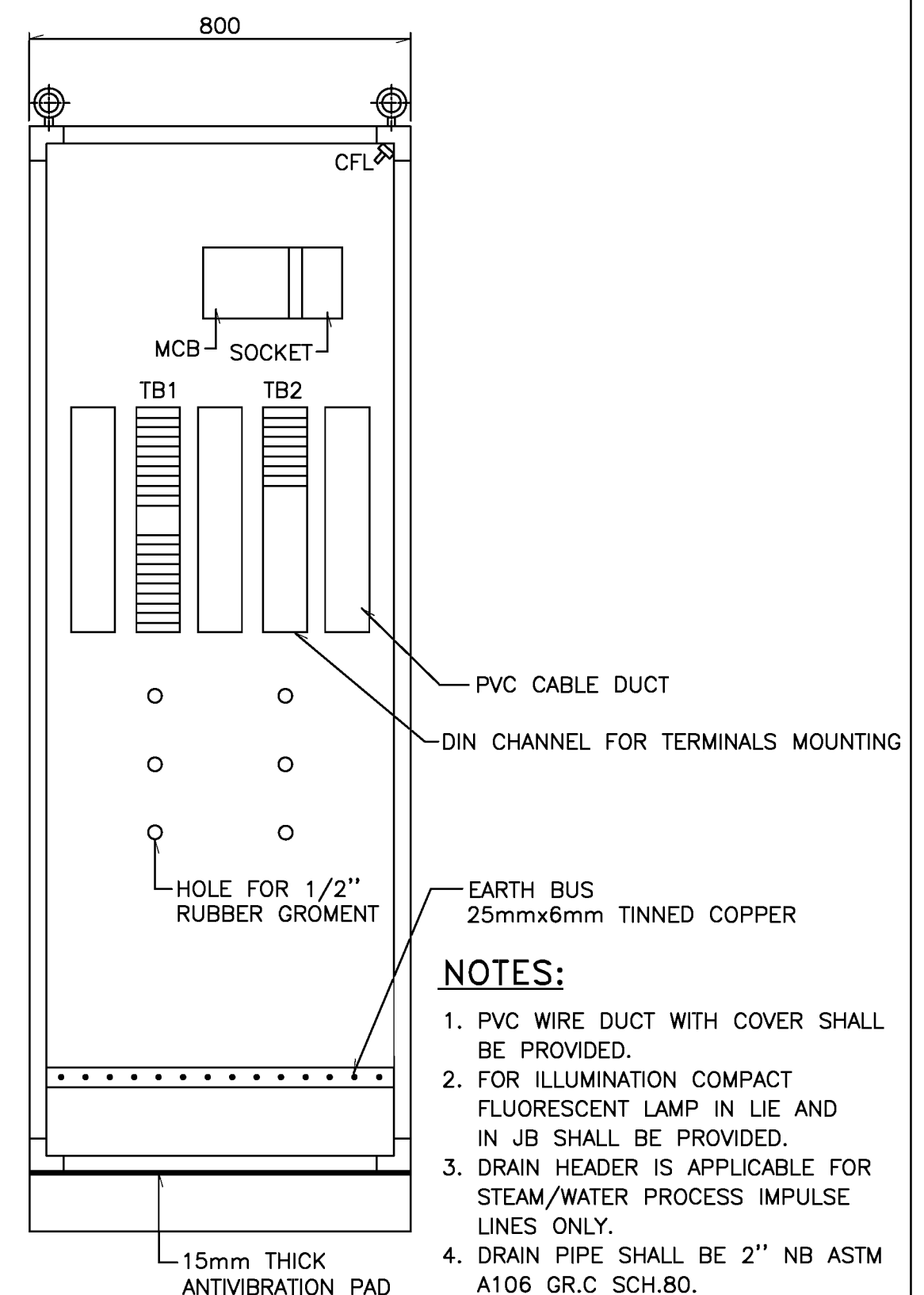
ISSUE	REVISIONS	BY	CLEARED					APPD	DATE	FOR RO ISSUE ONLY			"P" (PRELIMINARY) ISSUES ARE NOT TO BE USED FOR CONSTRUCTION / FABRICATION BUT ARE ISSUED FOR LIMITED PURPOSES ONLY AS INDICATED IN THE SMALL BLOCK AT THE TOP RIGHT HAND CORNER OF THE TITLE BLOCK. CONSTRUCTION / FABRICATION WORK IS PERMITTED ON "R" (RELEASED) ISSUES ONLY. INFORMATION CONTAINED WITHIN 'HOLD' IS NOT RELEASED FOR CONSTRUCTION / FABRICATION. FIELD MUST GET DESIGN OFFICE TO CLEAR 'HOLD' IN TIME BEFORE PROCEEDING WITH ANY CONSTRUCTION / FABRICATION WORK RELATED TO 'HOLD'. DRAWINGS SIGNED BY PROCON ENGINEERS' AUTHORIZED REPRESENTATIVE ONLY ARE CONSIDERED VALID DRAWINGS.	 MAHARASHTRA STATE POWER GENERATION CO.LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT	PROCON ENGINEERS (DIVISION OF NIMOTO CONSULTING ENGINEERS PVT.LTD.)				
			CHEM	CIVIL	ELEC	I&C	MECH			CLEARED					SCALE ~	APPROVED	DATE(RO ISSUE)		
										DEPT	SIGNATURE	DATE							
										CHEM						DIV. INST.		DATE(CURRENT ISSUE)	
										CIVIL							DR. P.N.Z.		23-08-2011
										ELEC							CH. D.J.P.	DWG.NO.	ISSUE
										I&C								PF-189-IN-SK-8004 (SH. 6 OF 10)	PO
										MECH									



FRONT INNER VIEW



SIDE VIEW FROM X1-X1



SIDE VIEW FROM A-A

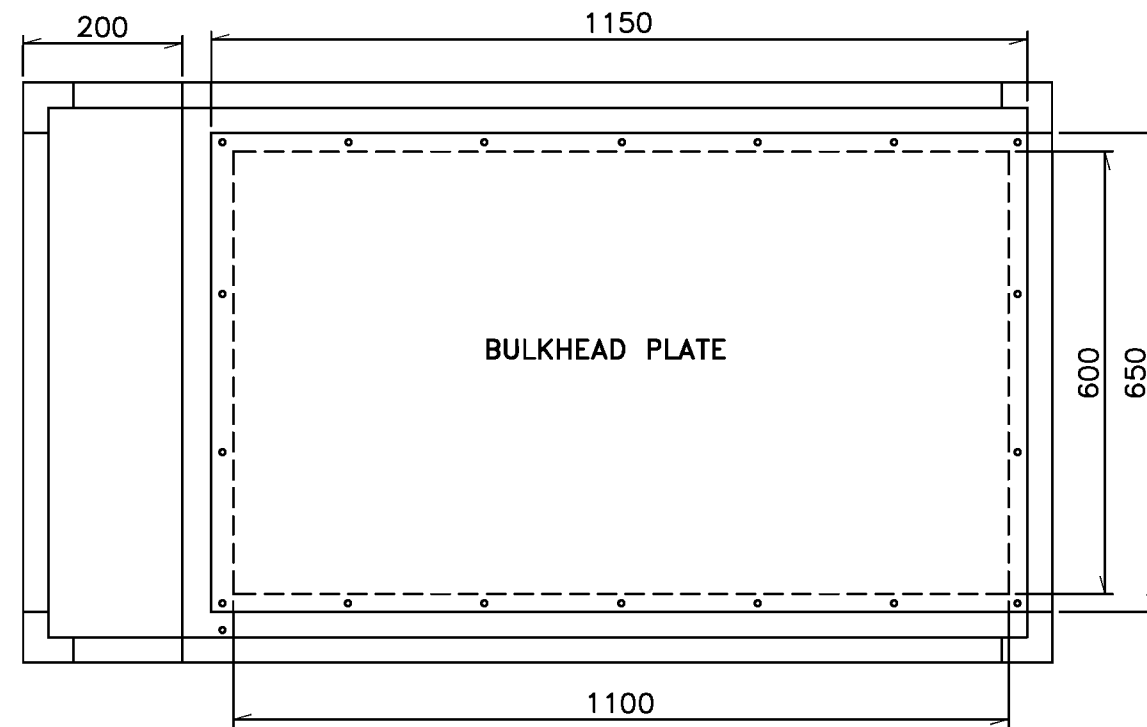
- NOTES:

1. PVC WIRE DUCT WITH COVER SHALL BE PROVIDED.
2. FOR ILLUMINATION COMPACT FLUORESCENT LAMP IN LIE AND IN JB SHALL BE PROVIDED.
3. DRAIN HEADER IS APPLICABLE FOR STEAM/WATER PROCESS IMPULSE LINES ONLY.
4. DRAIN PIPE SHALL BE 2" NB ASTM A106 GR.C SCH.80.
5. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED.

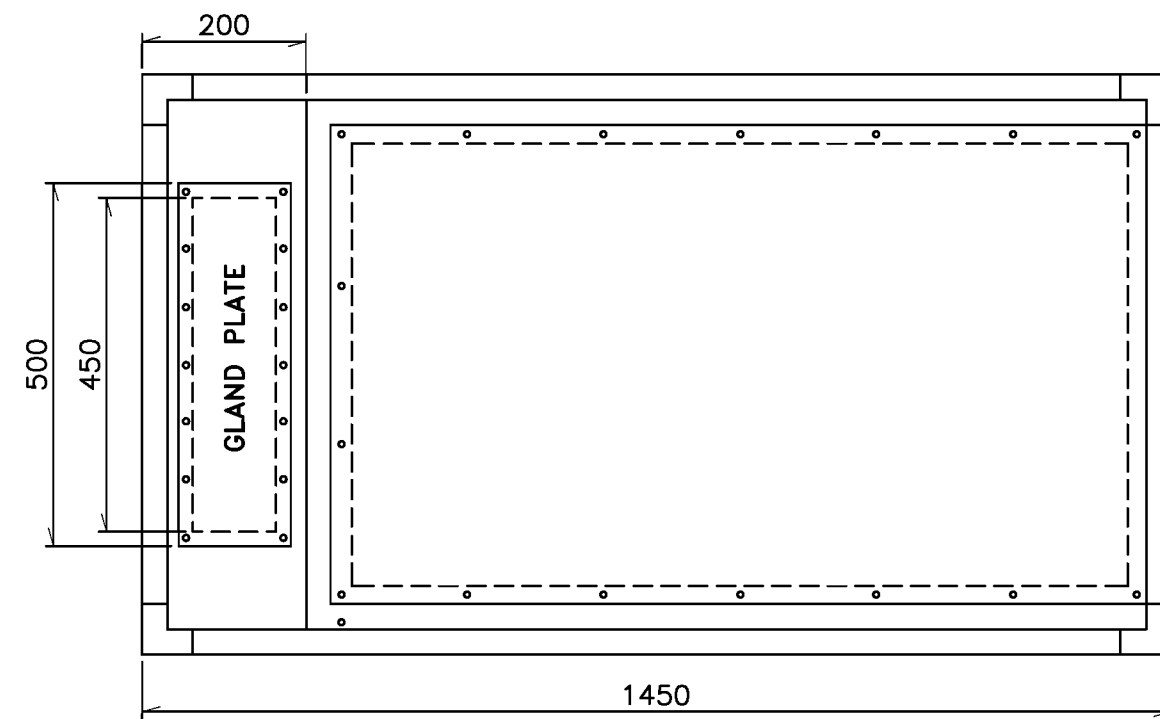
FOR BID PURPOSE ONLY

DO NOT SCALE

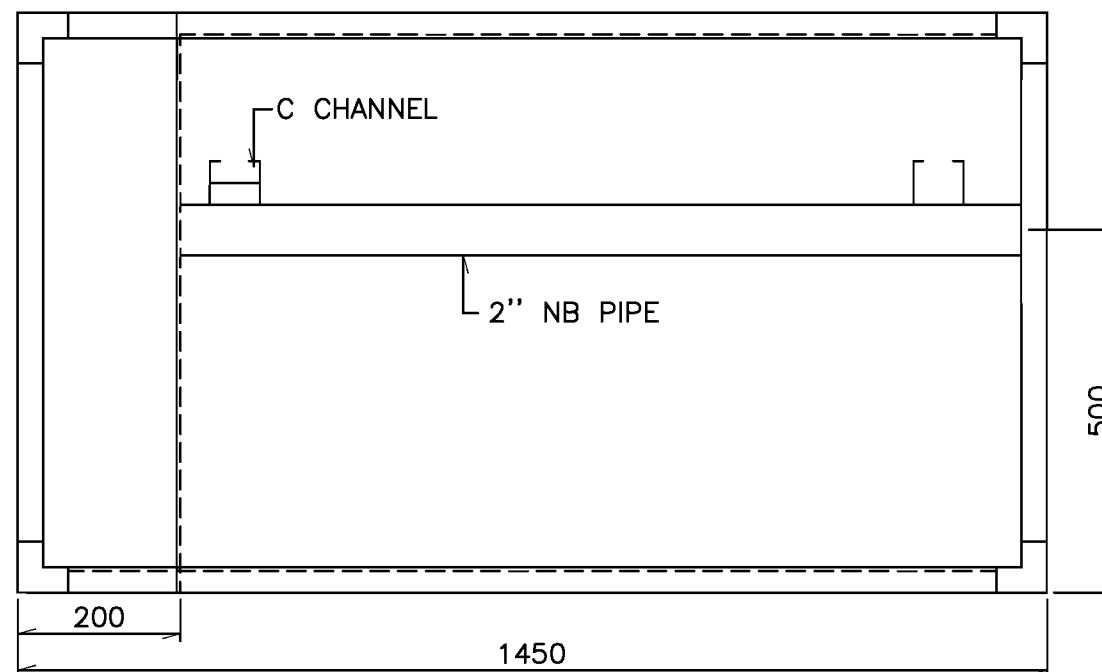
ISSUE	REVISIONS	BY	CLEARED					APPD	DATE	FOR RO ISSUE ONLY			"P" (PRELIMINARY) ISSUES ARE NOT TO BE USED FOR CONSTRUCTION / FABRICATION, BUT ARE ISSUED FOR LIMITED PURPOSES ONLY AS INDICATED IN THE SMALL BLOCK AT THE TOP RIGHT HAND CORNER OF THE TITLE BLOCK. CONSTRUCTION WORK IS PERMITTED ON "R" (RELEASED) ISSUES ONLY. INFORMATION CONTAINED WITHIN "HOLD" IS NOT RELEASED FOR CONSTRUCTION / FABRICATION. FIELD MUST GET DESIGN OFFICE TO CLEAR "HOLDS" IN TIME BEFORE PROCEEDING WITH ANY CONSTRUCTION / FABRICATION WORK RELATED TO "HOLDS". DRAWINGS SIGNED BY PROCON ENGINEERS' AUTHORIZED REPRESENTATIVE ONLY ARE CONSIDERED VALID DOCUMENTS.	 MAHARASHTRA STATE POWER GENERATION CO.LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT	PROCON ENGINEERS (DIVISION OF NIMOTO CONSULTING ENGINEERS PVT.LTD.)				
			CHEM	CIVIL	ELEC	I&C	MECH			DEPT	SIGNATURE	DATE			SCALE ~	APPROVED	DATE(RO ISSUE)		
																	DR. INST.		DATE(CURRENT ISSUE)
																	DR. P.N.Z.		23-08-2011
																	CH. D.J.P.	DWG.NO. PE-189-IN-SK-8004 (SH. 7 OF 10)	ISSUE NO. 01



TOP VIEW



BOTTOM VIEW



TOP VIEW WITHOUT BULKHEAD PLATE

NOTES:

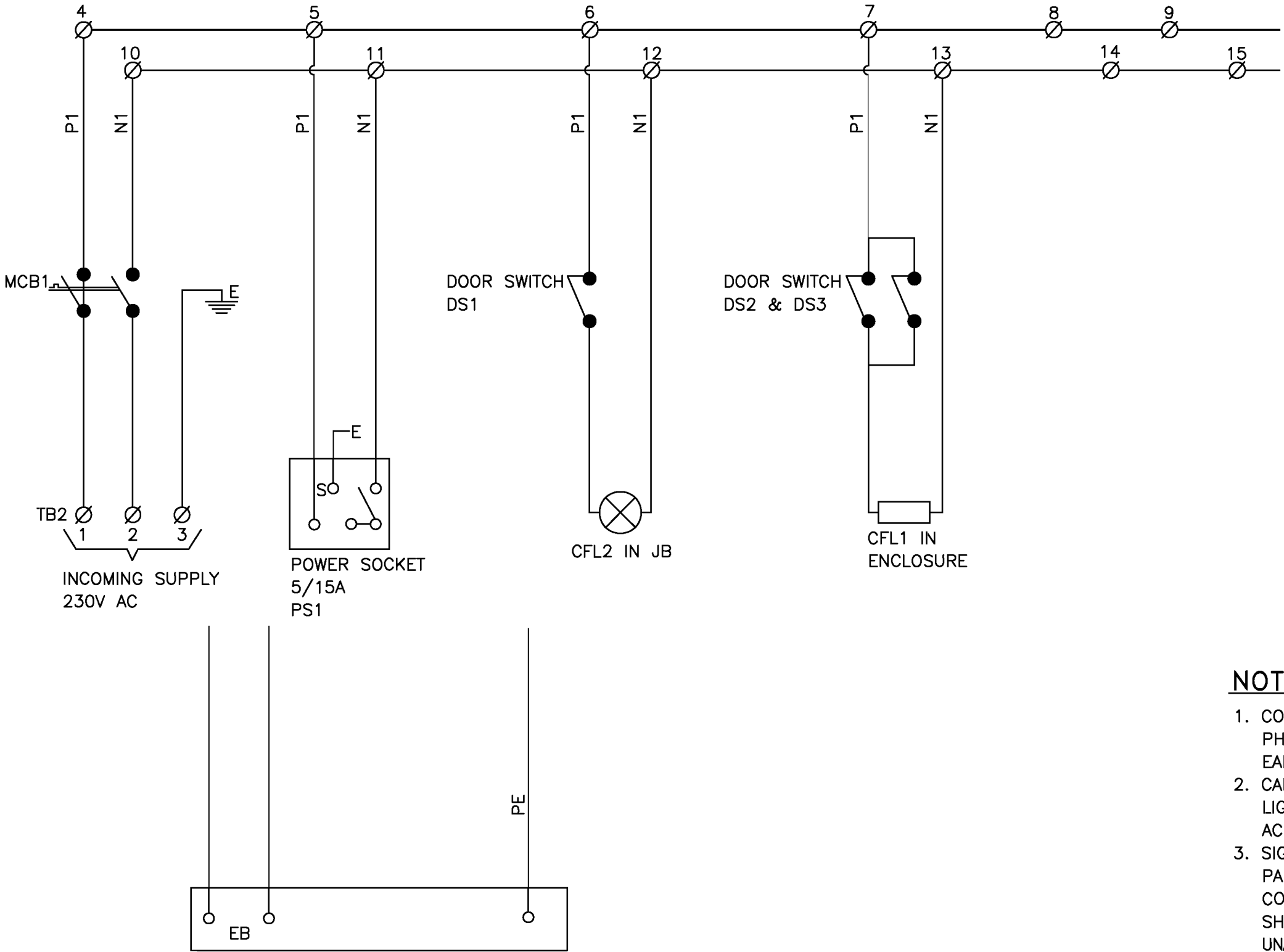
1. BULK HEAD PLATE DIMENSION ARE 1150 x 650 x 6.
2. IMPULSE PIPE ENTRY: BOTTOM ENTRY FOR AIR/FLUE GAS APPLICATIONS.
3. IMPULSE ENTRY: TOP ENTRY FOR STEAM/WATER APPLICATIONS.
4. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED.

FOR BID PURPOSE ONLY

DO NOT SCALE

ISSUE	REVISIONS	BY	CLEARED					APPD	DATE	FOR RO ISSUE ONLY			"P" (PRELIMINARY) ISSUES ARE NOT TO BE USED FOR CONSTRUCTION PURPOSES ONLY AS INDICATED IN THE SMALL BLOCK AT THE TOP RIGHT HAND CORNER OF THE TITLE BLOCK. CONSTRUCTION WORK IS PERMITTED ON "R" (RELEASED) ISSUES ONLY. INFORMATION CONTAINED WITHIN "HOLD" IS NOT RELEASED FOR CONSTRUCTION / FABRICATION. FIELD MUST GET DESIGN OFFICE TO CLEAR "HOLDS" IN TIME BEFORE PROCEEDING WITH ANY CONSTRUCTION / FABRICATION WORK RELATED TO "HOLDS". DRAWINGS SIGNED BY PROCON ENGINEERS AUTHORIZED REPRESENTATIVE ONLY ARE CONSIDERED VALID OTHERWISE.	 MAHARASHTRA STATE POWER GENERATION CO.LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT			PROCON ENGINEERS (DIVISION OF NIMOTO CONSULTING ENGINEERS PVT.LTD.)			
			CLEARED																	
			DEPT	SIGNATURE	DATE	SCALE	~			APPROVED	DATE(RO ISSUE)									
			CHEM			DIV.	INST.				DATE(CURRENT ISSUE)									
			CIVIL			DR.	P.N.Z.				23-08-2011									
			ELEC			CH.	D.J.P.			DWG.NO.	ISSUE									
			I&C			PE-189-IN-SK-8004 (SH. 8 OF 10)				PO										
			MECH			LOCAL INSTRUMENT ENCLOSURE														

POWER WIRING CIRCUIT



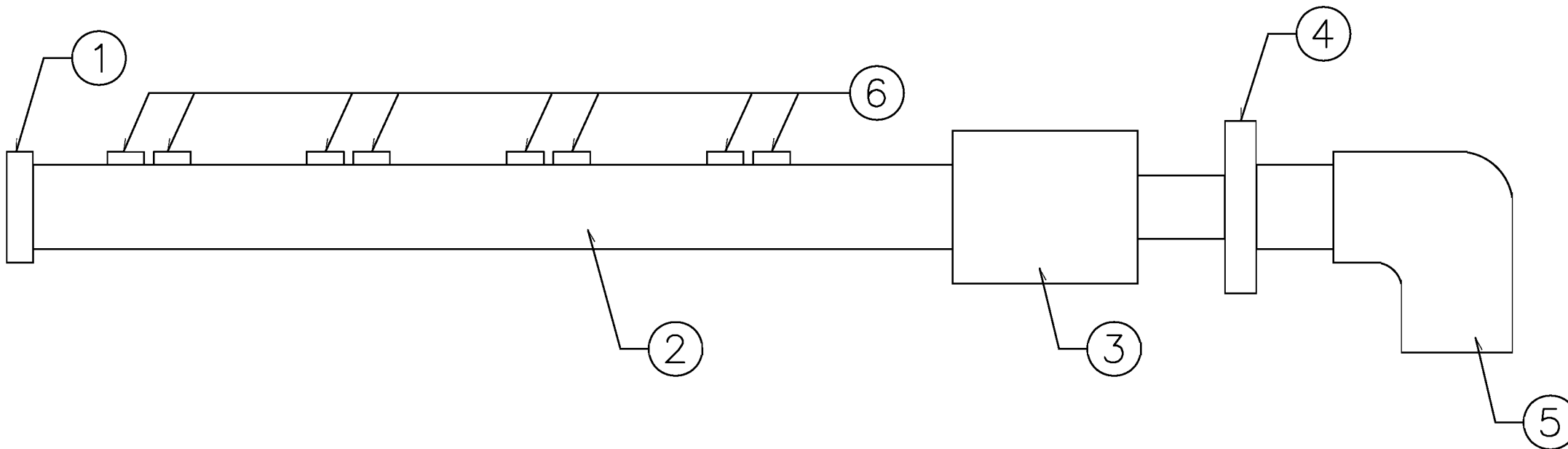
NOTES:

- COLOR CODING FOR POWER SUPPLY:
PHASE-RED, NEUTRAL-BLACK AND
EARTH-GREEN.
- CABLE ROUTING FROM TB TO PANEL
LIGHT WILL BE 1.5 sq.mm 1100V
AC GRADE.
- SIGNAL WIRING WILL BE DONE BY 4
PAIR x 0.5 sq.mm ANNEALED TINNED
COPPER, PAIR TWISTED OVERALL &
SHIELDED, VOLTAGE GRADE 1100V,
UNARMoured FRLS PVC SHIELDED CABLE.

FOR BID PURPOSE ONLY

DO NOT SCALE

ISSUE	REVISIONS	BY	CLEARED					APPD	DATE	FOR R0 ISSUE ONLY			"P" (PRELIMINARY) ISSUES ARE NOT TO BE USED FOR CONSTRUCTION / FABRICATION BUT ARE ISSUED FOR LIMITED PURPOSES ONLY AS INDICATED IN THE SMALL BLOCK AT THE TOP RIGHT HAND CORNER OF THE TITLE BLOCK. CONSTRUCTION / FABRICATION WORK IS PERMITTED ON "R" (RELEASED) ISSUES ONLY. INFORMATION CONTAINED WITHIN 'HOLD' IS NOT RELEASED FOR CONSTRUCTION / FABRICATION. FIELD MUST GET DESIGN OFFICE TO CLEAR 'HOLD' IN TIME BEFORE PROCEEDING WITH ANY CONSTRUCTION / FABRICATION WORK RELATED TO 'HOLD'.	MAHARASHTRA STATE POWER GENERATION CO.LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT ELECTRICAL WIRING AND TERMINATION DRAWING FOR LOCAL INSTRUMENT ENCLOSURE	PROCON ENGINEERS (DIVISION OF NIMOTO CONSULTING ENGINEERS PVT.LTD.)		
			CHEM	CIVIL	ELEC	I&C	MECH			DEPT	SIGNATURE	DATE			SCALE ~	APPROVED	DATE(R0 ISSUE)
										CHEM					DIV. INST.		DATE(CURRENT ISSUE)
										CIVIL					DR. P.N.Z.		23-08-2011
										ELEC					CH. D.J.P.		ISSUE
										I&C					DWG.NO. PE-189-IN-SK-8004 (SH. 9 OF 10)		P0
										MECH							



BILL OF MATERIAL		
SL. NO.	DESCRIPTION	QTY.
1	2" S.W. CAP, CS	1
2	2" NB, ASTM A-106, SCH 80/GR. C	1
3	2" SW x 1" NPT(F) COUPLING, CS	1
4	1" NPT(M) x 1" BSP(M) HEX. NIPPLE WITH FITTING, CS	1
5	1" BSP(F) ELBOW, CS (BOTH ENDS THREADED)	1
6	HALF COUPLING; SIZE; 1/2" NB SW	AS REQD.

FOR BID PURPOSE ONLY

DO NOT SCALE

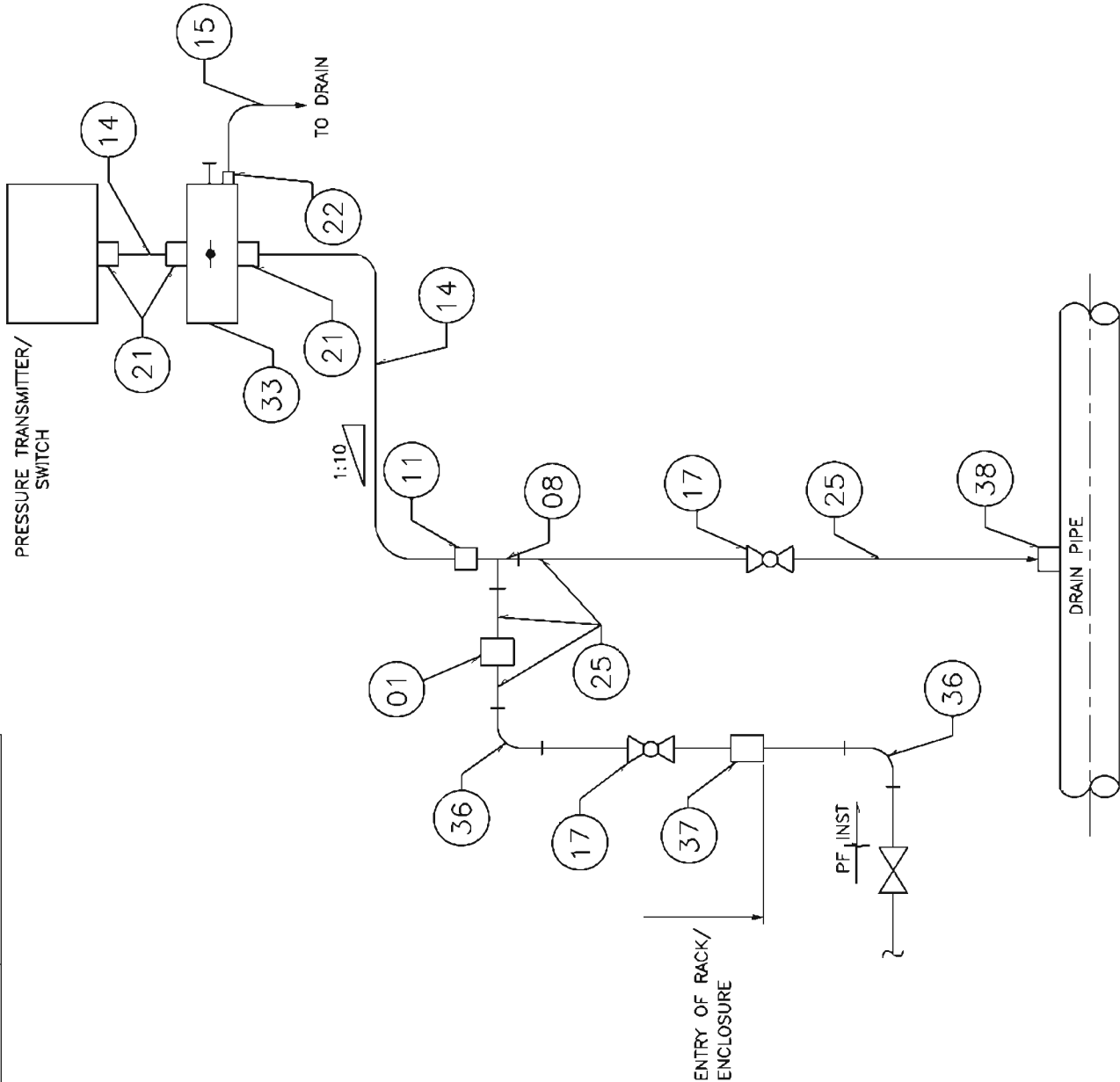
ISSUE	REVISIONS	BY	CLEARED					APPD	DATE	FOR RO ISSUE ONLY			MAHARASHTRA STATE POWER GENERATION CO.LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT DRAIN HEADER DETAIL FOR LOCAL INSTRUMENT ENCLOSURE	PROCON ENGINEERS (DIVISION OF NIMOTO CONSULTING ENGINEERS PVT.LTD.)							
			CHEM	CIVIL	ELEC	I&C	MECH			CLEARED				SCALE ~	APPROVED		DATE(RO ISSUE)				
			DEPT	SIGNATURE	DATE									DR. INST.		DATE(CURRENT ISSUE)					

NOTES:

1. PROVISION OF SINGLE OR DOUBLE ROOT VALVE AND DRAIN VALVE SHALL BE IN ACCORDANCE WITH THE PRESSURE/ TEMPERATURE REQUIREMENT. FOR LINE PRESSURE EQUAL TO OR GREATER THAN 40 KG/SQ. CM. 2 NOS ROOT VALVE AND 2 NOS DRAIN VALVE SHALL BE REQUIRED.
2. MATERIAL, SIZE AND RATING OF THE PROCESS HOOK UP ITEMS SHOWN IN THE DRAWING ARE INDICATIVE ONLY. ACTUAL REQUIREMENT SHALL BE AS PER PROCESS CONDITION AND SPECIFICATION OF CONTROL & INSTRUMENTATION.
3. DRAIN PIPE IN RACK AND ENCLOSURE SHALL BE 2" NB SCH 80.

				FOR BID PURPOSE ONLY	
				DO NOT SCALE	DATE : 23-08-2011
ISSUE	BY	CH	DATE	TYPICAL INSTRUMENT INSTALLATION DIAGRAM	
				PROCON ENGINEERS (DIVISION OF NIMOTO CONSULTING ENGINEERS PVT. LTD.) CLIENT : MAHARASHTRA STATE POWER GENERATION CO.LTD. PROJECT : BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT	
				SCALE ~ DIV INST. DR P.N.Z. CH D.J.P.	APPROVED DWG.NO. PE-189-IN-SK-8003 (Sht. 2 of 20) PD

PRESSURE TRANSMITTER/PRESSURE SWITCH
 MOUNTED ABOVE SOURCE POINT



SERVICE : CONDENSER PRESSURE, INSTRUMENT AIR ETC.

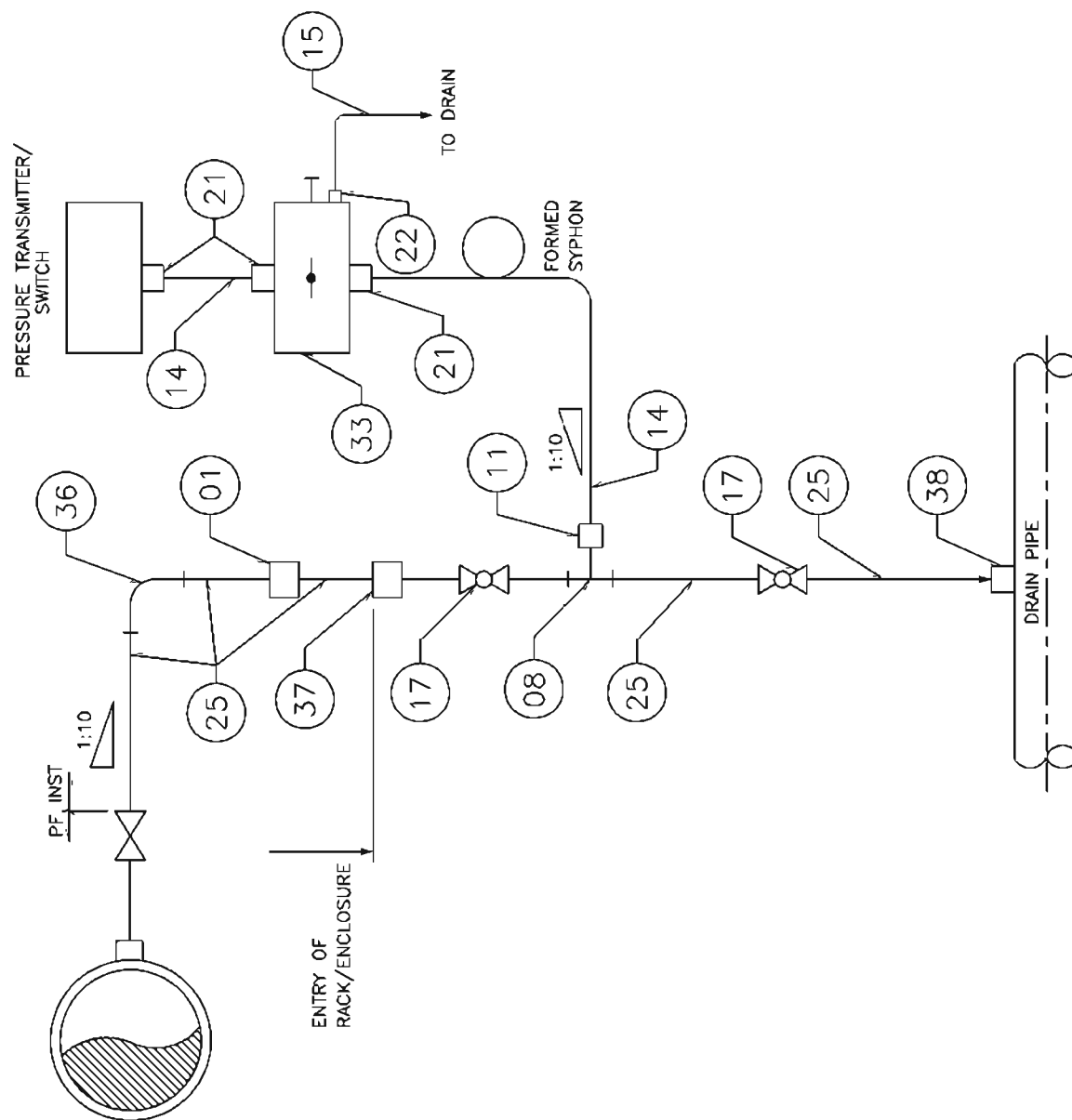
BILL OF MATERIAL		
ITEM NO.	QTY./INST	DESCRIPTION
08	1	EQUAL TEE (FEMALE) 1/2" SW 3000lbs, CS/AS
11	1	MALE CONNECTOR 1/2" PE x 1/2" OD 3000 lbs OF CS/AS
17	2	GLOBE VALVE 1/2" SW 800lbs OF CS/AS
14	3 MTRS.	TUBE 1/2" OD, 2.1mm THICK, SS 316
21	3	MALE CONNECTOR 1/2" NPT(M) x 1/2" OD 3000 lbs, SS 316
25	15 MTRS.	IMPULSE PIPE 15 NB SCH 80, CS/AS
33	1	2 VALVES MANIFOLD 1/2" NPT(F), SS 316
01	1	FULL COUPLING 1/2" SW 3000lbs, CS/AS
15	0.15 MTRS.	TUBE 8mm OD, 1.0mm THK. SS 316
22	1	MALE CONNECTOR 1/4" NPT(M) x 8mm OD 3000 lbs
36	2	90° ELBOW 1/2" SW 3000lbs, CS/AS
37	1	BULKHEAD UNION/COUPLING CL:3000 lbs, 1/2" NB-SW, AS PER ANSI B16.11, CS/AS
38	1	HALF COUPLING CL:3000 lbs/ 1/2" NB-SW, AS PER ANSI B16.11, CS/AS

FOR BID PURPOSE ONLY

DO NOT SCALE		PROCON ENGINEERS (DIVISION OF INMOTO CONSULTING ENGINEERS PVT.LTD.)	
SCALE	~	DATE (DD MM YY)	
DNV.	INST.	APPROVED	
DNV.	P.N.Z.	DATE (DD MM YY)	23-08-2011
DNV.	D.J.P.	DATE (DD MM YY)	23-08-2011
MAHARASHTRA STATE POWER GENERATION CO.LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT		TYPICAL INSTRUMENT INSTALLATION DIAGRAM	
FOR RO ISSUE ONLY		BY	
CHECKED	DATE	CHECKED	DATE
CHEM		CHEM	
CIVIL		CIVIL	
ELEC		ELEC	
MEC		MEC	
MACH		MACH	
REVISIONS	BY	DATE	
ISSUE			

BILL OF MATERIAL		
ITEM NO.	QTY./INST	DESCRIPTION
08	1	EQUAL TEE (FEMALE) 1/2" SW 3000lbs, CS/AS
11	1	MALE CONNECTOR 1/2" PE x 1/2" OD 3000 lbs, CS/AS
17	2	GLOBE VALVES 1/2" SW 800lbs, CS/AS
14	3 MTRS.	TUBE 1/2" OD, 2.1mm THK.
21	3	MALE CONNECTOR 1/2" NPT(M) x 1/2" OD 3000 lbs, SS 316
25	15 MTRS.	IMPULSE PIPE 15 NB SCH 80, CS/AS
33	1	2 VALVES MANIFOLD 1/2" NPT(F), SS 316
01	1	FULL COUPLING 1/2" SW 3000lbs, CS/AS
15	0.15 MTRS.	TUBE 8mm OD, 1.0 mm THK. SS 316
22	1	MALE CONNECTOR 1/4" NPT(M) x 8mm OD 3000 lbs, SS 316
36	1	90° ELBOW 1/2" SW 3000lbs, CS/AS
37	1	BULKHEAD UNION/COUPLING CL:3000 lbs/ 1/2"NB-SW, AS PER ANSI B16.11, CS/AS
38	1	HALF COUPLING CL:3000 lbs/ 1/2" NB-SW, AS PER ANSI B16.11, CS/AS

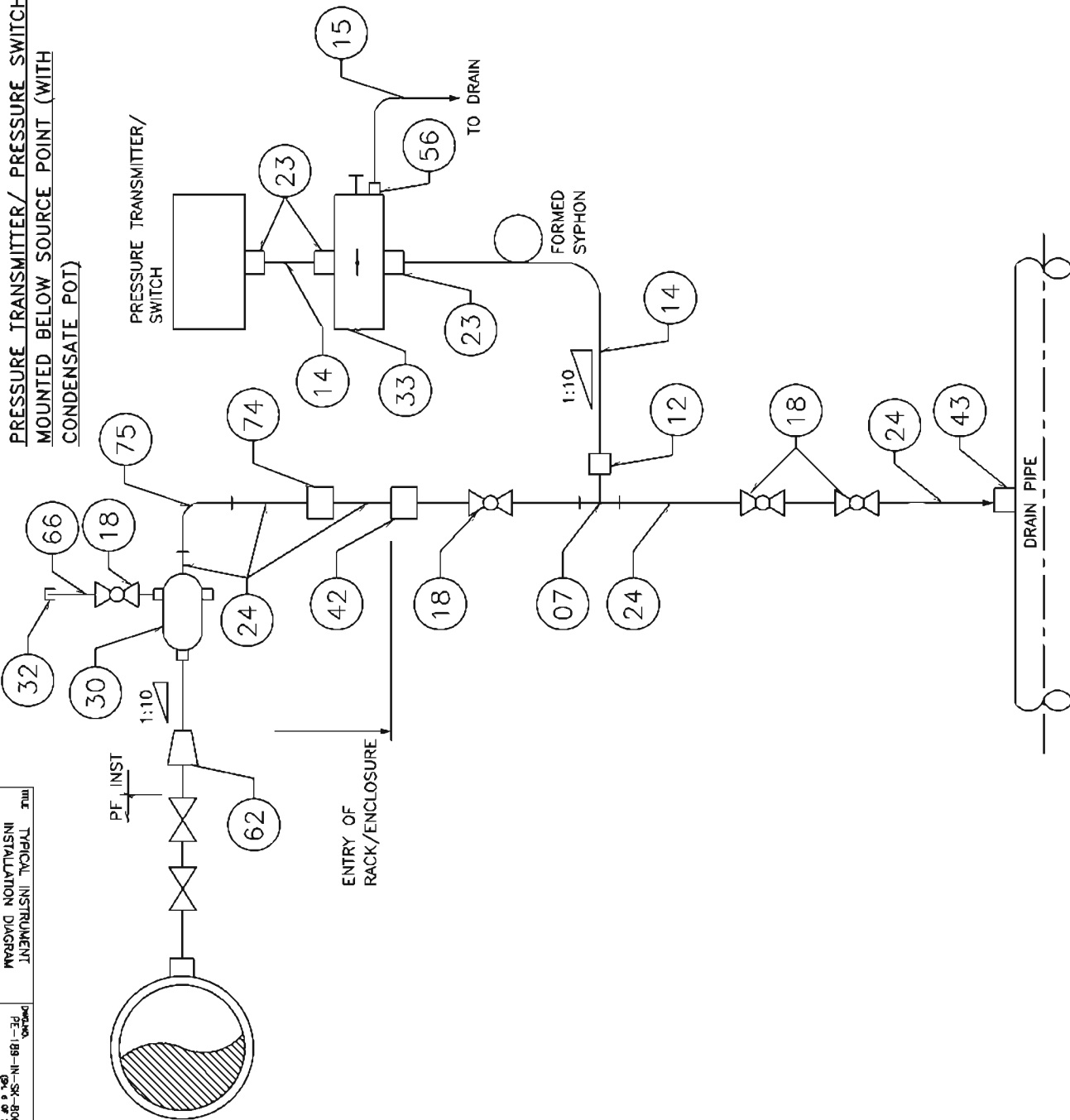
SERVICE : LOW PRESSURE STEAM.



FOR BID PURPOSE ONLY

[illegible]

PRESSURE TRANSMITTER/ PRESSURE SWITCH
 MOUNTED BELOW SOURCE POINT (WITH
 CONDENSATE POT)



SERVICE : MEDIUM AND HIGH PRESSURE STEAM

ITEM NO.	QTY./ INST.	DESCRIPTION
62	1	REDUCER 1"SW x 1/2" SW 9000lbs, CS/AS
07	1	EQUAL TEE (FEMALE)1/2" SW 9000 lbs, CS/AS
12	1	MALE CONNECTOR 1/2" PE x 1/2" OD 9000 lbs, CS/AS
18	4	GLOBE VALVES 1/2" SW 1500 lbs, CS/AS
14	3 MTRS.	TUBE 1/2" OD, 2mm THK, SS 316
23	3	MALE CONNECTOR 1/2" NPT(M) x 1/2" OD 9000 lbs, SS 316
24	15 MTRS.	IMPULSE PIPE 15 NB SCH. 80, CS/AS
33	1	2 VALVES MANIFOLD 1/2" NPT(F), SS 316
74	1	FULL COUPLING 1/2" SW 9000lbs, CS/AS
15	0.15 MTRS.	TUBE 8mm OD, 1.0mm THK, SS 316
56	1	MALE CONNECTOR 1/4" NPT(M) x 8mm OD, 9000 lbs, SS 316
42	1	BULKHEAD UNION/COUPLING CL:9000 lbs- AS PER ANSI B16.11, 1/2" NB-SW, CS/AS
43	1	HALF COUPLING CL:9000 lbs, 1/2" NB-SW, AS PER ANSI B16.11, CS/AS
75	1	90° ELBOW 1/2" SW CL:9000 lbs, CS/AS
32	1	PLUG 1/2" NPT(F) 9000lbs, CS/AS
30	1	CONDENSATE POT 1/2" SW NPT(F) 9000lbs, CS/AS
66	1	15 NB SCH 80, SW x 1/2" NPT(M), SEAMLESS NIPPLE 6000 lbs, CS/AS

FOR BID PURPOSE ONLY

DO NOT SCALE		PROCON ENGINEERS (DIVISION OF MARGO CONSULTING ENGINEERS PVT.LTD.)	
SCALE	~	APPROVED	DATE (DD MM YY)
BY	INST.	DATE (DD MM YY)	23-08-2011
BY	P.N.Z.	DATE (DD MM YY)	23-08-2011
BY	D.J.P.	DATE (DD MM YY)	23-08-2011
MAHARASHTRA STATE POWER GENERATION CO.LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 650 MW PROJECT		TYPICAL INSTRUMENT INSTALLATION DIAGRAM	
FOR RO ISSUE ONLY		BY	
CHECKED	DATE	APPROVED	DATE
CHEM		UAC	
CIVIL		MECH	
ELEC			
MECH			

SERVICE : CONDENSATE, FEED WATER ETC.
PRIMARY ELEMENT : FLOW NOZZLE/ORIFICE.

DO NOT SCALE

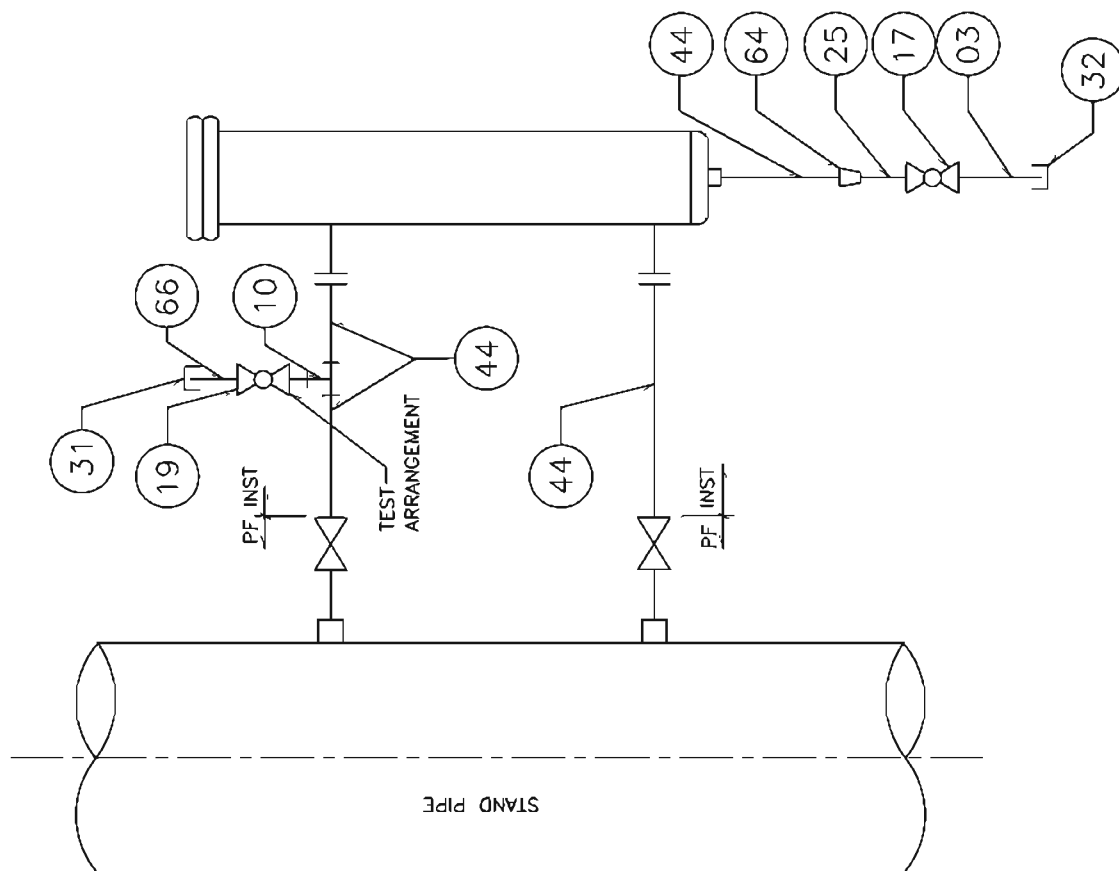
MAHARASHTRA STATE POWER GENERATION CO. LTD.
BHUSAWAL T.P.S. UNIT-6 : 1 X 680 MW PROJECT
(MUMBAI)

TYPICAL INSTRUMENT INSTALLATION DIAGRAM

PROCON ENGINEERS

ISSUE	REVISIONS	BY	CLEARED				APPD	FOR RO ISSUE ONLY				DATE	CLEARED																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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FLOAT OPERATED LEVEL SWITCH

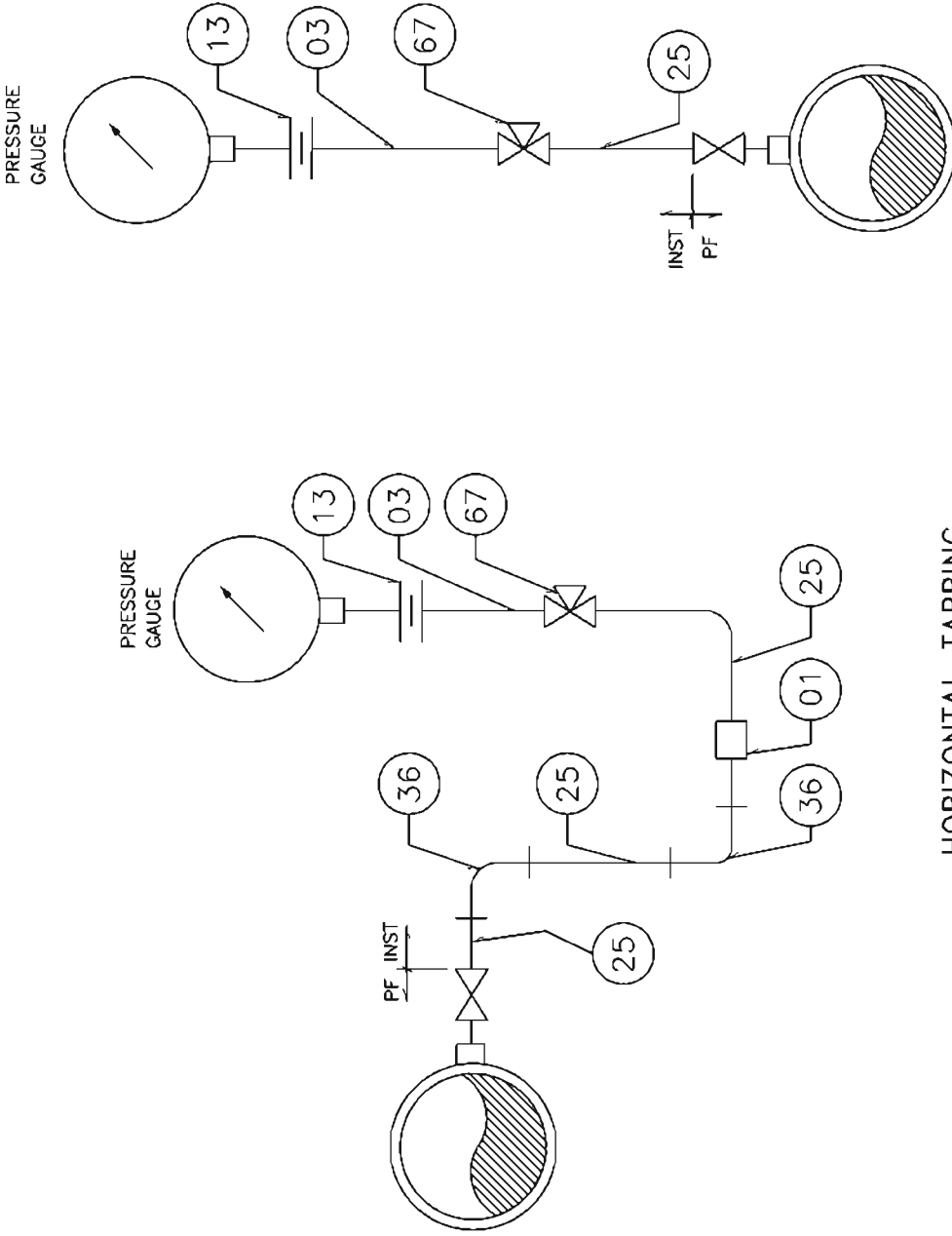


SERVICE : CONDENSATE.

BILL OF MATERIAL		
ITEM NO.	QTY./INST	DESCRIPTION
17	1	GLOBE VALVES 1/2" SW 800lbs, CS/AS
25	0.5 MTRS.	IMPULSE PIPE 15 NB SCH 80, CS/AS
32	1	PLUG 1/2" NPT(M) 3000lbs, CS/AS
10	2	EQUAL TEE (FEMALE) 1" SW 3000lbs, CS/AS
44	2 MTRS.	IMPULSE PIPE 25 NB SCH 80, CS/AS
64	1	REDUCER 1" SW x 1/2" SW 3000lbs, CS/AS
19	1	GLOBE VALVES 1" SW 800lbs, CS/AS
31	1	PLUG 1" NPT(F) 3000lbs, CS/AS
66	1	1" NB SCH 80 SW x 1" NPT(M) SEAMLESS NIPPLE 3000 lbs, CS/AS
03	1	15 NB SCH 80 SW x 1/2" NPT(M) SEAMLESS NIPPLE 3000lbs, CS/AS

FOR BID PURPOSE ONLY

[illegible]



HORIZONTAL TAPPING

VERTICAL TAPPING

BILL OF MATERIAL		
ITEM NO.	QTY./ INST	DESCRIPTION
25	15 MTRS.	IMPULSE PIPE 15 NB SCH 80, CS/AS
01	1	FULL COUPLING 1/2" SW 3000lbs, CS/AS
36	2	90° ELBOW 1/2" SW 3000lbs, CS/AS
03	1	1/2" NPT(M) x 1/2" PE, 4" LONG NIPPLE, CS/AS
13	1	NUT & TAIL FITTING WITH CU WASHER 1/2" NPT(F) x 1/2" PE
67	1	3 WAY GAUGE COCK 1/2" SW 3000lbs, CS/AS

SERVICE : WATER, CONDENSATE ETC.

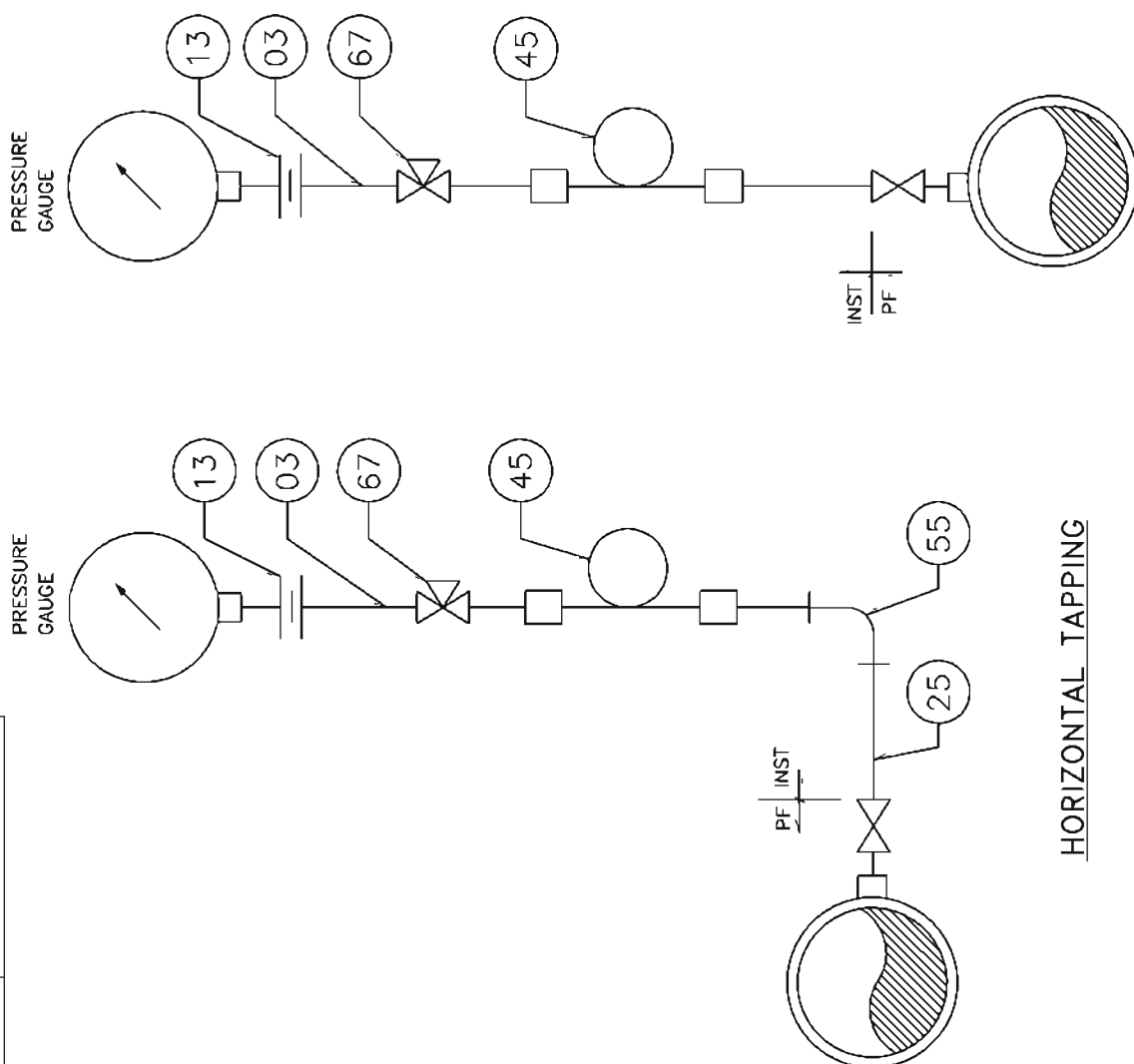
FOR BID PURPOSE ONLY

ISSUE	REVISIONS	BY	Cleared	DATE	FOR RO ISSUE ONLY			
					DEPT	SIGNATURE	DATE	CLEAR
					CHEM			
					CIVIL			
					ELEC			
					MECH			

MAHARASHTRA STATE POWER GENERATION CO.LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT		MAHARASHTRA STATE POWER GENERATION CO.LTD. DIVISION OF MAHARASHTRA CONSULTING ENGINEERS PVT.LTD.)	
SCALE	~	APPROVED	DATE/RO ISSUED
DNV	INST.		
DNV	P.N.Z.		23-08-2011
CH	D.J.P.	ORIGINAL	PE-189-IN-SK-8003 11 of 20

BILL OF MATERIAL		
ITEM NO.	QTY./INST	DESCRIPTION
25	15 MTRS.	IMPULSE PIPE 15 NB SCH 80, CS/AS
55	1	90° ELBOW 1/2" SW 6000lbs, CS/AS
03	1	1/2" NPT(M) x 1/2" PE 4" LONG NIPPLE, CS/AS
13	1	NUT & TAIL FITTING WITH SS WASHER 1/2" NPT(F) x 1/2" PE
45	1	SYPHON 1/2" OD SCH. 80, CS/AS
67	1	3 WAY GAUGE COCK 1/2" SW 3000lbs, CS/AS

SERVICE : STEAM, FEED WATER.



HORIZONTAL TAPPING

VERTICAL TAPPING

FOR BID PURPOSE ONLY

[illegible]

MODEL	TYPICAL INSTRUMENT INSTALLATION DIAGRAM
PE-189-M-SX-8003 (EX. 14 OF 20)	



MODEL	TYPICAL INSTRUMENT INSTALLATION DIAGRAM
PE-189-M-SX-8003 (EX. 14 OF 20)	

A/R - AS PER REQUIREMENT,

1. QUANTITY IN COLUMNS TO BE DOUBLED FOR DP MEASUREMENT.

DO NOT SCALE

[illegible]

BILL OF MATERIAL		
ITEM NO.	QTY./ INST	DESCRIPTION
27	15MTRS.	IMPULSE PIPE 3/4" NB, CS/AS.
26	A/R	GI PIPE, 1/2" NB.
09	2	FORGED UNEQUAL TEE AS PER ANSI B16:11 SIZE: 2 x 3/4" NB SW x 1/2" NPTF, CL 3000.
46	3	GALVANISED ELBOW CL 3000 SIZE: 1/2" NPTF.
20	1	QUICK DISCONNECTING FITTING MALE/END CONN. TO SUIT 1/2" OD CONN.
02	A/R	NYLON NOSE TO SUIT 1/2" END CONN. PR. TESTING 10 Kg/cm ² g.
14	A/R	SEAMLESS TUBE 1/2" OD, 2.1mm THICK, SS 316.
47	3	BULK HEAD COUPLING TO SUIT 1/2" OD TUBE & 1/2" NB PIPE, SS 316.
65	5	BALL VALVE 1/2" NPT(F), SS 316.
21	18	MALE CONNECTOR 1/2" NPT(M) x 1/2" OD 3000lbs, SS 316.
48	1	INSTRUMENT AIR HEADER 1" NB PIPE, SS 316.
64	1	EQUAL TEE, SS 316, TO SUIT 1/2" OD TUBE.
05	1	PR. GAUGE, 4" DIAL SIZE, RANGE 0-10 Kg/cm ² g CONNECTION 1/2" NPTM
06	1	3 WAY GAUGE COCK 1/2"NPTF x 1/2" OD.

FOR BID PURPOSE ONLY

ISSUE	BY	CH	DATE

PROCON ENGINEERS
(DIVISION OF NIMOTO CONSULTING ENGINEERS PVT. LTD.)

CLIENT : MAHARASHTRA STATE POWER GENERATION CO.LTD.

PROJECT : BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT

DO NOT SCALE

DATE : 23-08-2011

TYPICAL INSTRUMENT INSTALLATION DIAGRAM

SCALE ~

APPROVED

DIV INST.

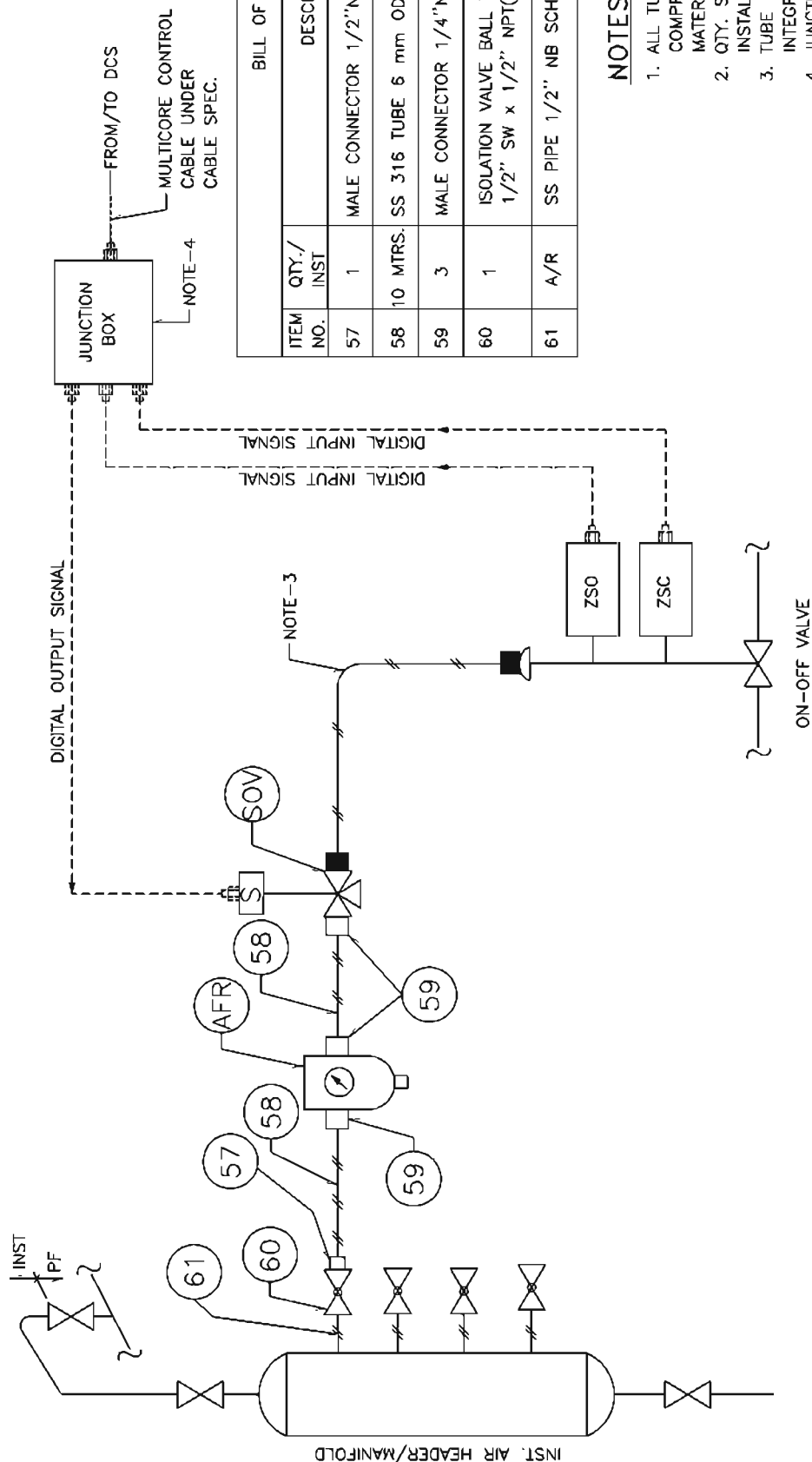
DR P.N.Z.

CH D.J.P.

DWG.NO.PE-189-IN-SK-8003

(SHEET 16 OF 20)

PD



PNEUMATIC SOV HOOK UP SCHEME

LEGEND:

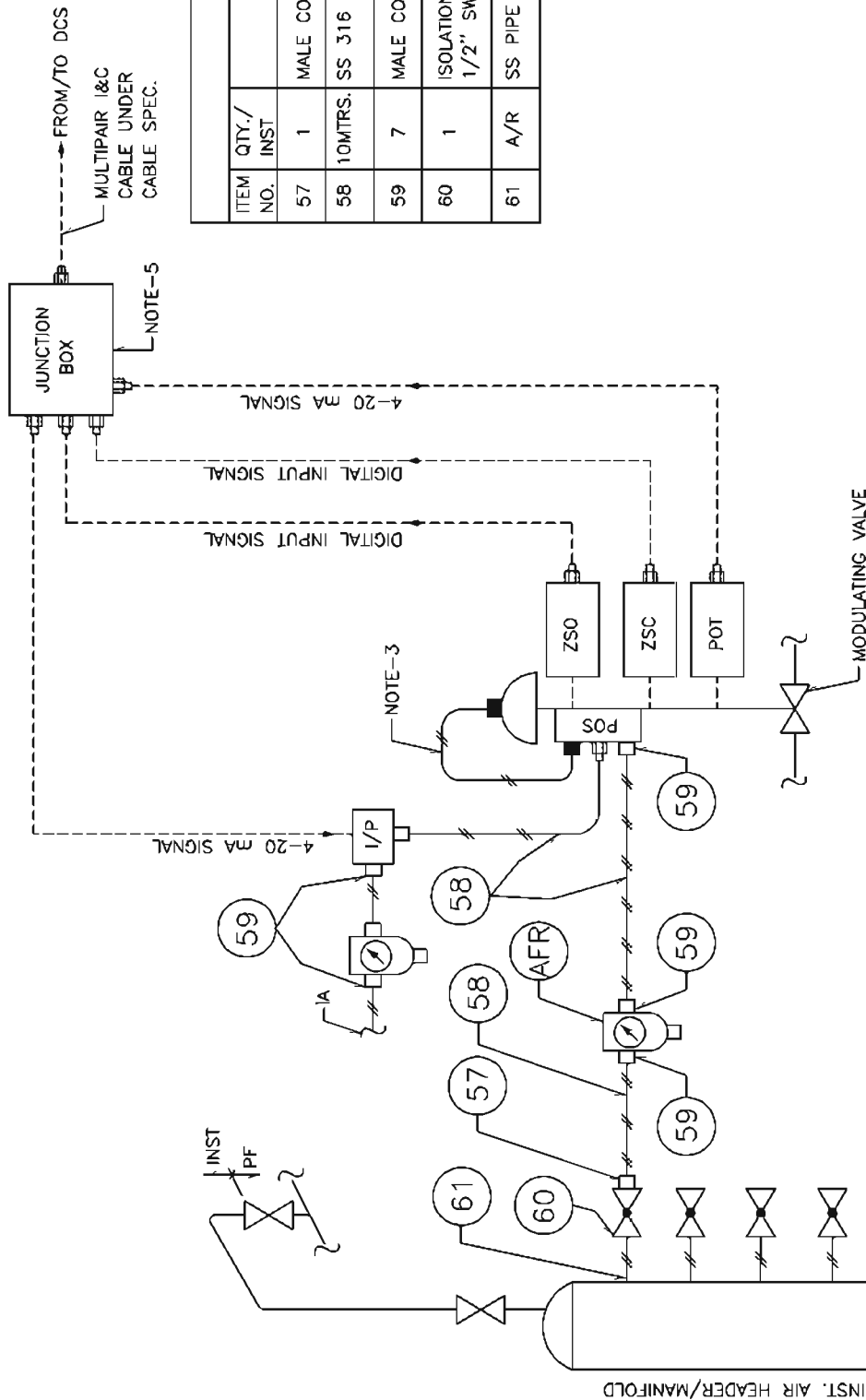
- A/R - AS PER REQUIREMENT
SOV - SOLENOID VALVE
AFR - AIR FILTER REGULATOR

NOTES:

1. ALL TUBE FITTINGS ARE OF DOUBLE COMPRESSION TYPE AND OF SS 316 MATERIAL.
2. QTY. SHOWN ARE TYPICAL FOR ONE INSTALLATION ONLY.
3. TUBE & FITTINGS MARKED ARE  INTEGRAL TO THE VALVE.
4. JUNCTION BOX WILL BE INTEGRAL TO ACTUATOR.
5. ISOLATION VALVE SHALL BE INSTALLED CLOSE TO THE VALVE ASSEMBLY.

FOR BID PURPOSE ONLY

ISSUE	REVISIONS	BY	CLEARED			APPD	DATE	FOR RO ISSUE ONLY	1. If the instrument is used for the first time, it must be calibrated by the manufacturer. The calibration certificate must be attached to the instrument. The calibration certificate must be valid for the period of use of the instrument. 2. The instrument must be used in accordance with the instructions for use. The instrument must be used in a clean, dry, and well-ventilated area. The instrument must be used in a safe manner. The instrument must be used in a safe manner. 3. The instrument must be used in accordance with the instructions for use. The instrument must be used in a clean, dry, and well-ventilated area. The instrument must be used in a safe manner. The instrument must be used in a safe manner.	 MAHARASHTRA STATE POWER GENERATION CO. LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT	PROCON ENGINEERS (DIVISION OF INDIANO CONSULTING ENGINEERS PVT.LTD.)	DO NOT SCALE				
			CHEM	CIVIL	ELEC								MECH			
			CLEARED					DEPT	SIGNATURE	DATE	SCALE	~	INST.	APPROVED	DATE/RO ISSUED	
								CHEM				DR.	P.N.Z.		23-08-2011	DATE/RO ISSUED
								CIVIL				CH.	D.J.P.			23-08-2011
								ELEC				TYPICAL INSTRUMENT INSTALLATION DIAGRAM				DATE/RO ISSUED
								MECH								23-08-2011



PNEUMATIC CONTROL VALVE HOOK UP SCHEME

BILL OF MATERIAL		
ITEM NO.	QTY./INST	DESCRIPTION
57	1	MALE CONNECTOR 1/2" NPT(M) x 6mm OD COMPRN.
58	10MTRS.	SS 316 TUBE 6mm OD x 1mm THK.
59	7	MALE CONNECTOR 1/4"NPT(M) x 6mm OD COMPRN.
60	1	ISOLATION VALVE BALL TYPE 600 lbs 1/2" SW x 1/2" NPT(F), SS 316.
61	A/R	SS PIPE 1/2" NB SCH 40S.

LEGEND:

A/R - AS PER REQUIREMENT
 POT - POSITIONER TRANSMITTER
 AFR - AIR FILTER REGULATOR
 IA - INSTRUMENT AIR

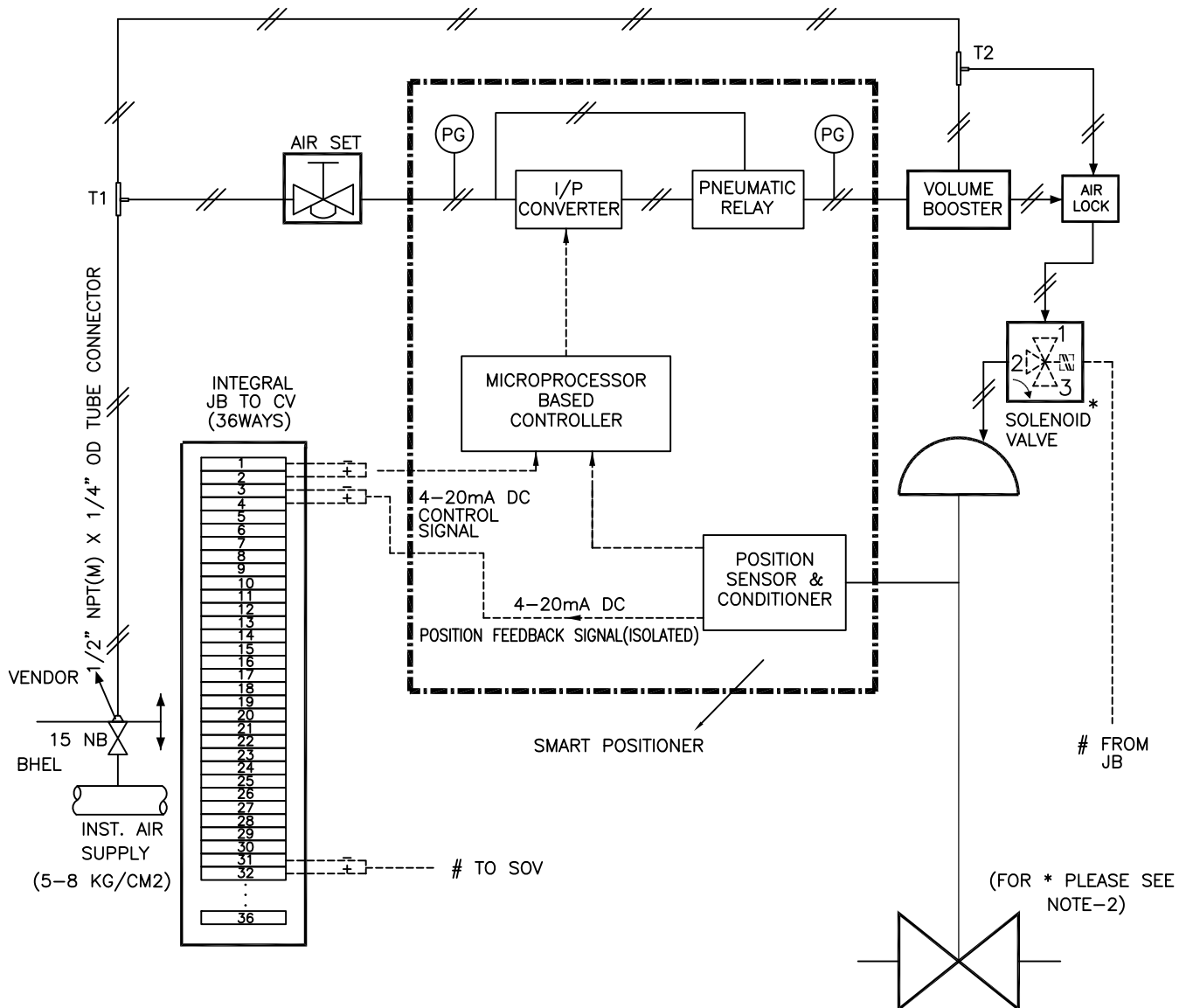
NOTES:

1. ALL TUBE FITTINGS ARE OF DOUBLE COMPRESSION TYPE AND OF SS 316 MATERIAL.
2. QTY. SHOWN ARE TYPICAL FOR ONE INSTALLATION ONLY.
3. TUBE & FITTINGS MARKED ARE INTEGRAL TO THE VALVE.
4. LIMIT SWITCHES WILL BE CONNECTED WHEREVER APPLICABLE.
5. JUNCTION BOX WILL BE INTEGRAL TO ACTUATOR.
6. ISOLATION VALVE SHALL BE INSTALLED CLOSE TO THE VALVE ASSEMBLY.

FOR BID PURPOSE ONLY

DO NOT SCALE		PROCON ENGINEERS (DIVISION OF MASTRO CONSULTING ENGINEERS PVT.LTD.)	
SCALE	~	APPROVED	DATE/REV ISSUED
DNV.	INST.		DATE/ISSUED
DNV.	P.N.Z.		23-08-2011
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FOR BID PURPOSE ONLY			
MAHARASHTRA STATE POWER GENERATION CO.LTD. BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT			
TYPICAL INSTRUMENT INSTALLATION DIAGRAM			
FOR REVISIONS ONLY BY: CHEN CIVIL ELEC IAC MECH DATE: APPD: DATE: CLEAR: DATE: FOR RO ISSUE ONLY DEPT: SIGNATURE: DATE: CIVIL: ELEC: IAC: MECH:			

CONTROL VALVE HOOK-UP DIAGRAM (WITH SMART POSITIONER)



NOTES :-

1. POSITION OF EACH VALVE ON SUPPLY AIR FAILURE / ELECTRICAL SIGNAL FAILURE SHALL BE AS PER SPECIFICATION / DATA SHEET.
2. SOLENOID VALVE WILL BE PROVIDED ONLY FOR CONTROL VALVES IF INDICATED IN RESPECTIVE DATA SHEETS.
3. SOLENOID VALVES PORTS CONDITION:
PORT 1 AND 2 SHALL BE CONNECTED UNDER DE-ENERGISED CONDITION.
PORT 2 AND 3 SHALL BE CONNECTED UNDER ENERGISED CONDITION.
4. PRESSURE GAUGES REQUIRED FOR AIR SUPPLY & OUTPUT(S).
5. MOUNTING ACCESSORIES AS REQUIRED.
6. POSITION FEEDBACK SIGNAL SHALL BE 2 WIRE 4-20mA ISOLATED SIGNAL.
7. JB TERMINALS SHALL BE CAGE CLAMP TYPE SUITABLE FOR 2.5 SQ. MM COPPER WIRE. EXTERNAL CONNECTION, THROUGH CABLE GLAND, SHALL BE AS PER DATA SHEET
8. ALL APPLICABLE ACCESSORIES SHALL BE PROVIDED AS INDICATED IN THE INDIVIDUAL CONTROL VALVE DATA SHEET / ACCESSORIES DATA SHEET.
9. 12 METERS 1/4" SS TUBING (AS PER ACCESSORIES DATA SHEET) & 1 SET OF SS FITTINGS TO BE SUPPLIED FOR EACH CONTROL VALVE FOR CONNECTION TO ISO VLV AT INST AIR HEADER ON ONE END AND TO AIR LOCK RELAY/AIR FILTER REGULATOR ON THE OTHER END. ALL THE SS FITTINGS SHALL BE DOUBLE COMPRESSION TYPE.
10. VOLUME BOOSTER (ALONG WITH TEE-T2 AND RELATED TUBING & CONNECTORS) SHALL BE PROVIDED IF REQUIRED. AIR CONNECTION TO VOLUME BOOSTER FROM TEE-T2 SHALL BE PROVIDED.



1 X 660 MW BHUSAWAL STPP

TITLE:-

CONTROL VALVE HOOK-UP DIAGRAM

DRG.
No.

PE-TS-415-145-I104

REV.
No.

02

DATE

08.03.19

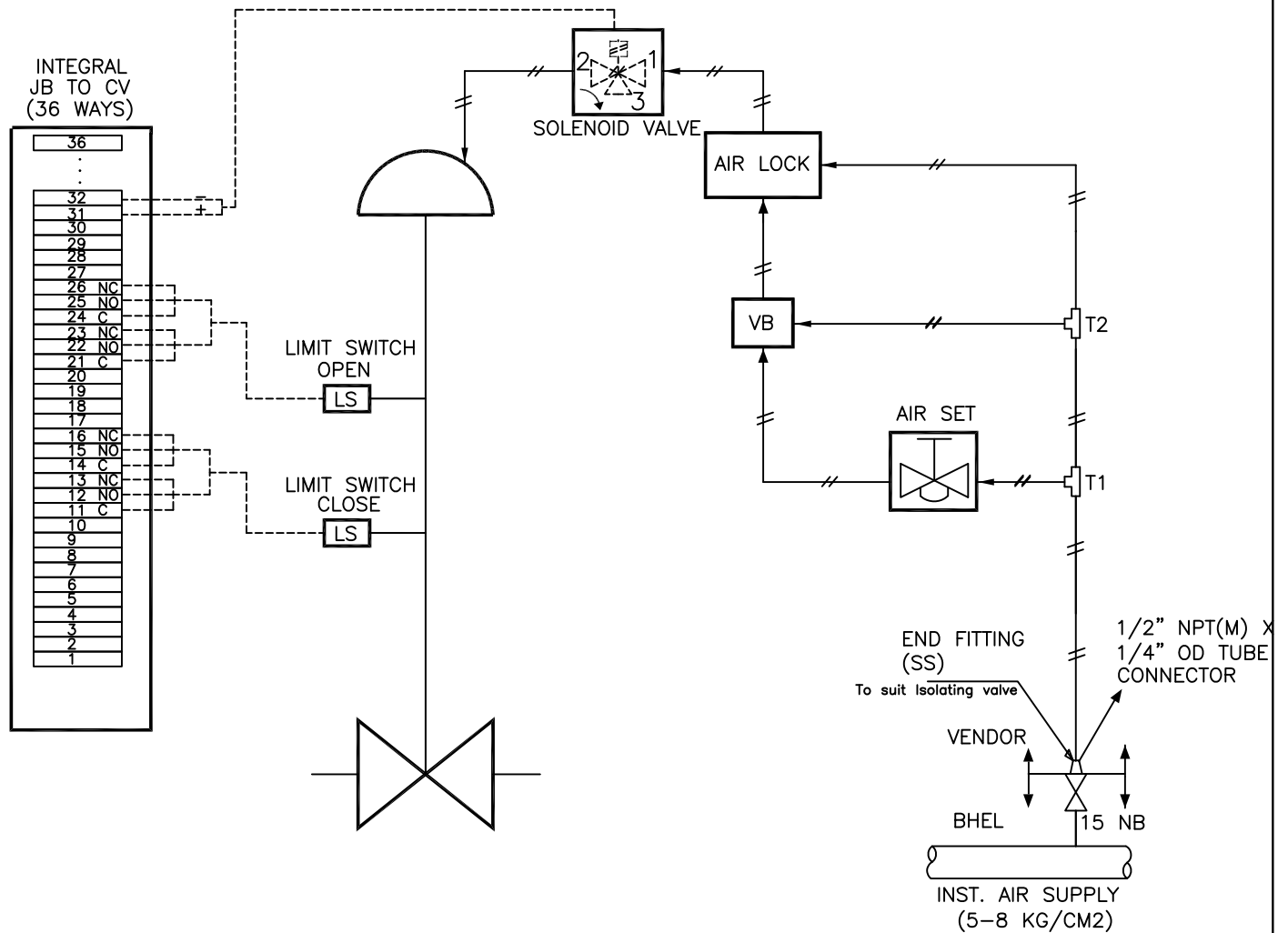
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OF

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CONTROL VALVE HOOK-UP DIAGRAM (FOR ON / OFF TYPE)



NOTES :-

1. POSITION OF EACH VALVE ON SUPPLY AIR FAILURE / ELECTRIC SIGNAL FAILURE SHALL BE AS PER SPECIFICATION / DATA SHEET.
2. SOLENOID VALVES PORTS CONDITION:
PORT 1 AND 2 SHALL BE CONNECTED UNDER DE-ENERGISED CONDITION.
PORT 2 AND 3 SHALL BE CONNECTED UNDER ENERGISED CONDITION.
3. MOUNTING ACCESSORIES AS REQUIRED.
4. JB TERMINALS SHALL BE CAGE CLAMP TYPE SUITABLE FOR 2.5 SQ. MM COPPER WIRE. EXTERNAL CONNECTION, THROUGH CABLE GLAND, SHALL BE AS PER DATA SHEET.
5. ALL APPLICABLE ACCESSORIES SHALL BE PROVIDED AS INDICATED IN THE INDIVIDUAL CONTROL VALVE DATA SHEET / ACCESSORIES DATA SHEET.
6. 12 METERS 1/4" SS TUBING (AS PER ACCESSORIES DATA SHEET) & 1 SET OF SS FITTINGS TO BE SUPPLIED FOR EACH CONTROL VALVE FOR CONNECTION TO ISO VLV AT INST AIR HEADER ON ONE END AND TO AIR LOCK RELAY/AIR FILTER REGULATOR ON THE OTHER END. ALL THE SS FITTINGS SHALL BE DOUBLE COMPRESSION TYPE.



1 X 660 MW BHUSAWAL STPP

TITLE:-

CONTROL VALVE HOOK-UP DIAGRAM

DRG.
No.

PE-TS-415-145-I104

REV.
No.

02

DATE

08.03.19

SHEET

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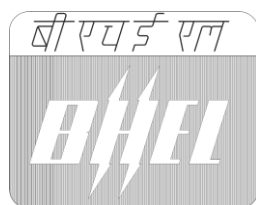
OF

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1X660 MW BHUSAWAL TPP UNIT 6

TECHNICAL SPECIFICATION
FOR
FUEL OIL UNLOADING & STORAGE SYSTEM

SECTION - II
STANDARD TECHNICAL SPECIFICATIONS.



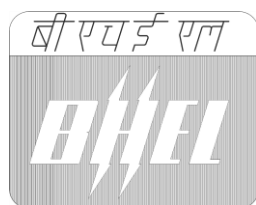
BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA

1X660 MW BHUSAWAL TPP UNIT 6

TECHNICAL SPECIFICATION
FOR
FUEL OIL UNLOADING & STORAGE SYSTEM

SECTION – II A

STANDARD TECHNICAL SPECIFICATION – MECHANICAL.



BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA



TITLE

STANDARD TECHNICAL SPECIFICATION FOR MISC TANKS

SPECIFICATION NO. PE-TS-STD-166-A001

SECTION III

REV 00

DATE

SHEET OF

1.0

SCOPE

The specification is intended to cover design, engineering, manufacture, inspection and testing at vendor's/ sub-vendor's works, proper packing, delivery at site including freight, unloading, storage & handling at site, erection & commissioning, hydro test at site, painting, handing over, tools & tackles, commissioning spares etc. for Misc. Tanks- site fabricated as mentioned in different sections of this specification

2.0

CODES & STANDARDS

The design, fabrication & assembly, erection & performance of steel tanks shall comply with all latest statutory regulations and safety codes applicable in the locality where the tanks are to be installed. Tanks shall conform to the latest applicable Indian/British/ USA standards. The vendor shall not be construed to be relieved of his responsibility by virtue of this specification. The tank in general shall conform to the latest editions, as is applicable, out of the following standards.

- 1 IS-800 Code of practice for use of steel in general building construction
- 2 IS-803 Code of practice for design, fabrication and erection of vertical mild steel cylindrical welded oil storage tank.
- 3 IS-804 Specification for rectangular pressed steel tanks
- 4 IS-805 Code of practice for use of steel in gravity water tank.
- 5 IS-816 Code of practice for metal arc welding for general construction in MS .
- 6 IS-817 Code of practice for training and testing for metal arc welder
- 7 IS-2825 Code of practice for unfired pressure vessel
- 8 BS-2594 Specification for carbon steel welded horizontal cylindrical storage tank
- 9 BS-2654 Specification for vertical steel welded storage tanks with butt welded shells for the petroleum industry
- 10 Indian explosive act and statutory requirements of chief controller of explosives, Nagger. (For oil storage tanks.)
- 11 Indian Boiler Regulations
- 12 Indian Factories Act
- 13 American code for oil tanks API 650

3.0

DESIGN REQUIREMENT

3.1

General Requirement

3.1.1

All tanks will be mild steel tanks. The tanks will be of welded construction and will be designed to withstand satisfactorily the internal forces due to the liquid these tanks have to hold as specified and external forces due to wind and seismic forces without deformation or undue strain. The



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	STANDARD TECHNICAL SPECIFICATION FOR	
	MISC TANKS	
	SECTION III	
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plates will be cold rolled through plate bending machines by several no. of passes to the curvature.

- 3.1.2 All tanks will be designed for the capacities ,dimensions and working conditions as specified in **DATA SHEET -A** . These tanks will be provided with all necessary connections as specified. The design of tanks will be such as to allow easy inspection, cleaning and repair. Due consideration will be given to wind loading and adequate stiffening will be provided to prevent failure of tank due to buckling when it is empty. A 2.0 mm corrosion allowance until unless specified in **DATASHEET-A** for shells, bottom and roof and beyond the required thickness shall be provided.
- 3.1.3 Vessel seams shall be so positioned that they do not pass through vessel connections.
- 3.1.4 The inside seam should be ground smooth, suitable for application of corrosion resistant primer. Except where otherwise indicated in the specification, if the stiffening of shell and/ or roof is necessary, tanks will be stiffened from outside.
- 3.1.5 Flange faces of all nozzles shall be machined and squared with the vessel center line.
- 3.1.6 All roofs and supporting structures shall be designed to support dead load plus a uniform live load of not less than 150 kg/m² of projected area.
- 3.1.7 The tanks shall be designed to have all courses truly vertical. Adequate distance between vertical joints in adjacent courses shall be taken so that the distortion is reduced to minimum.
- 3.1.8 When removing temporary attachments from shell plates, care should be taken that parent plate is not damaged. Holes in plate work to assist in fabrication / erection should be avoided as far as possible. The location of holes and method of filling shall be indicated in the fabrication drawing. Any projection of metal shall be chipped and ground flush with the plate surface .The plate shall not be gouged or torn in process of removing lugs.
- 3.1.9 In the construction of shell, very care shall be taken to minimize distortion or lack of circularity due to welding or for any other reason.
- 3.1.10 The successful bidder shall furnish design calculations to BHEL during detailed engineering stage for approval along with the Xerox copies of relevant pages of authentic supporting literature e.g. Code, Hand book, National / international Standards etc. Calculation shall be necessarily done in SI UNITS for the followings: -
- The tanks shall be designed as per good engineering practice as applicable and referred code shall be of latest edition.
 - Plate thickness calculation (different courses of shell plate, bottom plate and roof plate thickness), roof curb angle, top wind girder, intermediate wind girder, tank internal pressure vis –a-vis. allowable value.
 - Design of roof and roof structures for vertical storage tanks shall be designed based on guidelines given in the book titled “Process equipment design” by Brownell and Young.
 - Tank stability calculation (wind load / seismic / overturning stability) shall be done as per good engineering practice as applicable and referred code shall be of latest edition. However, factors /



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coefficients as required for the design of tank shall be obtained from BHEL by the bidder after placement of order.

- e) Vent sizing calculation shall be done as per good engineering practice as applicable and referred code shall be of latest edition.
- f) Sizing calculation for vent, NaOH / KOH breather, seal pot and breather valve.
- g) Weight calculation of plates, appurtenances & structures separately shall be included in the design calculation/GA.
- h) Staircase / access ladder and hand railing shall be provided as per the relevant codes and standards.

3.1.11 **Alignment**

- 3.1.11.1 Plates to be joined by butt welding shall be matched accurately. Misalignment in completed vertical joints shall not exceed 10% of the plate thickness or 1.5 mm for plates of 20 mm thick and under, whichever is larger.
- 3.1.11.2 In completed horizontal butt joints, the upper plate shall not project beyond the face of the lower plate at any point by more than 20% of the upper plate thickness with a maximum of 3 mm for plate thickness exceeding 8 mm except that for plate thickness 8 mm and under, the maximum shall be 1.5 mm.
- 3.1.11.3 Each tank shall be properly constructed ensuring perfect vertical alignment within 5 mm and tank circularity within 5 mm on diameter. Local bulging and / or depressions at any location of tank particularly shell shall not be permitted.

3.1.12 **WELDING**

- 3.1.12.1 Tanks and other attachments shall be welded as per AWS and the qualification of welder should be as specified in ASME.
- 3.1.12.2 Welding sequence shall be so adopted that distortion due to welding shrinkage shall be minimum. Welding procedure specification shall be submitted for approval of BHEL giving details of material, welding position, sequence, type of electrode used, pre-heat & post weld requirement etc as per the code of construction. Brand name of electrodes to be used with proper classification (e.g. E 6013) shall be as per BHEL's approval.
- 3.1.12.3 Welding shall not be carried out when the surface is wet and during periods of rain and high winds unless the welder and the work are properly shielded which should meet the approval of the purchaser.
- 3.1.12.4 Inspection of all welds shall be carried out in accordance with the governing code of construction. All material used by the purchaser such as electrodes, gaskets, bolts, nuts etc shall be conforming to relevant standards of repute and approved by the purchaser prior to use.
- 3.1.13 Each tank shall be complete with access staircase and fittings like drain connection, overflow connection, tank inlet and outlet covers, level gauge glass, fittings with isolation cocks and protection covers, tank vent connection etc all complete with needed accessories for the completeness of the tanks and as specified in data sheet -A.



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3.1.14 All openings in tank plate shall be well reinforced in approved manner by adding pad plates of adequate size and / or structural sections.

3.1.15 **STAIRCASE / ACCESS LADDER AND HAND RAILING**

3.1.15.1 All cylindrical vertical tanks shall be provided with spiral staircase and shall conform to the requirements specified in API 650 unless specified otherwise. All stair treads shall be 32 mm steel fabricated gratings. Each tread, if needed, shall be housed in individual steel fabricated frame which shall be adequately supported from the tank outer periphery. The staircase shall have minimum 750 mm clear width.

3.1.15.2 Access ladder, one (1) for each horizontal cylindrical / rectangular tank shall be provided for access to the tank roof. It shall be steel fabricated having minimum 450 mm width. Ladder stringers shall be heavy steel flats or angle section. All rungs shall be minimum 20 mm Dia rods spaced at not more than 30 cm center to center. All ladders shall have steel fabricated safety cage to the approved construction. Safety cage shall be provided about 2.5 m clear height of the ladder. Access ladder's stringers shall be widely spaced at top for free access to the tank roof.

3.1.15.3 All staircase and roofs of vertical cylindrical tanks shall be provided with pipe hand railings of 1070 mm effective height throughout. Handrails shall be constructed out of 32 NB medium class galvanized steel pipe conforming to ASTM A 53 Gr.B. Handrail posts shall be arranged at spacing not greater than 1850 mm. Two (2) sets of pipes horizontal runners all along the length shall be provided. All welds joints in the handrails shall be ground flush to protect any person getting injured. Steel toe plates of 100 mm flats shall be used. Hand railing shall be fabricated installed in an approved manner as directed by purchaser in accordance with approved drawings.

3.1.16 Unless otherwise specified, for all flanged connections vendor shall furnish suitable counter flanges and necessary nuts, bolts and gaskets materials.

3.1.17 Unless otherwise specified bolts and nuts shall be hexagonal head conforming to ISO -898-1:1999.

3.1.18 Gaskets shall be 3 mm thick full face rubber or CAF. On completion of hydraulic test / water fill test, contractor shall replace the gaskets used during testing at his own cost.

3.1.19 Float level indicators of approved make, as specified in data sheet-A shall be provided.

3.1.20 During erection of tank, shell plates shall be suitably supported both for outside and inside to avoid buckling / collapsing of tank due to high speed wind , gust or severe storm ,if any, occurring during erection.

3.1.21 The contractor shall furnish two (2) grounding pads for each vertical tank. Each pad shall be stainless steel plate 100 mm x 100 mm x 6 mm thick, with two 15 mm holes on 45 mm centers. Pads shall be edge welded to tank shell within 450 mm from the tank base. Two grounding lugs shall be provided for each horizontal tank.

3.2 **VERTICAL CYLINDRICAL STORAGE TANKS**

3.2.1 The vertical cylindrical storage (non- pressure) tanks shall be of mild steel welded construction and shall be designed in accordance with API-650 / AWWA D - 100. The vertical cylindrical



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storage tanks shall have slightly sloping bottom towards an adequately sized sump inside the tank to enable complete draining of the tank. The tank shall be designed for a wind pressure and seismic coefficient as specified. While worst of these two shall be increased as per API.

- 3.2.2 Conical roof shall be self-supported over the tank periphery. The roof shall have a slope of not less than 1 in 16 to ensure drainage of rainwater. Needed roof rafters and purlins adequately designed shall be provided.
- 3.2.3 All plates to be used for fabrication of tank shall be checked and all sides trimmed to make them square.
- 3.2.4 All bottom plates shall have lap weld joints on all sides with overlap not less than five times the plate thickness.
- 3.2.5 All shell course plates shall be taken during bending to prevent plate skewing. For butt weld joints, edges shall be prepared which shall be uniform and smooth throughout. To maintain needed root penetration gap at any butt weld joint, sufficient numbers of erection cleats shall be provided on all sides of outer periphery of each shell plate. Plates for tanks shall be straightened by pressing or by other non-injurious methods.
- 3.2.6 Each shell course shall be of uniform width throughout longitudinal weld in plates. Make up for the course width shall not be permitted. Shell plates in each course width shall be so arranged that all vertical joints are staggered having a minimum of 600 mm stagger. Shell thickness could be reduced in upper courses depending on design requirements but in no case the plate thickness shall be less than 6 mm.
- 3.2.7 The tank height shall be completed by the provision of top curb/ angle which shall be butt welded to the adjacent tank plate courses. The outstanding leg of the curb angle shall be kept outside the tank periphery. All butt weld joints shall be full strength welds but for design of shell plate thickness adequate weld efficiency as recommended by applicable code(s) shall be used.
- 3.2.8 Tank roof shall be supported over steel fabricated central column(s). Adequately sized and spaced rafters and purlins shall be provided. All rafters shall have sliding bolted connections at one end and preferably on the tank periphery side. The roof supporting frame shall have needed tie rods or bracing sets.
- 3.2.9 Roof plates shall have lap joints with lap not less than 25 mm and lap weld over the top surface only. Roof plates shall have continuous fillet welds around the tank curb angle. No joint of roof plate over the supporting frame shall be made.
- 3.2.10 Needed openings for mounting various specified accessories shall be well reinforced in accordance with application codes and as approved. Manhole shall be bolted and shall have hinged covers unless otherwise specified.
- 3.2.11 All inlet pipe nozzles located at the top of tanks shall be provided with internal piping up to 500 mm high above the tank's bottom inside with suitable weir plate at bottom. The inside piping shall be adequately supported and shall be provided with adequately sized vent connection at pipe top.
- 3.2.12 The manhole shall be of hinged & bolted type with nuts, bolts and gaskets with minimum size of 600 mm.



TITLE STANDARD TECHNICAL SPECIFICATION FOR MISC TANKS	SPECIFICATION NO. PE-TS-STD-166-A001	
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- 3.2.13 NaOH / KOH breather and seal pot shall be located in the bottom / ground level and necessary connection from tank vent to NaOH / KOH breather shall be provided through 200 NB SS pipe. The sizing of NaOH breather and Seal pot shall be decided based on emptying and filling rate of tanks. A tentative rate of 5 cum/hr may be considered for both emptying and filling of tank. However, the complete information shall be provided to vendor during detail engineering.
- 3.2.14 Material of construction of all pipes, fittings, valves, nozzles, flanges and counter flanges shall be as per datasheets given at the end of this section.
- 3.2.15 Material of construction for standpipe (if applicable) shall be stainless steel (SS) and size shall not be less than NB 100 unless otherwise specified in Datasheet-A for tanks given at the end of section.
- 3.2.16 Two (2) nos NaOH / KOH breather shall be provided by the bidder for each tank, out of which one shall be used for in-breathing purpose and the other shall be used for out-breathing purpose.
- 3.2.17 The size of the drain and vent valve of standpipes shall be 25 NB and size of the isolating valves (2 nos) for standpipe shall be 50 NB unless otherwise specified in the specification.
- 3.2.18 The overflow pipe from overflow nozzle shall be connected to seal pot.
- 3.2.19 All stair treads and platforms shall be made from gratings
- 3.3.0 RECTANGULAR TANKS**
- 3.3.1 Rectangular tanks shall be fabricated from steel material and shall be designed to withstand internal hydrostatic pressure. In addition these shall be checked for a wind pressure and seismic coefficient as specified wherever applicable. While worst of these two shall be considered, the permissible stress shall be increased as per IS when their effect considered with tank load.
- 3.3.2 Tank bottom and / or side plates shall be of minimum 6 mm thick plate. Corrosion margin of at least 2 mm shall be provided over the design thickness of bottom and / or side plates.
- 3.3.3 To support tank plates and to maintain required unsupported plate length, adequately sized and spaced steel structural closed frame shall be provided inside the tank. Longitudinal and / or vertical structural members to connect and adequately support these frames shall be provided at corners. Horizontal diagonal members / sway bracings at corner shall also be provided.
- 3.3.4 Tank plates cut to size shall be welded on these frames. Plate butt weld joints at other locations shall be eliminated to avoid warping of the plates at free joints. Adequate openings in the structural frames, particularly at the bottom shall be provided to ensure complete unrestricted drainage of tank at one point.
- 3.3.5 Complete assembled tank shall have at its bottom longitudinal steel fabricated bearer beams welded to it. The tank with bearer will rest over number of concrete blocks to be provided by purchaser. The tank shall be adequately bolted / welded to the concrete blocks. Needed inserts / anchor bolts shall be furnished by the bidders. Grouting of tank over concrete blocks in approved manner shall be included in bidder's scope of work, if erection is also awarded to the bidder.
- 3.3.6 Where rectangular tanks are flushed in dual compartments the inside partition plate shall be well reinforced to withstand hydrostatic test pressure completely on one side throughout the full height.



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	MISC TANKS	
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3.4 **HORIZONTAL CYLINDRICAL TANK**

- 3.4.1 The horizontal cylindrical tank with dished ends shall be of mild steel welded construction and shall be designed in accordance with BS- 2594. The tank shall be designed for a wind pressure and seismic coefficient as specified. While worst of these two shall be considered, the permissible stress shall be increased as per IS.
- 3.4.2 The shell and dished end plate thickness shall be chosen as per design requirement but in no case the dished end and shell plate thickness shall be less than 8 mm.
- 3.4.3 All seams, longitudinal as well as circumferential, shall be butt welded. Longitudinal seams should not be situated in the lower third of a tank or on the top centre line.
- 3.4.4 All tank shall be supplied with integral saddle support and shall be designed in accordance with BS- 2594.

4.0 **TESTING AND INSPECTION AT MANUFACTURER'S WORKS**

4.1 **General**

- 4.1.1 The supplier shall provide inspection to establish and maintain quality of workmanship in his works and that of his subcontractors to ensure the mechanical accuracy of components, compliance with drawings identity and acceptability of all materials, parts and equipment. He shall conduct all tests required to ensure that the equipment and material furnished shall conform to requirements of the acceptable codes. All tests and test procedure proposed by manufacturer shall be submitted to the purchaser for their prior approval.
- 4.1.2 All materials used for manufacture of the equipment under this specification shall be of tested quality. Relevant test certificates shall be made available to the purchaser before the final shop inspection. In case the relevant correlating test certificates are not available, the supplier shall arrange to carry out the necessary tests required by codes at his own cost.
- 4.1.3 Alloy cast iron and cast steel components shall be tested for both physical and chemical properties in absence of purchaser's representatives. Test bears shall be either integral or taken from the same ladle of material as the casting they represent.

4.2 **TESTING AND INSPECTION FOR TANKS**

- 4.2.1 The scope of testing and inspection for pressure vessel / tanks covered in this specification shall generally comprise of the following:
- i) Examination and approval of fabrication drawings to ensure that design, materials and fabrication details meet requirement of code and specifications. Purchaser will review these drawings for interface problems and conformity with the general arrangement drawings and accord their approval.
 - ii) Examination of materials of construction and identification with material test certificates.
 - iii) All the plates of thickness 50 mm or more shall be ultrasonically tested to ensure freedom from laminations.



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- iv) Ensuring the relevant weld procedure and welder qualification tests are in accordance with stipulated code requirements.
- v) Inspection of dished end flanges and alloy steel bolting where required.
- vi) Inspection during fabrication at appropriate stages including fit ups .
- vii) For all butt welds, the root run and final run shall be subjected to dye penetrant or magnetic particle inspection. For all fillet welds the final run shall be subjected to dye penetrant / magnetic particle examination.
- viii) Examination of radiographs including radiographic techniques, supervision of other non - destructive tests and heat treatment procedure as required by codes and specifications.
- ix) Examination of internal cleanliness before final closure.
- x) Dimensional examination of completed vessel including axis marking, proof marking , match marking etc.
- xi) Witnessing of hydrostatic, pneumatic or vacuum tests or special tests as required by the code and specification. In case of hydrostatic tests, the test pressure must be kept for a minimum of two hours.
- xii) Witnessing cleanliness, preservation, packing and marking.
- xiii) Stamping of vessel and issue of certificates.

4.2.2 NON - PRESSURE TANKS

FIELD TESTING

Scope of testing and inspection for non-pressure tanks covered in this specification will comprise of the following:

- 4.2.2.1 Identification of materials to manufacturer's test certificates.
- 4.2.2.2 Inspection of plates, edges after edge preparation and checking curvature against template if shell plates sent after rolling.
- 4.2.2.3 Checking of dimension and match marking.
- 4.2.2.4 DPT / MPI on all welds (100%).
- 4.2.2.5 All cross / Tee joints and butt welds to be 10% Radio graphed.
- 4.2.2.6 For the offered tanks, fill test shall be carried out for at least 24 hours. Atmospheric storage tanks on inside surface shall be leak tested before painting.
- 4.2.2.7 All quality plans / checklists for various items shall be furnished during detail engineering stage for BHEL / customer's approval and any changes required by BHEL / customer shall be incorporated in the documents and adhered without any price implication. However, minimum requirement of MQP as



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indicated in the technical specification shall be followed. All necessary items as required for inspection and testing of the tank including instruments shall be arranged by the bidder

4.2.3 REPAIR OF LEAKS

4.2.3.1 All leaks detected during testing shall be repaired to the satisfaction of the purchaser and on completion retested for leakages as per approved procedure.

4.2.3.2 In the joints between roof plates only, pin hole leaks may be repaired by mechanical method. However, where there is any indication of considerable porosity, the leaks shall be sealed by laying down an additional layer of weld over the porous sections.

4.2.3.3 In the other joints, whether between shell plates or bottom plates or both, leak shall be repaired by only welding and if necessary, after first cutting out the defective part.

5.0 PAINTING REQUIREMENT

Surface preparation, being a pre-requisite for any paint application, shall be such as to clean the surface thoroughly of any materials which will be conducive to premature failure of the paint substrata. Blast clean type (Grit blasting by copper/ MS/other) shall be decided during detailed engineering for which no commercial implication shall be entertained by BHEL.

All surfaces shall be cleaned of loose substances and foreign materials, such as dirt, rust, scale, oil, grease, welding flux etc. in order that the prime coat is rigidly anchored to virgin metal surface.

Paint shall be applied in accordance with paint manufacturer's recommendation and shall meet the requirement of the exposure condition and specific system of painting thereof.

The above is the minimum requirement to be followed by the successful bidder. Any additional requirement to ensure prevention of atmospheric corrosion shall be provided by the successful bidder without any commercial implication.

6.0 OTHER TECHNICAL REQUIREMENTS

1. All drawings shall be prepared as per BHEL's title block and bear BHEL's drawing No. and customer / consultant's drawing no; which will be forwarded to the successful bidder during detail engineering stage.
2. All possible efforts shall be made by the bidder to get the approval of drawings and documents from BHEL / customer / consultant at the earliest and the documents prepared / generated by them or their sub-vendors shall be checked by their competent authority before submission to BHEL.
3. Bidder to depute competent designer (s) at BHEL's office during detailed engineering stage to discuss drawings and other technical documents as and when required by BHEL.
4. All the drawings which are required to be furnished to BHEL during detailed engineering stage shall include technical parameters, details of paints, BOQ / BOM etc in tabular form indicating all components including bought out items and their quantity, material of construction indicating its applicable code / standard, weight, make etc.



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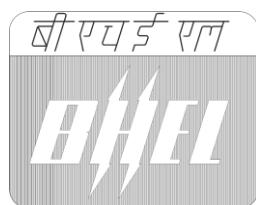
5. All testing of tanks shall be done in line with testing requirement of this specification and as finalized during detailed engineering and customer approvals.

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TECHNICAL SPECIFICATION
FOR
FUEL OIL UNLOADING & STORAGE SYSTEM

SECTION – II B

FORMAT FOR OPERATION AND MAINTENANCE.



BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA

Format for Operation & Maintenance Manual

Project name :

Project number :

Package Name :

PO reference :

Document number :

Revision number :

Sl.no. & Sections	Description	Tick (√)if included in Manual			Remarks
		Yes	No	Not Applicable	
1.	Cover page				
1.1	Project Name				
1.2	Customer/consultant Name				
1.3	Name of Package				
1.4	Supplier details with phone, FAX ,email address , Emergency Contact number				
1.5	Name and sign of prepared by , checked by & approved by				
1.6	Revision history with approval Details				
2.0	Index				
2.1	showing the sections & related page nos All the pages should be numbered section wise				
3.0	Description of Plant/System				
3.1	Description /write up of operating principle of system equipment/ associated sub-systems & accessories/controls system , operating conditions, performance parameters under normal , start up and special cases				
3.2	Equipment list and basic parameter with Tag numbers				
3.3	Data sheets approved by Customer/for information and catalogues provided by original manufacturer				
3.4	Associated other packages and Interface /terminal points				
3.5	P&ID & Process Diagrams				
3.6	GA Layout drawings, As-built drawings , Actual photograph of items/system (Drawings of A2 & bigger sizes are to be attached in the last)				
3.7	Single line/wiring diagrams				
3.8	Control philosophy /control write-ups				

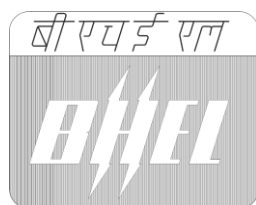
4.0	Commissioning Activities (if not covered in separate document i.e. erection manual, commissioning manual)				
4.1	Pre-Commissioning Checks				
4.2	handling of items at site				
4.3	Storage at site				
4.4	Unpacking & Installation procedure				
5.0	Operation Guidelines for plant personal/user/operator				
5.1	Interlock & Protection logic along with the limiting values of protection settings for the equipment along with brief philosophy behind the logic, drawings etc. to be provided.				
5.2	Start up, normal operation and shut down procedure for equipments along with the associated systems in step by step mode. Valve sequence chart, step list, interlocks etc. with Equipment isolating procedures to be mentioned.				
5.3	Do's & Don't of the equipments.				
5.4	Safety precautions to be taken during normal operation. Safety symbols, Emergency instructions on total power failure condition/lubrication failure/any other condition				
5.5	Parameters to be monitored with normal values and limiting values				
5.6	Trouble shooting with causes and remedial measures				
5.7	Routine operational checks, recommended logs & records				
5.8	Changeover schedule if more than one auxiliary for the same purpose is given				
5.9	Painting requirement and schedule				
5.10	Inspection, repair , Testing and calibration procedures				
6.0	Maintenance guidelines for plant personal				
6.1	List of Special Tools and Tackles required for Overhaul/Trouble shooting including special testing equipment required for calibration etc.				
6.2	Stepwise dismantling and re-assembly procedure clearly specifying the tools to be used, checks to be made, records to be maintained, clearances etc. to be mentioned. Tolerances for fitment of various components to be given.				

6.3	Preventive Maintenance & Overhauling schedules linked with running hours/calendar period along with checks to be given				
6.4	Long term maintenance schedules especially for structural, foundations etc.				
6.5	Consumable list along with the estimated quantity required during commissioning, normal running and during maintenance like Preventive Maintenances and Overhaul. Storage/handling requirement of consumables/self-life.				
6.6	List of lubricants with their Indian equivalent, Lubrication Schedule, Quantity required for each equipment for complete replacement is to be given				
6.7	List of vendors & Sub-vendors with their latest addresses, service centres ,Telephone Nos., Fax Nos., Mobile Nos., e-mail IDs etc.				
6.8	List of mandatory and recommended spare parts list				
6.9	Tentative Lead time required for ordering of spares from the equipment supplier				
6.10	Guarantee and warranty clauses				
7.0	Statutory and other specific requirements considerations.				
8.0	List of reference documents				
9.0	Binding as per requirement				

1X660 MW BHUSAWAL TPP UNIT 6

TECHNICAL SPECIFICATION
FOR
FUEL OIL UNLOADING & STORAGE SYSTEM

SECTION – II C
SITE STORAGE AND PRESERVATION.



BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA

SITE STORAGE AND PRESERVATION GUIDELINES

FOR

MECHANICAL BOPs

(Doc No: PE-DC-SSG-A001 REV.00)



PROJECT ENGINEERING MANAGEMENT, POWER SECTOR
BHARAT HEAVY ELECTRICALS LIMITED-NOIDA

CONTENT

- 1 SCOPE OF THE DOCUMENT
- 2 PURPOSE OF STORAGE & PRESERVATION
- 3 MEASURES TO BE TAKEN FOR STORAGE AND PRESERVATION
 - a) GENERAL STORAGE REQUIREMENTS
 - b) GENERAL PRESERVATION REQUIREMENTS
 - c) GENERAL INSPECTION REQUIREMENTS
- 4 TYPE OF STORAGE FOR VARIOUS EQUIPMENT
5. CONCLUSION
6. STACKING ARRANGEMENT FOR PLATES AND STRUCTURAL STEEL

1. SCOPE OF THE DOCUMENT

This guideline is prepared in intent to provide proper site storage and preservation of the Mechanical, Electrical and C & I items / equipment supplied under various bought out packages/items. This storage procedure shall be followed at different power plant sites by concerned agency for storage and preservation from the date of equipment received at site until the same are erected and handed over to the customer.

2. PURPOSE OF STORAGE & PRESERVATION

Many of the items may be required to be kept in stores for long period. It shall therefore be essential that proper methods of storage and preservation be applied so that items do not deteriorate, loose some of their properties and become unusable due to atmospheric conditions and biological elements.

3. MEASURES TO BE TAKEN FOR STORAGE, HANDLING & PRESERVATION

a) GENERAL STORAGE REQUIREMENTS

1. To the extent feasible, materials should be stored near the point of erection. The storage areas should have adequate unloading and handling facilities with adequate passage space for movement of material handling equipment such as cranes, fork lift trucks, etc. The storage of materials shall be properly planned to minimise time loss during retrieval of items required for erection.
2. The outdoor storage areas as well as semi-closed stores shall be provided with adequate drainage facilities to prevent water logging. Adequacy of these facilities shall be checked prior to monsoon.
3. The storage sheds shall be built in conformity with fire safety requirements. The stores shall be provided with adequate lights and fire extinguishers. 'No smoking' signs shall be placed at strategic locations. Safety precautions shall be strictly enforced.
4. Adequate lighting facility shall be provided in storage areas and storage sheds and security personnel positioned to ensure enforcement of security measures to prevent theft and loss of materials.
5. Adequate number of competent stores personnel and security staff shall be deployed to efficiently store and maintain the equipment / material.
7. The equipment shall be stored in an orderly manner, preserving their identification slips, tags and instruction booklets, etc., required during erection. The storage of materials shall be equipment-wise. Loose parts shall be stored in sheds on racks,

preserving the identification marks and tags in good condition. The group codes shall be displayed on the racks

6. At no time shall any materials be stored directly on ground. All materials shall be stored minimum 200 mm above the ground preferably on wooden sleepers

b) GENERAL PRESERVATION REQUIREMENTS

1. All special measures to prevent corrosion shall be taken like keeping material in dry condition, avoiding the equipment coming in contact with corrosive fluid like water, acid etc.
2. Materials which carry protective coating shall not be wrapped in paper, cloth, etc., as these are liable to absorb and retain moisture. The material shall be inspected and in case of signs of wear or damages to protective coating, that portion shall be cleaned with approved solution and coated with an approved protective paint. Complete record of all such observations and protective measures taken shall be maintained.
3. Generally equipment supplied at site are properly greased or rust protective oil is applied on machined/ fabricated components. However periodic inspection shall be carried out to ensure that protection offered is intact.
4. While handling the equipment, no dragging on the ground is permitted. Avoid using wire rope for lifting coated components. Use polyester slings (if possible) otherwise protective material (e.g. clothes, wood block etc.) should be used while handling the components with rope / slings
5. For Equipment supplied with finished paint, touch paint shall be done in case any surface paint gets peeled off during handling. Otherwise such surfaces shall necessarily be wrapped with polythene to avoid any corrosion. Further for equipment wherein finish coat is to be applied at site, site to ensure that equipment is received with primer coat applied.
6. It shall be ensured by periodic inspection that plastic inserts are intact in tapped holes, wherever applicable.
7. Pipes shall be blown with air periodically and it shall be ensured that there is no obstruction.
8. Silica gel or approved equivalent moisture absorbing material in small cotton bags shall be placed and tied at various points on the equipment, wherever necessary.
9. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion/jamming due to prolonged storage.

10. All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in three months and a record of such measured insulation values shall be maintained.
11. Following preservatives/preservation methods can be used depending upon type of equipment
 - a. Rust preventive fluid (RPF)
 - b. Rust protective paints
 - c. Tarpaulin covers, in case of outdoor storage
 - d. De-oxy aluminate for weld-ments

c) GENERAL INSPECTION REQUIREMENTS

1. Period inspection of materials with specific reference to –
 - Ingress of moisture and corrosion damages.
 - Damage to protective coating.
 - Open ends in pipes, vessels and equipment -
 - In case any open ends are noticed, same shall be capped.
2. Any damages to equipment / materials.
 - In case of any damages, these shall be promptly notified and in all cases, the repairs / rectification shall be carried out.
 - Any items found damaged or not suitable as per project requirements shall be removed from site. If required to store temporarily, they shall be clearly marked and stored separately to prevent any inadvertent use.

4. TYPE OF STORAGE FOR VARIOUS EQUIPMENT

The types of storage are broadly classified under the following heads:

i **Closed storage with dry and dust free atmosphere. (C)**

The closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated asbestos sheets / galvanised iron sheets for roofing. Brick walls / asbestos sheets can be used to cover all the sides. The floor of the shed can be finished with plain cement concrete suitably glazed. The shed shall be provided with proper ventilation and illumination.



ii **Semi-closed storage. (S)**

The semi closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated / asbestos sheets for roofing. The floor shall be brick paved. If required a small portion of sides can be covered to protect components from rainwater splashing onto the components.





iii Open storage (O)

The open yard shall be levelled, well consolidated to achieve raised ground with the provision of feeder roads for crane approach along with access roads running all sides. One part of the open yard shall be stone pitched, levelled and consolidated with raised ground suitable for storing / stacking heavier and critical components with due space to handle them by cranes etc . Adequate number of sleepers, concrete block etc. to be provided to make raised platforms to stack critical materials.

A separate yard to be identified as “scrap yard” slightly away from main open yard to store wooden/steel scraps, which are to be disposed off. This is required to avoid mix up with regular components as well as to avoid fire hazard.

Some of the components, which are having both machined & un-machined surfaces and are bulky, shall be stored in open storage area on a raised ground and suitably covered with water proof / fire retardant tarpaulin.



The equipment listed below shall be stored and inspected as per requirement mentioned in the table below.

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
Raw material /mechanical items like pipes, plates, structure sections etc.)				
1.	Steel pipes (lined/unlined)	S	Damage , paint, corrosion, rubber lining peeling	Provide end cap
2.	MS Plates	S	Damage, paint, corrosion	
3.	SS Plates	S	Damage	
4.	Non-metallic pipes	S	Damage, cracks	Provide end cap
5.	Stainless steel pipes	S	Damage ,	Provide end cap
6.	MS sections, beams	S	Damage, paint, corrosion	
7.	Cable trays	S	Damage, condition of preservations	
8.	Insulation sheets	S	Damage	
9.	Insulation	C	Damage, packing	
10.	Hangers Rods	S	Damage, paint, packing	
11.	Tubes	S	Damage, paint , packing	Provide end cap
12.	Hume pipes	O	Damage	
13.	Castings	O	Damage, paint, corrosion	
Fabricated mechanical items (pressure vessels, tanks etc.)				
14.	Pressure vessels (unlined)	O	Damage, paint, corrosion,	Covered nozzles
15.	Atmospheric storage tanks (unlined)	O	Damage, paint, corrosion	Covered nozzles

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
16.	Pressure vessels (lined)	S	Damage, paint, corrosion, rubber lining	
17.	Atmospheric storage tanks(lined)	S	Damage, paint, corrosion, rubber lining	
18.	Support structures	O	Damage , paint, corrosion	
19.	Flanges	C	Damage , paint, corrosion	
20.	Fabricated pipes	S	Damage , paint, corrosion	Provide end cap
21.	Vessels internals	C	Damage , paint, corrosion ,packing	
22.	Grills	S	Damage , paint, corrosion	
23.	Angles	S	Damage , paint, corrosion	
24.	Bridge mechanism/clarifier mechanism	O	Damage , paint, corrosion	
25.	Cranes, rails	S	Damage , paint, corrosion	
26.	Stair cases	O	Damage , paint, corrosion	
27.	Ladders/handrails	O	Damage , paint, corrosion	
28.	Fabricated ducts	S	Damage , paint, corrosion	
29.	Isolation Gates	O	Damage , paint, corrosion	
30.	Fabricated boxes/panels	S	Damage , paint, corrosion	
Mechanical components like valves, fittings, cables glands, spares etc.)				
31.	Valves	S	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
32.	Fittings	S	Damage , packing	Provide end cap
33.	Cable glands	C	Damage , packing	
34.	Tools & tackles	C	Damage , packing	
35.	Nut , bolts, washers,	C	Damage , packing	
36.	Gasket & Packings	C	Damage , packing	
37.	Copper tubes	C	Damage , packing, corrosion	Provide end cap
38.	SS tubing	C	Damage , packing	Provide end cap
Rotating assemblies (pumps, blowers, stirrers, fans, compressors etc.)				
39.	Pumps	S	Damage , packing, corrosion	Shaft rotation
40.	Blowers/Compressors	S	Damage , packing, corrosion	Shaft rotation
41.	Agitators/stirrers/radial launders	C	Damage , packing, corrosion	Shaft rotation
42.	Rollers for chlorine tonner mounting	C	Damage , packing, corrosion	
43.	Centrifuge	S	Damage , packing,	
44.	Gear box	C	Damage , packing, corrosion	
45.	Bearings	C	Damage , packing, corrosion	
46.	Fans	S	Damage , packing, corrosion	
47.	Dosing skids	S	Damage , packing, corrosion	
48.	Pump assemblies	S	Damage , packing, corrosion	
49.	Air washers(INTERNALS)	S	Damage , packing	
50.	Air conditioners (split)	C	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
51.	Elevators(CONTAINERIZED)	O	Damage , packing, corrosion	
52.	Chillers/VA machines	S	Damage , packing	
53.	Air handling Unit/Package unit	S	Damage , packing	
54.	Chlorinators & Evaporators	C	Damage , packing	
55.	Ejectors	C	Damage , packing	
56.	Electrolyser	C	Damage , packing	
Miscellaneous items like chain pulley blocks, hoists etc.				
57.	Chain pulley blocks	S	Damage, Packing	
58.	Electric hoists	S	Damage, Packing	
59.	Fire extinguishers	C	Damage, expiry date	
60.	Fork Lift Truck	S	Damage, Packing	
61.	Hydraulic Mobile Crane	O	Damage, Packing	
62.	Mobile Pick Up & Carry Crane	O	Damage, Packing	
63.	Motor boats	O	Damage, Packing	
64.	Safety showers	S	Damage, Packing	
65.	Diffusers/dampers	S	Damage, Packing	
Chemicals and consumables (acid, alkali, paints, oils, reagents and special chemicals)				
66.	Hydro Chloric Acid (HCl)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical
67.	Sulphuric acid (H ₂ SO ₄)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
68.	Sodium hydroxide (NaOH)	Store in canes/ storage tank in dyke area	Date of production/ leakage/ fumes/ breather	hazardous chemical ,breather to be checked for air ingress
69.	Sodium hypo chlorite	To be stored under shed	Date of production/ leakage/ fumes	hazardous chemical ,self-life normally 15-30 days after which strength of chemical decays
70.	Ammonia	S	Date of production/ leakage/ fumes	Store in closed storage tanks, hazardous chemical
71.	CW treatment chemicals	S	Date of production , Self-life	Store in closed canes
72.	RO/UF cleaning chemicals	S	Date of production , Self-life	Store in closed canes
73.	Lime	C	Damage to packing , seepage	Prevent moisture, rain
74.	Alum bricks	C	Damage to packing	Prevent moisture, rain
75.	Poly electrolyte	S		Store in closed storage tanks
76.	Laboratory chemicals(powder)	C	Damage, Packing self-life	
77.	Laboratory chemicals(liquid)	C	Damage, Packing self-life	
78.	Lubrication oils	C	Leakage	
79.	Paints	S	Leakage ,air tightness	
80.	Sand	O	Damage of packing	No hooks
81.	Salt (NaCl)	C	Damage of packing, water ingress	Prevent moisture, rain
82.	Anthracite	S	Damage of packing	
83.	Activated carbon	S	Damage of packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
84.	Thermal insulation	S	Damage of packing	
85.	Cement	C	Damage of packing	Prevent moisture, rain
86.	Gravels	O	Damage of packing	
87.	ION exchange resins	C	Damage , packing	Refer manufacturer guidelines
88.	RO membranes	C	Damage , packing	Refer manufacturer guidelines
89.	UF membranes	C	Damage , packing	Refer manufacturer guidelines
90.	Cleaning chemicals	C	Damage , packing	Refer manufacturer guidelines
91.	Chemicals for analysers/calibration	C	Damage , packing	Refer manufacturer guidelines
Electrical and C & I items (motors, cables etc.)				
92.	Motors	C	Damage , packing	
93.	Cable drums	O	Damage	
94.	Control Panel /control desk, UPS ,JB	S	Damage, Packing	
95.	Instruments(gauges/analysers)	C	Damage	
Special items		As per Manufacturer's item, like Hydrogen cylinders, Ozonator, Analyser, Chlorine dioxide generators etc.		

5. CONCLUSION

Concerned storage agency at site should make sure that loss in equipment performance and wear & tear are minimised through proper storage and preservation. The above are broad guidelines and cover major equipment / materials. However specific storage practices shall be followed as per manufacturer recommendation. All the necessary measures even in addition to the ones mentioned above, if found necessary, should be taken to achieve the objective.

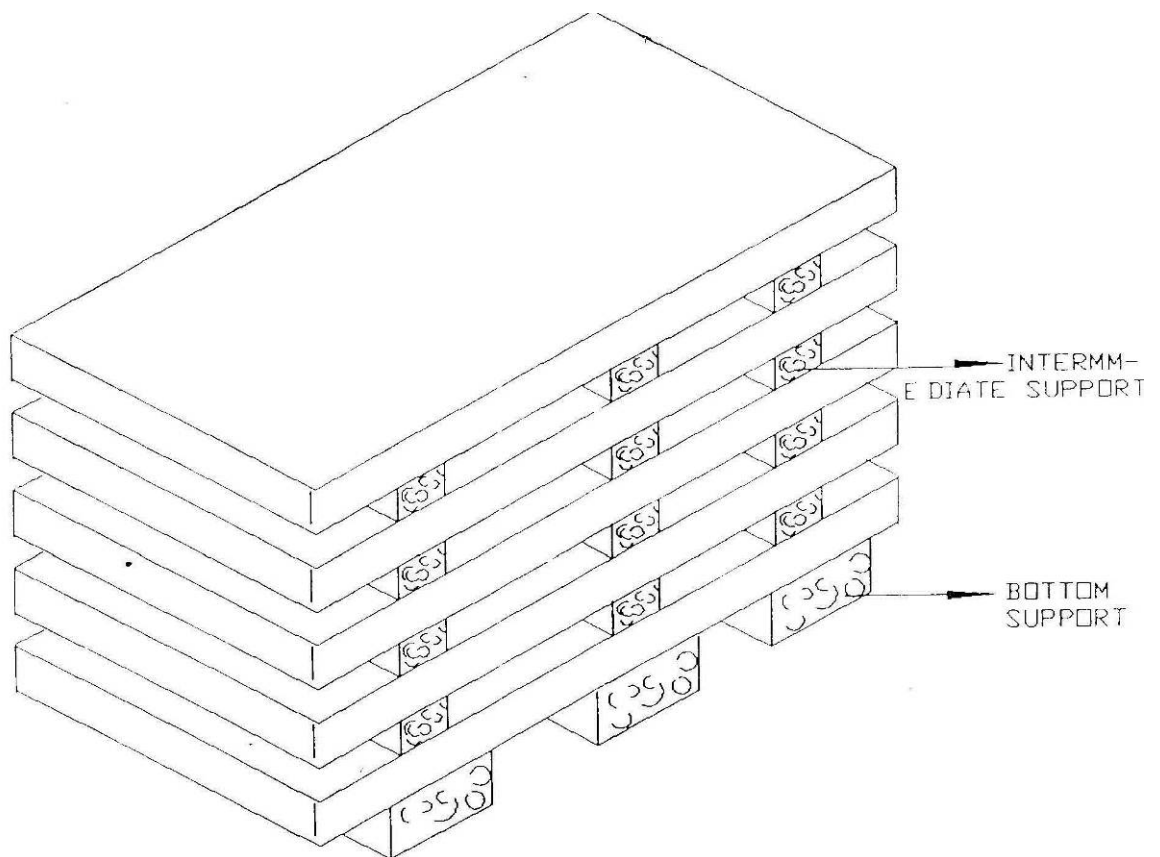


Figure – 1 – PLATE STACKING ARRANGEMENT

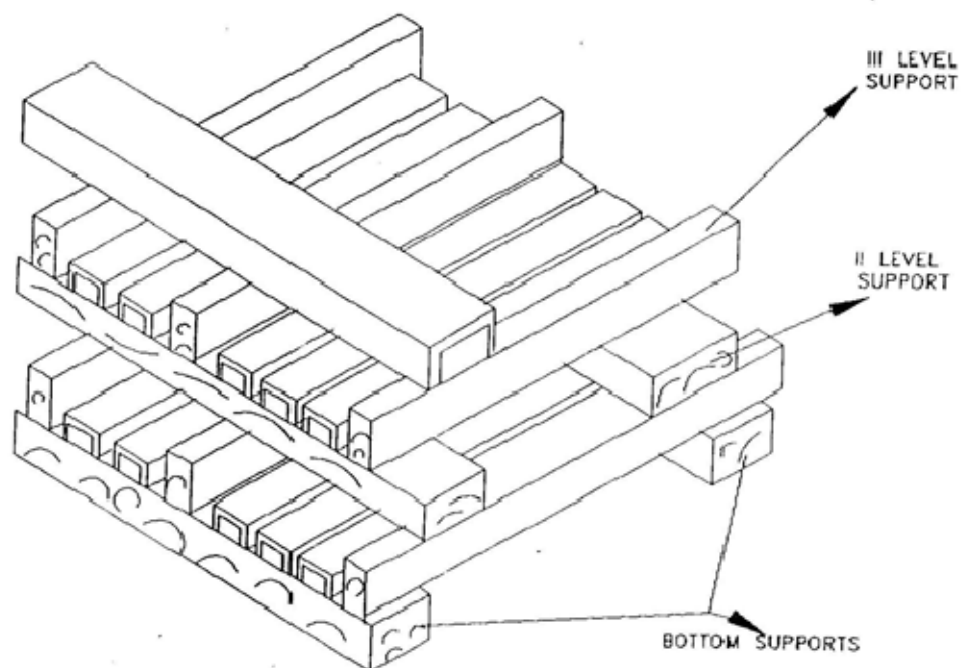


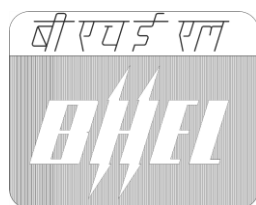
Figure – 2 – STRUCTURAL STEEL STACKING ARRANGEMENT

1X660 MW BHUSAWAL TPP UNIT 6

TECHNICAL SPECIFICATION
FOR
FUEL OIL UNLOADING & STORAGE SYSTEM

SECTION – III

DOCUMENTS TO BE SUBMITTED BY BIDDER.



BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA



**TECHNICAL SPECIFICATION FOR
FUEL OIL UNLOADING & STORGAE SYSTEM
1X660 MW BHUSAWAL TPP UNIT 6**

SPECIFICATION NO. PE-TS-415-166-A001

SECTION IIIA

REV – 01

DATE - 18.03.2020

1X660 MW BHUSAWAL TPP UNIT 6

**TECHNICAL SPECIFICATION
FOR
FUEL OIL UNLOADING & STORAGE SYSTEM**

SECTION-IIIA



**BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT PPEI,
NOIDA-INDIA**



**TECHNICAL SPECIFICATION FOR
FUEL OIL UNLOADING & STORGAE SYSTEM
1X660 MW BHUSAWAL TPP UNIT 6**

SPECIFICATION NO. PE-TS-415-166-A001

SECTION IIIA

REV – 01

DATE - 18.03.2020

LIST OF DOCUMENTS TO BE SUBMITTED WITH THE BID

Bidder shall submit following drawings / documents along with their bid:

- a. Signed and stamped copy of Compliance cum Confirmation Certificate.
- b. Signed and Stamped copy of pre-bid clarification.
- c. Signed and stamped copy of Deviation Schedule strictly as per format.
- d. Signed and stamped copy of Electrical Load Data for confirmation of loads.
- e. Copy of unpriced price bid indicating “QUOTED / NOT QUOTED” / “NOT APPLICABLE” as the case may be.
- f. Copy of electrical scope between BHEL & vendor dully signed and stamped.
- g. Format for required MS Plates.

NOTES:

OFFER WILL BE CONSIDERED AS INCOMPLETE IN ABSENCE OF ANY OF THE ABOVE DOCUMENTS.

DOCUMENTS OTHER THAN ABOVE, IF ANY, SUBMITTED WITH THE OFFER WILL NOT FORM PART OF CONTRACT AND ACCORDINIGLY WILL NOT BE CONSIDRED FOR BID EVALUATION.



TITLE:

**TECHNICAL SPECIFICATION
1x660 MW BHUSAWAL TPP UNIT 6
COMPLIANCE CUM CONFIRMATION
CERTIFICATE**

SPEC. NO.: PE-TS-415-166-A001

SECTION: IIIB

REV. NO. 01 DATE

SHEET 1 OF 2

COMPLIANCE CUM CONFIRMATION CERTIFICATE

The bidder shall confirm compliance with following by signing/ stamping this compliance certificate (every sheet) and furnish same with the offer.

- a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions other than those mentioned under "exclusion" and those resolved as per 'Schedule of Deviations', if applicable, with regard to same.
- b) There are no other deviations w.r.t. specifications other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'.
- c) Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL/ CUSTOMER approval & customer hold points for inspection/ testing shall be marked in the QP at the contract stage. Inspection/ testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This shall be within the contracted price with no extra implications to BHEL after award of the contract.
- d) All drawings/ data-sheets/ calculations etc. submitted along with the offer shall be considered for reference only, same shall be subject to BHEL/ CUSTOMER approval in the event of order.
- e) The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified/ intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre - bid discussions, otherwise BHEL/ Customer's decision shall be binding on the bidder whenever the deficiency is pointed out.

For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.

- f) The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.
- g) All sub vendors shall be subject to BHEL/ CUSTOMER approval in the event of order.
- h) Guarantee for plant/equipment as applicable, shall be as per relevant clause of GCC /SCC /Other Commercial Terms & Conditions.
- i) In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities. This clause will apply in case during site commissioning additional requirements emerges due to customer and/ or consultant's comments. No extra claims shall be put on this account.
- j) Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's/ Customer's/ Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.



TITLE:

**TECHNICAL SPECIFICATION
1x660 MW BHUSAWAL TPP UNIT 6
COMPLIANCE CUM CONFIRMATION
CERTIFICATE**

SPEC. NO.: PE-TS-415-166-A001

SECTION: IIIB

REV. NO. **01** DATESHEET **2** OF **2**

- k) As built drawings shall be submitted as and when required during the project execution.
- l) The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.

SIGNATURE: _____

NAME : _____

DESIGNATION: _____

COMPANY: _____

DATE: _____

COMPANY SEAL



**TECHNICAL SPECIFICATION FOR
FUEL OIL HANDLING SYSTEM
1X660 MW BHUSAWAL TPP UNIT # 6**

SPECIFICATION NO. PE-TS-415-166-A001

SECTION III, SUB-SECTION: IIIC

REVISION 01

DATE: 18.03.2020

**SECTION – III
SUB-SECTION IIIC
PRE-BID CLARIFICATION SCHEDULE**



TITLE

**TECHNICAL SPECIFICATION FOR FOHS
1X660 MW BHUSAWAL TPP UNIT 6**

SPECIFICATION NO. PE-TS-415 -166-A001

SECTION III, SUB-SECTION IIIC

REV 01

PRE-BID CLARIFICATION SCHEDULE

S.No.	Section/Clause/ Page No.	Statement of the referred clause	Clarification required

The bidder hereby certifies that above mentioned are the only clarifications required on the technical specification for the subject package.

SIGNATURE: _____

NAME : _____

DESIGNATION: _____

COMPANY: _____

DATE: _____

COMPANY SEAL



**TECHNICAL SPECIFICATION FOR
FUEL OIL HANDLING SYSTEM
1X660 MW BHUSAWAL TPP UNIT # 6**

SPECIFICATION NO. PE-TS-415-166-A001

SECTION III, SUB-SECTION: IIID

REVISION 01

DATE: 18.03.2020

**SECTION – III
SUB-SECTION IIID
SCHEDULE OF TECHNICAL DEVIATION**

DEVIATION SHEET (COST OF WITHDRAWAL)									
 PROJECT:- 1X660 MW BHUSAWAL TPP UNIT 6									
PACKAGE:- FUEL OIL HANDLING SYSTEM									
TENDER ENQUIRY REFERENCE:-									
NAME OF VENDOR:-									
SL NO	VOULME/ SECTION	PAGE NO.	CLAUSE NO.	TECHNICAL SPECIFICATION/ TENDER DOCUMENT	COMPLETE DESCRIPTION OF DEVIATION	COST OF WITHDRAWAL OF DEVIATION	REFERENCE OF PRICE SCHEDULE ON WHICH COST OF WITHDRAWAL OF DEVIATION IS APPLICABLE	NATURE OF COST OF WITHDRAWAL OF DEVIATION (POSITIVE/ NEGATIVE)	REASON FOR QUOTING DEVIATION
TECHNICAL DEVIATIONS									
COMMERCIAL DEVIATIONS									
PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE									
NAME				DESIGNATIONS		SIGN & DATE			
NOTES:									
1. For self manufactured items of bidder, cost of withdrawl of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.									
2. For directly dispatchable items, cost of withdrawl of deviation will be applicable on the basic price including taxes, duties & freight.									
3. All the bidders have to list out all their Technical & Commercial Deviations (if any) in detail in the above format.									
4. Any deviation not mentioned above and shown separately or found hidden in offer, will not be taken cognizance of.									
5. Bidder shall submit duly filled unpriced copy of above format indicating "quoted" in "cost of withdrawl of deviation" column of the schedule above along with their Techno-commercial offer, wherever applicable.									
6. Bidder shall furnish price copy of above format along with price bid.									
7. The final decision of acceptance/ rejection of the deviations quoted by the bidder shall be at discretion of the Purchaser.									
8. Bidders to note that any deviation (technical/commercial) not listed in above and asked after Part-I opening shall not be considered.									
9. For deviations w.r.t. Payment terms, Liquidated damages, Firm prices and submission of E1/ E2 forms before claiming 10% payment, if a bidder chooses not to give any cost of withdrawl of deviation loading as per Annexure-VIII of GCC, Rev-06 will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not mentioned in priced copy of this format submitted with Priced bid, the cost of withdrawl of deviation shall be taken as NIL.									
10. Any deviation mentioned in priced copy of this format, but not mentioned in the un-priced copy, shall not be accepted.									
11. All techno-commercial terms and conditions of NIT shall be deemed to have been accepted by the bidder, other than those listed in unpriced copy of this format.									
12. Cost of withdrawl is to be given seperately for each deviation. In no event bidder should club cost of withdrawl of more than one deviation else cost of withdrawl of such deviations which have been clubbed together shall be considered as NIL.									
13. In case nature of cost of withdrawl (positive/negative) is not specified it shall be assumed as positive.									
14. In case of descerepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.									



TECHNICAL SPECIFICATION FOR
FUEL OIL HANDLING SYSTEM
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SPECIFICATION NO. PE-TS-415-166-A001

SECTION III, SUB-SECTION: IIIE

REVISION 01

DATE: 18.03.2020

SECTION – III

SUB-SECTION IIIE

FORMAT FOR ELECTRICAL LOAD DATA