

ANNEXURE-I

S. NO.	DESCRIPTION OF MANUALS	NO OF PRINTS (sets)	NO. OF CD- ROMs (sets)
1.	PLANT DEFINITION MANUAL-	-	3 CD-ROMs
2.	Drawings "FOR APPROVAL"	10	Soft Copy
3.	Drawings "FOR INFORMATION"	10	Soft Copy
4.	Drawings "FINAL APPROVED DRAWING"	8	Soft Copy
5.	Drawings "AS BUILT "	8	3 CD-ROMs
6	DATASHEETS,DESIGNCALCULATI ONS,PURCHASE SPECIFICATIONS, etc. and Other type of documents		
	i) For Approval	10	SOFT COPY
	ii) FINAL	8	3 CD-ROMs -
	iii) Analysis reports of equipment/ piping/ structures components/ systems employing software packages as detailed in the specifications		
	a) Input	10	SOFT COPY
	b) Output	10	SOFT COPY
	c) Drawings/ Sketches	10	SOFT COPY
7	Erection manual "FINAL"	8	3CD ROMS
8	Operation & Maintenance manual	10	3CD ROMS
9	Plant Hand Book "DRAFT"	6	SOFT COPY
10	Plant Hand Book "FINAL"	15	3CD ROMS
11	Commissioning and Performance Procedure manual	10	3CD ROMS
12	Performance and Functional Guarantees test report	6	3CD ROMS
13	Progress Reports	6	3CD ROMS
14	Project completion report	10	3CD ROMS
15	QA programme including	1	



S. NO.	DESCRIPTION OF MANUALS	NO OF PRINTS (sets)	NO. OF CD- ROMs (sets)
	Organization for implementation and QA system manual (with revision-servicing)		
16	Vendor details in respect of proposed vendors including Bidder's evaluation report.	1	
17	Manufacturing QPs, Field QPs, Field welding schedules and their reference documents like test procedures, WPS, POR etc.		
	(i) For review/comment	3	
	(ii) For final approval	4	1 set CD ROMS
18	Welding Manual, Heat Treatment Manuals, Storage & preservation manuals	4	
	Final	4	2 CD ROMS
19	Monthly Vendor Approval and QP approval status	2	1 CD ROM
20	QA Documentation Package for items / equipment manufactured and dispatched to site	2	2 CD ROMS
21	QA Documentation Package for field activities on equipment/systems at site	2	2 CD ROMS



**TITLE****2x800 MW UPPUR STPP****TECHNICAL SPECIFICATION FOR
FUEL OIL HANDLING SYSTEM**

SPECIFICATION NO.: PE-TS-425-166-A001

REV.: 00

Section: I

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**APPENDIX – III
MASTER DRAWING LIST**


TITLE
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SL. NO.	BHEL DWG. NO.	DRAWING TITLE	DWG. SUB. SCHEDULE FROM LOI	DWG CAT.
1	PE-V0-425-166-A003	DESIGN CALCULATION OF HSD DAY TANK FOR AUXILIARY BOILER	3	B
2	PE-V0-425-166-A035	SUB-VENDOR LIST WITH INSPECTION CATEGORIZATION LIST FOR FOHS	2	B
3	PE-V0-425-166-A012	PAINTING SCHEDULE OF HSD DAY TANK & ASSOCIATED PIPING FOR AUXILIARY BOILER	6	D
4	PE-V0-425-166-A025	CIVIL INPUT DRAWING IN HSD DAY TANK FARM AREA FOR FOHS FOR AUXILIARY BOILER	3	D
5	PE-V0-425-166-A067	QAP OF MISCELLANEOUS ITEMS FOR HSD DAY TANK & ASSOCIATED COMPONENTS FOR AUXILIARY BOILER	8	MC
6	PE-V0-425-166-A045	DEMONSTRATION TEST PROCEDURE OF FOHS FOR AUXILIARY BOILER	12	D
7	PE-V0-425-166-A019	SUGGESTIVE ELECTRICAL LAYOUT DRAWING OF HSD DAY TANK FOR AUXILIARY BOILER	9	D
8	PE-V0-425-166-A016	PIPING LAYOUT IN & AROUND TANK FARM AREA OF HSD DAY TANK FOR AUXILIARY BOILER	4	D
9	PE-V0-425-166-A021	GAD OF HSD DAY TANK INCLUDING ROOF STRUCTURE & NOZZLE ORIENTATION	3	D
10	PE-V0-425-166-A032	CABLE SCHEDULE OF HSD DAY TANK FOR AUXILIARY BOILER	6	D
11	PE-V0-425-166-A033	ELECTRICAL LOAD DATA OF HSD DAY TANK FOR AUXILIARY BOILER	2	D
12	PE-V0-425-166-A034	ISOMETRIC DRAWING OF HSD DAY TANK & ASSOCIATED PIPING FOR AUXILIARY BOILER	6	D
13	PE-V0-425-166-A050	DS AND GAD PIPES, PLATES AND FITTINGS, INSTRUMENTS & OTHER MISCELLANEOUS ITEMS FOR FOHS FOR AUXILIARY BOILER	6	MC
14	PE-V0-425-166-A001	P&ID OF HSD DAY TANK FOR AUXILIARY BOILER	2	B
15	PE-V0-425-166-A044	O&M MANUAL OF HSD DAY TANK FOR AUXILIARY BOILER	20	D
16	PE-V0-425-166-A023	FABRICATION DRAWING OF HSD DAY TANK INCLUDING ACCESSORIES FOR AUXILIARY BOILER	14	D
17	PE-V0-425-167-A001	FABRICATION DRAWING OF CONDENSATE STORAGE TANKS	14	D
18	PE-V0-425-167-A002	DESIGN CALCULATION OF CONDENSATE STORAGE TANKS	2	B
19	PE-V0-425-167-A003	GA DRAWING OF CONDENSATE STORAGE TANKS INCLUDING ROOF STRUCTURE AND NOZZLE ORIENTATION	2	D
20	PE-V0-425-167-A005	DATASHEET & GA DRAWING OF COMPONENTS OF CONDENSATE STORAGE TANKS	5	MC
21	PE-V0-425-167-A007	QAP OF COMPONENTS OF CONDENSATE STORAGE TANKS	5	MC
22	PE-V0-425-167-A008	SUB VENDOR LIST WITH INSPECTION CATEGORY FOR CONDENSATE STORAGE TANKS	2	B
23	PE-V0-425-167-A009	O & M MANUAL FOR CONDENSATE STORAGE TANKS AND ITS VARIOUS COMPONENTS.	20	D
24	PE-V0-425-167-A010	PAINTING SCHEDULE OF CONDENSATE STORAGE TANKS	6	D

Note: Drawing category: B-Basic / D-Detailed / MC-Manufacturing Clearance.

**TITLE****2x800 MW UPPUR STPP****TECHNICAL SPECIFICATION FOR
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SECTION – II**STANDARD TECHNICAL REQUIREMENTS****SECTION IIA – Standard Technical Requirement (Mechanical)**

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1.0

SCOPE

This specification covers design, engineering, supply of material, fabrication, assembly, inspection and testing at shop as well as at site, erection and commissioning, painting and functional demonstration testing at site.

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 applicable, out of the following standards.

1.

IS-800 Code of practice for use if 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

12.

Indian Factories Act

13.

American code for oil tanks API 650

14.

Material Specification as per relevant IS / or approved equal

15.

American water works association standards (AWWA D100)

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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 which these tanks have to hold as specified and external forces due to wind and seismic forces without deformation or undue strain. The plates will be cold rolled through plate bending machines by several no. of passes to the curvature.

3.1.2

Tank thickness shall be calculated as per IS803 latest edition. Intermediary wind girder design, Wind Design, Seismic design, anchor bolt design / selection etc. shall be done as per API 650 latest edition, latest addendum available at the time of detail engineering.

3.1.3

All tanks will be designed for the capacities, dimensions and working conditions as specified in **DATA SHEET for HSD Day & Condensate Storage Tank**. 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 1.8 mm corrosion allowance for shells, bottom and roofs above and beyond the required thickness / calculated thickness / nominal thickness as specified in the design code shall be provided.

3.1.4

Vessel seams shall be so positioned that they do not pass through nozzle connections on vessel. For vessels consisting of more than two sections, longitudinal seams shall be offset.

3.1.5

The inside seam should be ground smooth, suitable for application of corrosion resistant primer. If the stiffening of shell, bottom and / or roof is necessary, tanks will be stiffened from outside.

3.1.6

Flange faces of all nozzles shall be machined and squared with the vessel center line.

3.1.7

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.

3.1.8

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.

3.1.9

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.

3.1.10

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.

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3.1.11	Material of construction of all tanks shall be mild steel conforms to IS – 2062 grade – B unless otherwise specified in the DATA SHEET for Condensate Storage Tank & HSD Day tank.		
3.1.10	<u>Alignment</u>		
3.1.10.1	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.		
3.1.10.2	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.		
3.1.10.3	Each tank shall be properly constructed ensuring perfect vertical alignment with 5 mm or as specified in the relevant code / standard and tank circularity within 5 mm on diameter or as specified in the relevant code / standard. Local bulging and / or depressions at any location of tank particularly shell shall not be permitted.		
3.1.11	<u>WELDING</u>		
3.1.11.1	Tanks and other attachments shall be welded as per IS-816.		
3.1.11.2	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.		
3.1.11.3	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.		
3.1.11.4	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.		
3.1.12	Each tank shall be complete with access staircase, ladder and safety cage 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 for HSD day & Condensate Storage Tank.		
3.1.13	All openings in tank plate shall be well reinforced in approved manner by adding pad plates of adequate size and / or structural sections.		
3.1.14	<u>STAIRCASE / ACCESS LADDER AND HAND RAILING</u>		

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3.1.14.1

All cylindrical vertical tanks shall be provided with spiral staircase and shall conform to the requirements specified in design codes / standards unless specified otherwise. All stair treads shall be 50 mm steel fabricated gratings or 8mm thk. chequered plate which will be decided during detail engineering stage. 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 800 mm clear width.

3.1.14.2

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 diameter rods spaced at not more than 30 mm 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.

3.1.14.3

All staircase and roofs of vertical cylindrical tanks shall be provided with pipe hand railings of effective height as indicated in the relevant code / standard throughout. Handrails shall be constructed out of 32 mm medium class galvanized steel pipe conforming to IS- 1239: 1968. 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 and installed in an approved manner as directed by purchaser in accordance with approved drawings.

3.1.15

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

3.1.16

Unless otherwise specified, bolts and nuts shall be hexagonal head conforming to bolts and nuts shall be SA 193 & 194 respectively.

3.1.17

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.

3.1.18

Float level indicators other than float and arrow type level indicator, gauge glass shall be provided.

3.1.19

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.

3.2

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 codes and standards as specified in the **DATA SHEET for HSD day & CS Tank**. The vertical cylindrical 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.

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3.2.2	Conical roof shall be either self-supported or supporting. The roof shall have a slope as specified in the relevant design code 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 be 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 8 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 either self-supported or supported over rafters / 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	Openings needed for mounting various specified accessories shall be well reinforced in accordance with application codes and as approved. Manhole shall be bolted and 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.		
3.3.0	<u>RECTANGULAR TANKS</u>		

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3.3.1	Rectangular tanks shall be fabricated in 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 good engineering practice when their effect considered with tank load.		
3.3.2	Tank bottom and / or side plates shall be of minimum 8 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. Suitable sized drain valve of size minimum 25 NB unless otherwise specified in the DATA SHEET for HSD day & Condensate Storage Tank shall be provided below the tank bottom for proper draining of the tank.		
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.		
3.3.7	The rectangular tank shall be designed as per good engineering practice and reference shall be taken from the book named "Theory of plates and shells" by Timoshenko. Design calculation shall be done in accordance with the above mentioned book.		
3.3.8	Suitable steel structural e.g. channels shall be provided below the bottom plate so that tank can rest on the foundation / slabs through the structural supports.		
3.4	<u>HORIZONTAL CYLINDRICAL TANK</u>		
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 / IS – 2825 / ASME as specified in the DATA SHEET for DM & Condensate Storage Tank . 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 relevant code / standard.		

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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 center line.		
3.4.4	All tank shall be supplied with integral saddle support and shall be designed in accordance with BS- 2594 / IS – 2825 / ASME as specified in the DATA SHEET for HSD DAY & Condensate Storage Tank.		
4.0	<u>TESTING AND INSPECTION AT MANUFACTURERER’S WORKS</u>		
4.1	<u>General</u>		
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.		
4.1.4	All materials including valves, instruments, pipings, flanges, counter flanges etc. shall be procured from BHEL approved manufacturer’s only. Dealers are not acceptable.		
4.2	<u>TESTING AND INSPECTION FOR TANKS</u>		
4.2.1	The scope of testing and inspection for pressure vessel 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.

xiv)

All tanks under this specification shall be tested as per the relevant design and testing code / standard. Supplier shall submit the detailed testing procedure for the tanks during detail engineering stage for BHEL / customer / consultant's approval and approved document shall be adhered by them and testing shall be done accordingly without any commercial implication.

4.2.2

NON - PRESSURE TANKS

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

i)

Identification of materials to manufacturer's test certificates.

ii)

Inspection of plate edges after edge preparation and checking curvature against templates if shell plates sent after rolling.

iii)

Checking of dimension and match marking.

iv)

Bottom testing

a.

After the bottom and bottom course of shell plates have been welded, the bottom shall be tested by pumping air beneath the bottom plates to a pressure just sufficient to lift them off

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the foundation and in any case not less than 100 mm water gauge. The pressure shall be held by construction of a temporary dam of clay or other suitable material around the tank periphery. Soap suds or other suitable material shall be applied to all joints for detection of leaks.

b. Fuel oil may be used instead of air and soap suds to test for leaks, subject to prior agreement and approval of purchaser.

c. Alternatively, the bottom seams may be tested by vacuum box method subject to prior agreement and approval of the purchaser. The vacuum box used shall comply with IS- 803, 1976 (figure-24)

v) Shell testing

The shell of fixed roof non - pressure tanks shall be tested after completion of roof. Testing shall be done by filling the tank with water to the level of the top leg of the top curb angle and noting any leaks.

vi) Roof testing

The roof of the tank shall be tested by pumping air under the roof plates while the tank is still full of water. In the non - pressure tank, the roof shall be tested to a pressure of 75 mm of water gauge and in case of pressure roof tanks, to a pressure of one and a quarter times the pressure at which the pressure sides of the pressure / vacuum relief valve is designed to open. Soap suds or other suitable material shall be applied to all joints for detection of leaks.

vii) All field-testing shall be performed prior to any painting or coating application.

4.3 REPAIR OF LEAKS

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

4.3.2 In the joints between roof plates only, pin hole leaks may be repaired by mechanical caulking. 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.

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

4.3.4 When the tank is filled with water for testing, defects in the shell joints shall be repaired with the water level at least 300 mm below the joint being repaired.

4.3.5 No welding shall be done on any tank unless all lines connecting thereto have been completely blanked off. No repairs shall attempted on tanks while filled with oil, nor any tanks which have contained oil until the tanks have been emptied, cleaned and freed from gas in a safe manner. No repair shall be attempted by the on a tank which has contained oil

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**TECHNICAL SPECIFICATION FOR
FUEL OIL
HANDLING SYSTEM
(STANDARD TANK SPECIFICATION)**

SPECIFICATION NO. PE-TS-425-166-A001

SECTION

IIA

REVISION 00

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except in a manner approved in writing by the purchaser, and in absence of the purchaser's inspector.

**TITLE****2x800 MW UPPUR STPP****TECHNICAL SPECIFICATION FOR
FUEL OIL HANDLING SYSTEM**

SPECIFICATION NO.: PE-TS-425-166-A001

REV.: 00

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Date: 25/10/2017

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STANDARD QAP's

- 43.3 In case of any major deviations in technical specifications, if the Owner is convinced that such deviation is superior to the equipment proposed by the Owner, then Owner reserves right to accept this major deviation without any additional financial implications.

44.0 DUES TO THE TANGEDCO

Amount due from the Tenderer to the TANGEDCO for default in any other purchase will be adjusted against Security Deposit or balance amount in the event of an order placed against this Tender. The Purchaser reserves the right:

- a. To recover any dues against this Contract in any bills, Security Deposit, EMD of the Supplier/ Contractor either in this Contract or other Contract with the TANGEDCO.
- b. To recover any dues against any other Contract of the Supplier/ Contractor with TANGEDCO, with the available amount due to the Supplier/ Contractor against this Contract.

45.0 GUARANTEE CERTIFICATE

A written undertaking guaranteeing TANGEDCO against defects in the materials supplied either in materials or workmanship shall be furnished along with the bid. (Annexure -12).

46.0 INTEREST ON OVER DUE PAYMENTS

Any interest on overdue payments is not acceptable, under any circumstances.

47.0 DISCREPANCIES BETWEEN DRAWING AND SPECIFICATION

- 47.1 Should there be any discrepancy between the Specification and or drawings or any inconsistency error or omission in either of them, reference must be made to the Engineer for an explanation and the Contractor will be held responsible for any errors that may occur in the work through neglect of this precaution. The Contractor shall be responsible for and shall pay for any alterations of the work done due to any discrepancies, error or omissions, in the drawings or particulars supplied by him, whether such drawings or particulars have been approved by the Owner or not, provided that such discrepancies, errors or omission be not due to inaccurate information or particulars furnished by the Contractor to the Owner, but the Contractor shall be responsible for drawing and information supplied to the Owner and the Contractor shall pay for any alterations of the work necessitated by reason of inaccurate information supplied to Owner by the Contractor.

48.0 INSPECTION, TESTING & INSPECTION CERTIFICATES GENERAL

- 48.1 The Plant and Equipments, covered by this Contract shall be subjected to inspection and testing. The Supplier/ Vendor/ Contractor/ Fabricator shall provide all services to establish and maintain quality of workmanship in his works and that of his Sub-Suppliers/ Sub-Vendors/Sub-Contractors/Sub-Fabricators to ensure the mechanical accuracy of components, compliance with drawings, identification and acceptability of all materials, parts and Equipment.
- 48.2 The Owner and / or his duly authorized representative shall have at all reasonable times access to the Supplier's / Vendor's / Contractor's / Fabricator's premises or works and shall have the power, at all reasonable times to inspect and examine the materials and



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workmanship during manufacture and if part of the equipment is being manufactured or assembled on other premises or works, the Supplier / Vendor / Contractor / Fabricator shall obtain for the Engineer and for his duly authorized representatives, permission to inspect as if the Equipments were manufactured or assembled on the Supplier's / Vendor's / Contractor's / Fabricator's own premises or works.

- 48.3 Necessary accommodation and local travel shall be arranged free of cost for the inspecting officers by the Contractor during inspection, testing at the premises.

49.0 DESPATCH CLEARANCE

The despatch clearance will be normally issued by TANGEDCO within 30 days of the receipt of inspection report/ Test Certificates.

50.0 BLACK LISTING

The firm or the bidder will be black listed if the particulars produced by the bidders such as Auditor Certificate/ Annual Account, Sales Tax Clearance Certificate & Experience etc. are found to be false.

51.0 JURISDICTION FOR LEGAL PROCEEDINGS

- 51.1 No suit or any proceedings in regard to any matter arising in any respect under this contract shall be instituted in a Court Save in the City Civil Court of Chennai or the Courts of Small Causes at Chennai. It is agreed that no other courts shall have jurisdiction to entertain any suit or proceedings even though part of the cause of action might arise within their jurisdiction. In case any part of cause of action arises within the jurisdiction of any of the courts in Tamil Nadu and not in the courts in the Chennai City, it is agreed to between the parties that such suits or proceedings shall be instituted in a court within Tamil Nadu and no other court outside Tamil Nadu shall have jurisdiction, even though any part of the cause of action might arise within the jurisdiction of such courts.

- 51.2 The bidders shall furnish an undertaking in a non-judicial stamp paper of value Rs.80/- agreeing to the above condition as per schedule furnished in Annexure-7 in Volume I of this specification.

52.0 CHANGE OF QUANTITY BEFORE AWARD OF THE CONTRACT

- 52.1 The owner reserves the right to vary the quantities of items to be ordered as per specifications, if found necessary before award of the contract as per unit prices. In case unit prices are not available, the prices for items added/ deleted shall be mutually agreed.

53.0 AWARD OF CONTRACT

- 53.1 Notification of award of contract shall be made in writing through a 'Notice of Award i.e. A Letter of Intent (LOI) to the successful Bidder. This Letter of Intent may be in writing by telefax, which shall be confirmed in writing by letter by registered post or by courier service or by speed post informing the successful bidder that its bid has been accepted.
- 53.2 Subject to the submission of Security Deposit cum Performance Bank Guarantee within 30 days from the date of Letter Of Intent (LOI), the Owner shall award the contract to the successful bidder (through a Purchase order (PO)) whose bid has been determined to be qualified, substantially responsive, and has been determined as the lowest evaluated bid.



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be retained by the Purchaser and the Contractor will forthwith pay the Purchaser, the shortfall amount between the claim money and the total of amounts as per mentioned above.

In case of damage to any equipment/ material during any stage, the Contractor upon rectification of the damaged equipment to the satisfaction of the Purchaser shall be paid to the extent of full claims settled by the underwriters. Subsequent payments, if any, due under the Contract shall be regulated by the relevant terms of payment.

21.0 TROPICAL SERVICEABILITY

- 21.1 All equipments furnished under the Contract shall be suitable and whenever necessary treated and processed for delivery, storage and use under tropical conditions including high temperature, high humidity, mild dew and fungus conducive environment. All equipments shall be specially protected with protective coating and other measures to ensure prevention of rusting of the equipment/material. An approved drying agent such as 'silica gel' shall be packed in containers or packages holding parts which should not be adversely affected by moisture or excessive humidity.

22.0 INSPECTION, TESTING AND INSPECTION CERTIFICATE

- 22.1. The Owner and/or his duly authorized representative shall have at all reasonable times access to the contractor premises or works and shall have the power at all reasonable times to inspect and examine the materials and workmanship of the works during its manufacture and if part of works is being manufactured or assembled on other's premises of works, the contractor shall obtain for the Owner/Purchaser and for his duly authorized representative, permission to inspect, as if the works were manufactured or assembled on the contractors own premises.
- 22.2 The Contractor shall furnish in English translation of the standards to which shop tests on equipment shall conform. He shall finalize the test methodology, test set up furnish list of tests and their approximate time and place of tests to the Owner/Purchaser.
- 22.3. The Contractor shall give the Owner/Purchaser/Inspector fifteen (15) days notice by telex or Fax of any material being ready for testing. Such tests shall be to the contractor's account including the expenses of the Inspector towards all local transport, living and other incidental expenses including the cost of international passage to and fro. The Owner/Purchaser/Inspector, unless the inspection of the tests is virtually waived, shall attend such tests within thirty (30) days from the date on which the equipment is notified as being ready for inspection/witnessing of test, failing which, the Contractor may proceed with the tests which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Inspector duly certified copies of the test results in triplicate. The Contractor shall assemble equipment and carry out shop test in the works in the presence of one Engineer from TANGEDCO for each unit.
- 22.4. The Owner/Purchaser or Inspector shall within seven (7) days from the date of



inspection as defined herein give notice in writing to the Contractor of any objection to any drawings unless already approved earlier testing procedure and testing facilities and all or any equipment and workmanship which in his opinion is not in accordance with the contract. The Contractor shall give due consideration to such objection and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Owner/ Purchaser/Inspector giving reasons therein, that no modifications are necessary to comply with the Contract.

- 22.5. When the factory tests have been completed at the contractors or sub-contractors works, the Owner/Purchaser/Inspector shall issue a certificate to this effect within seven (7) days after completion of tests but if the tests are not witnessed by the Owner/Purchaser/Inspector to issue such a certificate shall not prevent the contractor from proceeding with the contract. The completion of these tests or the issue of the certificate shall not bind the Owner/Purchaser to accept the equipment should it, on further tests after erection, can be found not to comply with the contract.
- 22.6. In all cases where the contract provides for tests whether at the premises of works of the contractor or any sub-contractor the Contractor where otherwise specified, shall provide free of charge such items as labour, materials, electricity, fuel, water stores, apparatus and instruments, as may reasonably be demanded by the Owner/Purchaser/Inspector or his authorized representative(s) to carry out effectively, such tests of the equipment in accordance with the contract and shall give facilities to the Owner/Purchaser/Inspector or to his authorized representative to accomplish testing.
- 22.7. The inspection by the Owner/Purchaser and issue of inspection certificate thereon shall in no way limit liabilities and responsibilities of the Contractor in respect of the agreed quality assurance programme forming a part of the contract.
- 22.8. Final acceptance letter after witnessing the test by the Owner/Purchaser's representative shall be issued by the office awarding this contract. The contractor shall despatch the equipment after receipt of the letter of consent from the office awarding the contract.
- 22.9. Final acceptance letter for the test certificates will be approved by the Owner/Purchaser within 10 (Ten) days from the date of receipt of test reports. The documents shall be negotiated for payment along with the approval of test certificate.

23.0 LIABILITY FOR ACCIDENTS TO PERSONS

- 23.1 The Contractor shall indemnify and save harm to the Purchaser against all sections, suits, claims, demands, cost of expenses arising in connection with injuries suffered, prior to the date when the works or plant shall have been taken over, by the Purchaser by person employed by the Contractor or his sub-contractor on the works whether under the general law or under the workmen's compensation Act, 1923, or any other statute in force on the date of the contract, dealing with question of liability of employer for injuries suffered by employees and to have taken steps properly to insure against any claims there under.



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ANNEXURE-V

Project Bidder Bidder No. System		Stage :		FIELD WELDING SCHEDULE (To be raised by the Bidder) Welding Code:				DOC. NO.:						
								REV. NO.:						
								DATE :						
								PAGE : OF						
Sl. No.	DRG No. for Location Identification mark	Weld Description and parts to be welded	Matl. of Spec.	Dimensions	Process of welding	Type of Weld	Electrode filler spec.	WPS. No.	Min. pre-heat	Heat treatment Temp.	NDT method/ Quantum	REF Spec. No.	ACC Norm Ref.	Remarks
NOTES:														
SIGNATURE														



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ANNEXURE-VI

MFGR.'s LOGO		MANUFACTURER'S NAME AND ADDRESS	MANUFACTURING QUALITY PLAN					PROJECT :						
			CHARACTERISTIC S	CLAS S	TYPE OF CHECK	QUANT UM OF CHECK	REFERENC E DOCUMENT T	ACCEPTAN CE NORMS	FORMAT OF RECORD	AGENCY			REMARKS	
COMPONENT & OPERATIONS	3.	4.								5.	6.	7.		8.
			1.	2.										
			LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER/SUB-SUPPLIER C: SUPPLIER/NOMINATED INSPECTION AGENCY, OWNER N: THE					DOC. NO.: REV..... CAT.....						
MANUFACTURER/ SUB-SUPPLIER		MAIN- SUPPLIER						FOR THE						



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SIGNATURE	P: PERFORM VERIFICATION. CHP: THE OWNER SHALL IDENTIFIED IN COLUMN "N"	W: WITNESS AND AS APPROPRIATE,	V: V:	OWNE R USE	REVIEWED BY	APPROVE D BY	APPRO VAL SEAL



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ANNEXURE-VII

MFGR.'s LOGO		SUPPLIER'S NAME AND ADDRESS		FIELD QUALITY PLAN					PROJECT : PACKAGE : CONTRACT NO. : MAIN-SUPPLIER:				
				ITEM :		TYPE							
				SUB-SYSTEM :	CLASS# OF CHECK	OF CHECK	QUANT UM OF CHECK	REFEREN CE DOCUMENT					
SL NO	ACTIVITY AND OPERATION	CHARACTERISTICS / INSTRUMENTS	4.	5.	6.	7.	8.	9.	D*	10.	ACCEPTANCE NORMS	FORMAT OF RECORD	REMAR KS
1.	2.	3.											
				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. LEGEND TO BE USED: CLASS #: A = CRITICAL, B=MAJOR, C=MINOR;					DOC. NO.: REV.....				
MANUFACTURER/ SUB-SUPPLIER		MAIN- SUPPLIER							FOR THE				



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SIGNATURE	'A' SHALL BE WITNESSED BY THE OWNER FQA, 'B' SHALL BE WITNESSED BY OWNER'S ERECTION / CONSTRUCTION DEPTT. AND 'C' SHALL BE WITNESSED BY ERECTION SUPPLIER (A & B CHECK SHALL BE OWNER CHP STAGE)	OWNER USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL



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QAP OF LEVEL INDICATOR

Manufacturer's Name:				QUALITY ASSURANCE PLAN				PROJECT: PACKAGE: Misc. Tanks (Site Fabricated) LOI No. : Customer : BHEL			BHEL Doc. No.: Rev. No. : 0 Date:			SHEET 1 OF 1	
				QAP OF LEVEL INDICATOR											
SI. No.	Components and Operation	Characteristic/ Item	Class	Type of Check	Extent of Check	Reference Document	Acceptance Norm	Format of Record (D*)	Agency			Remarks			
1	2	3	4	5	6	7	8	9	M	B	C	11			
1	Level Indicator	Check for Type, Model No., Tag No.	MA	Visual	100%	Approved Data Sheet	Approved Data Sheet	Mfgr. TC	P	V	V				
2		Float Leakage Test	CR	Mechanical	100%	Approved Data Sheet	Approved Data Sheet	Mfgr. TC	P	V	V				
3		Review of TC for Material	CR	Visual	For Lot	MTC	MTC	Mfgr. TC	P	V	V				
			C: BHEL B : Vendor M. : Manufacturer				P - Perform W - Witness V - Verification								
Manufacturer / Contractor / Sub contractor							FOR BHEL			FOR CUSTOMER			APRD. BY		
Signature															

Manufacturer's Name:			MANUFACTURING QUALITY PLAN FOR VALVES				PROJECT:			BHEL Doc. No.:		
							PACKAGE: Misc. Tanks (Site Fabricated)			Rev. No. : 0		
							LOI No. :			Date:		
							Customer : BHEL			SHEET 1 OF 1		
Sl. No.	Components and Operation	Characteristic/ Item	Class	Type of Check	Quantum	Reference Document	Acceptance Norm	Format of Record (D*)	D	Agency		Remarks
										M	B	C
1.0	Material :											
1.1	Body,Bonnet,forgings/casting	1.Chemical composition	CR	Chem.test	One /heat	Approved Data Sheet/DRG	Relevant standard.	TC	✓	P	V	V
		2.Mech properties	CR	Tensile test	One /heat HT Batch	Approved Data Sheet/DRG	Relevant standard.	TC	✓	P	V	V
1.2	Disc & spindle	1. Mech Properties	MR	Tensile test	1 Test bar /Heat	Approved Datasheet	Relevant standard.	TC	✓	P	V	V
		Chemical properties	MR	Chemical analysis								
2.0	In Process Inspection :-											
2.1	Body,Bonnet,Disc,spindle after Machining	Visual	MR	Visual	100%		No visual surface defect	IR	✓			
		Dimension	MR	Measurements	100%	Component drg	Component drg	compliance report		P		
2.2	Body,Seat ring ,Disc,spindle after Machining	Surface defects	MR	DPT	100%		No significant defects	mfrg.TC	✓	P	-	
3.0	TESTING & FINAL INSPECTION											
3.1	Complete valve	hydrotesting(pressure & duration as per approved datasheet/std.)	MR	Body/seat	100%	Approved datsheet	No leakage through Body/seat	TC	✓	P	W	W
3.2		Functional test	MR	Full open & full close	100%	Approved Drg/datasheet	Smooth operation	IR	✓	P	W	W
	LEGEND : * RECORDS IDENTIFIED WITH "TICK" SHALL BE INCLUDED C: BHEL B : VENDOR M:Manufacturer DPT=Dye penetrant test MR-MAJOR,CR-Critical ,CHP-customer Hod, R=review,NDT-non Destructive test,TC-test certificate,IR-inspection Report ,D-Data folder,DPT=Dye penetrant Test											
	Manufacturer / Contractor / Sub contractor	CR-Critical Characteristics MA - Major Characteristics MI- Minor Characteristics	FOR BHEL			FOR CUSTOMER				APRD. BY		
	Signature											

QAP OF MS PLATES

Manufacturer's Name: Approved sub vendor				MANUFACTURING QUALITY PLAN				PROJECT:				BHEL Doc. No.:			
				ITEM: MS PLATES Sub-system- Misc.tanks				PACKAGE: Misc.Tanks (Site Fabricated) LOI No. : Customer : BHEL				Rev. No. : 0 Date:			
Sl. No.	Components and Operation	Characteristic/ Item	Class	Type of Check	Extent of Check	Reference Document	Acceptance Norm	Format of Record (D*)	Agency			Remarks			
1	2 RAW MATERIAL	3	4	5	6	7	8	9	M	B	C	12			
1	STEEL PLATES	Chemical composition and Mechanical test	MA	Review of correlated Visual and MTC	one/heat	IS:2062	IS:2062	Mfgr. TC	✓	P	V	V	Refer Note below		
2		Visual and dimensionl check	MA	100%	100%	Mfg.TC	Mfg.TC IS1852	Mfgr. TC	✓	P	**W	**W			
3		Identification/markng	MA	Correlation establish	100%	As per manufacturing practice	As per manufacturing practice IS 2062	Mfgr. TC	✓	P	V	**W			
				LEGEND : * RECORDS IDENTIFIED WITH "TICK" SHALL BE INCLUDED											
				C: BHEL B: VENDOR M.Manufacturer				P - Perform W - Witness V - Verification				DOC. NO. : Rev No.0			
Manufacturer / Contractor / Sub contractor								FOR BHEL				FOR CUSTOMER			
Signature												APRD. BY			

Notes ** In case material is despatched directly from Approved sub-vendor plant/stockyard or procured from dealer against co related TC's witnessing by BHEL is waived off and material will be accepted based on MTC of approved sub vendor.
In case material is procured from dealer and co related TC's are not available check on 100% quantity of plates will be performed on sample drawn from them at NABL certified/approved laboratory for chemical & physical properties,however dimensional check shall be witnessed by BHEL

QAP OF PIPE FITTINGS, FLANGES & ACCESSORIES

Manufacturer's Name:		QUALITY ASSURANCE PLAN		PROJECT: PACKAGE: Misc. Tanks (Site Fabricated) LOI No. : Customer : BHEL		BHEL Doc. No.: Rev. No. : 0 Date:		SHEET 1 OF 1	
		INSPECTION CHECK LIST FOR PIPE FITTINGS , FLANGES & ACCESSORIES							
Sl. No.	Components and Operation	Class	Type of Check	Reference Document/Acceptance Norm		Agency		Remarks	
1	2	3	4	5		6		7	
1	Pipes Fittings, Flanges & Accessories	MI	Visual	As per Approved Data Sheet/Tech spec.		P	V	V	
2		MI	Dimensional	As per Approved Data Sheet/Tech spec.		P	V	V	
3		MI	Review of TC	As per MTC		P	V	V	
		MA	Hydro Test	As per MTC		P	V	V	
		LEGEND : * RECORDS IDENTIFIED WITH "TICK" SHALL BE INCLUDED C : CUSTOMER /BHEL B. : VENDOR M. : Manufacturer							
Manufacturer / Contractor / Sub contractor Signature				FOR BHEL		FOR CUSTOMER		APRD. BY	APPROVAL SEAL
								DOC. NO. :	

STANDARD QUALITY PLAN FOR STRUCTURAL STEEL										QUALITY PLAN NO.: PE-QP-XXX-166-A803				
PROJECT-										PACKAGE-FULE OIL SYSTEM				
REV.NO. 0										DATE: 31/03/2012				
SHEET 1 OF 1														
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS		
									D	M	C	CU		
1.0	Structural	a) Chemical Composition b) Mechanical test c) Dimensional conformity	M	Chemical Analysis Mechanical Properties Measurement	Sample -do- 100%	IS:2062/ Spec./Drg. -do- -	IS:2062/ Spec./Drg. -do- -	Mfr's TC Mfr's TC Mfr's TC	✓ ✓ ✓	P P P	V* V* W**	V V V	11	
* In case material is procured from dealer, and co-related TCs are not available, check test on identified sample will be carried out at recognised testing laboratory. ** In case material is despatched directly from SAIL/IISCO plant to project site, the witnessing required is waived and material will be accepted on challan & MTC of SAIL/IISCO														
LEGEND: RECORDS IDENTIFIED WITH "✓" * SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENT. M - MANUFACTURER C - MAIN VENDOR CU - BHEL/CUSTOMER/NOMINATED INSPECTION AGENCY "P" PERFORM, "W" WITNESS AND V VERIFICATION														
MAIN VENDOR/SUB-VENDOR (SIGN WITH DATE & STAMP)										REVIEWING AGENCY (SIGN WITH DATE & STAMP)			APPROVING AGENCY (SIGN WITH DATE & STAMP)	

										STANDARD QUALITY PLAN FOR STEEL PLATE										QUALITY PLAN NO.: PE-QP-XXX-166-A804									
PEM MAUX																				PACKAGE-FULE OIL SYSTEM									
																				PROJECT-									
																				REV.NO. 0 DATE: 31/03/2012									
																				SHEET 1 OF 1									
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS CHECKED	CATEGORY	TYP/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY		REMARKS																		
									P	W	V																		
1.0	Steel Plate	a) Chemical Composition	MA	Chemical Analysis	Sample	IS:2062/ Spec./Drg.	IS:2062/ Spec./Drg.	Mfr's TC	3		2*,1																		
		b) Mechanical test	MA	Mechanical Properties	-do-	-do-	-do-	Mfr's TC	3		2*,1																		
		c) Dimensional conformity	MA	Measurement	100%	-	-	Mfr's TC	3	2**	1																		
* In case material is procured from dealer, and co-related TCs are not available, check test on identified sample will be carried out at testing laboratory. ** In case material is despatched directly from SAIL/TISCO plant/Stock yard to project site, the witnessing required is waived and material will be accepted on MTC of SAIL/TISCO																													
LEGEND CR - Critical characteristics MA - Major characteristics MI - Minor characteristics													P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.																
MAIN VENDOR/SUB-VENDOR (SIGN WITH DATE & STAMP)													REVIEWING AGENCY (SIGN WITH DATE & STAMP)																
APPROVING AGENCY (SIGN WITH DATE & STAMP)													1 - BHEL 2 - Vendor 3 - Sub-vendor 4-CUSTOMER																

STANDARD QUALITY PLAN FOR BALL VALVE										QUALITY PLAN NO.:PE-QP-XXX-166-A808 PACKAGE-FULE OIL SYSTEM PROJECT- REV.NO. 0 SHEET 1 OF 3 DATE: 31/03/2012									
SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS							
1	2	3	4	5	6	7	8	9	D	M	C	CU							
1.0	MATERIALS:																		
1.1	BODY & END PIECE	CHEMICAL COMPOSITION	CRITICAL	CHEM TEST	ONE/ HEAT	APPD.DRG./ DATA SHEET	APPD.DRG./ DATA SHEET/ RELEVANT STD.	MATRL TC/ MFR'S TC	✓	P	V	V							
		MECHANICAL PROPERTIES	- DO -	MECH. TEST	ONE/HEAT/ HEAT TREAT- MENT BATCH	- DO -	- DO -	- DO -	✓	P	V	V							
		HEAT TREATMENT	- DO -	REVIEW OF HT CHART	100%	- DO -	- DO -	- DO-/HT CHART	✓	P	V	V							
		IDENTIFICATION & CORRELATION	MAJOR	VISUAL	100%	- DO -	- DO -	INTERNAL RECORD		P	V	-							
		SURFACE DEFECTS	- DO -	- DO -	100%	MSS-SP-55	FREE FROM DEFECTS	- DO -	✓	P	V	-							
		DIMENSIONAL	- DO -	MEASU- REMENT	100%	APPD. DRG./ RELEVANT STD.	APPD. DRG./ RELEVANT STD.	LOG BOOK		P	V	-							
LEGEND: RECORDS, IDENTIFIED WITH ✓ ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION. M: MANUFACTURER . C:MAIN VENDOR, CU: BHEL/CUSTOMER INDICATE "P" PERFORM, "W" WITNESS AND "V" VERIFICATION																			
MAIN VENDOR/SUB-VENDOR (SIGN WITH DATE & STAMP)										REVIEWING AGENCY (SIGN WITH DATE & STAMP)				APPROVING AGENCY (SIGN WITH DATE & STAMP)					



STANDARD QUALITY PLAN FOR
BALL VALVE

QUALITY PLAN NO.: PE-QP-XXX-166-A808
 PACKAGE-FULE OIL SYSTEM
 PROJECT-
 REV.NO. 0
 SHEET 3 OF 3
 DATE: 31/03/2012

SL NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									D	M	C	
1	2.3 BALL & SEAT	BLUE MATCH	CRITICAL	BLUE MATCHING	100%	THE SURFACE WILL BE SMOOTH & WILL HAVE UNIFORM METAL TO METAL CONTACT	SAME AS COL.7	LOG BOOK	✓	P	V	11
3.0	ASSEMBLY	DIMENSIONS	MAJOR	MEASUREMENT	*AS PER NOTE-1 BELOW	APPD. DRG./ RELEVANT STD.	APPD. DRG./ RELEVANT STD.	INTERNAL RECORD	✓	P	W	W
4.0	TESTING:	OPENING & CLOSING	-DO -	OPERATION	-DO -	SMOOTH OPERATION OF VALVE	-DO -	-DO -	✓	P	W	W
4.1	SHELL	LEAKAGE	CRITICAL	HYDRO-STATIC	*AS PER NOTE-1 BELOW	APPD. DRG./ DATA SHEET	NO LEAKAGE	TEST CERTIFICATE	✓	P	W	W
4.2	SEAT	-DO -	-DO -	-DO -	-DO -	-DO -	-DO -	-DO -	✓	P	W	W
4.3	SEAT	-DO -	-DO -	AIR	-DO -	-DO -	-DO -	-DO -	✓	P	W	W
4.4	FIRE SAFE TEST REPORT WITNESSED BY LLOYD/BV SHALL BE FURNISHED FOR REVIEW											
4.5	REVIEW OF QA DOCUMENTATION AS PER APPD. QP											
5.0	PAINTING:	QUALITY & THICKNESS OF PAINT	MAJOR	VISUAL & MEASUREMENT	100%	TECH. SPEC/ DATA SHEET/ MFG. STD.	SAME AS COL.7	INTERNAL RECORD	✓	P	V	-
6.0	PACKING:		MAJOR	VISUAL	100%			INTERNAL RECORD		P	-	-

NOTE-1:
 100% BY MANUFACTURER
 10% BY TECHNO

For Actuator operating valves - Actuator test certificate shall be furnished to BHEL for review.
 For Fire safe valves - Valves are to be accepted based on fire test certificates

LEGEND:
 RECORDS, IDENTIFIED WITH ' / ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.
 M: MANUFACTURER.
 C: MAIN VENDOR, CU: BHEL/CUSTOMER
 INDICATE 'P' PERFORM, 'W' WITNESS AND 'V' VERIFICATION

MAIN VENDOR/SUB-VENDOR
(SIGN WITH DATE & STAMP)

REVIEWING AGENCY
(SIGN WITH DATE & STAMP)

APPROVING AGENCY
(SIGN WITH DATE & STAMP)

STANDARD QUALITY PLAN FOR CS PIPE -ERW										QUALITY PLAN NO.:PE-QP-XXX-166-A809 PACKAGE-FULE OIL SYSTEM PROJECT- REV.NO. 0 SHEET 1 OF 1 DATE: 31/03/2012				
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS		
1	2	3	4	5	6	7	8	9	D	M	C	10	11	
1.0	ERW PIPE	a) Physical & Chemical test b) Dimensional conformity c) Hydro test	M	Physical & Chemical Properties Measurement Leak test	Sample At random 100%	IS:1239 Pt.1/ API 5L Gr. B/ Appd. Data sheet -do- -do-	IS:1239 Pt.1/ API 5L Gr. B/ Appd. Data sheet -do- -do-	MTC/ Mfr's TC MTC/ Mfr's TC MTC/ Mfr's TC	✓ ✓ ✓	P P P	V V V	V V V	Refer Note-1	
Note-1: In case material is procured from dealer, and co-related Mfr's TCs are not available, check test on identified sample will be carried out at testing laboratory and hydro test at pressure 1.5 times of design pressure on 10% of total quantity will be witnessed by BHEL.														
LEGEND: RECORDS IDENTIFIED WITH " W " SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENT. M - MANUFACTURER C - MAIN VENDOR CU - BHEL/CUSTOMER "P" PERFORM, "W" WITNESS AND V VERIFICATION														
MAIN VENDOR/SUB-VENDOR (SIGN WITH DATE & STAMP)										REVIEWING AGENCY (SIGN WITH DATE & STAMP)			APPROVING AGENCY (SIGN WITH DATE & STAMP)	



STANDARD QUALITY PLAN FOR CCS /CFS GATE,GLOBE & CHECK VALVE (UP TO 50 NB-FCS #800 & 1 NO. 50 NB GLOBE VALVE #600) (65 NB & ABOVE CCS # 150)						QUALITY PLAN NO.:PE-QP-XXX-166-A810 PACKAGE-FULE OIL SYSTEM PROJECT- REV.NO. 0 SHEET 1 OF 2 DATE: 31/03/2012												
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS						
									D	M	C	N						
1			4	5	6	7	8	9			10							
1	Raw Material: Body, bonet, gld., Flange, Disc. / wedge	Chem. & mech. Test Dimensions Surface quality	CR MR MR	Chem & mech. Test Measurement Visual	Per Heat 100% 100%	Appd.Drg./ Mfg. Drg./ Data Sheet Mfg. Drg./ Data Sheet	Relevant Standard Mfg. Drg./ Data Sheet Defect Free	MTC IR IR	✓ ✓ ✓	P P P	V V V	V V V						
1.1	Stem,body seat ring,gland.	Chem. & mech. Test	CR	Chem & mech. Test	Per Heat	Appd.Drg./Relevant Std.	Appd.Drg./Relevant Std.	MTC	✓	P	V	V						
1.2	Fasteners	Chem. & mech. Test	MR	Chem & mech. Test	Per Heat	Appd.Drg./Relevant Std.	Appd.Drg./Relevant Std.	IR	✓	P	V	V						
1.3	Gasket & gland packing	Compliance to PO	MR	Measurement	100%	Appd.Drg./Relevant Std.	Appd.Drg./Relevant Std.	IR	✓	P	V	V						
2.0	In Process Inspection																	
2.1	Machining of valves components	Surface quality Dimension	MR MR	Visual Measurement	100% 100%	Mfg. Drg. Mfg. Drg.	Mfg. Drg. Mfg. Drg.	IR IR	✓ ✓	P P	V V	V V						
2.2	Spindle	Surface finish	MR	Measurement	100%	Mfg. Drg.	Mfg. Drg.	IR	✓	P	V	V						
2.3	Wedge / disc , seating, stem & back seat	Lapping	MR	Blue Matching	100%	100% metal to metal contact	100% metal to metal contact	IR	✓	P	V	V						
LEGEND: RECORDS IDENTIFIED WITH " ✓ " * SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENT. M MANUFACTURER/SUB-CONTRACTOR C CONTRACTOR/NOMINATED INSPECTION AGENCY. N CUSTOMER, INDICATE "P" PERFORM "W" WITNESS AND V VERIFICATION AS APPROPRIATE CHP SHALL IDENTIFIED IN COLUMN "N" IR - INSPECTION REPORT, CMT-CERTIFICATE OF MATERIAL & TEST																		
MAIN VENDOR/SUB-VENDOR (SIGN WITH DATE & STAMP)													REVIEWING AGENCY (SIGN WITH DATE & STAMP)			APPROVING AGENCY (SIGN WITH DATE & STAMP)		



STANDARD QUALITY PLAN FOR
 CCS /CFS GATE GLOBE & CHECK VALVE
 (UP TO 50 NB-FCS #800
 (65 NB & ABOVE CCS # 150)

QUALITY PLAN NO.:PE-QP-XXX-166-A810
 PACKAGE/FULE OIL SYSTEM
 PROJECT-
 REV.NO. 0
 SHEET 2 OF 2
 DATE: 31/03/2012

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	AGENCY				REMARKS
								FORMAT OF RECORD	D	M	C	
1			4	5	6	7	8	9				11
3.0 Testing & Final Inspection												
3.1	Performance	Operation	CR	Manual	100%	Appd. Drg./Data Sheet	Should be smooth	IR	✓	P	W	W*
3.2	Shell & Sheet / backseat	Pr. Testing	CR	Hyd. Testing	100%	Appd. Drg./Data Sheet	Relevant Standard / Data Sheet	CMT	✓	P	W	W*
3.3	Seat	Pr. Testing	CR	Pneumatic Testing	100%	Appd. Drg./Data Sheet	Relevant Standard / Data Sheet	CMT	✓	P	W	W*
3.4	Valve Assembly	1. Chk. For completeness/ Visual Inspection 2. Dimention 3. Wear Travel / valve lift	MR	Visual	100%	Appd. Drg. / Tech. Spec./ Data Sheet	Appd. Drg./Data Sheet	IR	✓	P	W	W*
			MR	Measurement	10%	Appd. Drg./Data Sheet	Appd. Drg./Data Sheet	IR	✓	P	W	W*
			MR	Manual	100%	Appd. Drg.	Appd. Drg.	IR	✓	P	W	W*
4.0 Painting & Packaging												
		1. Painting & Packaging	MR	Manual	100%	Appd. Drg. / Tech. Spec.	Appd. Drg. / Tech. Spec.	IR		P	V	
		2. Tagging	MR	Manual	100%	Appd. Drg. / Tech. Spec.	Appd. Drg. / Tech. Spec.	PS / RS		P	V	
LEGEND: RECORDS IDENTIFIED WITH " ✓ " SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENT.												
M MANUFACTURER/SUB-CONTRACTOR C CONTRACTOR/NOMINATED INSPECTION AGENCY, N CUSTOMER. INDICATE "P" PERFORM "W" WITNESS AND V VERIFICATION AS APPROPRIATE CHP SHALL IDENTIFIED IN COLUMN "N" IR - INSPECTION REPORT, CMT-CERTIFICATE OF MATERIAL & TEST												
MAIN VENDOR/SUB-VENDOR (SIGN WITH DATE & STAMP)												
REVIEWING AGENCY (SIGN WITH DATE & STAMP)												
APPROVING AGENCY (SIGN WITH DATE & STAMP)												

										STANDARD QUALITY PLAN FOR CS PIPE -SEAMLESS										QUALITY PLAN NO.:PE-QP-XXX-166-A813 PACKAGE-FULE OIL SYSTEM PROJECT- REV.NO. 0 DATE: 31/03/2012 SHEET 1 OF 1									
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS																	
1	2	3	4	5	6	7	8	9	D	M	C	CU	11																
1.0	SEAMLESS PIPE	a) Physical & Chemical test	M	Physical & Chemical Properties	Sample	ASTM A106 Gr.B/ Appd. Data sheet	ASTM A106 Gr.B/ Appd. Data sheet/ Relevant Std.	MTC/ Mfr's TC	✓	P	V	V	Refer Note-1																
		b) Dimensional conformity	M	Measurement	100%	-do-	-do-	MTC/ Mfr's TC/IR	✓	P	V	V																	
		c) Hydro test	M	Leak test	100%	-do-	-do-	MTC/ Mfr's TC	✓	P	V	V																	
Note-1: In case material is procured from dealer, and co-related Mfr's TCs are not available, check test on identified sample will be carried out at testing laboratory and hydro test at pressure 1.5 times of design pressure on 10% of total quantity will be witnessed by BHEL																													
LEGEND: RECORDS IDENTIFIED WITH " ✓ " SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENT. M - MANUFACTURER C - MAIN VENDOR CU - BHEL/CUSTOMER "P" PERFORM, "W" WITNESS AND V VERIFICATION																													
MAIN VENDOR/SUB-VENDOR (SIGN WITH DATE & STAMP)														REVIEWING AGENCY (SIGN WITH DATE & STAMP)															
														APPROVING AGENCY (SIGN WITH DATE & STAMP)															

STANDARD CHECK LIST									
STANDARD CHECK LIST FOR: CS-FITTINGS (FORGED/SEAMLESS)									
PACKAGE-FULE OIL SYSTEM									
PROJECT-									
CHECK LIST NO.:PE-QP-XXX-166-A817									
REV.NO. 0									
DATE: 31/03/2012									
Sheet 1 of 1									
SL. NO.	TESTS/CHECKS	QUANTUM OF CHECKS	REFERENCE DOCUMENT./ ACCEPTANCE NORMS	M	C	N	D	REMARKS	
1	2	3	4	5				6	
1	Visual and Dimensional Checks for each size and type	100% by Manufacturer and 10% by BHEL	Appd. Data Sheet/ Relevant Standard	P	W	W	✓	Inspn. Report shall be furnished	
2	Check for Logo mark & Specification	-do-	-do-	P	V	V	✓		
3	Check for TC of mother pipe/forgings	100%	-do-	P	V	V	✓	Manufacturer's TCs of mother pipe/forgings shall be furnished	
4	Cross check for Mech/Chem properties of mother pipe/forging	One/Heat	-do-	P	V	V	✓	-do-	
LEGEND: RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION. M= MANUFACTURER/SUB-CONTRACTOR C= CONTRACTOR/NOMINATED INSPECTION AGENCY, N= CUSTOMER P= PERFORM; W= WITNESS; V= VERIFICATION									
MAIN VENDOR/SUB-VENDOR (SIGN WITH DATE & STAMP)					REVIEWING AGENCY (SIGN WITH DATE & STAMP)				
					APPROVING AGENCY (SIGN WITH DATE & STAMP)				

CHECK LIST

Check list for item : Dished-end for Flash Tank
 Check list No. :
 Project :
 Package : Fuel Oil Handling
 Contract No. :
 Contractor : BHEL
 Sub-Contractor :

SL. NO.	TESTS/CHECKS	QUANTUM OF CHECKS	REFERENCE DOCUMENT/ ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY			REMARKS
					D	S	C	
A.	<u>RAW MATERIAL</u>							
	Plate - conforming to IS 2002 Gr.A							
B	Chemical Composition & Physical Properties	1 sample/heat	IS:2002 Gr.A	Material TC	✓	V	V	V
	<u>IN PROCESS INSPECTION</u>							
C.	UT on Plate	100%	ASTM A388 (Defect giving echo height more than 20% on total CRT Screen height shall be treated unacceptable. Defect causing reduction in backwall echo less than 80% of Screen height shall be treated as unacceptable)	UT Report	✓	P	V	V
	<u>FINAL INSPECTION</u>							
	1 Visual Exam.	100%	Appd.Drg.	Inspn. Report	✓	P	V	V
	2 Dimensional Check	100%	Appd.Drg.	-do-	✓	P	V	V
	3 DP on Knuckle	100%	ASTM E165	-do-	✓	P	V	V

Legend

S = SUB-CONTRACTOR
 C= CONTRACTOR
 N= CUSTOMER
 P= PERFORM; W= WITNESS; V= VERIFICATION
 "✓" Marked document to be furnished along with QA Doc. Pkg.

Manufacturer's Name & Address :		QUALITY ASSURANCE PLAN					Project :			
		Item : Plug Valve		Sub-System : Fuel Oil System		Contract				
				Page No.: 1 OF 4		Contract Sub-Contract				
Sl. No.	Components & Operations	Characteristic/Item	Class	Type of check	Extent of Check	Reference Document	Acceptance Norm	Format of Record	AGENCY	Remarks
									P W V	
1	RAW MATERIAL	3	4	5	6	7	8	9	10	11
1	Castings (Body, Cover, Plug)	a) Verification	MA	Material TC	100%	Appr. Drg. Tech. Specs.	Tech. Specs.	Material TC	3	3
		b) Size/Class	MA	Material TC	100%	Appr. Drg. Tech. Specs.	Tech. Specs.	Material TC	3	3
		c) Material Id.	MA	Material TC	100%	Appr. Drg. Tech. Specs.	Tech. Specs.	Material TC	3	3
		d) Heat No.	MA	Material TC	100%	Appr. Drg. Tech. Specs.	Tech. Specs.	Material TC	3	3
		e) Surface Defect	MA	Visual	100%	MSS-SP-55	No crack acceptable	Inspection Report	3	3
		f) Dimension	MA	Vernier scale	100%	Mfg. Drg.	Mfg. drg.	Mfg. drg.	3	3
		g) RT on body	MA	Physical	100%	NDT Report	ANSI B16.34 ANNEX-I	NDT REPORT	3	3
		h) Tensile Properties	MA	Verification of foundry TC	100%	Tech. Specs.	Relevant Standard		3	3
		i) Chemical Properties	MA	Verification of foundry TC	100%	Tech. Specs.	Relevant Standard		3	3
		j) Heat Treatment	MA	Verification of foundry TC	100%	Tech. Specs.	Relevant Standard		3	3
		LEGEND : Records identified with "√" shall essentially be included by Contractor in QA Documents 1 - BHEL 2 - PACKAGE SUPPLIER 3 - Manufacturer CR - Critical Characteristics MA - Major Characteristics MI - Minor Characteristics IR - Inspection Report, MTC - Material/Manufacturer's Test Certificate								
SUB-CONTRACTOR		CONTRACTOR		CLIENT NO REV. : CAT.						
SIGNATURE				REVIEWED BY NAME & SIGNATURE OF APPROVING AUTHORITY						

Manufacturer's Name & Address :			QUALITY ASSURANCE PLAN					Project			
Item : Plug Valve			Sub-System : Fuel Oil System					Contract			
Page No.: 2 of 4								Contract Sub-Cont			
Sl. No.	Components & Operations	Characteristic/Item	Class	Type of check	Extent of Check	Reference Document	Acceptance Norm	Format of Record	Agency	Remarks	
									P	W	V
1	Fasteners	a) Dimension	4	5	1/Lot/Size	7	Appr. Drg	9	3	10	11
2		b) Tensile Properties	MA	Dimensional	100%	Appr. Drg	Appr. Drg	...	3	3	1.2
		c) Chemical Properties	MA	Verification of Supplier TC	100%	Appr. Drg	Relevant Std	Mfg. TC	3	3	1.2
		d) Heat Treatment	MA	Verification of Supplier TC	100%	Appr. Drg	Relevant Std	Mfg. TC	3	3	1.2
3	Limit Switch	a) Dimension	MA	Dimensional	1/Lot/Size	PO	Mfg. Drg	Mfg. TC	3	3	3
		b) Chemical properties	MA	Mfg. TC	1/Lot/Size	Relevant Std	Relevant Std	...	3	3	3
4	Hand Wheel	a) Dimension	MA	Dimensional	1/Lot/Size	PQ	Mfg. Drg	CR	3	3	1.2
		b) Surface Defect	MA	Visual	100%	PO	Mfg. Drg	No crack acceptable	3	3	1.2

BHEL

SUB-CONTRACTOR

CONTRACTOR

SIGNATURE

LEGEND :
Records identified with "✓" shall essentially be included by Contractor in QA Documents

- 1 - BHEL
- 2 - PACKAGE SUPPLIER
- 3 - Manufacturer
- CR - Critical Characteristics
- MA - Major Characteristics
- MI - Minor Characteristics
- IR - Inspection Report, MTC - Material/Manufacturer's Test Certificate

CLIENT NO.

REV. 00 CAT.

REVIEWED BY

NAME & SIGNATURE OF APPROVING AUTHORITY

Manufacturer's Name & Address :			QUALITY ASSURANCE PLAN				Project :			
			Item : Plug Valve				Contract I			
			Sub-System : Fuel Oil System				Contracto			
			Page No.: 3 of 4				Sub-Contr			
Sl. No.	Components & Operations	Characteristic/Item	Class	Type of check	Extent of Check	Reference Document	Acceptance Norm	Format of Record	Agency	Remarks
									P W V	
1	IN PROCESS INSPECTION	3	4	5	6	7	8	9	10	11
1	Body / Cover	a) Mechined surface	MA	Visual	100%	Mfg. Drg.	No blow holes are acceptable	...	3	3
		b) Dimension	MA	Dimensional	100%	Mfg. Drg.	Mfg. Drg	...	3	3
2	Plug	Mechined surface	MA	Visual	100%	Mfg. Drg.	No blow holes are acceptable	...	3	3
3	Component	Dimension	MA	Dimensional	100%	Mfg. Drg.	Mfg. Std.	...	3	3
4	Assembly	Operational Test	MA	Ful opening / closing test	100%	GA Drg	Mfg. Std.	...	3	3
				Min. Stem Projection	100%	...	Mfg. Drg	...	3	3
				Smooth operation	100%	...	Mfg. Std.	...	3	3

BHEL

CONTRACTOR

MANUFACTURE

SUB-CONTRACTOR

SIGNATURE

LEGEND :

Records identified with "√" shall essentially be included by Contractor in QA Documents

1 - BHEL / DVC
2 - PACKAGE SUPPLIER
3 - Manufacturer

CR - Critical Characteristics
MA - Major Characteristics
MI - Minor Characteristics
IR - Inspection Report, MTC - Material/Manufacturer's Test Certificate

CLIENT NO.

REV. 00 CAT.

REVIEWED BY

NAME & SIGNATURE OF APPROVING AUTHORITY

Manufacturer's Name & Address :				QUALITY ASSURANCE PLAN				Project :				
Item : Plug Valve				Sub-System : Fuel Oil System				Contract				
Page No. : 4 of 4				Contract				Sub-Contract				
Sr. No.	Components & Operations	Characteristic/Item	Class	Type of check	Extent of Check	Reference Document	Acceptance Norm	Format of Record	Agency			Remarks
									P	W	V	
1	Complete valve	a) Dimension	MA	Fig. Drilling face to face	100%	Relevant Std	Relevant Std	Dimensional Report	3	1, 2	1, 2	100% Inspection by Manufacturer & 10% by Inspection Agency
		b) Operational Test	MA	Full opening / closing test	100%	Relevant Std	PO	Testing Register	3	1, 2	1, 2	
		c) Pressure testing	MA	Hydro shell	100%	Relevant Std	Relevant Std	Testing Register	3	1, 2	1, 2	
				Hydro seat	100%	Relevant Std	Relevant Std	Testing Register	3	1, 2	1, 2	
		Fire Safe Testing	MA	Fire Safe	1/prob type	API 607 / BS 6755 P-II	Relevant Std	Testing Register	3	3	1, 2	
	Paint & Packing	Surface	MA	Visual	Dryness	PO	PO	Testing Register	3	3	3	
				Visual	Two coats of red oxide	PO	PO	Testing Register	3	3	3	
				Visual	One coat of hammer tone dark grey	PO	PO	Testing Register	3	3	3	
				Visual	Anti rust layer at machined surface	PO	PO	Testing Register	3	3	3	
				Visual	Fixing of wooden/plastic end protector	PO	PO	Testing Register	3	3	3	

BHEL

CONTRACTOR

CONTRACTOR

LEGEND :

Records identified with "V"

1 by Contractor in QA

- 1 - BHEL
- 2 - PACKAGE SUPPLIER
- 3 - Manufacturer
- CR - Critical Characteristics
- MA - Major Characteristics
- MI - Minor Characteristics
- IR - Inspection Report, MTC - Material/Manufacturer's Test Certificate

- P - Agency Performing the Test
- W - Agency Witnessing the Test
- V - Agency Verifying the Test

CLIENT NO.

REV. 00 CAT.

SIGNATURE

REVIEWED BY

NAME & SIGNATURE OF APPROVING AUTHORITY

QAP Electrical Actuator

Sl. No.	Component & operation	Characteristics	Class	Type of Check	Quantum of Check			Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N				9	D*	M	C	N	
						6									
1	2	3	4	5				7	8			10**		11	
1.1	RAW MATERIAL ACTUATOR HOUSING CASTING	MECHANICAL PROPERTIES a. TENSILE STRENGTH b. HARDNESS c. SURFACE DEFECTS	MAJOR MAJOR	MECHANICAL TESTING VISUAL	ONE / HEAT 100%	- -	AIPL DRG. & IS 210 IS 210	FG – 260 IS 210 & AIPL DRG IS 210	SUPPLIER TC & GRN GRN	- -	P/V P	- -	- -	HEAT NUMBER ON CASTING	
1.2	WORM WHEEL	CHEMICAL COMPOSITION MECHANICAL PROPERTIES a. TENSILE STRENGTH b. ELONGATION c. SURFACE DEFECTS	MAJOR MAJOR MAJOR	CHEMICAL ANALYSIS MECHANICAL PROPERTIES VISUAL	ONE / HEAT ONE / HEAT 100%	- - -	AIPL DRG, BS 1400 AB2/HTB1 -	AIPL DRG, BS 1400 AB2/HTB1 -	SUPPLIER TC & GRN -	- - -	P/V P/V P	- - -	- - -		
1.3	BEARING FLANGE CASTING	MECHANICAL PROPERTIES a. TENSILE STRENGTH b. HARDNESS c. SURFACE DEFECTS	MAJOR MAJOR	MECHANICAL TESTING VISUAL	ONE / HEAT 100%	- -	AIPL DRG. & IS 210 IS 210	FG – 260 IS 210 & AIPL DRG IS 210	SUPPLIER TC & GRN GRN	- -	P/V p	- -	- -		
1.4	CLUTCH RING (FOR SA/SAR 3,6,12,15)	a. CHEMICAL COMPOSITION b. SURFACE DEFECTS	MAJOR MAJOR	CHEMICAL ANALYSIS VISUAL	ONE / HEAT 100%	- -	AIPL DRG. & IS 713 IS 713	ZnAl4Cu1, IS 713 -	SUPPLIER TC & GRN	- -	P/V P	- -	- -		
1.4.2	CLUTCH RING (FOR SA/SAR 25,30,50, 60,100)	a. TENSILE STRENGTH b. HARDNESS c. ELONGATION d. SURFACE DEFECTS	MAJOR	MECHANICAL TESTING VISUAL	ONE / HEAT 100%	- -	AIPL DRG. & IS 1865 IS 1865	SG – 400/15 SG – 500/7 IS 1865 IS 1865	SUPPLIER TC & GRN GRN	- -	P/V P	- -	- -		

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1.5	OUTPUT DRIVE STEM NUT (A – TYPE ONLY)	a. CHEMICAL COMPOSITION b. MECHANICAL PROPERTIES b.1 TENSILE STRENGTH b.2 ELONGATION c. SURFACE DEFECTS	MAJOR MAJOR MAJOR	CHEMICAL ANALYSIS MECHANICAL TESTING VISUAL	ONE / HEAT ONE / HEAT 100%	- - -	AIPL DRG. & BS-1400 BS 1400 BS 1400	AB2/BS 1400 & AIPL DRG. AB2/BS 1400 BS 1400	SUPPLIER TC & GRN SUPPLIER TC & GRN GRN	- - P	P/V P/V P	- - -
1.6	BARSTOCK WORMSHAFT	a. CHEMICAL COMPOSITION b. MECHANICAL PROPERTIES c. SURFACE DEFECTS	MAJOR MAJOR MAJOR	CHEMICAL ANALYSIS HARDNESS VISUAL	ONE SAMPLE/HEAT ONE SAMPLE/HEAT 100%	- - -	4M-3532 R2 & AIPL DRG. AIPL DRG. BS 970	4M-3532 R2 & AIPL DRG. AIPL DRG. BS 970	NABL LAB / SUPP. TC / GRN GRN GRN	- - P	P/V P/V P	- - -
1.7	HOLLOW DRIVE SHAFT	a. CHEMICAL COMPOSITION b. SURFACE DEFECTS	MAJOR MAJOR	CHEMICAL ANALYSIS VISUAL	ONE SAMPLE/HEAT 100%	- -	4M-3532 R2 & AIPL DRG. BS 970	4M-3532 R2 & AIPL DRG. BS 970	SUPPLIER TC & GRN GRN	- P	P/V P	- -
1.8	PINION	a. CHEMICAL COMPOSITION b. MECHANICAL PROPERTIES c. SURFACE DEFECTS	MAJOR MAJOR MAJOR	CHEMICAL ANALYSIS HARDNESS VISUAL	ONE SAMPLE/HEAT ONE SAMPLE/HEAT 100%	- - -	4M-3532 R2 & AIPL DRG. AIPL DRG. BS 970	4M-3532 R2 & AIPL DRG. AIPL DRG. BS 970	NABL LAB / SUPP. TC / GRN GRN GRN	- - P	P/V P/V P	- - -
1.9	DRIVE SHAFT	a. CHEMICAL COMPOSITION b. MECHANICAL PROPERTIES c. SURFACE DEFECTS	MAJOR MAJOR MAJOR	CHEMICAL ANALYSIS HARDNESS VISUAL	ONE SAMPLE/HEAT ONE SAMPLE/HEAT 100%	- - -	4M-3532 R2 & AIPL DRG. AIPL DRG. BS 970	4M-3532 R2 & AIPL DRG. AIPL DRG. BS 970	NABL ACCREDITED L LAB /SUPPLIER TC GRN GRN	- - P	P/V P/V P	- - -
2	IN – PROCESS CONTROL (MACHINED ITEMS)											
2.1	ACTUATOR HOUSING	a. DIMENSIONS b. SURFACE FINISH	MAJOR MAJOR	MEASUREMENT VISUAL	One / batch 100%	- -	AIPL COMP. DRG./FIR AIPL COMP. DRG.	AIPL COMP. DRG./FIR AIPL COMP. DRG.	GRN/ MCN/FIR GRN / MCN	- P	P P	- -

No.	operation	3			4	5	6		Documents		8	9	10**		11
		M	C/N	7			8	D*	M	C			N		
1															
2.2	WORM WHEEL	a. DIMENSIONS b. ROLL CHECK c. SURFACE FINISH d. MATCHING	MAJOR MAJOR MAJOR MAJOR	MEASUREMENT ROLL CHECK VISUAL VISUAL	One / batch One / batch 100% One / batch	- - - -			AIPL COMP. DRG./FIR AIPL COMP. DRG./FIR AIPL COMP. DRG. 4-M-3335	AIPL COMP. DRG./FIR AIPL COMP. DRG./FIR AIPL COMP. DRG. 4-M-3335	GRN/ MCN/FIR GRN/ MCN/FIR GRN / MCN GRN / MCN	- - - -	P P P P	- - - -	- - - -
2.3	BEARING FLANGE	a. DIMENSIONS b. SURFACE FINISH	MAJOR MAJOR	MEASUREMENT VISUAL	One / batch 100%	- -			AIPL COMP. DRG./FIR AIPL COMP. DRG.	AIPL COMP. DRG./FIR AIPL COMP. DRG.	GRN/ MCN/FIR GRN / MCN	- -	P P	- -	- -
2.4	OUTPUT DRIVE ITEM NUT (A-TYPE)	a. DIMENSIONS b. SURFACE FINISH	MAJOR MAJOR	MEASUREMENT VISUAL	One / batch 100%	- -			AIPL COMP. DRG./FIR AIPL COMP. DRG.	AIPL COMP. DRG./FIR AIPL COMP. DRG.	GRN/ MCN/FIR GRN / MCN	- -	P P	- -	- -
2.5	WORMSHAFT	a. DIMENSIONS b. HARDNESS AFTER NITRIDING c. SURFACE FINISH	MAJOR MAJOR MAJOR	MEASUREMENT TESTING VISUAL	One / batch One / batch 100%	- - -			AIPL COMP. DRG./FIR AIPL COMP. DRG. AIPL COMP. DRG.	AIPL COMP. DRG./FIR AIPL COMP. DRG. AIPL COMP. DRG.	GRN/ MCN/FIR SUPPLIER TC/GRN GRN	- - -	P P/V P	- - -	- - -
2.6	HOLLOW DRIVESHAFT	a. DIMENSIONS b. SURFACE FINISH	MAJOR MAJOR	MEASUREMENT VISUAL	One / batch 100%	- -			AIPL COMP. DRG./FIR AIPL COMP. DRG.	AIPL COMP. DRG./FIR AIPL COMP. DRG.	GRN/ MCN/FIR GRN / MCN	- -	P P	- -	- -
2.7	PINION	a. DIMENSIONS b. SURFACE FINISH	MAJOR MAJOR	MEASUREMENT VISUAL	One / batch 100%	- -			AIPL COMP. DRG./FIR AIPL COMP. DRG.	AIPL COMP. DRG./FIR AIPL COMP. DRG.	GRN/ MCN/FIR GRN / MCN	- -	P P	- -	- -
2.8	DRIVE SHAFT	a. DIMENSIONS b. HARDNESS AFTER NITRIDING c. SURFACE FINISH	MAJOR MAJOR MAJOR	MEASUREMENT TESTING VISUAL	One / batch One / batch 100%	- - -			AIPL COMP. DRG./FIR AIPL COMP. DRG. AIPL COMP. DRG.	AIPL COMP. DRG./FIR AIPL COMP. DRG. AIPL COMP. DRG.	GRN/ MCN/FIR SUPPLIER TC/GRN GRN	- - -	P P/V P	- - -	- - -

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3	MOTORS (AUMA make)	a. RPM b. NO LOAD CURRENT c. IR / HV d. THERMO SWITCHES e. NOISE f. MOUNTING DIMENSIONS g. NAME PLATE i. TYPE TEST	MAJOR " " " " MAJOR " MAJOR	ELECTRICAL PERFORMANCE TEST " " " " DIMENSIONAL VISUAL TESTING	100% " " " " ONE IN LOT 100% ONE / TYPE	- - - - - - -	IS 325 " " " " AS PER DRG " IS 325	IS 325 " " " " AS PER DRG " IS 325	AIPL INS. RECORD " " " " " " Test Certificate	- - - - - - -	P " " " " " "	- - - - - - -	- - - - - - -
4	BOUGHT OUT ITEMS												
4.1	PASTENERS	a. DIMENSIONS b. GRADE	MINOR MAJOR	MEASUREMENT VISUAL	One / batch One / batch	-	IS 2269, IS 1364 IS 1363, IS 2500	IS 2269, IS 1364 IS 1363, IS 2500	GRN GRN	-	P P	- -	- -
4.2	LIMIT & TORQUE SWITCHES	a. CONTINUITY (MAKE/BREAK)	MAJOR	PERFORMANCE	One / batch	-	QC/QW.047	QC/QW.047	GRN	-	P	-	-
4.3	POTENTIOMETER	a. RESISTANCE VALUE	MAJOR	MEASUREMENT	One / batch	-	QC/QW.031	QC/QW.031	GRN	-	P	-	-
4.4	SPACE HEATER	a. IR b. HV	MAJOR MAJOR	MEASUREMENT MEASUREMENT	One / batch One / batch	-	QC/QW.045	QC/QW.045	GRN	-	P	-	-
4.5	ELECTRONIC POSITION TRANSMITTER	a. OUTPUT MEASUREMENT	MAJOR	MEASUREMENT	One / batch	-	CATALOGUE CHECK	CATALOGUE CHECK	GRN	-	P	-	-
4.6	BEARINGS	a. MAKE b. TYPE	MAJOR MAJOR	VISUAL VISUAL	One / batch One / batch	-	QC/QW-023, IS-2500 AIPL COMP. DRG	QC/QW-023	GRN	-	P	-	-
4.7	'O' RINGS AND QUADRINGS	a. MATERIAL IDENTIFICATION b. ELONGATION	MAJOR MAJOR	MEASUREMENT MEASUREMENT	One / batch One / batch	-	AIPL COMP. DRG AIPL COMP. DRG	QC/QW .024, IS 9975 QC/QW .024, IS 9975	GRN	-	P	-	-

Sl. No.	Component & operation	Characteristics	Class	Type of Check	Quantum of Check			Reference Documents	Acceptance Norms	Format of Records			Agency				Remarks
					M	C/N	6			D*	9	P	M	C	N		
																5	
1		3	4	5					8				10**	11			
4.8	SPRINGS	DIMENSIONS	MAJOR	MEASUREMENT	One / batch	-	QC/QW.019 & DIN 2093	QC/QW.019 & DIN 2093	SUPPLIER TC/GRN	-	P	-	-	-			
5	ASSEMBLY INSPECTION																
5.1	WORM SHAFT ASSEMBLY	a. SURFACE DEFECTS b. FREE ROTATION	MAJOR MAJOR	VISUAL VISUAL	100% 100%	- -	4M – 3335 4M – 3335	4M – 3335 4M – 3335	AIPL LOG BOOK AIPL LOG BOOK	- -	P P	- -	- -	- -			
5.2	WORM WHEEL ASSEMBLY	a. SURFACE DEFECTS b. FREE ROTATION	MAJOR MAJOR	VISUAL VISUAL	100% 100%	- -	4M – 3335 4M – 3335	4M – 3335 4M – 3335	AIPL LOG BOOK AIPL LOG BOOK	- -	P P	- -	- -	- -			
6	FINAL TESTING	a. WIRING CONTINUITY b. PHASE SEQ. CORRECTION c. OPERATION & SETTING OF LIMIT & TORQUE SWITCH d. NO LOAD CURRENT e. HANDWHEEL – MANUAL & AUTO DECLUTCH OPERATION f. OUTPUT SPEED g. POTENTIOMETER h. SPACE HEATER i. MECHANICAL POSITION INDICATOR j. VOLTAGE VARIATION TEST k. INSULATION RESISTANCE l. HV TEST l.1 NORM ACT.: 1.6 kV, 1 min l.2 EPAC ACT.: 1.1 kV, 1 min	CRITICAL	FUNCTIONAL	100%	10%	NTPC APPRD. DATA SHEET; AIPL STD. NTPC APPRD. DATA SHEET; AIPL STD. QM-FINAL INSP. REPORT QC/FM.006			✓	P	W	V		Document review on 100 % basis by Contractor / TPIA and NTPC / Customer.		

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Sl. No.	Component & operation	Characteristics	Class	Type of Check		Quantity of Check		Reference Documents	Acceptance Norms	Form of Records		Agency			11		
				5	VISUAL	100%	10%			7	8	9	D*	M		C	N
1		3	4			M	6							10**			
	FINAL TESTING (Contd.)	m. GREASE LEAKAGE n. VISUAL INSPECTION o. ELECTRONIC POSITION TRANSMITTER p. STALL TORQUE and Current q. PAINTING and Rust Prevention r. MOUNTING DIMENSION		VISUAL VISUAL OUTPUT MEASUREMENT MEASUREMENT SHADE & DRY PAINT THICKNESS PHYSICAL	100% 1 PER TYPE One / batch 100%		10% 1 PER TYPE -	NTPC APPRD. DATA SHEET; AIPL STD. TD/QW.005 Tech.Spec. / NTPC Approved Data sheet AIPL DRG./CATALOGUE	NTPC APPRD. DATA SHEET; AIPL STD. TD/QW.005 Tech.Spec. / NTPC Approved Data sheet AIPL DRG./CATALOGUE	QM-FINAL INSP. REPORT QC/FM.006 DIMENSION REPORT	✓ ✓	P P	W V	V V	Document review on 100 % basis by Contractor / TPIA and NTPC / Customer.		
7	ACCESSORIES PLUG & SOCKET	a. VISUAL b. ELECTRICAL	MAJOR MAJOR	VISUAL HV	One / batch One / batch		- -	CATALOGUE INSPECTION REPORT	CATALOGUE INSPECTION REPORT	GRN & INSP REPORT GRN	- -	P P	- -	- -	WITH ACTUATOR		
8	ELECTRICAL TEST FOR INTEGRAL STARTERS	a. HV TEST b. BURN IN TEST c. 24V DC OUTPUT d. OPERATIONAL CHECK	MAJOR	ELECTRICAL / FUNCTIONAL	100%		10%	AIPL STD.	AIPL STD.	SUPPLIER-TC	✓ -	P P	V W P	V V -	WITH ACTUATOR		
9	SHIPPING INSPECTION	a. NAME PLATE b. PAINTING c. Rust Prevention d. ACCESSORIES e. ANCHORING						PACKING SLIP	PACKING SLIP	PACKING SLIP	-	P	-	-			

**TITLE****2x800 MW UPPUR STPP****TECHNICAL SPECIFICATION FOR
FUEL OIL HANDLING SYSTEM**

SPECIFICATION NO.: PE-TS-425-166-A001

REV.: 00

Section: II

Date: 25/10/2017

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Format for Operation & Maintenance Manual

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				

**TITLE****2x800 MW UPPUR STPP****TECHNICAL SPECIFICATION FOR
FUEL OIL HANDLING SYSTEM**

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SITE STORAGE & PRESERVATION GUIDELINES

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.

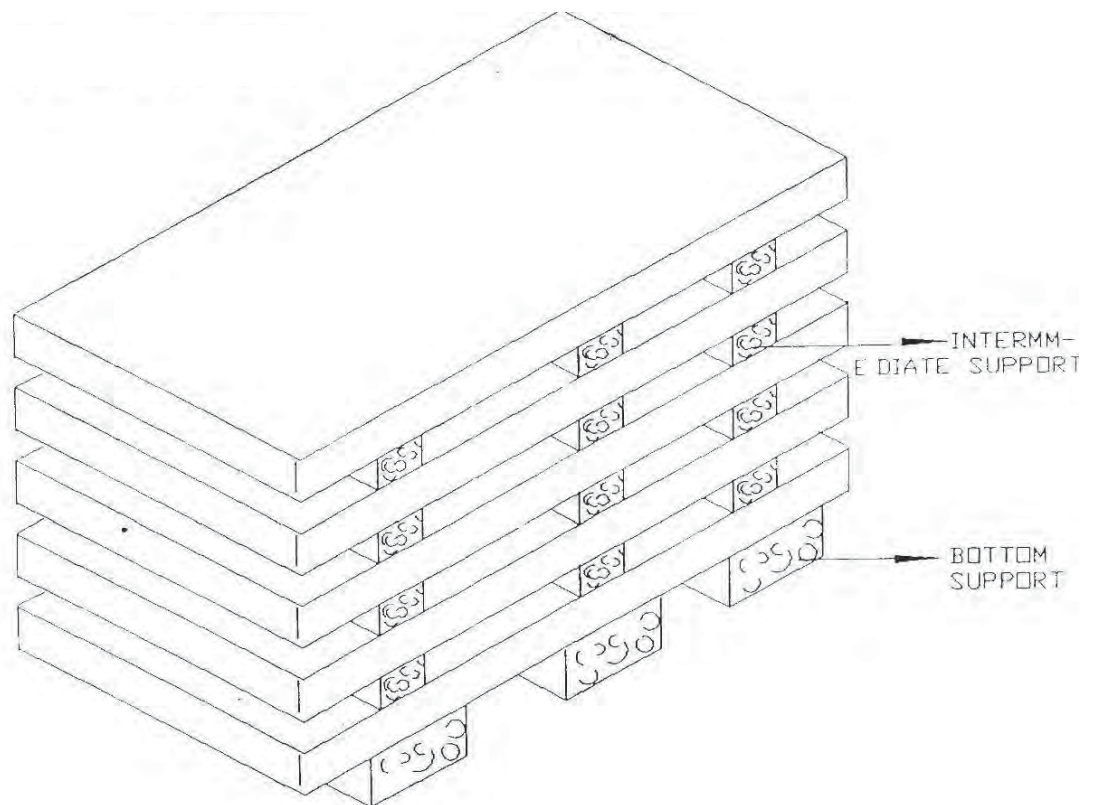


Figure – 1 – PLATE STACKING ARRANGEMENT

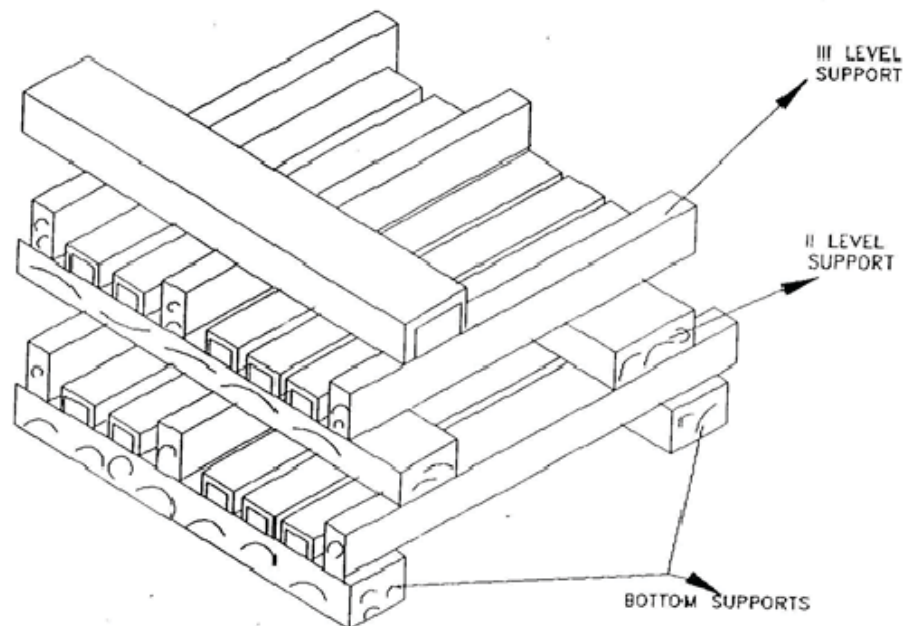


Figure – 2 – STRUCTURAL STEEL STACKING ARRANGEMENT

The equivalent 'A' weighted sound pressure level measured at a height of 1.0 m above floor level in elevation and at a distance of one (1) meter horizontally from the nearest surface of any equipment / machine, furnished and installed under these specifications, expressed in decibels to a reference of 0.0002 microbar, shall not exceed 85 dBA except for

- (a.) Safety valves and associated vent pipes for which it shall not exceed 105 dBA.
- (b.) Regulating drain valves in which case it shall be limited to 90 dBA.
- (c.) TG unit in which case it shall not exceed 90 dBA.
- (d.) For HP-LP bypass valves and other intermittently operating control valves, the noise level shall be within the limit of 85 dBA.

15.00.00 PACKAGING AND TRANSPORTATION

All the equipment & spares shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. Each spare shall be clearly marked or labeled on the outside of the packing with its description. When more than one spare part is packaged in a single case, a general description of the contents shall be shown on the outside of such a case and other packages must be suitably marked and numbered for the purpose of identification. All cases, containers or packages, are liable to be opened for such examination as may be considered reasonable by the Engineer. In case of equipment supplied with grease/lubricants from imported origin, the supplied shall clearly indicate the indigenous equivalent of the grease/lubricant and source of supply so as to enable the Owner to procure these items from indigenous sources. While packing all the materials, the limitation from the point of view of the sizes of railway wagons available in India should be taken account of. The Bidder shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. The Bidder shall ascertain the availability of Railway wagon sizes from the Indian Railways or any other agency concerned in India well before effecting dispatch of equipment. Before dispatch it shall be ensured that complete processing and manufacturing of the components is carried out at shop, only restricted by transport limitation, in order to ensure that site works like grinding, welding, cutting & pre-assembly to bare minimum. The Owner's Inspector shall have right to insist for completion of works in shops before dispatch of materials for transportation.

16.00.00 ELECTRICAL ENCLOSURE

All electrical equipment and devices, including insulation, heating and ventilation devices shall be designed for ambient temperature and a maximum relative humidity as specified elsewhere in the specification.

17.00.00 INSTRUMENTATION AND CONTROL



2 x 800 MW Supercritical Coal Based Uppur
Thermal Power Project
Spec. No. SE/E/T&H(P)/OT No.01 /2015-16



**TITLE****2x800 MW UPPUR STPP****TECHNICAL SPECIFICATION FOR
FUEL OIL HANDLING SYSTEM**

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SUB VENDOR LIST



**TECHNICAL SPECIFICATION FOR
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SL. NO	ITEM	SUB-VENDORS	PLACE	TECHNICAL LIMIT
MECHANICAL				
1	GATE, GLOBE AND CHECK (CARBON STEEL VALVES)	A.V. VALVES LTD	AGRA	
		ATAM VALVES PVT. LTD.	JALANDHAR	
		FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	
		M/S GM ENGINEERING	RAJKOT	
		INTERVALVE (INDIA) LTD.	PUNE	A) STEEL GATE VALVES: UPTO 50NB, #800 AND 65NB TO 150NB, #150 B) STEEL GLOBE VALVES: UPTO 50NB, #800 AND 65NB TO 100NB, #150 C) SUPPLIER NOT REGISTERED FOR NR VALVES
		LEADER VALVES LTD.	JALANDHAR	
		NITON VALVE INDUSTRIES PVT LTD	MUMBAI	
		NSSL LIMITED.	NAGPUR	
		STEEL STRONG VALVES (I) PVT.LTD.	MUMBAI	LIMIT AS PER VD FILE AS ATTACHED IN SHEET 2
		VENUS PUMPS AND ENGG. WORKS	KOLKATA	CC/CSS-GATE-BBT-UPTO600NB CL UPTO300,GATE-PSBT UPTO250NB CL 1500,GLV-BBT-UPTO300NB CL UPTO600,SCNRV-BBT-UPTO600NB CL UPTO150,SCNRV-BBT-UPTO300NB CL 300,SCNRV-PSBT-UPTO150NB CL UPTO900
		VALTECH INDUSTRIES	MUMBAI	CAST CARBON & ALLOY STEEL - VALVE/RATING/SIZE- GV/150/900,GV/300/400, GV/600/300 , GV/GLV/NRV/900/250 , GLV/300/300,GLV/150/350/ , SCNRV/150/700, SCNRV/300/350, SCNRV/600/250.
		V.K. VALVES PVT. LTD.,	JALANDHAR	
		WEIR BDK VALVES	NEW DELHI	
		AUDCO -L&T	CHENNAI / COIMBATORE	
		OSWAL INDUSTRIES		
		HITECH	AHMEDABAD	
		KSB WATER PUMPS / VALVES	COIMBATORE	
		KBL	KONDHAPURI	
		HAWA ENGINEERS	AHMEDABAD	
		BHEL	GOINDWAL	
		FOURESS ENGG	MUMBAI	UPTO 600 NB, CL-300 & 300NB CL-600
		FOURESS ENGG	AURANGABAD	



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2	CS BALL VALVES	A.V. VALVES LTD	AGRA	
		AKAY INDUSTRIES PVT.LTD.	DHARWAD	
		BELGAUM AQUA VALVES PVT. LTD.	BELGAUM	
		ASIAN INDUSTRIAL VALVES & INSTRUMENTS.	CHENNAI	
		ATAM VALVES PVT. LTD.	JALANDHAR	(1) BALL VALVES: FCS/FSS - 1/2" TO 2" #800 & CCS/CSS - 2.1/2" TO 4" # 150 (2) BALL VALVES: GUN METAL VALVES SIZE 15 NB TO 80 NB - UPTO PN16.0
		DEMBLA VALVES LTD.	THANE	
		M/S GM ENGINEERING	RAJKOT	
		HAWA VALVES (INDIA) PVT. LTD.	THANE	SIZE UP TO 2" & #800 WITH MOC AS FCS & FSS AND FOR SIZE FROM 65 NB TO 150 NB & #150 WITH MOC AS CCS AND CSS.
		INTERVALVE (INDIA) LTD.	PUNE	STEEL BALL VALVES UPTO 50NB, #800 AND 65NB TO 150NB. #150
		LEADER VALVES LTD.	JALANDHAR	CAST STEEL UPTO 200 MM, CLASS 150/300.
		MICROFINISH VALVES PVT LTD.	HUBLI	
		NILON VALVES PRIVATE LIMITED	AHMEDABAD	
		SURYA VALVES AND INSTRUMENTS MFG CO.	CHENNAI	FOR CARBON STEEL/STAINLESS STEEL UPTO SIZE 200NB.
		UNIFLOW	CHENNAI	
		VALTECH INDUSTRIES	MUMBAI	FORGED CARBON & ALLOY STEEL BALL VALVES, SCREWED TYPE BALL VALVES RATING 800, SIZES UPTO 50 & CC& ALLOY STEEL BALL VALVES RATING 150, SIZES 65 TO 200 FLANGED TYPE.
		VAAS AUTOMATION PVT. LTD.	DELHI	
		WEIR BDK VALVES- A UNIT OF WEIR INDIA PVT. LTD.	DELHI	
		PEC	NASHIK	(UPTO 400 NB CLASS 150)
		L&T VALVES	COIMBATORE	
		L&T VALVES (AUDCO)	CHENNAI	
		FLOW CHEM	AHMEDABAD	(UPTO 350 NB CLASS 150)
		BELGUAM AQUA VALVES	BELGAUM	UPTO 200 NB, CL 150
3	CS PLUG VALVES	FLOWSERVE (AUDCO)	CHENNAI	
		MICROFINISH	HUBLI	
		WEIR BDK	HUBLI	UPTO 150 NB CLASS 300 & UPTO 400 NB CLASS 150
		FISHER XOMOX	CHENNAI	
		LEADER VALVES LTD.	JALANDHAR	
4	SUMP PUMP (VERTICAL)	DARLING PUMPS PVT. LTD	INDORE	
		FLOWMORE LTD.	GURGAON	



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	CENTRIFUGAL)	SU MOTORS PVT. LTD.	MUMBAI	
		VARAT PUMP AND MACHINERY PVT. LTD.	KOLKATA	
		WPIL LIMITED	KOLKATA	
		SAM TURBO INDUSTRY LTD	COIMBATORE	
		KISHORE	PUNE	
		AQUA MACHINERY	AHMEDABAD	
		FLOWMORE PUMP	GHAZIABAD	
		M&P	PUNE	
		B & C ENGG(BECON WEIR)	CHENNAI	
5	SCREW PUMPS	ROTO PUMPS	NOIDA	
		TUSHACO	MUMBAI	
		UT PUMPS	FARIDABAD	
6	API 5L ERW PIPE	TISCO	JAMSHEDPUR	
		SURYA ROSHNI	BAHADURGARH	UP TO 400 NB
		JINDAL	GHAZIABAD	UP TO 350 NB
		MSL	RAIGAD	200 TO 500 NB
		SAIL	ROURKELA	
		RATNAMANI	KUTCH	UP TO 400 NB
7	ASTM A 106, CS SEAMLESS PIPE	ISMT	AHMED NAGAR	UP TO 150 NB
		MSL	RAIGAD	UP TO 350 NB
		JINDAL SAW LTD	NASHIK	
		REMI METAL GUJRAT LTD	BHARUCH	UP TO 150 NB HOT FINISH & UPTO 100NB COLD FINISH
		ISMT	BARAMATI	UP TO 200 NB
8	CS ERW PIPE (IS 1239 / 3589)	SURYA ROSHNI	BAHADURGARH	UPTO 400 NB ERW PIPES AS PER IS 1239/3589 AND SAW AS PER IS 3589
		JINDAL	GHAZIBAD/HISSA R	UP TO 350 NB
		MSL	RAIGAD	200-500 NB ERW PIPES AS PER IS 3589
		SAIL	ROURKELA	
		WELSPUN	ANJAR/BHARUCH	UPTO 400 NB ERW PIPES AS PER IS 1239/3589 AND SAW AS PER IS 3589
		INDUS TUBE	GAUTAM BUDDH NAGAR	UP TO 300 NB
		RATNAMANI	KUTCH /AHMEDABAD / CHHATRAL	UPTO 400 NB ERW PIPES AS PER IS 3589 AND SAW AS PER IS 3589
		TATA TUBE	JAMSHEDPUR	UPTO 150 NB ERW PIPES AS PER IS 1239
		PSL	CHENNAI/VIZAG/ KUTCH/DAMAN	SPIRAL WELD SAW AS PER IS 3589
		LALIT PROFILE	THANE	SPIRAL WELD SAW AS PER IS 3589
		SAMSHI PIPES INDUSTRIES	VADODARA	SPIRAL WELD SAW AS PER IS 3589



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		MUKUT PIPES	RAJPURA	LONGITUDINAL SAW (SINGLE SIDE WELD) AS PER IS 3589
		INDUS TUBES	G B NAGAR	UPTO 300 NB ERW PIPES AS PER IS 1239/3589
		MANN IND	INDORE	SPIRAL WELD SAW AS PER IS 3589
		SURENDRA ENGG	RAJPURA	SPIRAL WELD SAW AS PER IS 3589
		PRATIBHA PIPES & STRUCTURE PVT LTD	THANE	SPIRAL WELD SAW AS PER IS 3589
		JCO GAS PIPE	CHINDWARA	SPIRAL WELD SAW AS PER IS 3589
		NUKAT TANKS AND VESSELS	TARAPUR	LONGITUDINAL SAW (SINGLE SIDE WELD) AS PER IS 3589
		DADU PIPES	SIKRANDRABAD	UPTO 300 NB ERW PIPES AS PER IS 1239/3589
		APL APOLLO TUBES LTD	SIKRANDRABAD	IS3589 UPTO 250 NB
9	SUCTION HEATER	PARKAIRE	DELHI	
		MVS	DELHI	
		MELCON	DELHI	
		GASO ENERGY	PUNE	
		INDCON	DELHI	
		TEMASME	NOIDA	
10	PRESSURE REDUCING VALVE & DESUPERHEATER	CIRCOR (EARLIER MAZDA)	AHMEDABAD	
		SPIRAX MARSHALL	PUNE	
		LEADER VALVES LTD.	JALANDHAR	
		SPX CORPORATION, USA	M/S SPX FLOW TECHNOLOGY INDIA PVT. LTD, GUJARAT	
		CONTROL COMPONENT INDIA PVT. LTD.	NOIDA	
		DAUME REGELARMATUREN GMBH,	GERMANY	
		HOLTER REGELARMATUREN GMBH & CO.	GERMANY	
		INSTRUMENTATION LTD.	PALAKKAD	
11	STRAINERS (DUPLEX / SIMPLEX BASKET TYPE)	GENERAL MECHANICAL WORKS PVT LTD	VADODARA	
		GRAND PRIX	FARIDABAD	
		GUJARAT OTOFILT	VATVA , AHMEDABAD	
		FILTRATION ENGRS	MUMBAI	
		JAYPEE INDUSTRIES PVT. LTD.	NEW DELHI	
		MULTITEX FILTRATION ENGINEERS LIMITED,	NEW DELHI	
		OTOKLIN GLOBAL BUSINESS LIMITED	MUMBAI	
		BHATIA ENGINEERING CO.	NEW DELHI	SIMPLEX ONLY
		FILTRATION ENGINEERS (I) PVT. LTD.	MUMBAI	SIMPLEX ONLY
		SUNGOV ENGINEERING PVT. LTD.	CHENNAI	



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		SAROJINI ENTERPRISE	HOWRA	SIMPLEX ONLY
12	CONTROL VALVE	SPX CORPORATION, USA	M/S SPX FLOW TECHNOLOGY INDIA PVT. LTD. (AHMEDABAD)	
		CONTROL COMPONENT INC.	USA	
		DRESSER VALVE INDIA PVT. LTD	COIMBATORE	
		DAUME REGELARMATUREN GMBH,	GERMANY	
		EMERSON PROCESS MANAGEMENT CHENNAI LIMITED	CHENNAI	
		FORBES MARSHALL ARCA PVT.LTD.	PUNE	
		WEIR VALVES & CONTROLS UK LTD.	UK	
		HOLTER REGELARMATUREN GMBH & CO.KG	GERMANY	
		INSTRUMENTATION LTD.	PALAKKAD	
		KOSO INDIA PRIVATE LIMITED,	NASHIK	
		LESLIE CONTROLS, INC	USA	
		MIL CONTROLS LTD.	THRISSUR	
		METSO SINGAPORE PTE. LTD.,	SINGAPORE	
		PARCOL S.P.A	ITALY	
		R.K.CONTROL INSTRUMENTS PVT. LTD.	THANE	
		RINGO VALVULAS S.L,	SPAIN	
		SEVERN GLOCON INDIA PVT. LTD.	CHENNAI	
		SHENJIANG VALVE CO. LTD.	CHINA	
		VALVITALIA S.P.A. ,	ITALY	
		WALDEMAR PRUSS ARMATURENFABRIK GMBH	GERMANY	
13	STEAM TRAP	SPIRAX MARSHALL	PUNE	MAIN CONTRACTOR COC +MANUFACTURER STANDARD TC SHALL BE SUBMITTED FOR ISSUING DESPATCH CLEARANCE
		UNIKLINGER	PUNE	
		LEADER	JULLANDHAR	
		CRECENT VALVE MFG CO LTD	MUMBAI	
		PENNANT ENGINEERING	PUNE	
14	THERMAL INSULATION	GOENKA ROCKWOOL (INDIA) PVT.LTD.	RAIPUR	
		LLOYD INSULATIONS (INDIA) LTD.	NEW DELHI	
		MINWOOL ROCK FIBRES LTD.	RAJNANDGAON	
		POLYBOND INSULATION PRIVATE LIMITED,	BHILAI	
		ROCKWOOL (INDIA) PVT. LTD.	HYDERABAD	
		SHREERAM EQUITECH PRIVATE LIMITED	DURG	
		THERMOCARE ROCKWOOL INDIA PRIVATE LTD.	CHATTISGARH	



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		LOPINUS ROCKWOOL	GWALIOR	
		SAIL		
		ESSAR STEEL		
		TISCO		
		RINL		
		JINDAL		
		M/S UTTAM VALUE STEEL (LLOYDS)		
		ISPAT		
		JSW		
		INDIAN IRON & STEEL CO. LTD		
		SPIRAX MARSHALL	PUNE	
		FISCHER SANMAR	CHENNAI	
		BHEL	TRICHY	
		KEYSTONE	BARODA	
		LEADER	JULLANDHAR	
		ASIAN PAINT		
		BERGER		
		KANSAI NEROLAC		
		JOTUN		
		SHALIMAR		
		JENSON & NICHOLSON (I) LTD		
		CDC CARBOLINE (I) LTD.		
		ADDISON PAINTS LTD		
		GRAND POLYCOAT		
		BOMBAY PAINTS		
		HEMPLE PAINTS (SINGAPORE)		
		AKZONOBEL COATINGS		
		PIPE FIT ENGINEERS	VADODARA	
		GUJRAT INFRA PIPES	VADODARA	
		MS FITTINGS	KOLKATA	
		TUBE PRODUCT	VADODARA	
		SIDDARTH & GAUTAM	FARIDABAD	
		EBY	MUMBAI	
		NL HAZRA	KOLKATA	
		EXCEL METAL		
		INTERTECH		
		FITTECH		
		METAL LLOYDS	MUMBAI	
		TRUE FORGE	FARIDABAD	
		D WREN & CO	KOLKATA	
		SUDEEP INDUSTRIES	KOLKATA	
		HYDROKRIMP	MUMBAI	
		PRESIDENCY RUBBER	KOLKATA	



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		SUDEEP INDUSTRIES	KOLKATA	
21	FLOWMETER (CORIOLIS TYPE)	EMERSON PROCESS MANAGEMENT	CHENNAI	
		E&H	CHENNAI	
		KROHNE MARSHALL	PUNE	
22	ALUMINUM CLADDING	BHARAT ALUMINIUM COMPANY LTD	DELHI	
		CHONGQING LANREN ALUMINIUM CO. LTD., CHINA	CHINA	
		HINDALCO INDUSTRIES LTD	MUMBAI	
		NATIONAL ALUMINIUM COMPANY LTD.	ODISHA	
23	METALLIC EXPANSION BELLOWS	AEROSUN TOLA EXPANSION JOINT CO. LTD.,	CHINA	
		B. D. ENGINEERS	AHMEDABAD	
		FLEXICAN BELLOWS AND HOSES PVT. LTD.	BARODA	
		FLEXATHERM EXPANLLOW PVT. LTD.	VADODARA	
		LONESTAR INDUSTRIES	CHENNAI	
		MB METALLIC BELLOWS PVT. LTD.	CHENNAI	
		METALLIC BELOWS INDIA PVT. LTD.	CHENNAI	
		QINHUANGDAO NORTH METAL HOSE CO. LTD.,	CHINA	
		TEDDINGTON ENGINEERED SOLUTIONS LTD.	UK	
ELECTRICAL AND C&I				
24	LEVEL TRANSMITTER (RADAR AND ULTRASONIC TYPE)	K TEK (ABB)	FARIDABAD	
		E & H	AURANGABAD	
		MEGNETROL	BELGIUM	ONLY RADAR TYPE
		EMERSON PROCESS MGT	PAWANE	
		MOORE INDUSTRIES INTERNATIONAL INC.	USA	
		SIEMENS LIMITED	MUMBAI	
		SMART INSTRUMENTS LTD, BRAZIL	MUMBAI	LD-301 & T-301 TRANSMITTER FROM M/S SMART EQUIPMENTS BRAZIL.
		HONEYWELL AUTOMATION INDIA LIMITED	DELHI	
		TOSHNIWAL INDUSTRIES PVT. LTD.,	AJMER	
		V. AUTOMAT & INSTRUMENTS (P) LTD.	DELHI	
		YOKOGAWA INDIA LIMITED,	BANGALORE	
		SIEMENS MILTRONICS	CANADA	ONLY RADAR TYPE
		NIVELCO	HUNGARY	ONLY RADAR TYPE
		HAWK	AUSTRALIA	ONLY RADAR TYPE
25	LT MOTORS	CROMPTON GREAVES LIMITED	AHMEDNAGAR	
		KIRLOSKAR ELECTRIC COMPANY	BANGALORE /	



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		ABB	MUMBAI	
		BHARAT BIJLEE	BANGALORE / FARADABAD	
		JYOTI	MUMBAI	
		MARATHON	VADODARA	
		NGEF	KOLKATA	
		BHARAT ELECTRIC (BHEL)	BANDALORE / HUBLI	
		LHP		
26	PRESSURE / DP / TEMP.SWITCH	SOR	SOLAPUR	
		GIC(GAUGES BOURDON)	USA	
		HERION	PANVEL	
		ITT BARTON	GERMANY	
		DELTA CONTROL	USA	
		ASHCROFT	UK	
		TRAFAG	USA / GERMANY	
		INDFOSS	RANIPET	
		ASHCROFT	GHAZIABAD	
		SWITZER	GANDHINAGAR	
27	LEVEL INDIATOR FLOAT AND BOARD TYPE	CHENNAI	EXCEPT 9000 SERIES	
		FLOW STAR		
		SCIENTIFIC DEVICES	FARIDABAD	
		GAUGES BOURDEN	MUMBAI	
		PUNE TECH TROL	PANVEL	
		SBEM	PUNE	
		LEVCON	PUNE	
		SIGMA	KOLKATA	
		CHEMTROL	MUMBAI	
		DK INSTRUMENT		
28	PRESSURER / DP GAUGE / TEMPERATURE GAUGE (DIAL TYPE)	V AUTOMAT	KOLKATA	
		H GURU (SI)	DELHI	
		H GURU INDUSTRIES	BANGALORE	
		AN INSTRUMENT	MUZAFFARPUR / RISHRA	
		GOA THERMOSTATIC	KOLKATA	
		WAAREE	GOA	
		MANOMETER	VAPI	
		GLUCK	MUMBAI	
		FORBES MARSHALL	MUMBAI	
		ASHCROFT	HYDERABAD	
		WIKI	GANDHINAGAR	
		GAGES BOURDON	PUNE	
		BAUMER TECHNOLOGIES INDIA PVT. LTD.	MUMBAI / GOA	
			MUMBAI	



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		BOSE PANDA INSTRUMENTS PVT.LTD.	KOLKARA	ONLY PRESSURE AND DP GAUGE
		BUDENBERG GUAGE CO.LTD.	UK	ONLY TEMPERATURE GAUGE
		GOA INSTRUMENTS INDUSTRIES PVT.LTD.,	GOA	
29	RTD /THERMOCOUPLE ASSEMBLY	PYROELECTRIC	GOA	
		GIC(THERMAL INSTRUMENTS)	MAHARASHTRA	
		TEMPSENS	UDAIPUR	
		DETRIVE	MUMBAI	
		TECHNO INSTRUMENTS	GUJRAT	
		TEMPSENS INSTRUMENT (I) PVT LTD	UDAIPUR	
		TM TECNOMATIC SPA	ITALY	
		TOSHNIWAL INDUSTRIES PVT. LTD.,	AJMER	
		THERMAL INSTRUMENT INDIA PVT. LTD.	MUMBAI	
		BAUMER TECHNOLOGIES INDIA PVT. LTD.	MUMBAI	
		GOA INSTRUMENTS INDUSTRIES PVT.LTD.,	GOA	
30	ELECTRICAL ACTUATORS	ROTORK	BANGALORE	
		ROTORK	CHENNAI	
		AUMA	BANGALORE	
		LIMITORK	FARIDABAD	
31	LEVEL SWITCH (FLOAT AND DISPLACER TYPE)	TRAC	HYDERABAD	
		I EVCON	KOLKATA	
		DK INSTRUMENTS	KOLKATA	
		SBEM	PUNE	
		SBEM	PUNE	
		FLOW STAR	FARIDABAD	
		SIGMA	MUMBAI	
		V AUTOMAT	DELHI	
32	TEMPERATURE TRANSMITTER	EMERSON PROCESS MGT	PAWANE	
		MOORE	USA	
		ABB	FARIDABAD	
		YOKOGAWA	BANGLORE	MAKE YOKOGAWA, JAPAN
		ABB LIMITED	FARIDABAD	
		ENDRESS + HAUSER (INDIA) PVT. LTD.,	DELHI	
		MOORE INDUSTRIES INTERNATIONAL INC.	USA	
		SIEMENS LIMITED	MUMBAI	
		SMART INSTRUMENTS LTD, BRAZIL	MUMBAI	
		HONEYWELL AUTOMATION INDIA LIMITED	DELHI	
		TOSHNIWAL INDUSTRIES PVT. LTD.	AJMER	
		YOKOGAWA INDIA LIMITED,	BANGALORE	



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33	AIR FILTER REGULATOR	PLACKA INSTRUMENT	CHENNAI	
		SHAVO NORGEN	MUMBAI	
		FISHER SANMAR	CHENNAI	
34	SOLENOID VALVE	AVCON	MUMBAI	
		ROTEX	BARODA/VV NAGAR	
		SMC	NOIDA	
		NUCON	HYDERABAD	
		ASCO	CHENNAI	
35	LOCAL CONTROL PANEL	PYROTECH	UDAIPUR	
		POSITRONICS	VADODARA	
		JACKSON	NOIDA	
		CONTROL DEVICE	KOLKATA	
		ROCKWELL AUTOMATION INDIA LTD	GHAZIABAD	
		SIEMENS LIMITED	DELHI	
		SCHNEIDER ELECTRIC INDIA PVT.LTD.	DELHI	
		JOSPER	NOIDA	
		I C A	MUMBAI	
		INDIAN SWITCH GEAR	VADODARA	
36	JUNCTION BOX	SWITCHING CKT	KOLKATA	
		PYROTECH	UDAIPUR	
		POSITRONICS	VADODARA	
		JACKSON	NOIDA	
		CONTROL DEVICE	KOLKATA	
		JOSPER	NOIDA	
		I C A	MUMBAI	
		AJMERIA INDUSTRIAL & ENGINEERING WORKS	MUMBAI	
		FLEXPRO ELECTRICALS PVT. LTD.	GUJARAT	
		K.S.INSTRUMENTS PVT.LTD.	BANGALORE	
		SUCHITRA INDUSTRIES	BANGALORE	
		SHRENIK & COMPANY,	AHMEDABAD	
		HOFFMAN	BANGALORE	
37	CABLE LUGS (NON FLAME PROOF)	RITTAL	BANGALORE	
		SWITCHING CKT	KOLKATA	
		3D	UMERGAON	
38	CABLE GLANDS (NON FLAME PROOF)	DOWELL	MUMBAI	
		CHITRA	NASIK	
		ARUP	KOLKATA	
		SUNIL	KOLKATA	
39	CABLE GLAND,	QPIE	KOLKATA	
		COMMET	MUMBAI	
		AJMERIA	MUMBAI	



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	LUGS, JB (FLAME PROOF)	BALIGA	CHENNAI	
		FLEXPRO	NAVSARI	
40	BATTERY CHARGER FOR PLC	CHLORIDE POWER	KOLKATA	
		CHABBI	JALGAON	
		AMAR RAJA	TIRUPATI	
		STATCON	NOIDA	
		HBL POWER SYSTEM	HYDERABAD	
		JEMA ENERGY	SPAIN	
		MASS-TECH CONTROLS PVT.LTD.	MUMBAI	
		DUBAS	BANGALORE	
		CALDYNE	KOLKATA	
41	DC LEAD ACID / NI- CD BATTERIES	AMCO SAFT INDIA LTD	BANGALORE	NI-CD BATTERIES ONLY
		EXIDE INDUSTRIES LTD	DELHI	LEAD ACID BATTERIES ONLY.
		HBL POWER SYSTEMS LTD	HYDERABAD	NI/CD AND TUBULAR TYPE FOR LEAD ACID
		HOPPECKE BATTERIEN GMBH & CO.KG,	GERMANY	
		AMAR RAJA	TIRUPATI	
		SAFT	FRANCE/SWEDEN	
42	CONTROL / POWER CABLE	CORDS CABLE	BHIWADI	
		RADIANT CABLES	HYDERABAD	
		POLYCAB	DAMAN	
		KEI	BHIWADI	
		NICCO	KOLKATA	
		RAVIN CABLES	PUNE	
		INCAB	PUNE	
		HVPL	FARIDABAD	
		TORRENT CABLE	NADIAD	
		HAVELLS	ALWAR	
		PARAMOUNT	KHUSHKHERA	
		SRI RAM CABLES	BHIWADI	
		THERMOCABLES	HYDERABAD	
		TORRENT CABLE	NADIAD	
		UNIVERSAL CABLES	SATNA	
		GEMSCAB	BHIWADI	
		DELTON	FARIDABAD	
43	PLC BASED PANELS	SIEMENS	NASIK	
		SCHNEIDER	NASIK	
		ROCKWELL	SAHIBABAD	
		GE INTELLIGENT PLATFORM	BANGALORE	
		HONEYWELL AUTOMATION INDIA LIMITED ,	PUNE	
		ABB	BANGALORE	
44	OWS/PC	HP/COMPAQ /DELL/HCL/IBM/LENOVO		



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45	PRINTER	HP/CANNON/EPSON/XEROX/IBM/L EXMARK		
6	INSTRUMENT FITTINGS	AURA INCORPORATED	DELHI	
		ASTEC VALVES & FITTINGS PVT. LTD.,	MUMBAI	
		ARYA CRAFTS & ENGINEERING PVT. LTD.	MUMBAI	
		COMFIT & VALVE PVT. LTD.	NANDASAN	
		FLUIDFIT ENGINEERS PVT. LTD.	MUMBAI	REGISTERED AS PER 22ND ELECTRICAL AND C&I MISCC MEETING DTD. 15.01.2014
		FLUID CONTROLS PVT. LTD.	MUMBAI	NAME CHANGED FROM M/S HYD- AIR VALVES PVT. LTD. TO M/S FLUID CONTROLS PVT. LTD. AS PER 25TH MISCC-ELECTRICAL AND C&I DTD. 20.02.2014
		HP VALVES & FITTINGS INDIA PVT. LTD.	CHENNAI	
		PRECISION ENGINEERING INDUSTRIES	MUMBAI	
		PANAM ENGINEERS,	MUMBAI	
		PERFECT INSTRUMENTATION CONTROL (INDIA) PVT. LTD.	MUMBAI	
47	CABLE TRAY SUPPORT SYSTEM - BOLTABLE	VIKAS INDUSTRIAL PRODUCTS	NOIDA	FINANCIAL LIMIT REVIEWED ON 05.06.2014
		AM-TECH ENGG.SERVICES	PUNE	
		INDUSTRIAL PERFORATION (I) PVT.LTD.	KOLKATA	
		INDMARK FORMTECH PVT. LTD.	PUNE	
		PREMIER POWER PRODUCTS (CAL) PVT. LTD.	KOLKATA	GALVANISATION TO BE DONE AT ITS OWN PLANT OR FROM BHEL- PEM APPROVED GALVANIZERS.
		RATAN PROJECTS & ENGINEERING CO. PVT.LTD.	KOLKATA	
48	CABLE TRAY SUPPORT SYSTEM- WELDED(GALV)	STEELITE ENGINEERING LTD.	MUMBAI	
		ASSOCIATED POWER STRUCTURES PVT. LTD.	G. I. D. C., MAKARPURA, VADODARA- GUJARAT	WORKS ADDRESSES ARE APPLICABLE FOR MANUFACTURING AND GALVANISING.
		INDUSTRIAL PERFORATION (I) PVT.LTD.	DUM DUM KOLKATA-WEST BENGAL	
		INDMARK FORMTECH PVT. LTD.	MIDC BHOSARI PUNE- MAHARASHTRA	GALVANIZING UNIT LOCATED AT PHAS-3, E-11/1, MIDC, PUNE ,
		JAMNA METAL COMPANY	DSIDC, NARLA INDL. AREA DELHI	
		PREMIER POWER PRODUCTS (CAL) PVT. LTD.	KOLKATA,-WEST BENGAL	GALVANISATION TO BE DONE AT ITS OWN PLANT OR FROM BHEL- PEM APPROVED GALVANIZERS.
		PATNY SYSTEMS (P) LTD	SARDAR PATEL	



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	CABLE TRAY SUPPORT SYSTEM- WELDED(GALV)		ROAD SEUNDRABAD	
		PASSIVE INFRA PROJECTS PVT. LTD.	VAISHALI, PITAMPURA DELHI-	
		RUKMANI ELECTRICAL & COMPONENTS PVT LTD	KOLKATA-WEST BENGAL-INDIA	GALVANISATION TO BE DONE AT ITS OWN PLANT OR FROM BHEL- PEM APPROVED GALVANIZERS.
		RATAN PROJECTS & ENGINEERING CO. PVT.LTD.	P.K. TAGORE STREET, MAIN BUILDING KOLKATA-WEST BENGAL	GALVANISATION TO BE DONE AT ITS OWN PLANT OR FROM BHEL- PEM APPROVED GALVANIZERS. ADDITIONAL WORKS AT "SANKRAIL INDUSTRIAL PARK, BHAGABATIPUR MAUJA, DHULAGARH, HOWRAH- 711302" APPROVED
		RABI ENGINEERING WORKS PVT. LTD.	R.N. GUHA ROAD, DUM DUM, KOLKATA- WEST BENGAL	GALVANISATION TO BE DONE AT ITS OWN PLANT OR FROM BHEL- PEM APPROVED GALVANIZERS.
		SARAL INDUSTRIES	INDUSTRIAL AREA-1 SULTANPUR ROAD RAE BARELI-UTTAR PRADESH	REGISTERED IN PERMANENT CATEGORY ALONG WITH GALVANIZER M/S SARAL PROJECTS AND PROCESSORS , ,
		UNITECH FABRICATORS AND ENGINEERS PVT LTD	M.B RAOD , BIRATI KALABAGAN KOLKATA KOLKATA-WEST BENGAL	GALVANISATION TO BE DONE AT ITS OWN PLANT OR FROM BHEL- PEM APPROVED GALVANIZERS.
49	CABLE TRAY SUPPORT SYSTEM- WELDED(UNGALV)	RASHTRIYA ISPAT NIGAM LIMITED	AMBAWADI AHMEDABAD-	
		STEEL AUTHORITY OF INDIA LTD.	ISPAT BHAWAN LODI ROAD NEW DELHI-	
50	CABLE TERM.& JOINT KITS	3M ELECTRO AND COMMUNICATION INDIA P.LTD	RAJENDRA PLACE, DELHI	HEAT SHRINKABLE TYPE ONLY.
		HARI CONSOLIDATED PVT.LTD.,NEW DELHI	JHANDEWALAN, NEW DELHI-DELHI	
		RAYCHEM RPG PRIVATE LIMITED	JANAKPURI NEW DELHI	
		YAMUNA CABLE ACCESSORIES PVT. LTD.	AMBALA ROAD, JAGADHRI YAMUNANAGAR- HARYANA	
51	LIMIT SWITCH	BCH	NEW DELHI	
		SIEMENS	NEW DELHI	
		JAIBALAJI	NEWDELHI	
52	ANNUNCIATOR	IIC	MUMBAI	
		MINILEC	AHEMDABAD	
		PROCON	CHENNAI	



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53	INTERPOSING RELAY	ECONIX	MUMBAI	
		PHEONIX	DELHI	
54	SELECTOR SWITCH	SCHENIDER	INDIA	
		SIEMENS	INDIA	
		L&T	INDIA	
		KAYCEE	INDIA	
55	INDICATION LAMPS, PUSHBUTTON, AUX. CONTACTOR, AUX. RELAYS	SCHENIDER	INDIA	
		SIEMENS	INDIA	
		ABB	INDIA	
		L&T	INDIA	
56	TIMER	BCH	INDIA	
		EAPL	INDIA	
57	PNEUMATIC ACTUATOR/CYLINDER(METALLIC)	SCHRADDER	MUMBAI	
		NUCON	HYDERABAD	
		ROTEX	MUMBAI	
		VAAS	CHENNAI	

The make of Sub-vendor items shall be generally as indicated above which is subject to customer / BHEL approval during detail engineering.

Make of any unlisted items shall be subject to customer / BHEL approval during detail engineering. For such items, bidder to furnish list of sub-vendors during detail engineering stage for Customer / BHEL's review and approval. Bidder shall furnish following supporting documentation within 1 month of placement of LOI. Thereafter no request for additional sub-vendor shall be entertained.

- Documentation to show that the equipment /system has been supplied for a plant of similar or higher capacity.
- Documentation in the form of certificate that the equipment/system has been operating satisfactorily for two years as on the scheduled date of bid opening.

The successful bidder will get the makes of all items approved from Customer/ Consultant during detail engineering within two months of placement of LOI. The complete list will be necessarily be submitted within one month of placement of LOI to ensure timely placement of order for BOIs

Bidder to assess the capability of their proposed sub-vendors in terms of preparation of drawings, calculations, documents, quality assurance, supply of material etc. as per project schedule before placing the order on them.

Dealers are not acceptable for any item of the package. Bidder shall procure all items including plates, structural, flanges; counter flanges etc. from approved sub vendor only.



**TECHNICAL SPECIFICATION FOR
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SUB-VENDORS - MISCELLANEOUS TANKS

S.NO	ITEM	SUB-VENDORS	PLACE	TECHNICAL LIMIT
1	CS PIPES ERW	TISCO	JAMSHEDPUR	UP TO 350 NB
		SAIL	ROURKELA	
		SURYA ROSHNI	BAHADURGARH	UP TO 400 NB
		JINDAL	GHAZIABAD	UP TO 350 NB
		RATNAMANI	KUTCH	UP TO 400 NB
		MAHARASHTRA SEAMLESS	RAIGARH	UP TO 500 NB
		WELSPUN	ANJAR	UP TO 400 NB (IS 3589)
2	CS PIPES SEAMLESS	MAHARASHTRA SEAMLESS	RAIGARH	UP TO 350 NB
		ISMT	AHMEDNAGAR	UP TO 150 NB
		JINDAL SAW	NASHIK	
		REMI METAL GUJRAT LTD	BHARUCH	UP TO 150 NB HOT FINISH & UPTO 100NB COLD FINISH
		ISMT	BARAMATI	UP TO 200 NB
3	SS PIPES	REMI	TARAPUR	
		RATNAMANI	KUTCH	
		APEX TUBES	BEHROR (ALWAR)	
		PRAKASH STEELAGE LTD	MUMBAI	SS SEAMLESS PIPE UPTO 50MM
		SUMITAMO	JAPAN	
4	STRUCTURAL STEEL / MS PLATE	SAIL		
		ESSAR STEEL		
		TISCO		
		RINL		
		JINDAL		
		M/S UTTAM VALUE STEEL (LLOYDS)		
		ISPAT		
		JSW		
		INDIAN IRON & STEEL CO. LTD		
5	GATE, GLOBE AND CHECK (STAINLESS STEEL VALVES)	A.V. VALVES LTD	AGRA	
		FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	
		M/S GM ENGINEERING	RAJKOT	
		INTERVALVE (INDIA) LTD.	PUNE	A) STEEL GATE VALVES: UPTO 50NB, #800 AND 65NB TO 150NB, #150 B) STEEL GLOBE VALVES: UPTO 50NB, #800 AND 65NB TO 100NB, #150 C) SUPPLIER NOT REGISTERED FOR NR VALVES
		LEADER VALVES LTD.	JALANDHAR	
		NITON VALVE INDUSTRIES PVT LTD	MUMBAI	
		NSSL LIMITED.	NAGPUR	
		STEEL STRONG VALVES (I) PVT.LTD.,	MUMBAI	LIMIT AS PER VD FILE AS ATTACHED IN SHEET 2
		VALTECH INDUSTRIES	MUMBAI	CAST CARBON & ALLOY STEEL - VALVE/RATING/SIZE- GV/150/900, GV/300/400, GV/600/300, GV/GLV/NRV/900/250, GLV/300/300, GLV/150/350/, SCNRV/150/700, SCNRV/300/350, SCNRV/600/250.



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6	GATE, GLOBE AND CHECK (CS STEEL VALVES)	V.K. VALVES PVT. LTD.,	JALANDHAR	
		WEIR BDK VALVES	NEW DELHI	
		AUDCO		
		OSWAL INDUSTRIES		
		A.V. VALVES LTD	AGRA	
		ATAM VALVES PVT. LTD.	JALANDHAR	
		FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	
		M/S GM ENGINEERING	RAJKOT	
		INTERVALVE (INDIA) LTD.	PUNE	A) STEEL GATE VALVES: UPTO 50NB, #800 AND 65NB TO 150NB, #150 B) STEEL GLOBE VALVES: UPTO 50NB, #800 AND 65NB TO 100NB, #150 C) SUPPLIER NOT REGISTERED FOR NR VALVES
		LEADER VALVES LTD.	JALANDHAR	
		NITON VALVE INDUSTRIES PVT LTD	MUMBAI	
		NSSL LIMITED.	NAGPUR	
		STEEL STRONG VALVES (I) PVT.LTD.,	MUMBAI	LIMIT AS PER VD FILE AS ATTACHED IN SHEET 2
		VENUS PUMPS AND ENGG. WORKS	KOLKATA	CC/CSS-GATE-BBT-UPTO600NB CL UPTO300,GATE-PSBT UPTO250NB CL 1500, GLV-BBT-UPTO300NB CL UPTO600, SCNRV-BBT-UPTO600NB CL UPTO150, SCNRV-BBT-UPTO300NB CL 300, SCNRV-PSBT-UPTO150NB CL UPTO900
		VALTECH INDUSTRIES	MUMBAI	CAST CARBON & ALLOY STEEL - VALVE/RATING/SIZE- GV/150/900, GV/300/400, GV/600/300 , GV/GLV/NRV/900/250 , GLV/300/300, GLV/150/350/ , SCNRV/150/700, SCNRV/300/350, SCNRV/600/250.
		V.K. VALVES PVT. LTD.,	JALANDHAR	
		WEIR BDK VALVES	NEW DELHI	
		AUDCO -L&T	CHENNAI / COIMBATORE	
		OSWAL INDUSTRIES		
7	LEVEL INDIATOR FLOAT AND BOARD TYPE	HITECH	AHMEDABAD	
		KSB WATER PUMPS / VALVES	COIMBATORE	
		KBL	KONDHAPURI	
		HAWA ENGINEERS	AHMEDABAD	
		BHEL	GOINDWAL	
		FOURESS ENGG	MUMBAI	UPTO 600 NB, CL-300 & 300NB CL-600
		FOURESS ENGG	AURANGABAD	
		FLOW STAR	FARIDABAD	
		SCIENTIFIC DEVICES	MUMBAI	
		GAUGES BOURDEN	PANVEL	
		PUNE TECHTROL	PUNE	
		SBEM	PUNE	
		LEVCON	KOLKATA	
		SIGMA		



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		CHEMTROL		
		DK INSTRUMENT	KOLKATA	
		V AUTOMAT	DELHI	
8	PAINT	ASIAN PAINT		
		BERGER		
		KANSAI NEROLAC		
		JOTUN		
		SHALIMAR		
		JENSON & NICHOLSON (I) LTD		
		CDC CARBOLINE (I) LTD.		
		ADDISON PAINTS LTD		
		GRAND POLYCOAT		
		BOMBAY PAINTS		
		HEMPLE PAINTS (SINGAPORE)		
		AKZONOBEL COATINGS		
9	FITTINGS (MS/SS)	PIPE FIT ENGINEERS	VADODARA	
		GUJRAT INFRA PIPES	VADODARA	
		MS FITTINGS	KOLKATA	
		TUBE PRODUCT	VADODARA	
		SIDDARTH & GAUTAM	FARIDABAD	
		EBY	MUMBAI	
		NL HAZRA	KOLKATA	
		EXCEL METAL		
		INTERTECH		
		FITTECH		
		METAL LLOYDS	MUMBAI	
		TRUE FORGE	FARIDABAD	
10	SEAL POT / NAOH BREATHER	SELF MANUFACTURED ITEM		
	INSPECTION CATEGORIZATION			
1. CAT I :INSPECTION BY OWNER, BHEL/BHEL NOMINATED TPIA & VENDOR .MDCC WILL BE ISSUED BASED ON INSPECTION REPORT IN LINE ITH APPROVED QAP.				
2. CAT II:INSPECTION BY BHEL/BHEL NOMINATED TPIA & VENDOR. MDCC WILL BE ISSUED BASED ON INSPECTION REPORT IN LINE ITH APPROVED QAP.				
3. CAT III: MDCC WILL BE ISSUED BASED COC & MTC ISSUED BY VENDOR AND VERIFICATION BY BHEL/OWNER IN LINE WITH APPROVED QAP/CHECK LIST				

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**TITLE****2x800 MW UPPUR STPP****TECHNICAL SPECIFICATION FOR
FUEL OIL HANDLING SYSTEM**

SPECIFICATION NO.: PE-TS-425-166-A001

REV.: 00

Section: III

Date: 25/10/2017

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III Documents to be submitted by the bidder

- IIIA** List of documents to be submitted with the bid
- IIIB** Electric load data
- IIIC** Compliance cum Confirmation Certificate
- IIID** Deviation Schedule
- IIIE** Pre-bid Clarification Schedule
- IIIF** Suggestive BBU

**TITLE****2x800 MW UPPUR STPP****TECHNICAL SPECIFICATION FOR
FUEL OIL HANDLING SYSTEM**

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III Documents to be submitted by the bidder**IIIA List of documents to be submitted with the bid**



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DRAWINGS AND DOCUMENTS TO BE SUBMITTED WITH THE BID

The bidder must submit the following drawings and documents along with their bid in **4 sets** so as to enable BHEL to evaluate their offer. In absence of any of these documents, BHEL reserves right not to evaluate the offer of the concerned bidder.

- a. All the relevant documents and certificates required to establish/meet PQR criteria, If applicable as given in tender documents
- b. Deviation schedule, strictly as per enclosed format under Sec-III.
- c. Un-priced copy of price format indicating quoted/ not quoted against each row & column.
- d. Compliance cum Confirmation certificate duly stamped and signed, attached under section -III of this Specification.

In the absence of any one of the documents mentioned above, bidder's offer is liable to be rejected. Further any documents submitted by bidder other than above shall not be taken cognizance of and these shall not form part of contract.

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III Documents to be submitted by the bidder**IIIB** Electric load data

[illegible]

**TITLE****2x800 MW UPPUR STPP****TECHNICAL SPECIFICATION FOR
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III Documents to be submitted by the bidder**IIIC** Compliance cum Confirmation Certificate

	TITLE:	SPEC. NO.: PE-TS-425-166-A001
	TECHNICAL SPECIFICATION	
	COMPLIANCE CUM CONFIRMATION CERTIFICATE	SECTION: IIIC
		REV. NO. 0 DATE: 25.10.17
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COMPLIANCE CUM CONFIRMATION CERTIFICATE

The bidder shall confirm compliance with following by signing/ stamping this compliance certificates (every sheet) and furnish the same with 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” in section C 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) The tank functional guarantees shall stand valid till at least eighteen (18) months from Hydro test of tank as per technical specification or commercial terms and conditions, whichever is later.
- 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 bill of materials, 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

COMPLIANCE CUM CONFIRMATION CERTIFICATE

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- 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

**TITLE****2x800 MW UPPUR STPP****TECHNICAL SPECIFICATION FOR
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III Documents to be submitted by the bidder**IIID Deviation Schedule**

- 39.2 If during the period of supply, it is found that the goods already supplied are defective in materials or workmanship or do not conform to the Specification or are unsuitable for the purposes for which they are purchased then it will be open to the Purchaser either to reject the goods and claim such loss that the Purchaser may suffer on that account or require the Contractor for replacement of the defective goods, free of cost.

40.0 FAILURE TO EXECUTE THE CONTRACT

Contractor failing to execute the order placed on them to the satisfaction of the Purchaser under the terms and conditions set forth therein, will be liable to make good the loss sustained by the Purchaser, consequent to the placing of fresh orders elsewhere at higher rate. In the event of such failure, the difference between the price accepted in the Contract already entered into and the price at which fresh orders have been placed at a later date, consequent to non-fulfillment of the Contract will be recovered from the Contractor.

41.0 POTENTIALLY SICK INDUSTRIAL COMPANY

All the tenderers including the foreign tenderers are requested to clearly indicate in their tender whether their Company is a potentially sick industrial Company or a sick industrial Company in terms of section 23 or section 15 of the Sick Industrial Companies Special Provision Act 1985.

42.0 MATERIALS AND WORKMANSHIP

- 42.1 All the materials shall be of the best class and capable of satisfactory operation in tropics with humid atmospheric conditions, without distortion or deterioration. No welding, filling or plugging of defective parts will be permitted without sanction in writing of the Department Engineer. Unless otherwise specified, they shall conform to the requirement of the appropriate British or Indian Standards
- 42.2 The workmanship shall be of the highest grade and the entire construction in accordance with the best modern practice.
- 42.3 The whole of the work shall be of the highest class throughout well finished and approved make. The entire designs and construction shall be capable of withstanding the severest stresses likely to occur in actual service and of resisting rough handling during transport.

43.0 DEVIATION FROM SPECIFICATION

- 43.1 TANGEDCO will not accept any deviation in respect of commercial terms and conditions. If the tenderer wishes to deviate from the technical Specification clauses in any respect, he shall draw the attention to such points of deviation explaining fully the reasons thereof in the **Schedule of Technical deviations/ Vol. I**. Unless this is done, the requirement of this Specification clauses will be deemed to have been complied with in every respect.

No price implications will be accepted on account of declared deviations.

- 43.2 The Owner desires that the bidder shall perform all the works strictly in accordance with the requirements stipulated in this bid specification. The Owner further desires that the bidder shall abide by all the terms and conditions of this bid specification without any major deviations.



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- 43.3 In case of any major deviations in technical specifications, if the Owner is convinced that such deviation is superior to the equipment proposed by the Owner, then Owner reserves right to accept this major deviation without any additional financial implications.

44.0 DUES TO THE TANGEDCO

Amount due from the Tenderer to the TANGEDCO for default in any other purchase will be adjusted against Security Deposit or balance amount in the event of an order placed against this Tender. The Purchaser reserves the right:

- a. To recover any dues against this Contract in any bills, Security Deposit, EMD of the Supplier/ Contractor either in this Contract or other Contract with the TANGEDCO.
- b. To recover any dues against any other Contract of the Supplier/ Contractor with TANGEDCO, with the available amount due to the Supplier/ Contractor against this Contract.

45.0 GUARANTEE CERTIFICATE

A written undertaking guaranteeing TANGEDCO against defects in the materials supplied either in materials or workmanship shall be furnished along with the bid. (Annexure -12).

46.0 INTEREST ON OVER DUE PAYMENTS

Any interest on overdue payments is not acceptable, under any circumstances.

47.0 DISCREPANCIES BETWEEN DRAWING AND SPECIFICATION

- 47.1 Should there be any discrepancy between the Specification and or drawings or any inconsistency error or omission in either of them, reference must be made to the Engineer for an explanation and the Contractor will be held responsible for any errors that may occur in the work through neglect of this precaution. The Contractor shall be responsible for and shall pay for any alterations of the work done due to any discrepancies, error or omissions, in the drawings or particulars supplied by him, whether such drawings or particulars have been approved by the Owner or not, provided that such discrepancies, errors or omission be not due to inaccurate information or particulars furnished by the Contractor to the Owner, but the Contractor shall be responsible for drawing and information supplied to the Owner and the Contractor shall pay for any alterations of the work necessitated by reason of inaccurate information supplied to Owner by the Contractor.

48.0 INSPECTION, TESTING & INSPECTION CERTIFICATES GENERAL

- 48.1 The Plant and Equipments, covered by this Contract shall be subjected to inspection and testing. The Supplier/ Vendor/ Contractor/ Fabricator shall provide all services to establish and maintain quality of workmanship in his works and that of his Sub-Suppliers/ Sub-Vendors/Sub-Contractors/Sub-Fabricators to ensure the mechanical accuracy of components, compliance with drawings, identification and acceptability of all materials, parts and Equipment.
- 48.2 The Owner and / or his duly authorized representative shall have at all reasonable times access to the Supplier's / Vendor's / Contractor's / Fabricator's premises or works and shall have the power, at all reasonable times to inspect and examine the materials and



DEVIATION SHEET (COST OF WITHDRAWAL)									
 PROJECT:- 2 X 800 MW UPPUR TPS									
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 withdrawal of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.									
2. For directly dispatchable items, cost of withdrawal 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 withdrawal 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 withdrawal 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 withdrawal 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 withdrawal is to be given separately for each deviation. In no event bidder should club cost of withdrawal of more than one deviation else cost of withdrawal of such deviations which have been clubbed together shall be considered as NIL.									
13. In case nature of cost of withdrawal (positive/negative) is not specified it shall be assumed as positive.									
14. In case of discrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.									

**TITLE****2x800 MW UPPUR STPP****TECHNICAL SPECIFICATION FOR
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III Documents to be submitted by the bidder**IIIE Pre-bid Clarification Schedule**



2X800 MW UPPUR TPS
FUEL OIL HANDLING SYSTEM

SPECIFICATION NO. PE-TS-425-166-A001

SECTION: IIIE

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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

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III Documents to be submitted by the bidder**IIIF** Suggestive BBU

INDICATIVE BILLING BREAK UP FOR FUEL OIL HANDLING SYTEM - SUPPLY				
2 X 800 MW UPPUR TPP				
Sl.No	DESCRIPTION OF EQUIPMENT / ITEM	QTY.	UNIT	Allocations percent of Total price (For site)
1	2	3	4	5
1.0.0	Total lump sum firm price inclusive of all prevailing taxes, duties and other levies for Supply part comprising of design (i.e.preparation and submission of drawing /documents including "As Built" drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles (as applicable) alongwith spares for erection, startup and commissioning as required, forwarding, proper packing, shipment and delivery at site, unloading, handling, transportation & storage at site, in-site transportation, assembly, erection & commissioning, final painting at site, minor civil work, preperation of layout drawings with all accessories for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order.	1	LOT	
2.0.0	Break Up Prices			
2.1.0	CS plates as per specification		TON	57-62 % of total price of clause 1.0.0
2.2.0	Structures including hand-railings etc. as per specification		TON	8-12 % of total price of clause 1.0.0
2.3.0	Valves as per specification		NOS	8-12 % of total price of clause 1.0.0
2.4.0	Piping for the tanks as per specification		MTR	12-16 % of total price of clause 1.0.0
2.5.0	Level gauges & other instruments as per specification		NOS	5-8 % of total price of clause 1.0.0
2.6.0	NaOH breathers & Seal pots as per specification		SET	
2.7.0	Commissioning spares		LOT	
2.8.0	Painting for the tank & pipes, including pipe to be free issued to vendor by BHEL.		LOT	
3.0.0	Total of 2.0.0 (Total of 2.1.0 to 2.8.0) should match with of 1.0.0.			100 % of Total price of clause 1.0.0
Note: The percentage of individual items shall be maintained by the successful bidder during submission of the BBU during detail engineering stage.				
	Bidder's / bidder's representative signature			