

1X660 MW BHUSAVAL TPP UNIT # 6.

MAHARASHTRA STATE POWER GENERATION CORPORATION LIMITED

***TECHNICAL SPECIFICATION
FOR
MISCELLANEOUS TANKS***

SPECIFICATION NO. : PE-TS-415-167-A001



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA (INDIA)**



1X660 MW BHUSAWAL TPP UNIT # 6.

SPECIFICATION No: PE-TS-415-167-A001

MISCELLANEOUS TANKS

REV. 01

DATE: 21.11.2019

SECTIONS	TITLE	PAGE NO.
SECTION - I	SPECIFIC TECHNICAL REQUIREMENT	
SECTION – IA	SPECIFIC TECHNICAL REQUIREMENT – MECHANICAL	3
	SCOPE OF ENQUIRY / INTENT OF SPECIFICATION	4-5
	PROJECT INFORMATION AND SITE SPECIFIC SEISMIC STUDY REPORT	6-11
	SCOPE OF WORKS, EXCLUSIONS AND TERMINAL POINTS	12-18
	CUSTOMER SPECIFICATION FOR MISC. TANKS	TECHNICAL REQUIREMENT GENERAL TECHNICAL REQUIREMENT
		19-34 35-124
	QUALITY ASSURANCE AND INSPECTION REQUIREMENT	125-128
	ANNEXURE I- MAKES OF SUB-VENDOR ITEMS	129-133
	ANNEXURE II- DRAWINGS/ DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT	134-137
SECTION- IB	DATA SHEET A and GA DRAWINGS OF MISCELLANEOUS TANKS	138-146
	DATASHEET FOR PIPES, FITTINGS, VALVES, PLATES, LEVEL GAUGE, PAINTING SPECIFICATION	147-149
SECTION - II	STANDARD TECHNICAL SPECIFICATIONS	
SECTION - IIA	STANDARD TECHNICAL SPECIFICATIONS-MECHANICAL	150-159
SECTION - IIB	SITE STORAGE AND PRESERVATION GUIDELINES	160-175
SECTION- IIC	FORMAT FOR OPERATION AND MAINTENANCE	176-179
SECTION - III	DOCUMENTS TO BE SUBMITTED BY BIDDER	
SECTION - IIIA	LIST OF DOCUMENTS TO BE SUBMITTED WITH BID	180-181
SECTION - IIIB	COMPLIANCE CUM CONFIRMATION CERTIFICATE	182-184
SECTION - IIIC	PRE-BID CLARIFICATION SCHEDULE	185-186
SECTION - IIID	SCHEDULE OF TECHNICAL DEVIATION	187-188



1X660 MW BHUSAWAL TPP UNIT # 6.

SPECIFICATION No: PE-TS-415-167-A001

MISCELLANEOUS TANKS

REV. 01

DATE: 21.11.2019

Sub section -IA
Specific Technical Requirement (Mechanical)

	TECHNICAL SPECIFICATION FOR MISCELLANEOUS TANKS 1X660 MW BHUSAWAL TPP UNIT # 6	SPECIFICATION NO. PE-TS-415-167-A001	
		SECTION I SECTION – IA	
		REVISION 01	DATE: 21.11..2019

1.0

SCOPE OF ENQUIRY/ INTENT OF SPECIFICATION

1.1

This specification includes, but not limited to Supply part, Services part and Mandatory spares 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), mandatory spares along with spares for erection, start up and commissioning as required, forwarding, proper packing, shipment and delivery at site, unloading, handling, transportation & storage at site, in-site transportation, fabrication, assembly, erection & commissioning, final painting at site, minor civil work and carrying out Performance guarantee / Functional / Demonstration tests at site (as applicable) and handover in flawless condition of Miscellaneous Tanks turnkey package specified for **1X660 MW BHUSAWAL TPP UNIT # 6** complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification, amendment & agreements till placement of order.

1.2

The contractor shall be responsible for providing all material, equipment & services, which are required to fulfil the intent of ensuring operability, maintainability, reliability and complete safety of the complete work covered under this specification, irrespective of whether it has been specifically listed herein or not. Omission of specific reference to any component / accessory necessary for proper performance of the equipment shall not relieve them of the responsibility of providing such facilities to complete the supply, erection and commissioning of **Miscellaneous Tanks** within quoted price.

1.3

It is not the intent to specify herein all the details of design and manufacture. However, the equipment / system shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.

1.4

The extent of supply under the contract includes all items shown in the drawings, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly, the extent of supply also includes all items mentioned in the specification and /or schedules, notwithstanding the fact that such items may have been omitted in the drawing.

1.5

Items though not specifically mentioned but needed to make the system complete as stipulated under these specifications are also to be furnished unless otherwise specifically excluded.

1.6

The general terms and conditions, instructions to tenderer and other attachment referred to elsewhere are hereby made part of the tender specifications. The equipment / material and works covered by this specification is subject to compliance to all the attachments referred in the specification. The tenderer shall be responsible for adherence to all requirements stipulated herein.

1.7

While all efforts have been made to make the specification requirement complete & unambiguous, it shall be bidders’ responsibility to ask for missing information, ensure completeness of specification, to bring out any contradictory / conflicting requirement in different sections of the specification and within a section itself to the notice of BHEL and to seek any clarification on specification requirement in the format enclosed under Sec.-III of the specification within 10 days of receipt of tender documents. In absence of any such clarifications, in case of any contradictory requirement, the more stringent requirement as per interpretation of Purchaser/Customer shall

	TECHNICAL SPECIFICATION FOR MISCELLANEOUS TANKS 1X660 MW BHUSAWAL TPP UNIT # 6	SPECIFICATION NO. PE-TS-415-167-A001	
		SECTION I SECTION – IA	
		REVISION 01	DATE: 21.11..2019

prevail and shall be complied by the bidder without any commercial implication on account of the same. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by Purchaser/ Customer as and when brought to their notice either by the bidder or by purchaser/ customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication.

1.8 Deviations, if any, should be very clearly brought out clause by clause in the enclosed schedule otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification.

1.9 In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.

1.10 Unless specified otherwise, all through the specification, the word contractor shall have same meaning as successful bidder/vendor and Customer/Purchaser/Employer will mean BHEL and/or Customer as interpreted by BHEL in the relevant context. Please refer GCC/SCC for better clarity.

1.11 The equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and dispatch release issued by BHEL/Customer.

1.12 BHEL’s Customer’s representative shall be given full access to the shop in which the equipment’s are being manufactured or tested and all test records shall be made available to him.

1.13 Various codes and standards to be used shall be as indicated in various parts of the specification. In case bidder uses any standard other than those indicated in the specification, the onus of establishing equivalence of the same with the specified standards will rest with the bidder and acceptance of the same shall be sole prerogative of customer. The bidder will also arrange for BHEL a copy of the standards in ENGLISH language. The cost of such service will be deemed to have been included by the bidder in the total cost of the package. BHEL will not entertain any additional cost on account of the same.

1.14 All text/ numeric in the document / drawings to be generated by the successful bidder will be in English language only.

1.15 The bidder’s offer shall not carry any sections like clarification, interpretations and /or assumptions.

Note:

Bidder to note that BHEL reserves the right for drawing/document submission through web based Document Management System. Bidder would be provided access to the DMS for drawing/document approval and adequate training for the same. Detailed methodology would be finalized during the kick-off meeting. Bidder to ensure following at their end.

- Internet explorer version – Minimum Internet Explorer 7.
- Internet speed – 2 mbps (Minimum preferred).
- Pop ups from our external DMS IP (124.124.36.198) should not be blocked.
- Vendor’s internal proxy setting should not block DMS application’s link (<http://dmsserver.bhelpem.com/Wrench%20Web%20Access/Login.aspx>).

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 19 of 555
1.0 <u>INTRODUCTION</u> The proposed 1x 660 MW Bhusawal Thermal Power Project will be set up by Maharashtra State Power Generation Co. Ltd. (MAHAGENCO) in Dipnagar near Bhusawal, Maharashtra, India. The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given herein under is for general guidance and shall not be contractually binding on the Owner. All relevant site data/information as may be necessary shall have to be obtained /collected by the Bidder. 2.0 <u>APPROACH TO SITE</u> Deepnagar is well connected by rail and road. By road, it is about 8 Km from Bhusawal city. Nearest railway station is at Bhusawal. The nearest Airport is at Aurangabad. The nearest sea port is at Mumbai. The site is located on the Mumbai-Nagpur Highway. 3.0 <u>LAND</u> Bhusawal Thermal Power Plant is already having 1x62.5 MW + 2x210 MW Units and Two (2) Units of 500 MW each are under execution stage. About 108.94 Hectares of land is acquired by MAHAGENCO near existing TPS. It is proposed to install 1x 660 MW unit on this land. 4.0 <u>SOURCE OF COAL</u> Indian coal would be sourced from Machaakata coal blocks in Orissa state. The Coal will be received at Plant site directly by rail. The coal from the railway wagons would be unloaded by means of wagon tipplers and will be either bunkered or stacked in the stock pile at site. 5.0 <u>SOURCE OF WATER</u> The main source of water is considered Ozerkheda Reservoir which is located at around 18 km from plant site.		

	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 20 of 555
6.0 <u>ASH DISPOSAL AREA</u> The ash generated from 1 x 660 MW unit shall be disposed off in slurry form to the existing Ash Pond located at Velhala, approx. 12 Km from the site.		
7.0 <u>PROJECT INFORMATION</u>		
7.1	Client / Owner	: Maharashtra State Power Generation Co. Ltd.
7.2	Consultant	: Procon Engineers, Navi Mumbai (Division of Nimoto Consulting Engineers Pvt. Ltd.)
7.3	Project Title	: BHUSAWAL T.P.S. UNIT – 6 : 1X660 MW
7.4	Location	: Dipnagar, Near Bhusawal, Maharashtra, India
7.5	Nearest railway station	: Bhusawal
7.6	Nearest Airport	: Aurangabad
7.7	Nearest Harbour	: Mumbai
7.8	Access Roads	: NH 6 (Mumbai-Nagpur Highway)
7.9	Elevation above MSL	: 210 M
7.10	Longitude/latitude	: 75°51'10" East /21° 02' 30" North
7.11	Seismic Zone	: Zone III as per IS:1893
7.12	<u>AMBIENT TEMPERATURE</u>	
7.12.1	Mean of daily maximum temperature	: 48.25 °C (during May)
7.12.2	Mean of daily minimum temperature	: 18 °C (during January)
7.12.3	Highest temperature recorded	: 48.7°C

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.		Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1		Section – 2
REV: R0	MASTER SPECIFICATIONS		Page 21 of 555
7.12.4	Lowest temperature recorded : 13°C		
7.13	Wet bulb temperature : 27°C (Maximum)		
7.14	Rainfall : 112 mm average annually		
7.15	Wind Speed : 0 to 39 Km/hr		
7.16	Wind direction : East North East to West South West		
	<u>ELECTRICAL</u>		
7.17	<u>MAIN POWER SOURCE FROM GRID</u>		
7.17.1	Rated Voltage : 400kV		
7.17.2	Voltage variation : ± 10 %		
7.17.3	Frequency Variation : ± 5 %		
7.17.4	Rated Short Circuit : 50 kA, Three Phase Symmetrical Level		
7.18	<u>AUXILIARY POWER SUPPLY</u>		
	Auxiliary electrical equipment shall be suitable for operation on the following supply system:		
7.18.1	Motors above 1000 kW & other Power devices : 11kV,3Ph,3wire,50Hz system		
7.18.2	Motors below 1000 kW & above 160kW & other power devices : 3.3kV, 3 ph, 3 wire 50 Hz, Non Effectively earthed		
7.18.3	Motors upto 160 kW & other power devices : 415V, 3 ph, 4 wire 50 Hz		
7.18.4	Motor Starting Methods : Direct on Line		
7.18.5	(a) Lighting fixtures, Space heaters, and single Phase motors : 240V, 1 phase, 50 Hz Supply through suitably rated transformers to limit the short circuit level to 9kA – 1 sec.		

CONSULTANT : PROCON ENGINEERS

	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 22 of 555
(b) Control & : 240V, 1 Phase, 50 Hz from UPS Instrumentation 7.18.6 Short circuit levels of 11kV, 3.3 kV and 415V system equipments The equipment shall be suitable for the following short circuit levels (a) 11kV Switchgears : 44 kA/3 sec (b) 3.3kV Switchgears : 40 kA/3sec (c) 415V PCC/ : 50 kA/1sec PMCC/ MCC (d) Lighting : 9 kA/1sec Distribution Boards & 240V A.C. supply 7.18.7 Auxiliary DC supply The auxiliary DC supply will be used for control, indication & protection, Turbine lube oil system, AVR, Emergency DC lighting of power plant and Control & Instrumentation etc. (a) Voltage : (i) 220V DC for utility purpose (ii) 24V DC for Control and Instrumentation (b) Voltage variation : + 10 %, - 15 % 7.18.8 Emergency power supply (a) Purpose : (i) Standby power to normal incomer of emergency MCC (ii) Alternate power source to Fire water Pumps (b) Rated voltage and frequency : 415 V, 3 phase, 3 wire, 50 Hz.		

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3
REV: R0	MASTER SPECIFICATIONS	Page 24 of 555

	TECHNICAL SPECIFICATION FOR MISCELLANEOUS TANKS 1X660 MW BHUSAWAL TPP UNIT # 6	SPECIFICATION NO. PE-TS-415-167-A001	
		SECTION –I, SECTION – IA	
		REVISION 01	DATE: 21.11.2019

1.0

SCOPE OF SUPPLY

1.1

Steel tanks fabricated and supplied at site under this specification shall be as per enclosed DATA SHEET and GA drawing for Miscellaneous tanks. Modifications may be made by the bidder to suit good engineering practice to the satisfaction of the customer. The customer, however, reserves the right to reject any modifications.

1.2

a)

The connections and accessories which are required to be supplied with each tank by the bidder shall be as indicated in the enclosed DATA SHEET and GA drawing for Miscellaneous tanks.

b)

The piping material inside the tank shall be supplied by the bidder. All inlet piping shall be extended up to the bottom of the tank and the clearance between the bottom of the tank and the edge of the inlet piping shall be kept as 500 mm (maximum).

c)

The inside piping shall be adequately supported and shall be provided with adequately sized vent connection at pipe top.

d)

Weir plates of adequate thickness (minimum 8 mm) shall be provided for all inlet piping.

e)

Pad plates on the tanks for supporting outside piping shall be provided by the bidder. Details of the pad plates (sizes, quantity etc.) shall be informed to bidder during detail engineering.

f)

Fabrication and supply of all flanges and counter flanges for all nozzles and valves of tank connections shall be included in the scope of work of the bidder. Necessary bolts, nuts and gaskets for these connections shall also be supplied by the bidder.

g)

The manhole shall be of hinged and bolted type with nuts, bolts and gaskets in bidder’s scope of supply. The size of the manhole shall be minimum 600 mm.

h)

Void.

1.3

The scope of works shall also include supply and installation of special accessories as indicated in DATA SHEET and GA drawing for miscellaneous tanks. The necessary fixtures and other accessories for mounting these special fittings shall be included in the scope of work of the bidder.

1.4

Level gauge / indicator for each tank shall be provided by the bidder along with all fittings & accessories as required for mounting the level gauge / indicator on the tanks. Float and board type level gauge / indicator shall be provided unless otherwise specified in DATA SHEET and GA drawing for Miscellaneous tanks.

1.5

Required number of tapings with 25NB instrument root valves shall be provided by the bidder for mounting instruments like level switches, level transmitters etc. The number of tapings shall be as indicated in the DATA SHEET and GA drawing for Miscellaneous tanks.

1.6

a)

Sampling Connection with isolation valve of size 25 NB for each tank.

	TECHNICAL SPECIFICATION FOR MISCELLANEOUS TANKS 1X660 MW BHUSAWAL TPP UNIT # 6	SPECIFICATION NO. PE-TS-415-167-A001	
		SECTION –I, SECTION – IA	
		REVISION 01	DATE: 21.11.2019
b) Drain valve of size 100 NB for CST tank, 100 NB for DM water storage tank and 80 Nb for SW storage tank shall be provided by the bidder unless otherwise indicated in the DATA SHEET and GA drawing for Miscellaneous tanks. c) Quantity and size of spare nozzles and valves shall be supplied by the bidder as per DATA SHEET and GA drawing for Miscellaneous tanks. 1.7 NaOH / KOH breather and seal pot shall be provided with necessary drain valve of size 25 NB with stainless steel construction unless otherwise specified in the DATA SHEET and GA drawing for Miscellaneous tanks. Two (2) nos. NaOH / KOH breather shall be provided by the bidder for each (DM and CST) tank out of which one shall be used for in-breathing purpose and the other shall be used for out-breathing purpose. 1.8 Pipes, fittings, nozzles, flanges and counter flanges shall be supplied by the bidder. The minimum requirement like quantity, size, type etc. are indicated in the DATA SHEET and GA drawing for Miscellaneous tanks and may undergo change during detail engineering stage and these shall be supplied by the bidder as per the approved drawings / documents for which no commercial implication shall be entertained by BHEL. Material of construction of all pipes, fittings, nozzles, flanges and counter flanges shall be as per DATA SHEET and GA drawing for Miscellaneous tanks. 1.9 All valves shall be of stainless steel construction as per section -IB for Condensate Storage Tank & DM water storage tank. 1.10 NaOH / KOH breather and seal pot shall be located in the bottom / ground level and necessary connection from tank vent to NaOH / KOH breather shall be provided through 200 NB SS pipe for condensate storage tank and DM storage tank. The overflow pipe from overflow nozzle to seal pot shall also be in bidder’s scope of work. 1.11 Void. 1.12 Painting of the tanks is included in bidder’s scope of work. Painting specifications of storage tanks / seal pot / NaOH / KOH breather are given under painting specification. Any modification in painting requirement found applicable during detained engineering, shall be under bidder’s scope without any commercial implication. 1.13 Commissioning spares as required for commissioning of the tanks / NaOH breathers / seal pots are in bidder’s scope. 1.14 Platforms, monkey ladder inside tank, staircase (hand railing, knee guard and toe guard (in stair case and all along the periphery of roof of the tank) etc. as per the relevant design code / good engineering practice (as indicated in the DATA SHEET and GA drawing for Miscellaneous tanks) shall be included in bidder’s scope of work. All stair tread and platforms shall be made from 8 thk. chequered plate. Roof level interconnection between DM storage tanks shall be done. 1.15 Suitable structural items like channels and saddle supports shall be provided for fixing the tank with foundation for each of rectangular tank and horizontal cylindrical tank respectively.			

	TECHNICAL SPECIFICATION FOR MISCELLANEOUS TANKS 1X660 MW BHUSAWAL TPP UNIT # 6	SPECIFICATION NO. PE-TS-415-167-A001	
		SECTION –I, SECTION – IA	
		REVISION 01	DATE: 21.11.2019

2.0

SCOPE OF SERVICES

Services shall include but not be limited to the followings:

2.1

Design, engineering, preparation of detailed fabrication drawings, bill of material, tag and piece numbers, welding procedures etc. Stiffeners and other structural framing for supporting the tank shall be designed by the fabricator and properly shown in the fabrication drawings.

2.2

Erection & Commissioning of Tanks.

2.3

Erection of all foundation bolts / anchor bolts etc. as required for any equipment/ foundation /concrete.

2.4

Minor civil work like chipping of foundation, grouting below base plate for all structures, equipment, grouting of pockets, excavation & filling of earth for buried MS pipes if and as required.

2.5

Inspection & testing and carrying out demonstration test.

2.6

Painting of tank and other equipment within the battery limit.

2.7

Any other equipment / material / services as required to make the installation complete in all respects shall be deemed to be included in bidder’s scope of work whether mentioned above or not.

3.0

DESIGN CONSIDERATIONS

3.1

Sizing calculation of NaOH / KOH breather, seal pot and breather valve.

3.2

All appurtenances and mountings shall also be designed as per relevant clauses of IS: 803 / API – 650 and as per the design code indicated in DATA SHEET and GA drawing for Condensate Storage Tank, DM Tank and service water tank.

3.3

Tank shall be suitably constructed for safe, proper and continuous operation under all conditions that can be expected in a plant life without undue strain, corrosion or other operating difficulties.

3.4

For cylindrical tanks, the plates shall be cold rolled through plate bending machine by several number of passes to true curvature.

3.5

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

3.6

Wherever possible, the inside seam weld shall be ground smooth, suitable for application of corrosion resistant primer.

3.7

For the tanks being of diameter larger than 3.75 m added structural supports in the form of rafter shall be provided.

3.8

Reinforcement in tanks shall be provided as per design code for Condensate Storage Tank, DM water storage tank and service water tank. The reinforced connection shall be completely pre - assembled into shell plate.

	TECHNICAL SPECIFICATION FOR MISCELLANEOUS TANKS 1X660 MW BHUSAWAL TPP UNIT # 6	SPECIFICATION NO. PE-TS-415-167-A001	
		SECTION –I, SECTION – IA	
		REVISION 01	DATE: 21.11.2019
3.9 Staircase / access ladder and hand railing shall be provided as per the relevant codes and standards. 3.10 Code conformance for flanges / counter flanges shall be ANSI B 16.5. Code conformance for bolts and nuts shall be SA 193 & 194 respectively. 3.11 The number & size of nozzles (including flanges, counter flanges and inside piping) indicated in the DATA SHEET and GA drawing are tentative and bidder guidance purpose only and the same may undergo change during detail engineering stage for which no commercial implication shall be entertained by BHEL. 3.12 Bidder shall furnish the STAAD calculation along with the roof structure calculation during detail engineering for checking the stability of roof. 3.13 Provision shall be made by the bidder to minimise the air ingress in the tank through float with arrow type level gauge and details of the same shall be furnished during detail engineering stage for BHEL’s approval and approved arrangement shall be provided by the bidder without any commercial implication. 3.14 The tank shall be designed for filled water head / atmospheric pressure and design temperature for the tank shall be as specified in the DATA SHEET and GA drawing for Miscellaneous tanks 3.15 Bidder to note that surface cleaning shall be of Blast clean type. However, Grit blasting shall be decided during detail engineering for which no commercial implication shall be entertained by BHEL. 3.16 All materials, furnished shall conform to the latest editions of America National Standard Code for Pressure piping, Power piping, ANSI B311.1, ANSI B16.11, ASME Boiler and Pressure Vessel Codes, IBR and other applicable ASME, ANSI and Indian Standards. Schedule numbers, sizes and dimensions of all carbon steel, stainless steel and alloy seamless steel pipe shall confirm to ANSI B.36.10 and of stainless steel pipe shall confirm to ANSI B 36.19 unless otherwise specified. 4.0 <u>WELDING</u> 4.1 Welding shall be in accordance with the requirement of IS: 803, 816, 817 and 823 or equivalent. 4.2 Welding sequence shall be adopted in such a way so as to minimize the distortion due to welding shrinkage. Contractor shall indicate in his drawing the sequence of welding proposed by him, which should meet prior approval of the Engineer. 4.3 All welders shall be BHEL / customer / consultant qualified as per the approved quality plan / field quality plan which will be submitted by the successful bidder during detail engineering stage. WPS and PQR shall be submitted by the successful bidder to BHEL / customer / consultant for review and approval. 5.0 <u>TEST AND INSPECTION</u> 5.1 The particulars of the proposed tests and the procedure for the tests shall be submitted to the Owner / Engineer for approval before conducting the tests. The successful bidder shall submit FQP (field quality plan) and demonstration test procedure for BHEL / customer / consultant’s approval during detail engineering stage. In the event of any change in the field quality plan and demonstration test			



**TECHNICAL SPECIFICATION FOR
MISCELLANEOUS TANKS
1X660 MW BHUSAWAL TPP UNIT # 6**

SPECIFICATION NO. PE-TS-415-167-A001

SECTION –I, SECTION – IA

REVISION 01

DATE: 21.11.2019

procedure, the same shall be incorporated by the bidder in the document and approved document shall be adhered by the bidder without any commercial implication.

- 5.2 DPT / MPI on all welds (100%).
- 5.3 All cross / Tee joints and butt welds to be 10% Radio graphed.
- 5.4 For the offered tanks, fill test shall be carried out for at least 24 hours. Atmospheric storage tanks on inside surface shall be leak tested before painting.
- 5.5 All quality plans / checklists for various items shall be furnished during detail engineering stage for BHEL / customer's approval and any changes required by BHEL / customer shall be incorporated in the documents and adhered without any price implication. However, minimum requirement of MQP as indicated in the technical specification shall be followed. All necessary items as required for inspection and testing of the tank including instruments shall be arranged by the bidder.

6.0 MANDATORY SPARES:

Mandatory spares shall be supplied by bidder as indicated below:

SL. NO.	DESCRIPTION OF ITEMS	QUANTITY
1	Level gauges for DM Water Storage tank	1 nos.
2	Level gauges for Condensate Water Storage tank	1 nos.
3	Level gauges for Service Water Storage tank	1 nos.

7.0 LIST OF COMMISSIONING SPARES:

SL. NO.	DESCRIPTION OF ITEMS	QUANTITY
1	CAF Gasket of size 1.5m X1.5m X 3 mm thk	2 nos.
2	Nuts, bolts & washers of each size (nos. of bolts, nuts & washers as required for each nozzle) as per approved Drg.	1 lot
3	Any other item required for successful commissioning of the tanks (to be specified clearly by bidder)	

8.0 TERMINAL POINTS

- Matching counter flanges for all nozzles mounted on the tank and its accessories. However, counter flanges for all nozzles and valves of tank shall be provided by the bidder.

	TECHNICAL SPECIFICATION FOR MISCELLANEOUS TANKS 1X660 MW BHUSAWAL TPP UNIT # 6	SPECIFICATION NO. PE-TS-415-167-A001	
		SECTION –I, SECTION – IA	
		REVISION 01	DATE: 21.11.2019

- Drain pipe of seal pot and NaOH breather pots.

9.0 EXCLUSIONS

MS plates for shell, roof and bottom of tanks, Tank foundation & associated civil works, LTs are excluded from bidder’s scope of work.

10.0 DRAWINGS AND DOCUMENTS TO BE SUBMITTED WITH THE BID

The bidder must submit the drawings / documents as mentioned under “CHECK LIST FOR DOCUMENT TO BE SUBMITTED” (In Section-III) along with their bid in 4 sets. In absence of any of these documents, BHEL reserves right not to evaluate the offer of the concerned bidder.

11.0 DRAWINGS/ DOCUMENTS REQUIRED DURING DETAIL ENGINEERING

The successful bidder shall submit the drawing / documents as mentioned under SECTION –IA during detail engineering for approval / information / reference (as the case may be): -

12.0 OTHER TECHNICAL REQUIREMENTS

- 1) 15 days’ time is required by BHEL to offer their comments on the drawings and documents being submitted by the bidder (during detailed engineering stage in the event of L.O.I being placed) from the date of receipt.
- 2) Bidder to depute competent designer (s) at BHEL’s office during detailed engineering stage to discuss drawings and other technical documents as and when required by BHEL.
- 3) Bidder to assess the capability of their 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. No deviations shall be entertained.
- 4) Commercial implication includes price implication as well as delivery implication.
- 5) Size of hand rails on stairway and tank roof / top shall be minimum 32 NB and shall conform to IS 1239 (M).
- 6) Type of roof for vertical cylindrical storage tanks shall be either supported cone roof or self-supporting cone roof as per latest edition of relevant design code.
- 7) Commissioning of tanks will consist of installation of all accessories of tanks as per approved drawing/specification, charging of tank, water-fill test (for minimum 24 hours after complete filling of tank), satisfactory functioning of all accessories, emptying of tank, subsequent painting of complete tanks and changing of gaskets as per specification requirement.
- 8) Bidder to furnish prices and unit price of each item of proposed tanks as per BHEL’s price format only along with the final price bid.

	TECHNICAL SPECIFICATION FOR MISCELLANEOUS TANKS 1X660 MW BHUSAWAL TPP UNIT # 6	SPECIFICATION NO. PE-TS-415-167-A001	
		SECTION –I, SECTION – IA	
		REVISION 01	DATE: 21.11.2019
9) Bidder shall check that specifications of all the items are available in the NIT specification. However, in the event of absence of specification for any item, bidder will approach BHEL to furnish the specification of missing items and new specification will be adhered by the bidder for which no commercial implication shall be entertained by BHEL. 10) All tools and plants including welding machines, crane, hydra, fork lift, batching plant etc. and instruments as required for construction, erection and commissioning, trial run and functional demonstration test at site shall be arranged by the bidder. 11) Bidder to furnish list of sub-vendors based on sub-vendor list enclosed with the specification during detail engineering stage for BHEL's / Customer review and approval and items shall be procured from these suppliers only. 12) Dealers are not acceptable for any item of the package. Bidder shall procure all items including plates, structural, flanges, counter flanges etc. from BHEL approved sub vendor only. No argument on this account shall be entertained.			



TECHNICAL SPECIFICATION FOR
MISCELLANEOUS TANKS
1X660 MW BHUSAWAL TPP UNIT # 6

SPECIFICATION NO. PE-TS-415-167-A001

SECTION I SECTION – IA

REVISION 01

DATE: 21.11..2019

CUSTOMER SPECIFICATION

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3 /D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS	Page 197 of 328

VOLUME III I
SECTION-3/D
MISCELLANEOUS STORAGE TANKS

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3 / D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS	Page 198 of 328

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3 /D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS	Page 199 of 328

CONTENTS

<u>CLAUSE NO.</u>	<u>DESCRIPTION</u>
1.0	GENERAL INFORMATION
2.0	CODES AND STANDARDS
3.0	SCOPE OF WORKS
4.0	DESIGN AND CONSTRUCTION
5.0	PAINTING
6.0	DRAWING, DATA AND INFORMATION
DATASHEET-A	MISCELLANEOUS STORAGE TANKS
ANNEXURE-I	SCHEDULE OF MISCELLANEOUS STEEL TANKS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3 / D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS	Page 200 of 328

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3 /D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS	Page 201 of 328

1.0 GENERAL INFORMATION

This section covers the design, supply of miscellaneous steel storage and all accessories as required, paints and protective paintings as specified and as required, fabrication, erection, painting, testing and associated civil works.

2.0 CODES AND STANDARDS

2.1 Steel Storage Tanks

The design, manufacture and testing of tanks shall comply with the requirements of one or more of the following standards as applicable

- | | | |
|-------|--|---|
| 2.1.1 | IS-805 | : Code of practice for use of steel in gravity water tank. |
| 2.1.2 | IS-803 | : Code of practice for use of Vertical Storage Tank. |
| 2.1.3 | IS-816 | : Code of practice for use of metal arc welding for general construction in mild steel. |
| 2.1.4 | IS-9595 | : Code of procedure for manual metal arc welding of mild steel. |
| 2.1.5 | BS EN 12285-1 : 2003
BS EN 12285-2 : 2005 | : Carbon steel welded horizontal cylindrical tank |
| 2.1.6 | IS-10987 | : Horizontal Cylindrical storage tank for Petroleum products. |

3.0 SCOPE OF WORK

3.1 The details of Miscellaneous steel tanks (minimum) for storage of water at atmospheric pressure to be fabricated and erected under this section of specification are given as follows:

- | | |
|-------|--|
| 3.1.1 | Two (2) Potable water Tanks shall be installed on the roof of Deaerator Floor. |
| 3.1.2 | Two (2) Service water tanks shall be located on the roof of Deaerator Floor. |
| 3.1.3 | Two (2) DM water storage tanks shall be located in the vicinity of DM plant. |

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3 / D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS	Page 202 of 328
3.1.4	One (1) Condensate Storage Tank near Compressor House	
3.1.5	Two (2) De-Mineralized Circulating Water Storage tanks (One common for SG & TG Auxiliaries shall be installed on the Auxiliaries PRDS floor & One for Ash Handling Plant on AHP Air compressor room.)	
3.2	The connections, accessories and fittings to be supplied with each tank shall be as specified and as required. Tank connections shall be provided with suitable counter flanges with necessary bolts, nuts & gaskets.	
3.3	The tank, where applicable, shall be complete with supporting structure, legs or pedestals, base plate, anchor bolts, nuts & sleeves etc, as required.	
3.4	The special fittings e.g. conservation vent valves, level indicators etc shall also be supplied by the Contractor.	
3.5	Preparation of detailed design, fabrication drawings, bill of materials, tag and piece numbers, welding procedure etc. Stiffeners where not specified and other structural framing for supporting tank shell shall be designed by the Contractor including supply of materials for the same.	
3.6	This specification covers supply of steel plates, structural steel, pipes etc, as required.	
3.7	The scope of work under this specification includes excavation and backfilling work required for installation of pipes running underground.	
3.8	All pipe supports, thrust blocks, etc. as required shall be properly designed and constructed by the Contractor in accordance with approved drawings. Necessary steel work at supports shall also be supplied, fabricated and erected by the Contractor.	
3.9	The final fixing grout over the concrete support or through the opening left in the concrete work shall also be done by the Contractor.	
4.0	<u>DESIGN AND CONSTRUCTION</u>	
4.1	Tanks shall be suitably constructed for safe, proper and continuous storage of liquid described. The design code, material standard, minimum plate	

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3 /D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS	Page 203 of 328
thickness, size and other details shall be as per the specified Codes and Standards, as applicable. 4.2 For cylindrical tanks, the plates shall be cold rolled through plate bending machine by several number of passes to true curvature. 4.3 Vessel seams shall be so positioned that they do not pass through vessel connections. For cylindrical vessels consisting of more than two sections, longitudinal seams shall be offset. 4.4 Where possible, the inside seam weld shall be ground smooth, suitable for application of corrosion resistant primer. 4.5 Due consideration for wind load and/or earthquake effect shall be given in the design of tanks. Data for wind load and earthquake shall be taken as indicated in the Volume-II of this specification. Maximum allowable stresses for design loadings combined with wind or earthquake shall not exceed 133% of stress permitted for the design loading condition but in no case shall exceed 80% of specified minimum yield strength of the material. 4.6 Except where otherwise indicated in the Owner's drawings/ specifications, if the stiffening of the shell and/or roof is necessary, the same shall be stiffened from outside. 4.7 Reinforcement pads in tank connections shall be provided as per applicable code & the reinforced connection shall be completely preassembled into a shell plate. The completed assembly including the connection shall be thermally stress-relieved as per API Standard 620, if specified. 4.8 All welding shall be done as per IS-816, IS-817 and IS-9595, latest revision as applicable. All welds are to be continuous welds. Bidder shall clearly state in his offer the make and type of welding rods proposed by him for fabrication. Inspection of welding shall be carried out in accordance to IS-822, IS-9595. Welding sequence shall be adopted in such a way so as to minimise the distortion due to welding shrinkage, Contractor shall indicate in his Drawing the sequence of welding proposed by him duly approved by Owner/Consultant.		

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3 /D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS	Page 204 of 328
4.9	<u>TANK CONNECTIONS</u>	
4.9.1	Bidder shall furnish all piping material required for the tank connections.	
4.9.2	Unless otherwise specified, for all flanged connections Bidder shall furnish suitable counter flanges and the necessary nuts, bolts, gaskets etc.	
4.9.3	Flange faces of all nozzles shall be machined and square with the vessel centerlines.	
4.9.4	Unless otherwise stated, bolts and nuts shall be of hexagonal head conforming to IS-1367, latest revision. The material and thickness of gaskets shall be suitable for the specified service. On completion of hydraulic test, Contractor shall replace the gaskets used during testing at his own cost.	
4.9.5	All tanks shall be provided with connections for drains, vents and overflow.	
4.10	<u>ACCESSORIES</u>	
4.10.1	Level Indicator Float operated or tubular gauge glass type indicator of high grade workmanship shall be provided on each tank. Tank of height not exceeding 3 m shall have tubular gauge glass and others shall have float operated level Indicator. For tubular gauge glass, isolating valves and protective guards against mechanical shock shall be provided.	
4.10.2	Level Switch Where specified, level switch of approved make & type shall be furnished along with instrument root valves. Repeat accuracy of operation shall be $\pm 1\%$ of the full range. At least two level switches, one for High level actuation and other for Low Level actuation, shall be provided for each tank.	

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3 /D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS	Page 205 of 328
4.10.3	Where the tank height exceeds 2 M, vertical ladder is to be provided with cage.	
4.10.4	Top Manhole shall be provided in all tanks. Manhole size shall be 600 NB (minimum). The tank shall be provided with accessories as indicated in the Specification. All the accessories shall conform to relevant Indian Standards. The following broad guidelines are given for some of the accessories.	
4.11	When installation of tank is specified the recommendation regarding installation in BS EN 12285-1 & BS EN 12285-2 shall be followed in general. In addition to those recommendations, the following shall also be taken care of.	
4.12	The finished tank grade for cylindrical tank shall be crowned from the outer periphery to the centre with a slope. The sloping factor shall be taken as 1:36 unless otherwise specified	
5.0	<u>PAINING</u>	
5.1	Surface preparation: Internal - Sand blasting and External - wire brushing.	
5.2	Primer	(a) Internal - epoxy based Zn rich primer (b) External - Synthetic Red lead
5.3	Finish Coat	(a) Internal - Coal tar epoxy (b) External - Synthetic enamel
5.4	Outside of bottom surface shall have 3 coats of Bitumastic paints.	
6.0	<u>DRAWINGS, DATA AND INFORMATION</u>	
6.1	For Drawing, Data and Information required along with BID, please refer Volume-VIII.	

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3 / D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS	Page 206 of 328

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.		Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1		Section – 3 /D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS		Page 207 of 328
<			

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.		Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1		Section – 3 / D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS		Page 208 of 328
SR. NO.	ITEM		
1.7.3	Design standard	:	IS-5620
1.7.4	Size	:	To be decided by bidder.
1.7.5	Materials of construction		
(a)	Gate	:	Fabricated from IS-2062 Gr. A
(b)	Gate frame	:	C.I. IS-210 Gr. 260
(c)	Seal	:	EPDM
(d)	Seal plate	:	Bronze/ brass
(e)	Guide	:	IS-2062 Gr. A
1.8	<u>STATIC SCREENS</u>	:	
1.8.1	Number	:	Eight (8) (One at the downstream of each gate)
1.8.2	Duty	:	Continuous
1.8.3	Size	:	To be decided by bidder
1.8.4	Materials of construction		
(a)	Screen	:	SS-304, 14 BWG Wire net with 20 mm opening.
(b)	Gate frame	:	IS-2062 Gr. A
2.0	<u>FILTERED WATER STORAGE TANK FOR NON-DM</u>		
2.1	Number	:	One (1)
2.2	Type	:	Closed type
2.3	Material of construction	:	RCC
2.4	Effective capacity	:	45000 m ³ (between maximum and minimum water level).
2.5	Overall dimensions	:	

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.		Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1		Section – 3 / D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS		Page 209 of 328
SR. NO.	ITEM		
2.6	Level switch, level transmitter, alarm, indicator and controller provided	:	Yes
2.7	<u>ISOLATION GATES</u>		
2.7.1	Number	:	Two (2) (One isolation gate between two compartments).
2.7.2	Duty	:	Continuous
2.7.3	Design standard	:	IS-5620
2.7.4	Size	:	To be decided by bidder
2.7.5	Materials of construction		
(a)	Gate	:	Fabricated from IS-2062 Gr. A
(b)	Gate frame	:	C.I. IS-210 Gr. 260
(c)	Seal	:	EPDM
(d)	Seal plate	:	Bronze/ brass
(e)	Guide	:	IS-2062 Gr. A
3.0	<u>FILTERED WATER STORAGE TANK FOR DM</u>	:	
3.1	Number	:	One (1)
3.2	Type	:	Closed type
3.3	Material of construction	:	RCC
3.4	Effective capacity	:	900 m ³
3.5	Level switch, level transmitter, alarm, indicator and controller provided	:	Yes

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3 / D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS	Page 210 of 328

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: III-I
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3 /D
REV: R0	MATERIAL HANDLING AND MISCELLANEOUS EQUIPMENTS	Page 211 of 328

ANNEXURE-I

SCHEDULE OF MISCELLANEOUS STEEL TANKS

Sr. No.	Description	Shape	Size	Nominal Capacity (m ³)	Numbers Reqd.
(1)	DM water storage tank in the vicinity of DM plant	Vertical Cylindrical	By Bidder	850	2
(2)	Condensate Storage Tank near Compressor House	Vertical Cylindrical	By Bidder	1000	1
(3)	DMCW Make up tanks	By Bidder	By Bidder	By Bidder	2
(4)	Service Water Storage Tank	Vertical Cylindrical	By Bidder	75	2
(5)	Potable water Storage Tank	Vertical Cylindrical	By Bidder	25	2

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 4
REV: R0	MASTER SPECIFICATIONS	Page 61 of 555
VOLUME II SECTION – 4 GENERAL TECHNICAL REQUIREMENTS		

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 4
REV: R0	MASTER SPECIFICATIONS	Page 62 of 555

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 4
REV: R0	MASTER SPECIFICATIONS	Page 63 of 555

CONTENTS

CLAUSE NO.

DESCRIPTION

1.0	CODES AND STANDARDS
2.0	RESPONSIBILITY FOR DESIGN
3.0	NAME PLATES (RATING PLATES)
4.0	SAFETY AND SECURITY
5.0	GUARDS
6.0	LOCATION AND LAYOUT REQUIREMENTS
7.0	OPERATION, MAINTENANCE AND AVAILABILITY CONSIDERATIONS
8.0	MATERIALS
9.0	LUBRICATION
10.0	LUBRICANTS & CONTROL FLUIDS
11.0	OPERATION AND MAINTENANCE
12.0	PLANT LIFE AND MODE OF OPERATION
13.0	PACKAGING & MARKING
14.0	PROTECTION
15.0	PAINTING
16.0	COLOUR CO-ORDINATION AND FINISH
17.0	ENVIRONMENT PROTECTION AND NOISE REQUIREMENT
18.0	INSPECTION AND TESTING
19.0	TRAINING OF OWNER'S PERSONNEL

CONSULTANT : PROCON ENGINEERS