

document to be submitted by him to the Owner/Engineer indicating dates against each document.

The documents shall be divided into two categories : a) for approval and b) for information/further engineering and co-ordination by the Owner.

In preparing this schedule, the Contractor shall allow two (2) weeks from date of receipt for review and comments by the Owner/Engineer for each submission of a document.

This document submission schedule shall require approval by the Owner/Engineer.

7.02.00 All contract documents shall be marked, without fail, with the name of the Owner, the Project, the specification title and number and the unit designation.

All dimensions shall be in metric units.

All notes, markings etc. shall be in English.

7.03.00 Documents/Drawings, submitted during tender stage, shall be revalidated or revised as required and submitted as certified contract document for approval / information of the Owner/Engineer.

7.04.00 Unless specified otherwise, the following categories of documents/drawings would require approval of the Owner/Engineer:

- a) List of sub-vendors (from Owner only)
- b) System scheme and instrumentation diagrams
- c) Design basis justifying selection of equipment & process parameters where not specified in the Contract
- d) Equipment data sheets and general arrangement drawings
- e) Materials of construction
- f) Layout drawings.
- g) Operation logic diagrams.
- h) Typical control circuit.
- i) Drawings of Instrumentation and control.

7.05.00 Unless specified otherwise, the following categories of documents/ drawings would be treated for information/further engineering by the Owner/Engineer. The Contractor shall, however, incorporate all additional information and clarifications in these documents / drawings as and when desired by the Owner/Engineer.

- a) Equipment foundation drawings.
- b) Equipment cross-section drawings, product literature etc. which are of proprietary nature.
- c) Predicted performance curves of equipment.
- d) Various bills of quantity, schedules etc.
- e) Piping fabrication drawings, isometrics etc.
- f) Panel wiring diagrams.
- g) Instruction/Operation manuals.
- h) Service manuals and trouble shooting guide for C & I system including field instruments.
- i) Cable schedule and interconnection chart.
- j) Drive/feederwise control scheme showing all external interfaces.

In essence, the Contractor is solely responsible for corrections and adequacy of design & engineering for documents under this category.

7.06.00 Upon review, the Owner/Engineer shall put his remarks and one of the following action stamps on the drawing/document:

- a) A - Drawing submitted as approved, proceed with fabrication
- b) B - Drawing approved subject to comments noted, proceed with fabrication, considering our comments. Correct as necessary and resubmit for record.
- c) C - See attached memo.
- d) D - Correct your original drawing incorporating our comments and resubmit for approval.
- e) E - Information furnished is noted.
- f) F - Prints not enclosed

For action stamps in category (c) & (d), documents must be resubmitted for review by the Owner/Engineer. For action stamp in category (b), further review by Owner/Engineer would not be necessary provided the Contractor agrees & incorporates the comments made on the document.

Except for action stamp under category (c) & (d), the Contractor can proceed with manufacturing and other sequential activities for those areas of a drawing/document which do not have any review comment by the Owner/Engineer.

The Owner/Engineer may accord approval in category (c) or (d) in more than one submission of a document till he is satisfied that the intent of the specification has been fully complied with. The Contractor shall be responsible for delay in such cases and no extension of time shall ordinarily be allowed on such grounds. Approval of contract documents by the Owner/Engineer shall not relieve the Contractor of his responsibility for any errors and fulfillment of contract requirements.

The Contractor's work shall be in strict accordance with the finally approved drawings and no deviation shall be permitted without written approval of the Owner/Engineer.

7.07.00 Except key plan/general yard plan, any layout drawing requiring scrutiny shall not be drawn to a scale less than 1:50.

7.08.00 For review by the Consulting Engineer, the Contractor shall furnish soft copies of drawings & documents and three (3) prints of each drawing/document. Two (2) prints of such submission shall also be sent to the Owner. After review, comment/approval will be sent to the Contractor. Upon action under category (a) or (e), the Contractor shall directly distribute the documents to the various offices of the Owner and other agencies in number of copies as specified in the contract document. Such distribution copies shall be marked with the reference and date of the letter by which the Owner/Engineer has accorded his final approval. Penal action shall be taken against the Contractor for any unauthorised revision in the drawings so distributed from the drawings approved by the Owner/Engineer. The contractor shall furnish three (3) CDs of all as built/final drawings for Owner/Consultant site.

7.09.00 In case of contradiction between the stipulations above and those stated elsewhere in the specification, the stipulations herein shall prevail.

7.10.00 For details of documentation for Civil, Structural and Architectural works, VII-A, VII-B and VII-C may be referred.

8.00.00 **TENDER STAGE DOCUMENT SUBMISSION**

8.01.00 The Bidder shall submit along with his bid all documents/drawings as requested in respective specifications. The documents shall include but not be limited to the following :

- a) All Bid proposal sheets duly filled up.
- b) Detailed experience list and financial resources of the prime bidder his collaborators/associates in this bid as well as the sub-vendors proposed.
- c) Scheme drawings indicating scope of supply and service as offered by the Bidder indicating clearly exclusions, if any.
- d) List of terminal points of the package offered together with quality and quantity of various input (i.e. water, air, electricity etc.) as required from the Owner at such interfaces.

- e) Equipment GA, Layout, Design Calculations, interlock and other write-up, catalogues/literature etc. as required for clear understanding of the bid submitted.
- f) L-1 network indicating target dates for intermediate milestones and final commissioning of equipment supplied; This network shall be supplemented by a detailed write-up on proposal procedure of project implementation, deployment schedule for Key personnel with their bio-data, schedule of construction machinery etc.
- g) List of suppliers for all bought out items.

DISTRIBUTION SCHEDULE

S. No	Description	TSGENCO								CONSULTANT			Equipment Vendor	Remarks
		Director Projects	Director Technical	CE/Civil Thermal Projects Hyd.	CE/ TPC-I, Hyd	CE/ O&M/ KTPS	SE/ Civil KTPS	SE/E&M / KTPS	DE Constr. KTPS	Kolkata	HYD	KTPS		
A	Letter Of Intent or Contract Documents	1	1	1	S	1	2	2	1	1	1	1	2	
B	Vendor Drawings													
1.	Preliminary	1	1	1	2	1	1	2	2	12	1	-	S	
2.	Return preliminary with comments	-	-	1	2	1	1	1	1	S	1	-	1	
3.	Final and any revision thereof													
	a. Civil	1	1	6+1T	1	1	6+1T	1	-	2+1T	1	1	S	
	b. E&M	1	1	1	6+1T	1	1	6+1T	1	2+1T	1	1	S	
C.	Design Drawings													
1.	Preliminary													
	a. Civil	1	1	2	1	1	2	1	1	4	1	1	S	
	b. E&M	1	1	1	2	1	1	2	1	4	1	1	S	
2.	Released for construction													
	a. Civil	1	1	2	1	1	6	1	1	1	1	2	S	
	b. E&M	1	1	1	1	2	1	6	1	1	1	2	S	
3.	Return marked 'As built'													
	a. Civil	-	-	1	-	-	1	-	-	1	1	S	1	
	b. E&M	-	-	-	1	-	-	1	1	1	1	S	1	
4.	As built drawings													
	a. Civil	-	-	1+1T	-	2+1T	5+1T	-	1	1+1T	-	1	S	
	b. E&M	-	-	1	2+1T	2+1T	-	5+1T	1+1T	1+1T	-	1	S	

S. No	Description	TSGENCO								CONSULTANT			Equipment Vendor	Remarks
		Director Projects	Director Technical	CE/Civil Thermal Projects Hyd.	CE/ TPC-I, Hyd	CE/ O&M/ KTPS	SE/ Civil KTPS	SE/E&M / KTPS	DE Constr. KTPS	Kolkata	HYD	KTPS		
D	Progress Report Monthly													
1.	Equipment vendor	1	1	1	2	1	1	2	1	1	1	1	S	
2.	M/s DCPL, Kolkata	1	1	2	2	1	1	2	1	S	1	1	Nil	
E	Test & Inspection Reports													
1.	Equipment manufacturer													
	a. Civil	1	1	1	2	1	1	1	-	11	1	1	S	
s	b. E&M	1	1	-	2	1	-	1	1	11	1	1	S	
2.	M/s DCPL, Kolkata	1	1	-	2	1	-	1	1	S	-	1	-	
F	Instruction Manuals/Data Books													
1.	Equipment manufacturer													
	a. Civil	1	1	1+1T	1	1	6+1T	1	1	2+1T	1	1	S	
	b. E&M	1	1	-	3+1T	1	-	6+1T	2	3+1T	1	1	S	
2.	M/s DCPL, Kolkata	1	1	-	10+1T	1	-	15+1T	-	S	1	1	Nil	
G	M/s DCPL, Kolkata Criteria	1	1	1	8+1T	1	1	2	1	1	1	1	S	
H	Design Calculations	1	1	1	8+1T	1	1	2	1	1	1	1	S	
I	Final consulting Engineering Report	1	1	1	10	1	1	2	1	S	1	1	Nil	

S – Source, T – Transparency & Soft Copy on CD,

TSGENCO : Telangana State Power Generation Corporation Limited

Director, Projects, Hyd : Director/ Projects, TSGENCO, Vidyut Soudha, Hyderabad – 500 082

QUALITY ASSURANCE REQUIREMENTS

CONTENT

CLAUSE NO.	DESCRIPTION
1.00.00	QUALITY ASSURANCE PROGRAMME
2.00.00	GENERAL REQUIREMENTS QUALITY ASSURANCE
3.00.00	QUALITY ASSURANCE DOCUMENTS
4.00.00	INSPECTION, TESTING & INSPECTION CERTIFICATES

ATTACHMENTS

ANNEXURE-I	FORMAT OF QUALITY ASSURANCE PROGRAMME
ANNEXURE-II	FIELD WELDING SCHEDULE

QUALITY ASSURANCE REQUIREMENTS

1.00.00 QUALITY ASSURANCE PROGRAMME

1.01.00 To ensure that the equipment and services under the scope of Contract whether manufactured or performed within the Contractor's works or at his Sub-contractor's premises or at the Owner's site or at any other place or work are in accordance with the specifications, the Contractor shall adopt suitable quality assurance programme to control such activities at all points, as necessary. Such programmes shall be outlined by the Contractor and shall be finally accepted by the Owner/Authorised representative after discussions before the award of contract. A quality assurance programme of the Contractor shall generally cover the following :

- a) His organisation structure for the management and implementation of the proposed quality assurance programme.
- b) Documentation control system.
- c) Qualification data for Bidder's key personnel.
- d) The procedure for purchase of materials, parts, components and selection of Sub-contractor's services including vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased etc.
- e) System for shop manufacturing and site erection control including process controls and fabrication and assembly controls.
- f) Control of non-conforming items and system for corrective actions.
- g) Inspection and test procedure both for manufacture and all site related works.
- h) Control of calibration and testing of measuring and testing equipments.
- i) System for quality audit.
- j) System for indication and appraisal of inspection status.
- k) System for authorising release of manufactured product to the Owner.
- l) System for handling storage and delivery.
- m) System for maintenance of records.

- n) Furnishing of quality plans for manufacturing and field activities detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of equipment/component as per format enclosed at Annexure-I to this section for Owners approval
- o) Internal standards, if referred in the quality plans shall generally be compatible with National / International standards and shall be mentioned in the quality plans. Alternatively bidder shall furnish extracts of the internal standards detailing out acceptance norm for the product / material.

2.00.00 **GENERAL REQUIREMENTS - QUALITY ASSURANCE**

2.01.00 All materials, components and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all the stages, as per a comprehensive Quality Assurance Programme. An indicative programme of inspection/tests to be carried out by the Contractor for some of the major items is given in the respective technical specification. This is however, not intended to form a comprehensive programme as it is the Contractor's responsibility to draw up and implement such programme duly approved by the Owner/Consultant. The detailed Quality Plans for manufacturing and field activities should be drawn up by the Bidder, separately in the format attached at Annexure-I and will be submitted to Owner/Authorised representative for approval. Schedule of finalisation of such quality plans will be finalised before award.

Contractor shall furnish list of Manufacturing Quality Plans of major equipments indicating proposed inspection categorisation indicating items that will be offered for Owner's inspection etc and the Field Quality Plans

2.02.00 Manufacturing Quality Plan for all the major equipment will detail out their respective important components, their in-process various tests/inspection & final inspection / tests, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by Contractor's Quality Control organization. The relevant reference documents and standards, acceptance norms, inspection documents raised etc., during all stages of materials procurement, manufacture, assembly and final testing/performance testing are to be comprehensively documented by Contractor.

Manufacturing Quality Plan for all major equipments/ items will be approved by owner. In these approved quality plans, Owner / Authorised representative shall identify customer hold points (CHP), test / checks which shall be carried out in presence of the Owners Engineer or his authorised representative and beyond which the work shall not proceed without consent of Owner / Authorised representative in writing. Inspection/ Test reports are to be submitted to owner as specified in final approved Manufacturing Quality Plans.

2.03.00 Field Quality Plans / Procedures for all field activities shall be submitted to

owner for review / approval. These Quality Plans / procedures will detail out, for all equipment, the quality practices and procedures etc. to be followed by the Contractor's site Quality Control organisation, during various stages of site activities from receipt of materials/ equipment at site.

- 2.04.00 The Bidder shall also furnish copies of the reference documents/plant standards/acceptance norms/tests and inspection procedure etc., as referred in Quality Plans along with Quality Plans. These Quality plans and reference documents/standards etc. will be subject to Owner's approval without which manufacture shall not proceed. These approved documents shall form a part of the contract. In these approved quality plans, Owner/Authorised representative shall identify customer hold points (CHP), test/checks which shall be carried out in presence of the Owners Engineer or his authorised representative and beyond which the work will not proceed without consent of Owner/Authorised representative in writing. All deviations to this specification, approved quality plans and applicable standards must be documented and major deviations in the form of Non Conformity Report shall be referred to Owner/Authorised representative for approval and dispositioning.
- 2.05.00 No material shall be despatched from the manufacturer's works before the same is accepted subsequent to pre-despatch final inspection including verification of records of all previous tests/inspections by Owner's Engineer/ Authorised representative for "CHP" and "W" points marked in quality plans , and duly authorised for despatch by issuance of Material Despatch Clearance Certificate (MDCC). For items which is not under owner's inspection the contractor shall apply for despatch clearance (MDCC) from owner by submitting their internal inspection reports and quality records
- 2.06.00 All materials used or supplied shall be accompanied by valid and approved materials certificates and tests and inspection report. These certificates and reports shall indicate the sheet serial numbers or other such acceptable identification numbers of the material. The material certified shall also have the identification details stamped on it.
- 2.07.00 Castings and forgings used for construction shall be of tested quality. Details of results of chemical analysis, heat treatment record, mechanical property test results shall be furnished.
- 2.08.00 All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section - IX (latest edition) or other International equivalent standard acceptable to the Owner.

All brazers, welders etc. employed on any part of the contract at Contractor's/ Sub-Contractor's works or at site shall be qualified as per ASME Section-IX (latest edition) or equivalent international standard approved by the Owner. Such qualification tests shall be conducted in presence of Owner / his authorised representative or owner approved Third Party Inspection Agency(TPIA). Previously qualified WPS & PQR shall be acceptable if witnessed by owner's approved TPIA.

For welding of pressure parts and high pressure piping coming under IBR purview, the requirements of IBR shall also be complied with.

- 2.09.00 All non-destructive examination (NDT) shall be carried out in accordance with LIST OF STANDARDS FOR REFERENCE as given below in this section.
- The NDT operator shall be qualified as per SNT-TC-IA (of American Society of non- destructive examination). Results of NDT for the list major equipments / items identified for owner's inspection shall be properly recorded and submitted for review and approval. Other items not covered under owner's inspection, contractor shall review and approve the NDT results and such reports shall be submitted to owner in the final documentation of the items / equipments
- 2.10.00 All the sub-vendors proposed by the Contractor for procurement of major bought out items including castings, forgings, semi-finished and finished components/equipment list of which shall be drawn up by the Contractor and finalised with the Owner shall be subject to Owner's approval. Quality Plans of the successful vendors shall be discussed, finalised and approved by the Owner/Authorised representative and form part of the Purchase Order between the Contractor and the Vendor.
- 2.11.00 All the purchase specifications for the major bought-out items, list of which shall be drawn up by the Contractor and finalised with the Owner shall be furnished to the Owner for comments and subsequent approval before orders are placed.
- Owner reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Contractor's or their sub-vendor's quality management and control activities. The Contractor shall provide all necessary assistance to enable the Owner carry out such audit and surveillance.
- Quality audit/approval of the results of tests and inspection will not prejudice the right of the Owner to reject equipment not giving the desired performance after erection and shall not in no way limit the liabilities and responsibilities of the Contractor in earning satisfactory performance of equipment as per specification.
- 2.12.00 Quality requirements for main equipment shall equally apply for spares and replacement items.
- 2.13.00 Repair/rectification procedures to be adopted to make any job acceptable shall be subject to the approval of the Owner.
- 2.14.00 For quality assurance of all civil works refer to the specifications for civil works.
- 3.00.00 **QUALITY ASSURANCE DOCUMENTS**
- 3.01.00 The Contractor shall be required to submit two (2) copies and two (2) sets of microfilms / CDs of the following Quality Assurance documents within three (3) weeks after despatch of the equipment:
- a) Material mill test reports on components as specified by the specification.

- b) The inspection plan with verification, inspection plan check points, verification sketches, if used and methods used to verify that the inspection and testing points in the inspection plan were performed satisfactorily.
- c) Non-destructive examination results /reports including radiography interpretation reports.
- d) Factory tests results for testing required as per applicable codes and standards referred in the specification.
- e) Welder identification list listing welder's and welding operator's qualification procedure and welding identification symbols.
- f) Sketches and drawings used for indicating the method of traceability of the radiographs to the location on the equipment.
- g) Stress relief time temperature charts.
- h) Inspection reports duly signed by QA personnel of the Owner and Contractor for the agreed inspection hold points. During the course of inspection, the following will also be recorded :
 - i) When some important repair work is involved to make the job acceptable.
 - ii) The repair work remains part of the accepted product quality.
- i) Letter of conformity certifying that the requirement is in compliance with finalised specification requirements.

4.00.00 **INSPECTION, TESTING AND INSPECTION CERTIFICATES**

4.01.00 The Owner's Engineer, or his duly authorised representative and/or an outside inspection agency acting on behalf of the Owner shall have access inside the workshops, test labs, establishments at all reasonable times to inspect and examine the materials and workmanship of the works during its manufacture or erection and if part of the works is being manufactured or assembled on other premises or works, the Contractor shall obtain for the Owner's Engineer and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works.

4.02.00 The Contractor shall give the Owner's Engineer/ Authorized Inspector twenty one (21) days written notice for "CHP" / "W" points of any material being ready for testing by owner' engineer / Authorized inspector. Such tests shall be to the Contractor's account except for the expenses of the Inspector. The Engineer/ Inspector, unless the witnessing of the tests is virtually waived, will attend such tests within fifteen (15) days of the date on which the equipment is notified as being ready for test/inspection. If owner's Engineer / Authorised Inspector fail to attend the inspection, next mutually convenient date for test shall be agreed with Contractor. Contractor shall. in

no case proceed with the test without owner or his authorized inspectors, unless the witnessing is officially waived and advised Contractor to proceed with the test. Contractor shall forthwith forward duly certified completed test report and a product quality certificate in six (6) copies to owner upon completion of such test.

- 4.03.00 The Engineer or Inspector shall within fifteen (15) days from the date of Inspection as defined herein give notice in writing to the Contractor, or any objection to any drawings and all or any equipment and workmanship which is in his opinion not in accordance with the contract / QAP or other approved quality documents. The Contractor shall give due consideration to such objections and shall either make modifications that may be necessary to meet the said objections or shall confirm in writing to the Engineer/Inspector giving reasons therein, that no modifications are necessary to comply with the contract / QAP or other approved quality documents.
- 4.04.00 When the factory tests have been completed at the Contractor's or sub-contractor's works, the Engineer/Inspector shall issue a certificate to this effect fifteen (15) days after completion of tests excluding the test completion date subject to submission of all certified documents related to the test. If the tests are not witnessed by the Engineer/Inspectors, the certificate shall be issued within fifteen (15) days of the receipt of the Contractor's test certificate by the Engineer/Inspector. Failure of the owner's Engineer/Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the works. The completion of these tests, or the issue of the certificates shall not bind the Owner to accept the equipment should it, on further tests after erection be found not to comply with the contract / QAP or other approved quality documents.
- 4.05.00 In all cases where the contract provides for tests whether at the premises or works of the Contractor or any sub-contractor, the Contractor, except where otherwise specified shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the owner's Engineer/Inspector or his authorised representatives to carry out effectively such tests on the equipment in accordance with the Contract / QAP or other approved quality documents. Contractor and shall give facilities to the owner's Engineer/ Inspector or to his authorised representative to accomplish testing.
- 4.06.00 To facilitate advance planning of inspection in addition to giving inspection notice as per Clause 4.02.00, the Contractor shall furnish quarterly inspection programme indicating proposed schedule dates of inspection at customer hold point and final inspection stages. Updated quarterly inspection plans will be made for each three consecutive months and shall be furnished before beginning of each calendar month.

LIST OF STANDARDS FOR REFERENCE

- a) International Standards Organisation (ISO).
- b) International Electro-technical Commission (IEC).
- c) American Society of Mechanical Engineers(ASME)
- d) American National Standards Institute (ANSI).
- e) American Society for Testing and Materials (ASTM).
- f) American Institute of Steel Construction (AISC).
- g) American Welding Society (AWS).
- h) Architecture Institute of Japan (AIJ).
- i) National Fire Protection Association (NFPA).
- j) National Electrical Manufacturer's Association (NEMA).
- k) Japanese Electro-technical Committee (JEC).
- l) Institute of Electrical and Electronics Engineers (IEEE).
- m) Federal Occupational Safety and Health Regulations (OSHA).
- n) Instrument Society of America (ISA).
- o) National Electric Code (NEC).
- p) Heat Exchanger Institute (HEI).
- q) Tubular Exchanger Manufacturer's Association (TEMA).
- r) Hydraulic Institute (HIS).
- s) International Electro-Technical Commission Publications.
- t) Power Test Code for Steam Turbines (PTC).
- u) Applicable German Standards (DIN).
- v) Applicable British Standards (BS).
- w) Applicable Japanese Standards (JIS).
- x) Electric Power Research Institute (EPRI).
- y) Standards of Manufacturer's Standardization Society (MSS)

- z) Bureau of Indian Standards Institution (BIS).
- aa) Indian Electricity Rules.
- bb) Indian Boiler Regulations (IBR).
- cc) Indian Explosives Act.
- dd) Indian Factories Act.
- ee) Tariff Advisory Committee (TAC) rules.
- ff) Emission regulation of Central Pollution Control Board (CPCB).
- gg) Pollution Control regulations of Dept. of Environment, Govt. of India
- hh) Central Board of Irrigation and Power (CBIP) Publications

FORMAT OF QUALITY ASSURANCE PROGRAMME

VENDOR'S LOGO , NAME & ADDRESS		MANUFACTURING QUALITY ASSURANCE PLAN				DOC NO: XXXXX-CAL-QAP-M-0001			
		ITEM : -				REV NO : 0 1 2 3 4			
						DATE :			
CLIENT :					LOCATION :				
PROJECT :					REFERENCE PURCHASE ORDER NO. & DT :				
VENDOR :					REFERENCE APPROVED DATA SHEET :				
SUB VENDOR :					REFERENCE APPROVED DRAWING. NO. :				
ABBREVIATIONS : QAP - QUALITY ASSURANCE PLAN, CR - CRITICAL, MA - MAJOR, MI - MINOR SPEC - SPECIFICATION, TC - TEST CERTIFICATES P - PERFORM w - WITNESS V - VERIFY CHP - CUSTOMER HOLD POINT					AGENCY : 1 - DCPL/PROJECT AUTHORITY 2 - SUPPLIER 3 - SUB-SUPPLIER 4 - MANUFACTURER 5 - THIRD PARTY INSPECTION AGENCY		GENERAL REMARKS 1 THE ITEMS WHICH ARE FALLING UNDER ANY STATUTORY AUTHORITY'S (LIKE I.B.R. ETC.) SCOPE SHALL BE SUBJECTED TO THAT STATUTORY AUTHORITY'S INSPECTION CLEARENCE.		
NOTES: 1. EXACT MATERIAL / PROCESS / INSPECTION / TESTS FOLLOWED BY THE MANUFACTURER SHALL BE SPECIFIED 2. EXACT REFERENCE DOCUMENT/ACCEPTANCE STANDARD SHALL BE SPECIFIED 3. IN CASE SPECIFIED ACCEPTANCE STANDARD / NORMS IS OTHER THAN NATIONAL / INTERNATIONAL STANDARDS STANDARD / COPY OF THE ACCEPTANCE NORMS FOLLOWED BY THE MANUFACTURER SHALL BE SUBMITTED FOR REVIEW RECORD 4 FINAL INSPECTION DOSSIER SHALL BE PREPARED BY MANUFACTURER & SHALL BE ENDORSED BY INSPECTIONION AGENCY									
Prepared by			Checked by			Approved By			
Revision	R0	R1	R2	R0	R1	R2	R0	R1	R2
DATE									

VENDOR'S LOGO, NAME & ADDRESS			ITEM :						DOC NO:				
									REV NO :		R0	R1	R2
									DATE :				
SL NO.	DESCRIPTION	CHECKS			CATEGORY	REF DOCS	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS	
		TYPE	METHOD	QUANTUM					P	W	V		
1	2	3	4	5	6	7	8	9	12	13	14	15	
1.00													
Notes:													
Prepared by				Checked by				Approved By					
Revision	R0	R1	R2	R0	R1	R2	R0	R1	R2				
DATE													

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									
Sl. No.	Components and Operation	Characteristic/ Item	Class	Type of Check	Extent of Check	Reference Document	Acceptance Norm	Format of Record (D*)	Agency			Remarks
									M	B	C	
1	2	3	4	5	6	7	8	9	10			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		CR-Critical Characteristics MA - Major Characteristics MI- Minor Characteristics			FOR BHEL			FOR CUSTOMER	APRD. BY			
Signature												

Manufacturer's Name:			MANUFACTURING QUALITY PLAN FOR VALVES				PROJECT: PACKAGE: Misc. Tanks (Site Fabricated) LOI No. : Customer : BHEL				BHEL Doc. No.: Rev. No. : 0 Date: 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 compositon	CR	Chem.test	One lheat	Approved Data Sheet/DRG	Relevant standard.	TC	√	P	V	V	
		2.Mech properties	CR	Tensile test	One lheat 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	√	P			
		Dimension	MR	Measurements	100%	Component drg	Component drg	compliance report					
2.2	Body,Seat ring ,Disc,spindle after Machining	Surface defects	MR	DPT	100%	ASTM A 165	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 INDENTIFIED 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				P - Perform W - Witness V - Verification							
Manufacturer / Contractor / Sub contractor		CR-Critical Characteristics MA - Major Characteristics MI- Minor Characteristics				FOR BHEL		FOR CUSTOMER		APRD. BY			

QAP OF MS PLATES

Manufacturer's Name: Approved sub vendor			MANUFACTURING QUALITY PLAN				PROJECT: PACKAGE: Misc.Tanks (Site Fabricated) LOI No. : Customer : BHEL		BHEL Doc. No.: Rev. No. : 0 Date: SHEET 1 OF 1				
			ITEM: MS PLATES Sub-system- Misc.tanks										
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	3	4	5	6	7	8	9	D	M	B	C	12
RAW MATERIAL													
1	STEEL PLATES	Chemical composition and Mechanical test	MA	Review of corelated MTC	one/heat	IS:2062	IS:2062	Mfgr. TC	√	P	V	V	Refer Note below
2		Visual and dimensionl check	MA	Visual and measurement	100%	Mfg.TC	Mfg.TC IS1852	Mfgr. TC	√	P	**W	**W	
3		Identification/markings	MA	Corelation 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								DOC. NO. : Rev No.0			
Manufacturer / Contractor / Sub contractor Signature		CR-Critical Characteristics MA - Major Characteristics MI- Minor Characteristics				FOR BHEL		FOR CUSTOMER		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
					M	B	C	
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			P - Perform W - Witness V - Verification		DOC. NO. :	
Manufacturer / Contractor / Sub contractor				FOR BHEL	FOR CUSTOMER		APRD. BY	APPROVAL SEAL
Signature								



**TECHNICAL SPECIFICATION FOR
MISCELLANEOUS TANKS
SUB-VENDOR LIST
ANNEXURE-I**

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

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**ANNEXURE-I
LIST OF MAKES OF SUB-VENDOR ITEMS
MISCELLANEOUS TANKS**


07/07/15

VIPIN NAUNI
PEM - NOIDA



**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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		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		
		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	
6	GATE, GLOBE AND CHECK (CS STEEL VALVES)	FLOW STAR	FARIDABAD	
		SCIENTIFIC DEVICES	MUMBAI	
		GAUGES BOURDEN	PANVEL	
		PUNE TECHTROL	PUNE	
		SBEM	PUNE	
		LEVCON	KOLKATA	
		SIGMA	MUMBAI	
7	LEVEL INDIATOR FLOAT AND BOARD TYPE			



**TECHNICAL SPECIFICATION FOR
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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			

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.



**TECHNICAL SPECIFICATION FOR
MISCELLANEOUS TANKS
SUB-VENDOR LIST
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- a) Documentation to show that the equipment /system has been supplied for a plant of similar or higher capacity.
- b) 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
MISCELLANEOUS TANKS
5X 800 MW YADADRI TPS
ANNEXURE-II**

SPECIFICATION NO. PE-TS-417-167-A001

SECTION-1 A

REVISION 00

DATE: 29.04.2018

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DRAWINGS DOCUMENTS REQUIRED DURING DETAIL ENGINEERING

S. NO	DOCUMENT NO.	DOCUMENT TITLE	SCH. DATE OF SUB. FROM LOI (IN WEEKS)	PURPOSE
1	PE-V0-410-167-A001	FABRICATION DRAWING OF DM STORAGE TANK and CONDENSATE STORAGE TANK	5	APPROVAL
2	PE-V0-410-167-A002	DESIGN CALCULATION OF ROOF STRUCTURE WITH STAAD CALCULATION	3	APPROVAL
3	PE-V0-410-167-A005	DATASHEET & GA DRAWING OF COMPONENTS OF DM STORAGE TANK and CONDENSATE STORAGE TANK	6	APPROVAL
4	PE-V0-410-167-A007	QAP OF COMPONENTS OF DM STORAGE TANK and CONDENSATE STORAGE TANK	6	APPROVAL
5	PE-V0-410-167-A008	SUB VENDOR LIST WITH INSPECTION CATEGORY FOR DM & CS TANK	3	APPROVAL

NOTE:

1. Drawing / Document shall be uploaded by the successful bidder on WRENCH /DMS. Procedure for the same will be informed after award of contract.
2. Resubmission of drawing/ documents shall be done within 7 days upon receipt of customer/BHEL comments by Bidder.

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

COMPANY _____

DATE: _____

COMPANY SEAL



**TECHNICAL SPECIFICATION FOR
MISCELLANEOUS TANKS
5X 800 MW YADADRI TPS
ANNEXURE-II**

SPECIFICATION NO. PE-TS-417-167-A001

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Other points to be considered while preparing drawings:

- a) Data sheets of various items shall be prepared by the bidder for storage tanks and shall be submitted to BHEL / customer / consultant for approval after placement of order and any changes required by BHEL / customer / consultant for the same shall be incorporated and adhered by the bidder without any commercial implications.
- b) Drawing, nozzle schedule, design data, material of construction etc. shall be prepared by the bidder during detail engineering stage based on specification / contractual requirement and there should be no commercial implication on account of finalization of the drawings and documents.
- c) Drawing covering all details shown in data sheets like design data, dimensions, material of construction, list of appurtenances, lists of specifications, details of paints, standards & codes, general notes including details of test to be conducted on tank in accordance with specification and brand-name of welding electrodes to be used etc.
- d) Field quality plan / quality assurance plan / check list shall be prepared by the bidder for storage tanks / each instrument / item and shall be submitted to BHEL / customer / consultant for approval after placement of order and any changes required by BHEL / customer / consultant for the same shall be incorporated and adhered by the bidder without any commercial implications.
- e) Bar chart, list of drawings and documents including data sheet, manual calculation, quality plan, field quality plan, PG test procedure, list of sub-vendors, technical specification and material of construction, painting specification / schedule, dispatch schedule etc. of various items as required by BHEL / customer / consultant shall be submitted to BHEL / customer / consultant during detail engineering stage for approval and the approved drawings / documents shall be adhered by the bidder without any commercial implication.
- f) All possible efforts shall be made by the bidder to get the approval of drawings and documents from BHEL / customer / consultant at the earliest and the documents prepared / generated by them or their sub-vendors shall be checked by their competent authority before submission to BHEL.
- g) Revision made by the bidder in any drawings and documents shall be highlighted by indicating the no. of revisions in a triangle without fail so that the minimum time is required by BHEL to review the drawings and documents.
- h) Any other drawings and documents in addition to the list of drawings and documents indicated in the NIT specification as required by BHEL for the execution of the project shall be furnished by them during detailed engineering stage and no commercial implication shall be entertained by BHEL for the same.
- i) Bidder to note that all the drawings shall be prepared in Auto Cad - 2010 version or later and required number of hardcopies and soft copies shall be furnished to BHEL during detailed engineering stage. Exact requirement of number of hard copies and soft copies of all drawings and documents as required by BHEL / customer / consultant shall be informed to the successful bidder during detail engineering stage and bidder to furnish the same for which no additional cost shall be entertained.
- j) Bidder to provide AutoCAD copy of drawing / document for review and interfacing with our facilities.



**TECHNICAL SPECIFICATION FOR
MISCELLANEOUS TANKS
5X 800 MW YADADRI TPS
ANNEXURE-II**

SPECIFICATION NO. PE-TS-417-167-A001

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- k) Civil works will be done by BHEL based on civil inputs furnished by the bidder during detail engineering. In case of any changes in the civil input drawing after civil work is completed. Necessary prices on account of modification of the civil work shall be deducted from bidder's account or rectification in civil work to be done by bidder.
- l) Bidder to furnish the civil foundation drawing of the tanks / seal pots / NaOH or KOH breather along with the loading data for approval during detailed engineering stage showing / indicating the followings:-
- Scope of work by BHEL and bidder shall be indicated with different legend or in the form of note.
 - Recommended locations of earthing pads.
 - Civil loads shall be furnished and the detailed calculation showing weights of roof, bottom, and shell plates, all accessories and nozzles etc.
- m) All drawings and documents shall be furnished to BHEL during detailed engineering stage and shall include / indicate the following details for clarity w.r.t. inspection, construction, erection and maintenance etc.: -
- All drawings and documents shall bear BHEL's title block and drawing / document number. However, BHEL's drawing / document numbering scheme shall be furnished to the successful bidder after the placement of L.O.I.
 - All drawings and documents shall indicate the list of all reference drawings including general arrangement.
 - All drawings shall include / show plan, elevation, side view, cross - section, skin section, blow - up view etc. All major self-manufactured and bought out items shall be labelled and included in BOQ / BOM in tabular form indicating all components including bought out items and their quantity, material of construction indicating its applicable code / standard, weight, make etc.
- n) All text/ numeric in the document / drawings to be generated by the successful bidder will be in English language only.



**TECHNICAL SPECIFICATION FOR
MISCELLANEOUS TANKS
5X 800 MW YADADRI TPS
ANNEXURE-II**

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DRAWING AND DOCUMENTS FOR SUBMISSION

S.N.	Drawings and documents	Soft and Hard Prints
1.0	<i>DRAWING FOR APPROVAL</i>	
1.1	For approval	Soft+2 Hard Print
1.2	For customer approval	Soft+2 Hard Print
1.3	For final distribution	Soft+2 CD +5 Hard Print
2.0	DRAWING FOR REFERENCE	
2.1	For reference	Soft+2 Hard Print
2.2	For final distribution	Soft+2 CD+5 Hard Print
3.0	CERTIFICATE, REPORTS ETC.	Soft+2 Hard Print
4.0	AS BUILT DRAWINGS (IF REQUIRED)	Soft+2 CD+8 Hard Print
5.0	O&M MANUAL	
5.1	Draft for approval	Soft +3 CD+ 5 Hard Print
5.2	For final distribution	Soft +3 CD + 8 Hard Print
6.0	QUALITY PLAN / Field quality plan / PG test	Soft + 2 Hard Print



**5X800 MW TSGENCO YADADRI TPS
MISCELLANEOUS TANKS**

SPECIFICATION No: PE-TS-417-167-A001

REV. 00

DATE: 29.03.2018

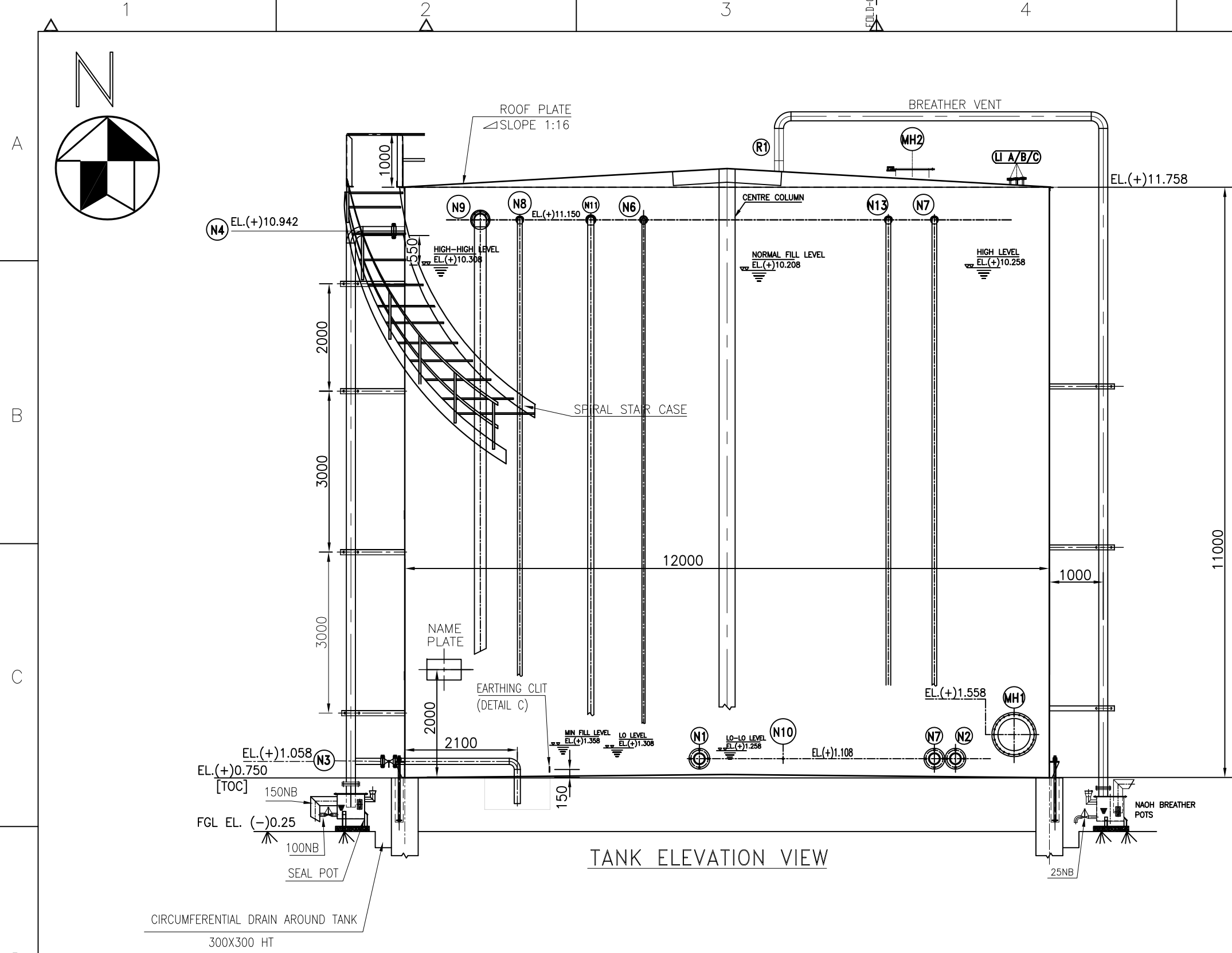
SHEET :

**Sub section -IB
Specific Technical Requirement (Mechanical)**

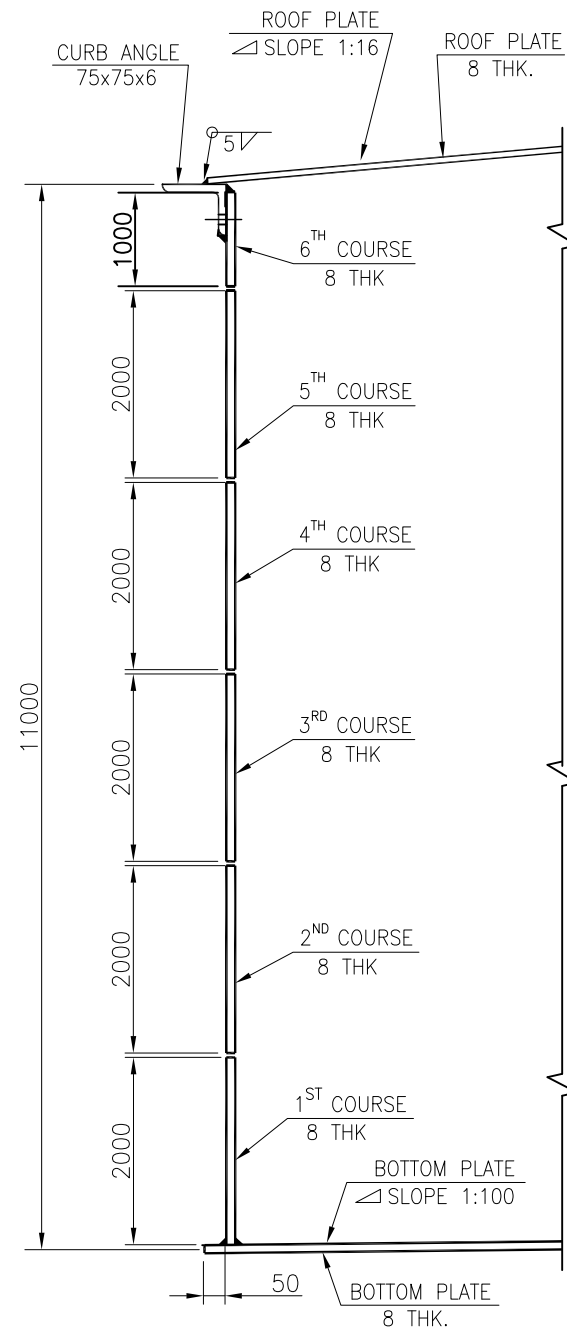
BHEL PEM	DATA SHEET-A FOR CONDENSATE STORAGE TANK	DOC NO: PE-DS-417-167-A001
	PROJECT TITLE: 5X800MW- Yadadri	SHEET NO: 01 OF 02
1	SERVICE IDENTIFICATION	CONDENSATE STORAGE TANK
2	SYSTEM	CONDENSATE TRANSFER SYSTEM
3	APPLICABLE CODES/ STATUTORY REGULATIONS	IS-803/API650
4	EFFECTIVE CAPACITY (m3)	1000
5	NUMBER REQUIRED	Five (05) NOS. FOR STATION (ONE NO. PER UNIT)
6	STORAGE MEDIUM	DM WATER
7	TYPE	VERTICAL, CYLINDRICAL
8	SIZE	12 M DIA x 11.0M HEIGHT
9	CORROSION ALLOWANCE	2.0MM
10	PRESSURE CLASS	DESIGN FOR FILLED WATER HEAD / ATOMSPHERIC
11	MATERIAL OF CONSTRUCTION	MILD STEEL TO IS:2062, GrB
12	DESIGN TEMPERATURE	50°C
13	LOCATION OF INSTALLATION	OUTDOOR
14	DRAIN VALVE FOR TANK	100 NB
15	DRAIN VALVE FOR NaOH/CO2 BREATHER	25 NB
16	DRAIN VALVE FOR SEAL POT	100 NB
17	PIPE MATERIAL FOR HAND RAILING	CARBON STEEL, GALVANIZED, MEDIUM GRADE
18	NOZZLE CONNECTIONS REQD / END CONNECTION	AS PER ENCLOSED GA DRAWING / SOCKET WELDED FOR SIZE <= NB50 & FLANGED FOR SIZE > NB50
19	VALVES END CONNECTION	SOCKET WELDED FOR SIZE <= NB50 BUTT WELDED FOR SIZE > NB50
20	INSTRUMENTS / ACCESSORIES REQUIRED	(a) CONSERVATION VENT VALVE / NAOH BREATHER (TO BE PLACED ON GROUND). (b) OVERFLOW OF 150 NB & DRAIN PIPING OF 100 NB WITH DRAIN VALVE (c) SEAL POT WITH DRAIN VALVE ETC FOR OVERFLOW (d) LEVEL GAUGE FLOAT & BOARD TYPE TO COVER ENTIRE RANG (e) 2 NOS OF NOZZLE CONNECTION OF 50 NB FOR LEVEL TRANSMITTERS. (f) SPARE CONNECTION OF 150 NB (2 NOS.), 200NB (1NO.), 100 NB (1 NO.) SPARE VALVES SHALL BE PROVIDED FOR SPARE CONNECTIONS. (g) SAMPLING CONNECTION WITH 25 NB VALVE ON TANK. (h) 3 NOS. INSTRUMENT CONNECTIONS ON TANK ROOF FOR LI.
21	INSIDE PROTECTION & EXTERNAL PAINTING	REFER GA DRAWING AND CUSTOMER SPECIFICATION FOR PAINTING
22	MANHOLE	TWO(2) NOS. SIZE OF 600 MM, ONE ON SHELL & OTHER ON ROOF

NOTE :1. ALL OTHER STANDARD TECHNICAL REQUIREMENTS / ACCESSORIES & SPARES AS APPLICABLE SHALL BE CONSIDERED.

2. ALL THE REQUIREMENTS SHOWN UNDER GA DRAWING ARE BARE MINIMUM , ANY OTHER ITEM FOUND APPLICABLE DURING DETAILED ENGINEERING AS PER TECHNICAL SPECIFICATION/ FUNCTIONAL REQUIREMENT SHALL BE SUPPLIED BY BIDDER WITHOUT ANY COMMERCIAL IMPLICATION TO BHEL.



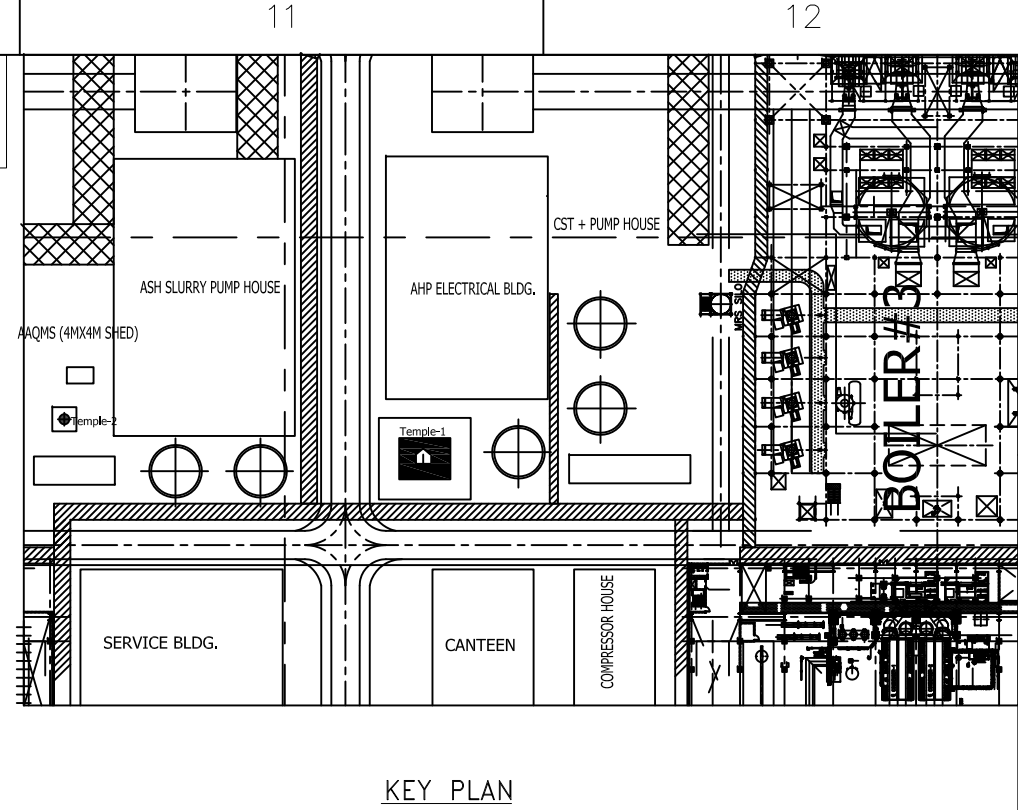
TANK ELEVATION VIEW



SHELL ARRANGEMENT FOR 1ST TO 6TH COURSE

Name of Manufacturer:	BHEL
TANK NOMINAL DIAMETER	12.0 M
TANK NOMINAL HEIGHT	11.0 M
MAXIMUM CAPACITY	1080 M3
DATE OF MANUFACTURE	2018
DESIGN LIQUID LEVEL	9.550 M
DESIGN CODE	API650
MAXIMUM OPERATING PRESS.	AMBIENT
MAXIMUM OPERATING TEMP.	AMBIENT
DESIGN TEMPERATURE	50 DEGC
MATERIAL OF TANK	IS 2062 GR. B

NAME PLATE DETAIL



KEY PLAN

DESIGN DATA			
DESCRIPTION	UNIT	DETAIL	
DESIGN CODE	-	API 650	
STORED PRODUCT	-	DM WATER	
SPECIFIC GRAVITY OF PRODUCT STORED	kg/m ³	1000	
TYPE OF TANK	-	VERTICAL CYLINDRICAL, SUPPORTED CONE ROOF	
NUMBER OF TANKS	no	FIVE (5)	
DIAMETER OF TANK (ID)	mm	12000	
HEIGHT OF TANK	mm	11000	
TANK EMPTY WEIGHT	kg	46538	
TANK FILLED WEIGHT	kg	1126538	
NET WORKING CAPACITY	m ³	1000 < AS PER FIG 5.4 OF API650	
MAXIMUM TANK CAPCITY	m ³	1080 < AS PER FIG 5.4 OF API650	
BASIC WIND SPEED	m/s	44	
DESIGN TEMPERATURE	°C	50	
INTERNAL DESIGN PRESSURE	KPa	18 AS PER API650 FOR SEISMIC CALCULATION	
OPERATING PRESSURE	-	ATMOSPHERIC	
CORROSION ALLOWANCE	mm	2.0	
SEISMIC FACTORS	-	ZONE-III, PEAK GROUND ACCELERATION - 0.16g	
SEISMIC MOMENTS	KNM	RING WALL MOMENT - 6145.85, SLAB MOMENT - 8724.61	
WIND LOAD	KN	VERTICAL - 138.6, HORIZONTAL - 198.96	
WIND MOMENT	KNM	1956.06	
ROOF LOAD (UNIFORM LIVE)	kg/m ²	150	
TESTING	-	AS PER CL7.3 AND SECTION 8 OF API650	
RATE OF FILLING OF TANK (MAX)	m ³ /hr	270, FOR SIX (6) NOS, 5W +1S, DM TRANSFER PUMPS (CAP. 45 M ³ /HR EACH)	
RATE OF EMPTYING OF TANK (MAX)	m ³ /hr	240, FOR THREE(3) NOS, 2W+1S, DM MAKE UP WATER PUMPS (CAP. 80 M ³ /HR EACH)	

SHELL NOZZLES & APPURTENANCES FOR TANK#1

MARK	SIZE NB	QTY. (NO.)	FLANGE TYPE, RATING	NOZZLE CENTRE ELE. FROM TOP OF BOTTOM PLATE AS PER TABLE 5.6a OF API650	PRQJ. DIST. FROM SHELL PLATE AS PER TABLE 5.6a OF API650	NOZZLE THK IN MM AS PER TABLE 5.6a OF API650	SERVICE
N1	200	1	SDRF,150#	350	200	12.70	DM WATER OUTLET
N2	200	1	SDRF,150#	350	200	12.70	SPARE OUTLET WITH VALVE
N3	100	1	SDRF,150#	300	175	8.56	DRAIN WITH VALVE
N4	150	1	SDRF,150#	10184	200	10.97	OVERFLOW
N5	80	1	SDRF,150#	10392	175	7.62	DM INLET
N6	50	1	SDRF,150#	10392	150	5.54	NOZZLE WITH BLIND FLANGE
N7	80	1	SDRF,150#	10392	175	7.62	COMMON NOZZLE FOR BOTH PUMP RECIRCULATION LINE
N8	150	1	SDRF,150#	10392	200	10.97	SPARE INLET WITH VALVE
N9	200	1	SDRF,150#	10392	200	12.70	CONDEN. EXCESS DUMP
N10	25	1	SDRF,150#	350	150	6.35	SAMPLING CONNECTION WITH VALVE
N11	100	1	SDRF,150#	10392	175	8.56	SPARE INLET WITH BLIND FLANGE
N12	150	1	SDRF,150#	350	200	10.97	SPARE WITH VALVE
N13	80	1	SDRF,150#	10392	175	7.62	DM WATER RE-CIRCULATION
MH1	600	1	AS PER FIG 5.16 OF API650	800	150	6.0	SHELL MANHOLE WITH COVER
EC	-	2	AS PER DETAIL C	-	-	-	EARTHING CLIT

ROOF NOZZLES & APPURTENANCES FOR TANK#1

MARK	SIZE NB	QTY. (NO.)	FLANGE TYPE, RATING	NOZZLE CENTRE DISTANCE FROM ROOF CENTRE	PRQJ. DIST. FROM SHELL PLATE AS PER TABLE 5.6a OF API650	NOZZLE THK IN MM AS PER TABLE 5.6a OF API650	SERVICE
R1	200	1	SDRF, #150	1000	200	12.7	BREATHING VENT
L1 A/B/C	25	3	SDRF, #150	5500	150	6.35	LEVEL INDICATOR (FLD&T & ARROW TYPE)
L/A/B	50	2	SDRF,150#	4500	150	5.54	LT CONNECTIONS
MH2	600	1	AS PER FIG 5.16 OF API650	5400	150	6	ROOF MANHOLE WITH COVER

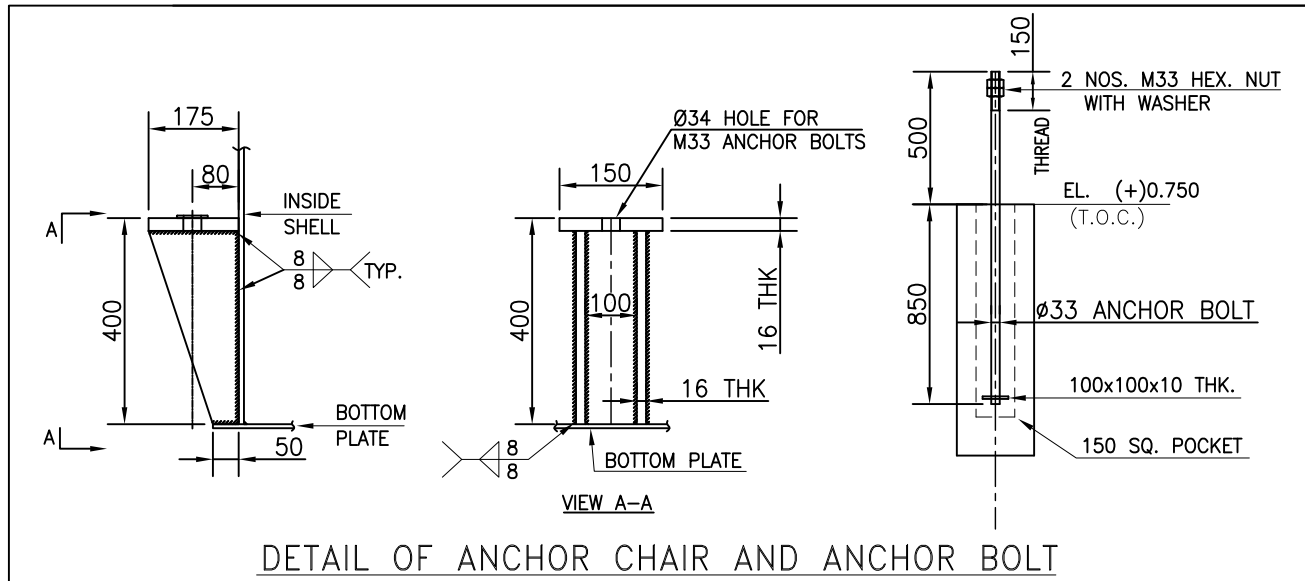
MATERIAL SPECIFICATION

ITEM	MATERIAL
SHELL, BOTTOM, ROOF, RF PL	IS 2062 GR B
NOZZLES	STAINLESS STEEL TO A312 GR. TP-304 & SW END FOR PIPE SIZES 50NB & BELOW AND BW ENDS FOR PIPE SIZES ABOVE 50 NB)
MANHOLE NECK	IS 2062 GR B
NOZZLE FLANGES	STAINLESS STEEL TO A182 GR. F-304 FOR PIPE SIZES 50NB & BELOW AND TO A403 GR. 304 FOR PIPE SIZES ABOVE 50 NB)
HAND RAILING (40NB)	32NB PIPE TO IS1239KM,GALV.
GASKETS	CAF/PTFE (TEFLON)
BOLTING (NUTS & BOLTS)	ASTM A193 Gr.B7/ASTM A194 Gr.2H
STRUCTURALS	IS 2062 GR A/B
FITTINGS OF 50 NB & BELOW	STAINLESS STEEL TO A182 F304, SW TO ANSI B16.11
FITTINGS ABOVE 50 NB	STAINLESS STEEL TO A403 GR. WP-304, BW TO ANSI B16.9
NAME PLATE AND EARTHING CLIT	SS 304

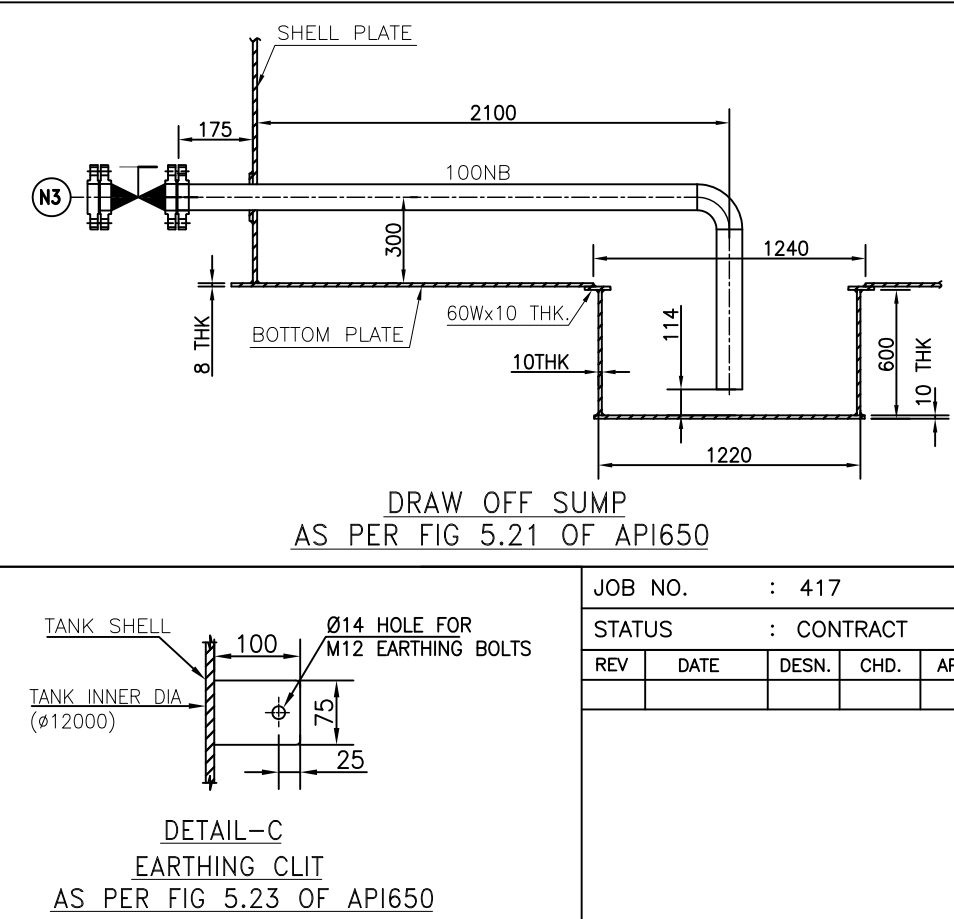
NOZZLE ORIENTATION OF CS TANK
(REFER NOTE-22)

NOTES:-

- ALL DIMENSIONS ARE IN MM. ELEVATIONS ARE IN METRE UNLESS OTHER WISE SPECIFIED.
- THE FINISHED FLOOR LEVEL (FFL) OF POWER HOUSE BUILDING GROUND FLOOR IS EL. + 0.00M WHICH CORRESPONDS TO RL. 81.5M, I.E., 0.5M ABOVE FGL (RL81.0M) IN MAIN PLANT AREA.
- TANK SURFACE SHOULD BE CLEANED THOUGHLY AFTER FABRICATION FROM LOOSE SUBSTANCES AND FOREIGN MATERIALS SUCH AS DIRT, RUST, SCALE, OIL, GREASE AND WELDING FLUX ETC.
- VERTICAL SHELL JOINTS SHALL BE OFFSET FROM EACH OTHER WITH A MINIMUM DISTANCE OF 5 TIMES THE THICKNESS OF SHELL COURSE UNDER CONSIDERATION.
- BOTTOM PLATE SHALL UNIFORMLY REST ON THE FOUNDATION. THREE PLATE JOINTS IN BOTTOM PLATE SHALL NOT BE CLOSER THAN 300mm FROM EACH OTHER AND ALSO FROM THE TANK SHELL.
- EARTHING LUG AND NAME PLATE SHALL BE WELDED TO THE TANK AS PER SITE REQUIREMENT.
- ALL THE INLET PIPING SHALL BE EXTENDED UP TO BOTTOM OF TANK AND CLEARANCE BETWEEN THE BOTTOM OF TANK AND THE EDGES OF INLET PIPING SHALL BE 500 MM MAXIMUM.
- WEIR PLATE SHALL BE PROVIDED AT THE BOTTOM OF ALL THE INLET PIPES INSIDE TANK TO AVOID EROSION OF BOTTOM PLATE.
- TREAD AND RISE FOR STAIRCASE OF THE TANK SHALL BE 250 AND 200 MM RESPECTIVELY.
- LEVEL INDICATOR SUPPORTS SHALL BE PROVIDED ON THE SHELL & ROOF.
- PAD PLATES FOR SUPPORTING ALL INLET PIPING OF TANK SHALL BE PROVIDED BY TANK VENDOR.
- FINAL PAINTING SHALL BE CARRIED OUT AS PER APPROVED PAINTING SCHEDULE AFTER HYDRO TEST OF TANK.
- TANK NOZZLE FLANGES SHALL BE PROVIDED WITH COUNTER FLANGES ALONG WITH NUTS & BOLTS BY TANK VENDOR.
- FABRICATION, ERECTION AND TESTING SHALL BE AS PER API650.
- FOR MANUAL WELDING PROCESSES, FILLET WELD LEGS OR GROOVE WELD DEPTHS GREATER THAN 6MM SHALL BE MULTIPASS.
- ALL TANK SHELL WELD INTERSECTIONS WHERE VERTICAL JOINTS MEET THE HORIZONTAL JOINTS SHALL BE RADIOGRAPHED, REGARDLESS OF THICKNESS.
- ALL RADIOGRAPHY OR OTHER NDE AND ANY WELDING SHALL BE COMPLETED PRIOR TO HYDROSTATIC TESTING.
- THE TANK HYDROSTATIC TEST SHALL BE CONDUCTED BEFORE PERMANENT EXTERNAL PIPING IS CONNECTED TO THE TANK EXCEPT FOR PIPING THAT IS NECESSARY TO FILL AND EMPTY THE TANK, WHICH SHOULD HAVE A FLEXIBLE COMPONENT TO ALLOW FOR SETTLEMENT.
- ALL INLET PIPING TO THE TANK SHALL BE PROVIDED WITH SUITABLE SIPHON BREAKER.
- MANHOLE FOR ROOF AND SHELL OF TANK SHALL BE HINGED TYPE.
- SEAL POT AND NAOH BREATHING POTS SHALL BE PLACED ON CIVIL FOUNDATION BY USING THE ANCHOR FASTENER BY TANK SUPPLIER.
- NO POCKETS BY CIVIL AGENCY WILL BE PROVIDED IN FOUNDATION OF SEAL POT AND NAOH BREATHING.
- NOZZLE ORIENTATION SHALL BE FINALISED AFTER FINALISATION OF LAYOUT.

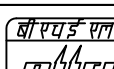


DETAIL OF ANCHOR CHAIR AND ANCHOR BOLT



DRAW OFF SUMP
AS PER FIG 5.21 OF API650

TANK SHELL	100	Ø14 HOLE FOR Ø12 EARTHING BOLTS
TANK INNER DIA. (Ø12000)	100	25
DETAIL-C EARTHING CLIT	AS PER FIG 5.23 OF API650	

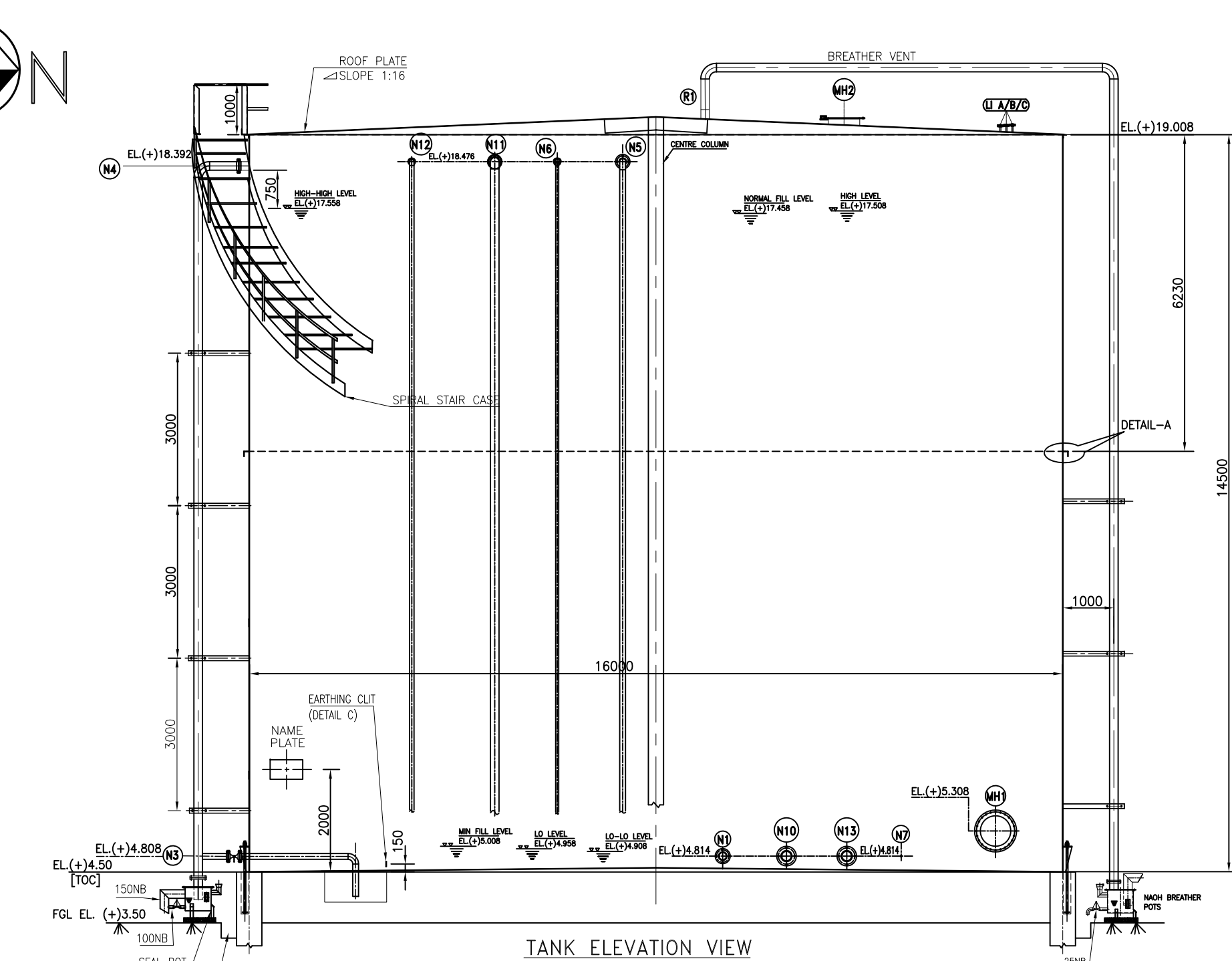
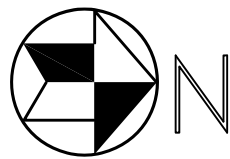
PROJECT		5x800 MW YADADRI TPS, NALGONDA			
OWNER CONSULTANT:		OWNER:  TELANGANA STATE POWER GENERATION CORPORATION LTD TELANGANA STATE, INDIA			
		 BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECTS ENGINEERING MANAGEMENT NOIDA		SCALE	
DRAWN BY	DATE	NAME			
DESIGN BY	02.02.17	SKY			SHEET
CHECKED BY	02.02.17	HK			
APPROVED BY	02.02.17	PK			
SUPERSEDES:		TITLE			
		GA DRAWING OF MISCELLANEOUS TANKS- CONDENSATE STORAGE TANKS- CAP 1000 M3			
SUPERSEDED BY:		SIZE:	PROJECT NO. 417	FILE:	
SYSTEM		ANNEX:	BHEL DRAWING NO. PE-DG-417-167-A001		REV

TITLE
GA DRAWING OF MISCELLANEDUS TANKS- CONDENSATE STORAGE TANKS- CAP 1000 M3

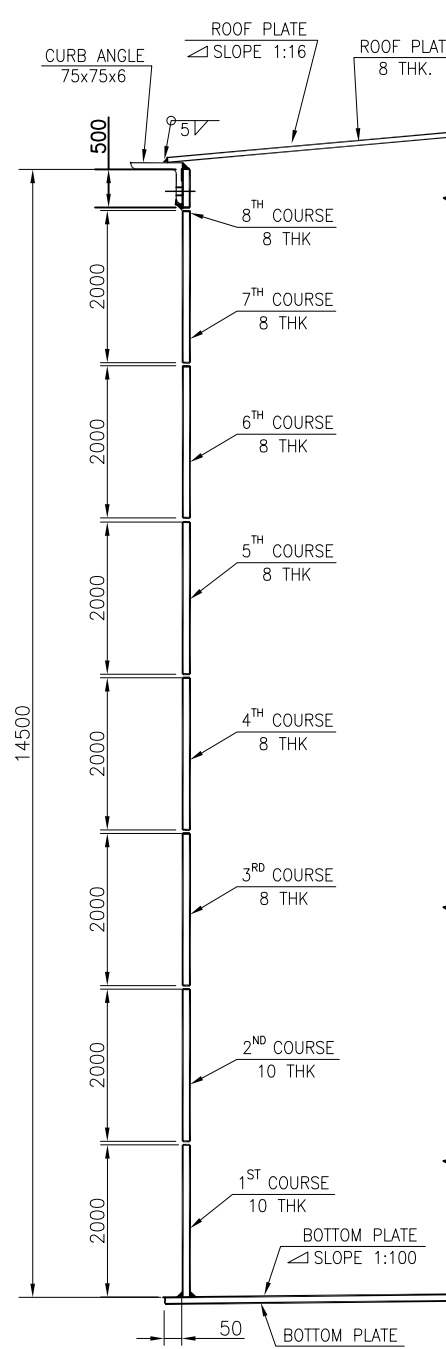
BHEL PEM	DATA SHEET-A FOR DM STORAGE TANK	DOC NO: PE-DS-417-167-A001
	PROJECT TITLE: 5X800MW- Yadadri	SHEET NO: 02 OF 02
1	SERVICE IDENTIFICATION	DM WATER STORAGE TANK
2	SYSTEM	DM WATER MAKE UP SYSTEM
3	APPLICABLE CODES/ STATUTORY REGULATIONS	IS-803/API650
4	EFFECTIVE CAPACITY (m3)	2500
5	NUMBER REQUIRED	Five (05) NOS. FOR STATION (ONE NO. PER UNIT)
6	STORAGE MEDIUM	DM WATER
7	TYPE	VERTICAL, CYLINDRICAL
8	SIZE	16.0 M DIA x 14.5 M HEIGHT
9	CORROSION ALLOWANCE	2.0MM
10	PRESSURE CLASS	DESIGN FOR FILLED WATER HEAD / ATOMSPHERIC
11	MATERIAL OF CONSTRUCTION	MILD STEEL TO IS:2062 Gr B.
12	DESIGN TEMPERATURE	50°C
13	LOCATION OF INSTALLATION	OUTDOOR
14	DRAIN VALVE FOR TANK	100 NB
15	DRAIN VALVE FOR NaOH/CO2 BREATHER	25 NB
16	DRAIN VALVE FOR SEAL POT	100 NB
17	PIPE MATERIAL FOR HAND RAILING	CARBON STEEL, GALVANIZED, MEDIUM GRADE
18	NOZZLE CONNECTIONS REQD / END CONNECTION	AS PER ENCLOSED GA DRAWING / SOCKET WELDED FOR SIZE <= NB50 & FLANGED FOR SIZE > NB50
19	VALVES END CONNECTION	SOCKET WELDED FOR SIZE <= NB50 BUTT WELDED FOR SIZE > NB50
20	INSTRUMENTS / ACCESSORIES REQUIRED	(a) CONSERVATION VENT VALVE / NAOH BREATHER (TO BE PLACED ON GROUND). (b) OVERFLOW OF 150 NB & DRAIN PIPING OF 100 NB WITH DRAIN VALVE (c) SEAL POT WITH DRAIN VALVE ETC FOR OVERFLOW (d) LEVEL GAUGE FLOAT & BOARD TYPE TO COVER ENTIRE RANG (e) 2 NOS OF NOZZLE CONNECTION OF 50 NB FOR LEVEL TRANSMITTERS. (f) SPARE CONNECTION OF 150 NB (2 NOS.), 100 NB (2 NOS.) SPARE VALVES SHALL BE PROVIDED FOR SPARE CONNECTIONS. (g) SAMPLING CONNECTION WITH 25 NB VALVE ON TANK. (h) 3 NOS. INSTRUMENT CONNECTIONS ON TANK ROOF FOR LI.
21	INSIDE PROTECTION & EXTERNAL PAINTING	REFER GA DRAWING AND CUSTOMER SPECIFICATION FOR PAINTING
22	MANHOLE	TWO(2) NOS. SIZE OF 600 MM, ONE ON SHELL & OTHER ON ROOF

NOTE :1. ALL OTHER STANDARD TECHNICAL REQUIREMENTS / ACCESSORIES & SPARES AS APPLICABLE SHALL BE CONSIDERED.

2. ALL THE REQUIREMENTS SHOWN UNDER GA DRAWING ARE BARE MINIMUM , ANY OTHER ITEM FOUND APPLICABLE DURING DETAILED ENGINEERING AS PER TECHNICAL SPECIFICATION/ FUNCTIONAL REQUIREMENT SHALL BE SUPPLIED BY BIDDER WITHOUT ANY COMMERCIAL IMPLICATION TO BHEL.



TANK ELEVATION VIEW



SHELL ARRANGEMENT FOR 1ST TO 08TH COURSE

Name of Manufacturer:	BHEL
TANK NOMINAL DIAMETER	16.0 M
TANK NOMINAL HEIGHT	14.5 M
MAXIMUM CAPACITY	2623 M3
DATE OF MANUFACTURE	2018
DESIGN LIQUID LEVEL	13.05 M
DESIGN CODE	API650
MAXIMUM OPERATING PRESS.	AMBIENT
MAXIMUM OPERATING TEMP.	AMBIENT
DESIGN TEMPERATURE	50 DEGC
MATERIAL OF TANK	IS 2062 GR. B

NAME PLATE DETAIL

DESIGN DATA		
DESCRIPTION	UNIT	DETAIL
DESIGN CODE	-	API 650
STORED PRODUCT	-	DM WATER
SPECIFIC GRAVITY OF PRODUCT STORED	kg/m ³	1000
TYPE OF TANK	-	VERTICAL CYLINDRICAL, SUPPORTED CONE ROOF
NUMBER OF TANKS	no	FIVE (5)
DIAMETER OF TANK (ID)	mm	16000
HEIGHT OF TANK	mm	14500
TANK EMPTY WEIGHT	kg	85571
TANK FILLED WEIGHT	kg	2708571
NET WORKING CAPACITY	m ³	2500 < AS PER FIG 5.4 OF API650
MAXIMUM TANK CAPCITY	m ³	2623 < AS PER FIG 5.4 OF API650
BASIC WIND SPEED	m/s	44
DESIGN TEMPERATURE	°C	50
INTERNAL DESIGN PRESSURE	KPa	18 AS PER API650 FOR SEISMIC CALCULATION
OPERATING PRESSURE	-	ATMOSPHERIC
CORROSION ALLOWANCE	mm	2.0
SEISMIC FACTORS	-	ZONE-III , PEAK GROUND ACCELERATION = 0.16g
SEISMIC MOMENTS	KNM	RING WALL MOMENT = 22674.56, SLAB MOMENT = 30565.31
WIND LOAD	KN	VERTICAL = 243.6, HORIZONTAL = 353.69
WIND MOMENT	KNM	4595.62
ROOF LOAD < UNIFORM LIVE	kg/m ²	150
TESTING	-	AS PER CL7.3 AND SECTION 8 OF API650
RATE OF FILLING OF TANK (MAX)	m ³ /hr	--
RATE OF EMPTYING OF TANK (MAX)	m ³ /hr	270, FOR 50NB NOS, SW+LS, DM MAKE UP WATER PUMPS < CAP: 45 M3/HR EACH

KEY PLAN

SHELL NOZZLES & APPURTENANCES FOR TANK#2

MARK	SIZE NB	QTY. (NO.)	FLANGE TYPE, RATING	NOZZLE CENTRE ELE. FROM TOP OF BOTTOM PLATE AS PER TABLE 5.6a OF API650	PRQJ. DIST. FROM SHELL PLATE AS PER TABLE 5.6a OF API650	NOZZLE THK IN MM AS PER TABLE 5.6a OF API650	SERVICE
N1	100	1	SDRF.150#	306	175	8.56	COND. OUTLET
N2	150	1	SDRF.150#	306	200	10.97	SPARE WITH VALVE
N3	100	1	SDRF.150#	300	175	8.56	DRAIN WITH VALVE
N4	150	1	SDRF.150#	13884	200	10.97	OVERFLOW
N5	100	1	SDRF.150#	13968	175	8.56	DM WATER INLET
N6	100	1	SDRF.150#	13968	175	8.56	PUMP RE-CIRCULATION
N7	100	1	SDRF.150#	306	175	8.56	SPARE WITH VALVE
N8	25	1	SDRF.150#	350	150	6.35	SAMPLING CONNECTION WITH VALVE
N9	100	1	SDRF.150#	13968	175	8.56	SPARE INLET WITH BLIND FLANGE
N10	150	1	SDRF.150#	306	200	10.97	SPARE OUTLET WITH VALVE
N11	80	1	SDRF.150#	13968	175	7.62	DM WATER RECIRCULATION LINE
MH1	600	1	AS PER FIG 5.16 OF API650	800	150	6.0	SHELL MANHOLE WITH BLIND FLANGE
EC	-	2	AS PER DETAIL C	-	-	-	EARTHING CLIT

ROOF NOZZLES & APPURTENANCES FOR TANK#2

MARK	SIZE NB	QTY. (NO.)	FLANGE TYPE, RATING	NOZZLE CENTRE DISTANCE FROM ROOF CENTRE	PRQJ. DIST. FROM SHELL PLATE AS PER TABLE 5.6a OF API650	NOZZLE THK IN MM AS PER TABLE 5.6a OF API650	SERVICE
R1	300	1	SDRF, #150	1000	225	12.7	BREATHER VENT
L1 A/B/ C	25	3	SDRF, #150	7500	150	6.35	LEVEL INDICATOR < FLDAT & ARROW TYPE
LT A/B	50	2	SDRF.150#	6500	150	5.54	LT CONNECTIONS
MH2	600	1	AS PER FIG 5.16 OF API650	7400	150	6	ROOF MANHOLE WITH COVER

MATERIAL SPECIFICATION

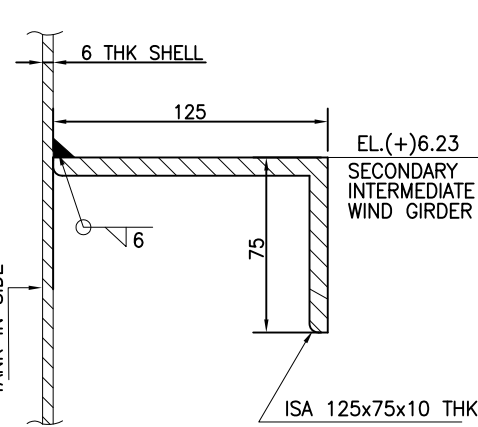
ITEM	MATERIAL
SHELL, BOTTOM, ROOF, RF PL	IS 2062 GR. B
NOZZLES	STAINLESS STEEL TO A312 GR. TP-304 < SW END FOR PIPE SIZES 50NB & BELOW AND BW ENDS FOR PIPE SIZES ABOVE 50 NB
MANHOLE NECK	IS 2062 GR. B
NOZZLE FLANGES	STAINLESS STEEL TO A182 GR. F-304 FOR PIPE SIZES 50NB & BELOW AND TO A403 GR. 304 FOR PIPE SIZES ABOVE 50 NB
HAND RAILING (40NB)	32NB PIPE TO IS12390M.GALV.
GASKETS	CAF/PTE (TEFLON)
BOLTING (NUTS & BOLTS)	ASTM A193 Gr.B7/ASTM A194 Gr.2H
STRUCTURALS	IS 2062 GR A/B
FITTINGS OF 50 NB & BELOW	STAINLESS STEEL TO A182 F304, SW TO ANSI B16.11
FITTINGS ABOVE 50 NB	STAINLESS STEEL TO A403 GR. WP-304, BW TO ANSI B16.9
NAME PLATE AND EARTHING CLIT	SS 304

PAINTING SPECIFICATION

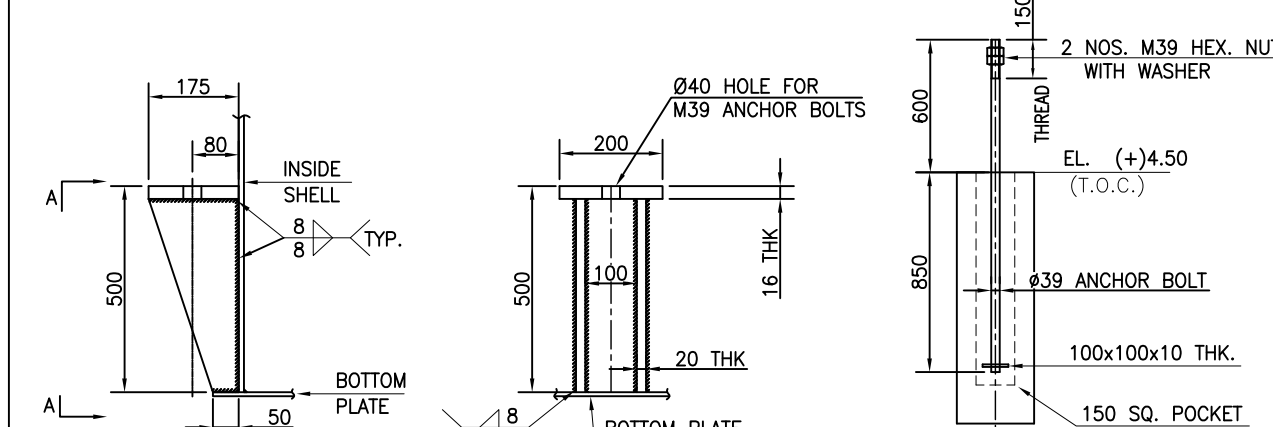
	TANK INTERNAL	TANK EXTERNAL	TANK UNDERNEATH
SURFACE PREPARATION(as per SSPC, Vis 1 or DIN 55928, section-4 or SIS 055900)	SA 2.5	SA 2.5	WIRE BRUSHING/HAND TOOL CLEANING TO ST-2
PRIMER	ONE COAT OF EPOXY PRIMER CONTAINING HIGH LEVEL OF ZINC PHOSPHATE ANTICORROSIVE PIGMENT. TOTAL DRY FILM THICKNESS(DFT) OF PRIMER SHALL NOT BE LESS THAN 125 MICRONS	ONE COAT (MINIMUM DFT OF 100 MICRONS) OF EPOXY RESIN BASED ZINC PHOSPHATE PRIMER.	3 COATS OF BITUMASTIC PAINTS. DFT: 80-100 MICRONS EACH COAT.
INTERMEDIATE COAT	N.A	ONE COAT (MINIMUM DFT OF 100 MICRONS) OF EPOXY RESIN BASED PAINT PIGMENTED WITH TITANIUM DIOXIDE	N.A
FINISH	THREE COATS OF POLYAMINE HB EPOXY PAINT. TOTAL DRY FILM THICKNESS (DFT) OF FINISH PAINT SHALL NOT BE LESS THAN 125 MICRONS PER COAT.	ONE COAT (MINIMUM DFT OF 75 MICRONS) OF EPOXY PAINT OF APPROVED SHADE AND COLOUR WITH GLOSSY FINISH. ADDITIONAL ONE COAT (MINIMUM DFT OF 25 MICRONS) OF FINISH COAT OF POLYURETHANE SHALL BE PROVIDED.	N.A
TOTAL DFT	500 MICRONS	300 MICRONS	240-300 MICRONS

NOTES:-

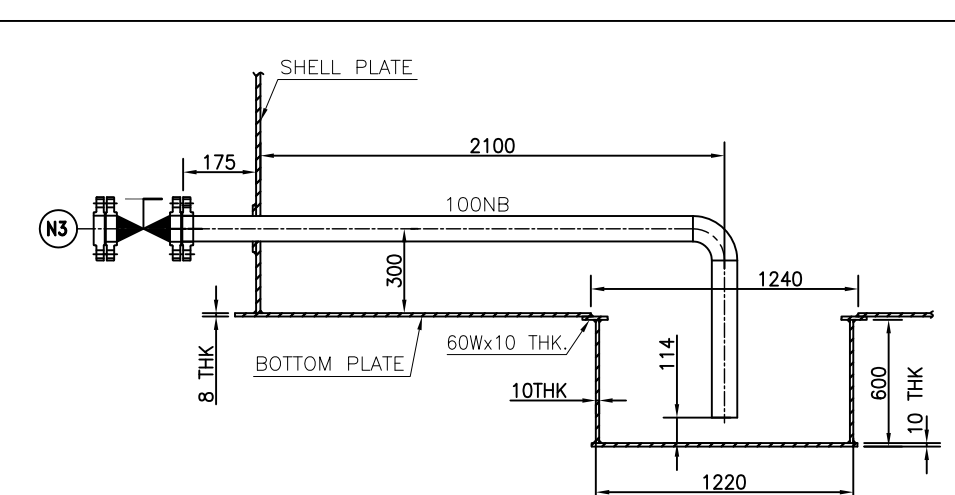
- ALL DIMENSIONS ARE IN MM. ELEVATIONS ARE IN METRE UNLESS OTHER WISE SPECIFIED.
- THE FINISHED FLOOR LEVEL (FFL) OF POWER HOUSE BUILDING GROUND FLOOR IS EL. + 0.00M WHICH CORRESPONDS TO RL. 81.5M, I.E., 0.5M ABOVE FGL (RL81.0M) IN MAIN PLANT AREA.
- TANK SURFACE SHOULD BE CLEANED THOUGHLY AFTER FABRICATION FROM LOOSE SUBSTANCES AND FOREIGN MATERIALS SUCH AS DIRT, RUST, SCALE, OIL, GREASE AND WELDING FLUX ETC.
- VERTICAL SHELL JOINTS SHALL BE OFFSET FROM EACH OTHER WITH A MINIMUM DISTANCE OF 5 TIMES THE THICKNESS OF SHELL COURSE UNDER CONSIDERATION.
- BOTTOM PLATE SHALL UNIFORMLY REST ON THE FOUNDATION. THREE PLATE JOINTS IN BOTTOM PLATE SHALL NOT BE CLOSER THAN 300mm FROM EACH OTHER AND ALSO FROM THE TANK SHELL.
- EARTHING LUGS AND NAME PLATE SHALL BE WELDED TO THE TANK AS PER SITE REQUIREMENT.
- ALL THE INLET PIPING SHALL BE EXTENDED UP TO BOTTOM OF TANK AND CLEARANCE BETWEEN THE BOTTOM OF TANK AND THE EDGES OF INLET PIPING SHALL BE 500 MM MAXIMUM.
- WEIR PLATE SHALL BE PROVIDED AT THE BOTTOM OF ALL THE INLET PIPES INSIDE TANK TO AVOID EROSION OF BOTTOM PLATE.
- TREAD AND RISE FOR STAIRCASE OF THE TANK SHALL BE 250 AND 200 MM RESPECTIVELY.
- LEVEL INDICATOR SUPPORTS SHALL BE PROVIDED ON THE SHELL & ROOF.
- PAD PLATES FOR SUPPORTING ALL INLET PIPING OF TANK SHALL BE PROVIDED BY TANK VENDOR
- FINAL PAINTING SHALL BE CARRIED OUT AS PER APPROVED PAINTING SCHEDULE AFTER HYDRO TEST OF TANK.
- TANK NOZZLE FLANGES SHALL BE PROVIDED WITH COUNTER FLANGES ALONG WITH NUTS & BOLTS BY TANK VENDOR.
- FABRICATION, ERECTION AND TESTING SHALL BE AS PER API650.
- FOR MANUAL WELDING PROCESSES, FILLET WELD LEGS OR GROOVE WELD DEPTHS GREATER THAN 6MM SHALL BE MULTIPASS.
- ALL TANK SHELL WELD INTERSECTIONS WHERE VERTICAL JOINTS MEET THE HORIZONTAL JOINTS SHALL BE RADIOGRAPHED, REGARDLESS OF THICKNESS.
- ALL RADIOGRAPHY OR OTHER NDE AND ANY WELDING SHALL BE COMPLETED PRIOR TO HYDROSTATIC TESTING.
- THE TANK HYDROSTATIC TEST SHALL BE CONDUCTED BEFORE PERMANENT EXTERNAL PIPING IS CONNECTED TO THE TANK EXCEPT FOR PIPING THAT IS NECESSARY TO FILL AND EMPTY THE TANK, WHICH SHOULD HAVE A FLEXIBLE COMPONENT TO ALLOW FOR SETTLEMENT.
- ALL INLET PIPING TO THE TANK SHALL BE PROVIDED WITH SUITABLE SIPHON BREAKER.
- MANHOLE FOR ROOF AND SHELL OF TANK SHALL BE HINGED TYPE.
- SEAL POT AND NAOH BREATHERS SHALL BE PLACED ON CIVIL FOUNDATION BY USING THE ANCHOR FASTENER BY TANK SUPPLIER. NO POCKETS BY CIVIL AGENCY WILL BE PROVIDED IN FOUNDATION OF SEAL POT AND NAOH BREATHERS.
- NOZZLE ORIENTATION SHALL BE FINALISED AFTER FINALISATION OF LAYOUT.



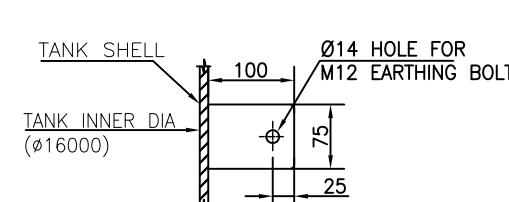
DETAIL-A



DETAIL OF ANCHOR CHAIR AND ANCHOR BOLT



DRAW OFF SUMP AS PER FIG 5.21 OF API650



DETAIL-C EARTHING CLIT AS PER FIG 5.23 OF API650

JOB NO.		: 417		
STATUS		: CONTRACT		
REV	DATE	DESIGN	CHD.	APPD.

PROJECT		5x800 MW YADADRI TPS, NALGONDA	
OWNER CONSULTANT:		OWNER: TELANGANA STATE POWER GENERATION CORPORATION LTD TELANGANA STATE, INDIA	
DRAWN BY		DATE	
DESIGN BY		DATE	
CHECKED BY		DATE	
APPROVED BY		DATE	
SUPERSEDED BY		DATE	
SYSTEM		ANNEX	
TITLE		GA DRAWING OF MISCELLANEDUS TANKS- DM WATER STORAGE TANKS- CAP 2500 M3	
SIZE		PROJECT NO. 417	
FILE		BHEL DRAWING NO. PE-DG-417-167-A001	
SHEET		REV 0	



STANDARD TECHNICAL SPECIFICATION FOR MISC TANKS

SPECIFICATION NO. PE-TS-417-167-A001

SECTION-I

SUB SECTION-I B

REV 00

DATE 29.03.2018

DATASHEET OF LEVEL INDICATOR

S.NO.	COMPONENT	DESCRIPTION
1	Type	Float and Board
2	Float Material	SS 316
3	Float Cable	SS-316
4	Indicator Assembly	Epoxy Painted Aluminium
5	Guide wire Spring assembly	SS-316 (2 nos.)
16	Guide wire Anchor	SS-316 Anodized Aluminium with engraved marking (minium graduation 10mm)
7	Scale Board	Mounting brackets and suitable hardware required as per tank height
8	Elbow Assembly	Anodized Aluminium
9	Flanges	RF, ANSI 150,SS (3 nos.)
10	Accuracy	± 10 mm or better
11	Accessories	All the mounting accessories including counter flange, nuts & bolts, suitable gasket as applicable.
12	Quantity	one(1) number per tank



STANDARD TECHNICAL SPECIFICATION FOR MISC TANKS

SPECIFICATION NO. PE-TS-417-167-A001

SECTION-I

SUB SECTION-I B

REV 00

DATE 29.03.2018

DATASHEET OF PLATES & STRUCTURAL STEEL

A.0	MS Plate		
1.0	Material		IS:2062, Gr. B
B.0	Angle, Channel, Beam, Bar and Flat		
1.0	Material		IS: 2062, Gr. A/B
C.0	Handrail		
1.0	Size of pipe		32 NB
2.0	Material		ERW pipe as per IS:1239,Part-I
3.0	Dimension standard		ANSI 36.10, plain ends



STANDARD TECHNICAL SPECIFICATION FOR MISC TANKS

SPECIFICATION NO. PE-TS-417-167-A001

SECTION-I

SUB SECTION-I B

REV 00

DATE 29.03.2018

DATASHEET OF PIPES, FITTINGS, FLANGES & ACCESSORIES

1.0	SS Pipes	Material Standard	Dimensional Standard
1.1	50 NB and below	Stainless steel pipe as per ASTM A-312, Gr. 304 , Seamless, Sch. 40S	As per ANSI B-36.19, socket welded
1.2	65 NB and above	Stainless steel pipe as per ASTM A-312, Gr. TP-304, Seamless, Sch.10S	As per ANSI B-36.19, BW ends as per ANSI B16.25
2.0	SS Fittings(Elbow, Tees & Reducers)		
2.1	50 NB and below	Forged Stainless steel as per ASTM A-182, F-304	ANSI B 16.11, S/W ends
2.2	65 NB and above	Stainless Steel as per ASTM A-351, CF8	ANSI B 16.9, B/W ends
3.0	SS Flanges		
3.1	For SS Pipes up to 50 NB	ASTM A182 F304	ANSI B16.5, RF
3.2	For SS Pipes above 50 NB	ASTM A403 Gr. 304	ANSI B16.5, FF
4.0	Gasket for SS fittings		
4.1	Up to 50NB	SS jacketed CAF with superior oil/resistance	ANSI B 16.21
4.2	Above 50NB	PTFE (TEFLON)	ANSI B 16.21
5.0	Bolts & Nuts		
5.1	Wherever applicable in all the tanks.	ASTM A-193, Gr. B7 for Bolts ASTM A-194, Gr. 2H for Nuts	ASTM A-193 / A-194