

ESP-001- 2A Rev.00		PROJECT ENGINEERING & SYSTEMS DIVISION (Technical Specification for Fabrication of FGD Storage Tanks)		Std. / Doc. Number	
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TECHNICAL SPECIFICATION FOR FABRICATION OF FGD STORAGE TANKS

PROJECT :	1X660 MW BHUSAWAL TPS UNIT-6
CUSTOMER :	M/s MAHARASTRA STATE POWER GENERATION CORPORATION LIMITED (MAHAGENCO)
CONSULTANT :	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI

Revisions: Refer to record of revisions	Prepared by :	Checked by :	Approved by :	Date :
	 R. MURALIDHAR	 K N B REDDY	 M. S.S. NAGESH	11.02.2021



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DOCUMENTS TO BE SUBMITTED BY THE BIDDER ALONG WITH BID:

Bidder must submit the following documents along with their bid so as to enable BHEL to evaluate their offer.

Bidder to note that in case the following documents are not submitted along with offer, the offer may be liable for Technical Rejection:

1. All the supporting documents indicated in “Pre-Qualification Criteria”.
2. Filled in Annexure-2 (Technical Datasheet for Slurry and Water Storage Tanks) duly signed and stamped
3. Checklist for the offer (Annexure-6) – Completely filled and duly signed and stamped
4. Submission of documents mentioned in Checklist(Annexure-6).
5. Unpriced “price-bid format” (Annexure-5) indicated as “quoted”.
6. Annexure-9 indicating as “NO DEVIATION”.
7. Signed and Stamped Copy of Pre-Bid Clarifications (If any) issued by the BHEL prior to the bid submission date.
8. Signed and Stamped copy of Corrigendum/Amendments (If any) issued by BHEL prior to the bid submission date.

Notes:

- a) Any specific deviations, which are impractical, shall be raised in form of pre-bid queries as per Annexure-7 before submission of Techno Commercial offer and bidder has to **submit zero deviation offer**.
- b) Pre-bid queries are to raised by bidders within 4 days of receipt of this enquiry, failing which it is presumed that bidder does not have any pre-bid queries.

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- c) Any deviation/ queries raised during technical bid submission shall not be entertained and the same shall not be considered for technical evaluation.
- d) Technical offer with deviation shall be liable for rejection.
- e) However, in case of ambiguity of any technical requirement in this technical specification and its Annexures, a clarification/ query shall be raised by the bidder and get clarified from Purchaser during pre-bid stage and before submission of offer.
- f) The quantities indicated in the tender specification are approximate and are liable for variation and alteration at the discretion of BHEL. The quoted unit rate shall be applicable for any additional material, if included at a later stage. The work executed shall be measured and price as per the unit rate will be arrived at for each work area as mentioned in the relevant clauses.

**PROJECT ENGINEERING & SYSTEMS DIVISION**
(Technical Specification for Fabrication of FGD Storage Tanks)**1.0 INTENT OF SPECIFICATION**

The specification is intended to cover the following

- 1.1 Complete fabrication of shell plates, bottom plates, roof plates, roof structure, agitator Structure, staircase material, baffle plates and anchor chair, inspection and testing of these items, painting (Surface preparation and primer and first coat), handing over of these items at site as per the specifications and requirements indicated in different sections of this specification.
- 1.2 Supply of Paints (primer and first coat) required for slurry and water storage tanks.
- 1.3 Bidder shall comply with all the requirements of this specification including good workmanship for carrying out the required fabrication works.
- 1.4 Bidder shall be responsible for providing all the fabricated items required for erection of storage tanks to ensure operability and maintainability as covered under this specification, irrespective of whether they have been specifically indicated in this specification or not.
- 1.5 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 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.
- 1.6 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 their specification are subject to all the attachments referred in the specification. The tenderer shall be responsible for adherence to all requirements stipulated herein.
- 1.7 All text/ numeric in the document / drawings to be generated by the successful bidder will be in English language only.
- 1.8 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/Consultant as interpreted by BHEL in the relevant context.



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PROJECT : 1X660 MW BHUSAWAL TPS UNIT-6

PROJECT INFORMATION

	Owner	M/s MAHARASHTRA STATE POWER GENERATION CORPORATION LIMITED (MAHAGENCO)
1.	Project	1 X 660 MW BHUSAWAL TPS UNIT-6
2.	Owner's consultant	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI
3.	Location	DEEPNAGAR, BHUSAWAL
4.	Nearest Airport	AURANGABAD
5.	Nearest Railway Station	BHUSAWAL
6.	Access to site	By Train: BHUSAWAL RAILWAY STATION By Road: NH6 (MUMBAI-NAGPUR HIGHWAY)
7.	Coordinates	Later
8.	Maximum Ambient Air Temperature (deg. C)	48.25°C (during May)
9.	Minimum Ambient Air Temperature (deg. C)	18° C (during January)
10.	Dry Bulb Temperatures (deg. C)	Later
11.	Highest recorded :	48.7°C
12.	Lowest recorded :	13°C
13.	Wet Bulb Temperatures (deg. C)	27° C (max)
14.	Design Ambient for Electrical equipment/system	Later
15.	Relative Humidity	Later
16.	Design AMB Humidity	Later
17.	Annual Mean Rainfall	112 mm
18.	Annual Total Rainfall	Later
19.	Wind data	Later
20.	Wind Speed	39 km/hr
21.	Prevailing Wind Direction	East North East to West South West
22.	Wind Pressure	Later
23.	Seismic coefficient	Seismic zone III as per IS 1893

Note: Any other data required by bidder may be asked prior to the submission of bid.

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General Description of the Project:**Plant Configuration & Capacity:**

1 X 660 MW Bhusawal Thermal Power Project (EPC project) is envisaged to meet the power demand of Maharashtra State. Flue Gas Desulphuration(FGD) is a part of main plant.

Brief Introduction:

Flue Gas Desulphurization(FGD) system is envisaged to control the Sox present in the flue gas from boiler to chimney.

Applicable FGD storage tanks (slurry and water) are as per clause 3.0 of this specification.

**PROJECT ENGINEERING & SYSTEMS DIVISION**
(Technical Specification for Fabrication of FGD Storage Tanks)**2.0 SPECIAL INSTRUCTIONS TO BIDDERS**

- 2.1 This specification shall be read in conjunction with all its Annexures. In case of any discrepancy arising between this specification & its Annexures, the most stringent of all (as determined by purchaser) shall be followed. Further, if a requirement in this specification or any of the enclosures, calls for a decision from the Purchaser, it shall be bidder's sole responsibility to clearly bring out/highlight the same distinctively in his pre-bid queries, so as to enable purchaser to furnish their decision/clarification. If such issues/requirements are not duly addressed by bidder during the pre-bid stage and if such issues/requirements are observed later during order execution stage, it shall be binding on the bidder to comply with the final decision made by the purchaser subsequently, without any cost, delivery, or any other commercial implications.
- 2.2 Any additional equipment, material, services etc., which are not specifically mentioned in this specification, but required to make all the Storage tanks complete in all respects, in accordance with the intent of this technical specification, contractual agreement, statutory requirements, relevant/applicable codes/standards, good engineering practices, and for safe and trouble-free operation, shall be deemed to be covered under the scope of this specification.
- 2.3 Any specific hardware / software / item / etc. required as indicated in 2.2. Above but not listed elsewhere in this specification or its enclosures, shall be deemed to be included in the basic price quoted by the bidder. Also, all mounting hardware/accessories/fittings/conduits/etc. required for the Erection & Commissioning of all the Storage tanks shall be deemed to be included in the basic price quoted by the bidder. Bidder, at no point of time, shall be eligible to raise any extra claim in this regard.
- 2.4 The bidder shall accept full responsibility for the completeness of fabrication of items as listed in the scope to ensure smooth erection of storage tanks as a whole. These shall be executed on the basis of good workmanship procedures laid down complying with the acceptable code and standards. Care shall be taken to ensure safe operation as well as simplicity of all the fabrication works of all the Storage tanks. Even though, the requirements are specified in detail to the extent possible, bidder to apply good engineering/workmanship practices as applicable in the fabrication works.
- 2.5 By accepting the contract, the bidder shall be deemed to have accepted the obligation of complying everything that is necessary for the purpose mentioned above, regardless of any omission in the specification or on the drawings for the fulfillment of complete main plant package.
- 2.6 Bidder to note that component weights quantity variation are covered in Cl. 5.2 of this specification.
- 2.7 Bidder shall quote strictly as per the scope of supply and other requirements of this specification. Bidder offer shall be strictly as per these specification requirements. Unsolicited or alternate offers from the bidders will not be entertained.

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- 2.8 In case bidder feels that it is necessary to exclude some components of scope of supply or some of the features of specification requirements due to any technical constraints, bidder shall bring the same to the notice of purchaser during pre-bid stage and take their prior approval before submission of their bid. All such clarifications required by the bidder shall be intimated to BHEL together as a single notice within a week of receipt of enquiry by bidder and clarifications on the same shall be obtained by the bidder from the purchaser. In case no such clarifications are sought during pre-bid stage, it will be assumed that bidder has no comments or observations on BHEL's specification and no deviations to the specifications will be taken by the bidder.
- 2.9 Bidder to quote strictly as per BHEL's Price Bid format (Annexure-5). Failure to do shall make their offer liable for rejection. Any tampering/modification/change of the BHEL's price format is not allowed and is liable for rejection of bidders offer.
- 2.10 In case Bidder is unable to offer due to any specific requirement of specification, Bidder shall bring out the same in their regret letter. Otherwise it will be considered that non participation by the bidder is attributable to reasons other than any specification requirements.
- 2.11 Compliance with this specification shall not relieve the bidder of the responsibility of furnishing equipment and accessories/auxiliaries of proper design, materials and workmanship to meet the specified start up and operating conditions.
- 2.12 The design information, specifications and drawings indicate the "Minimum" requirements and are intended to enable Bidders to ascertain the extent of the work involved. Bidders are expected to supplement the information included in this specification as required and submit a comprehensive bid.
- 2.13 The intending tenderers shall be deemed to have visited the site and have studied the conditions before submitting the Bids. Non-familiarity with the site conditions will not be considered a reason either for extra claims or for not carrying out the work in strict conformity with the drawings and specifications.
- 2.14 **The successful bidder shall furnish all the documentation (in native/original format) to BHEL during detailed engineering stage for approval along with the relevant pages of authentic supporting literature e.g. Code, Hand book, National / international Standards etc. All inputs / assumptions shall be indicated.**
- 2.15 Civil Engineering and Civil Works will be done by BHEL. Availability of civil fronts to the bidder shall be informed appropriately to carry out the fabrication of all the storage tanks.



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3.0 SCOPE OF SUPPLY, SCOPE OF SERVICES, EXCLUSIONS AND TERMINAL POINT DETAILS:

- a) **Supply by BHEL:** Plates and Structural Steel (Angles, Channels, Beams, Rods, Flats, etc) (in standard running lengths, commercially available) will be **FREE issued** by BHEL for all the 6 Nos of storage tanks to Bidder at site for carrying out the fabrication of bottom plates (including draw-off sump) shell plates, roof plates, Staircase Structure, Roof Structure, Agitator Structure, Anchor Chair assembly, Baffle Plates of slurry and water storage tanks. For more details, refer Annexure-14(Scope of Work in Vendor (Fabrication Agency) Scope)
- b) **Supply by bidder:** Paint required for primer and first coat. Details of Painting Specification, refer Annexure-13
- c) **Fabrication at site:** Fabrication works of shell plates, bottom plates (including draw-off sump) shell plates, roof plates, Staircase Structure, Roof Structure, Agitator Structure, Anchor Chair assembly, Baffle Plates, Reinforcement Pad Plates for nozzles, of slurry and water storage tanks at site as per the specifications and requirements indicated in Section 3.2 below.
- d) **Painting at site:** Surface Preparation SA 2 1/2, Primer and First Coat of all the plates and structural steel indicated in the fabrication drawing to be carried out at site as per the painting specification(Annexure-13)
- e) **Fabrication Drawings:** Detailed fabrication drawings for bottom, shell, roof plate cutting layouts, detail drawings of roof structure, agitator structure, staircase, anchor chair, baffle assembly shall be issued to bidder by BHEL. Fabrication of bottom plates (including draw-off sump) shell plates and roof plates, Staircase Structure, Roof Structure, Agitator Structure, Anchor Chair assembly, Baffle Plates shall be carried out by the bidder as per these fabrication drawings.

Sl. No	Description of the Tank	Diameter X Height in meters	Quantity (No's)	Raw Material Quantity (MT), Plates and Structural Steel [Refer Annexure-12]
1.	Auxiliary Absorbent Storage Tank	12.5 x 13.4	1	71.5
2.	Lime Stone Slurry Storage tank	8 x 9.4	1	50.5
3.	Secondary hydro cyclone feed storage tank	8 x 8.3	1	44.5
4.	Waste water storage tank	5.5 x 6.2	1	20

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5.	Filtrate water storage tank	4 x 4.3	1	10.5
6.	Process water storage tank	4.5 x 4.5	1	13.5

Table 3.1 : List of Storage Tanks (Slurry and Water)

Technical Details of above tanks are indicated in Technical Datasheet of Slurry and Water Storage Tanks (Annexure-2).

3.1 SCOPE OF SUPPLY

- 3.1.1 Bidder shall supply paint materials required for primer and first coat of painting as per painting specification(Annexure-13)
- 3.1.2 Plates and Structural Steel (Angles, Channels, Beams, Rods, Flats, etc) (in standard running lengths, commercially available) will be **FREE issued** by BHEL for all the 6 Nos of storage tanks to Bidder at site.

3.2 SCOPE OF FABRICATION

The major scope includes the following:

The plates and structural steel for fabrication shall be **free issued** to the successful bidder by BHEL at site (fabrication yard). Further plate and structural steel handling including the material handling equipment required during fabrication is by bidder.

Bidder has to do marking on the plates as per respective tank cutting plate drawing, cut to dimension as per drawing for bottom plates, shell plates and roof plates and perform bending of shell plates along with edge preparation as per drawing. The shell plates are bent and made to the courses(1st(bottom), 2nd, 3rd, etc as applicable) by completely welding and positioned to the internal diameter of the tank. The fabricated plates i.e bottom, roof and rolled shell plate courses shall be handed over to erection agency (at fabrication yard) by the successful bidder.

Bidder has to make the staircase structure, roof structure, agitator structure, anchor assembly, baffle plates, Reinforcement Pad Plates for nozzles to the erectable form including support steel for staircase, roof structure and agitator structure and handed over to the erection agency at site. For details of scope, refer annexure-14, over and above this specification requirement.

Bidder has to carry out the surface finishing, primer and first coat of the above plates and structural steel as per the fabrication drawings and painting specification (Refer Annexure-13).

- 3.2.1 Fabrication drawings for bottom, shell, roof plate cutting layouts, roof structure, staircase assembly, agitator structure, anchor chair assembly, baffle plates, Reinforcement Pad Plates for nozzles shall be issued by BHEL to the bidder. Further bidder shall carry out the



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fabrication of bottom plates (including draw-off sump) shell plates, roof plates, Staircase Structure, Roof Structure, Agitator Structure, Anchor Chair assembly, Baffle Plates.

3.2.2 Fabrication activities includes but not limited to following:

- a) Marking,
- b) Forming (Cutting, chamfering, filleting etc.,)
- c) Bending (only Shell Plates)
- d) Edge Preparation, etc.

of plates for bottom plate, shell plate, roof plate for all the tanks listed in Table 3.1 above.

3.2.3 Bending of shell plates of all the storage tanks shall be done as per shell plate cutting layout drawing issued by BHEL. These shell plates are bent and made to the courses (1st (bottom), 2nd, 3rd, etc as applicable) by completely welding and positioned to the internal diameter of the tank. Each shell course to be handed over to the erection agency at site for further erection of the tank.

3.2.4 Fabrication of draw-off sump for all the storage tanks as per the fabrication drawings issued by BHEL.

3.2.5 Fabrication of staircase (treds, handrails, platforms) to be made to the segments of height 2 to 3 mts. These segments are made to the erectable form and the same shall be handed over to the erection agency at site.

3.2.6 Fabrication of roof structure includes marking, cutting, welding as per the fabrication drawing of the roof structure and made to the assembled form. The assembled roof structure shall be made to the erectable form and the same is to be handed over to the erection agency at site.

3.2.7 Fabrication of agitator structure includes marking, cutting, welding as per the fabrication drawing of the agitator structure and made to the assembled form. The assembled agitator structure shall be made to the erectable form and the same is to be handed over to the erection agency at site.

3.2.8 Fabrication of anchor chair and baffle plates inside the tank to be carried out at site and the assembled form of anchor chair and baffle plates shall be handed over to the erection agency at site.

3.2.9 Fabrication of Reinforcement Pad plates for all the nozzles. These RF Pad plates to be fabricated by the bidder from the plate material issued.

3.2.10 Fabrication shall be carried out to meet the fabrication requirements of IS:803, API-650.

3.2.11 Deployment of experienced skilled and un-skilled manpower (Engineers / Supervisors / Workmen) for carrying out the fabrication of bottom, shell and roof plates.

3.2.12 All the necessary required machinery, tools & tackles, consumables etc., for carrying out the above fabrication activities to be ensured by the bidder before start and upto completion.

3.2.13 Plate and structural steel handling in the yard for carrying out fabrication including bending of plates is in bidder's scope. Bidder shall arrange the necessary material handling equipment for the same.

3.2.14 Visual Inspection as per the Field QAP (Annexure-10).

3.2.15 Handing over of all the fabricated items in assembled and erectable form to BHEL Erection Agency (BHEL PSWR) as per the site protocol.

3.2.16 Preparation and submission of all documentation as per Cl. No. 12 of this specification.

3.2.17 Any other service required for fabrication of items as specified in bidder scope shall be exclusively bought out by bidder prior to submission of offer. The same shall be raised



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through pre-bid query format(Annexure-7) and offer shall be submitted after receipt of pre-bid clarifications from BHEL.

3.2.18 Annexure-4 details out the Site facilities which are in Bidder's Scope and BHEL scope respectively.

3.3 EXCLUSIONS

3.3.1 Civil Engineering and Civil Works are excluded from bidder's scope of work.

3.3.2 Erection of fabricated components of storage tank in assembled form.

3.3.3 Supply of all the instrumentation.

3.3.4 Supply of raw materials(Plates and Structural Steel), bought out components etc.

3.3.5 Storage of raw materials(Plates and Structural Steel), bought out components etc.

3.3.6 Transportation of raw materials(Plates and Structural Steel) from storage yard to fabrication yard at site.

3.4 TERMINAL POINT DETAILS

3.4.1 Plate Materials (Bottom, Shell and roof plates) Free Issue by BHEL at fabrication yard.

3.4.2 Structural Materials (Roof Structure, Staircase, Agitator, Anchor chair, baffles) Free Issue by BHEL at fabrication yard.

3.4.3 Fabricated components of bottom, shell(in Course form, completely welded), roof plates, roof structure assembly, agitator structure assembly, staircase in segmented form, anchor chair assembly, baffle assembly) at fabrication yard.

3.5 TIME PERIOD FOR COMPLETION OF JOB

The time period for completion of job is five (05) months from the start of job or availability of site fronts.

4.0 DETAILED DESIGN & TECHNICAL REQUIREMENTS:

4.1 Bidder shall carry out the fabrication of bottom, shell, roof plates, roof structure assembly, agitator structure assembly, staircase in segmented form, anchor chair assembly, baffle assembly as per the final fabrication drawings issued by BHEL.

4.2 All the requirements wrt fabrication shall be considered in-line with IS 803/ API-650.

5.0 OTHER REQUIREMENTS:

5.1 Fabrication of bottom, shell and roof plate shall be carried out by the bidder as per the fabrication drawings issued by BHEL. Bidder is required to carry out all the fabrication which may be necessary to complete the work in all respects as detailed in the tender specifications. Payments for the work carried out shall be based on the actual tonnage assessed and certified by BHEL site competent authority, in-line with the BBU break-up approved during detailed engineering.

5.2 Not Used.

5.3 No increase in quoted / accepted unit rates / prices shall be allowed due to change in tonnage of material w.r.t that indicated in Purchase order.



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5.4 Bidder shall execute the work as per sequence and procedure prescribed by BHEL at site.

5.5 Bidder to assess the capability of their Sub-Contractors in terms of carrying out the fabrication, erection and commissioning activities, etc. as per project schedule before placing the order on them. No deviations shall be entertained.

5.6 It shall be specially noted that, the contractor may have to work round the clock (24x7) to achieve the completion schedules / plans / targets during the entire course of completion of fabrication works, which may involve payment of considerable overtime. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including engineers / supervisors / labours / T&Ps etc.

5.7 Bidder have to comply requirements of HSE & Statutory requirement in line with BHEL HSE plan, MSPGCL Safety requirement, Maharashtra/Central statutory requirement.

5.8 After placement of purchase order for supply, bidder shall submit the schedule of submission of documentation as per Annexure-8 (Master Documentation List).

5.9 After placement of purchase order for fabrication activities, bidder shall submit the complete schedule of fabrication activities required for completion of fabricated components of all the storage tanks.

5.10 Required materials (Plates and Structural) for fabrication shall be handed over to the L1-bidder at site. Bidder shall cautiously carryout the fabrications works in their scope confirming to dimensions and tolerances given in various fabrication drawings provided by BHEL. If any portion of work is found to be defective in workmanship or due to work instruction which is not conforming to drawings or other stipulations, the bidder shall dismantle and redo the work including supply of the defective materials at his own cost, failing which the job will be carried out by BHEL by engaging other agencies / departmentally and recoveries will be effected from bidder's bill towards expenditure incurred for rectification including BHEL's overhead charges.

5.11 Bidder shall execute the fabrication work of tanks as per the chronological sequence indicated by BHEL site based on availability of site fronts. Fabrication works shall be as carried out as per the fabrication drawings only. Any failure to comply with the above, which might lead to rework and cost for the same including replacement of defective material shall be borne by the bidder only. No claims for extra payment from the bidder will be entertained on the grounds of deviation w.r.t method of fabrication adopted or for any reason whatsoever.

6.0 TESTING AND INSPECTION REQUIREMENTS:

6.1 Bidder shall maintain an effective Quality Assurance System, to ensure the field quality plan requirements are met in addition to Quality standards and specifications.

6.2 After award of contract, bidder shall submit Quality Plan for approval. The quality plan shall be submitted in BHEL quality plan format. Bidder to note that all the cost involved in any of the inspection & testing requirements as per the approved quality plan shall be deemed to



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be included in the price quoted by the bidder. Bidder shall not be eligible to raise any extra claim on account of any inspection & testing as per the approved quality plan.

6.3 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 at sub-vendor works or at site as applicable. The successful bidder shall submit recommended FQP (field quality plan) for site fabrication activities for BHEL review during execution stage as applicable.

6.4 Test reports & certificates shall be submitted to BHEL.

Inspection agency :

Inspection agency will be BHEL / BHEL appointed third party / Customer / Customer's consultant. Various inspection stages will be witnessed by individual agencies (or) Group of Agencies as per above, in line with approved quality plan.

7.0 PAINTING SCHEME

Supply and application of Painting (surface finish, primer and first coat) bidder scope. For details of painting specification, Refer annexure-13

8.0 NOT USED.

9.0 SPARES

No spares are applicable.

10.0 DRAWINGS/ DOCUMENTS REQUIRED DURING DETAIL ENGINEERING

The successful bidder shall submit as per the Master Document List enclosed vide **Annexure-8**.

10.1 Master Document List

- Documentation shall be submitted by bidder during execution stage, as per the Master Document List (Annexure-8).
- Bidder shall ensure submission of all documentation as per approved Master Document List.
- Bidder to note that the dates of submission of all the documents shall be finalized by him considering the time required for approval of various documents at Purchaser's end. It shall be solely bidder's responsibility to get approval on the entire document from purchaser to meet project schedule.

11.0 PRE-BID CLARIFICATIONS AND DEVIATIONS

- Bidders shall comply with various requirements of this specification. It may please be noted that the requirements specified here in this specification are the standard practices being followed by the bidders. However, same things are presented in a structured form so that it can be ensured that the requirements of ultimate customer are complied with.



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Rev. No.

00

Sheet 16 of 17

- b) Bidders can bring out only those deviations which are impractical to meet, for our review in pre bid clarification only.
- c) Bidders may also please note that the data submitted along with the offer will be considered as indicative only, as the requirements specified in the specification are standard in nature. These will not be reviewed by BHEL before award of contract. Same will be reviewed during order execution stage in line with the requirements of specification and agreed deviations.

12.0 SUB VENDOR LIST

Refer Annexure-11

13.0 PRE-QUALIFICATION CRITERIA

- a) Bidder should be a regular fabricator of Storage Tanks for Power Plant / Process Industries / Refineries / Steel Plants. Bidder should have received at least two number of purchase orders for fabrication of storage tanks in the last three years whose individual tonnage is not less than 10 tons, ending on 01st March 2021.
- b) Bidder should have fabricated storage tanks meeting any one of the following criteria whose commissioning protocol / completion certificate is signed not later than 7 (Seven) Years, Ending On 01st March 2021:
 - i) Three tanks whose tonnage is not less than 28 tonnes
or
 - ii) Two tanks whose tonnage is not less than 36 tonnes
or
 - iii) One tank whose tonnage is not less than 57 tonnes

“Similar Work” means fabrication works of storage tanks in any Power Plant / Process Industries/ Refineries/Steel Plants.

DOCUMENTATION REQUIRED FOR MEETING PQC:

The bidders shall furnish following documentary evidence (in English), along with technical offer, for the assessment of Bidder's Pre-Qualification Technical Criteria as indicated above:

- (a) For Sl. No. 1 a) above, Purchase Order / LOI / Invoice and GA drawing for storage tanks
- (b) For Sl. No. 1 b) above, documents mentioned below under Sl. No. i, ii, iii:
 - i) Purchase Order / LOI / Invoice and
 - ii) GA Drawing of Storage tank / Fabrication drawing of storage tank and
 - iii) Commissioning protocol/completion certificate /hydro-test certificate from the purchaser

**PROJECT ENGINEERING & SYSTEMS DIVISION**
(Technical Specification for Fabrication of FGD Storage Tanks)

Std. / Doc. Number

PY-51681

Rev. No. 00

Sheet 17 of 17

RECORD OF REVISIONS

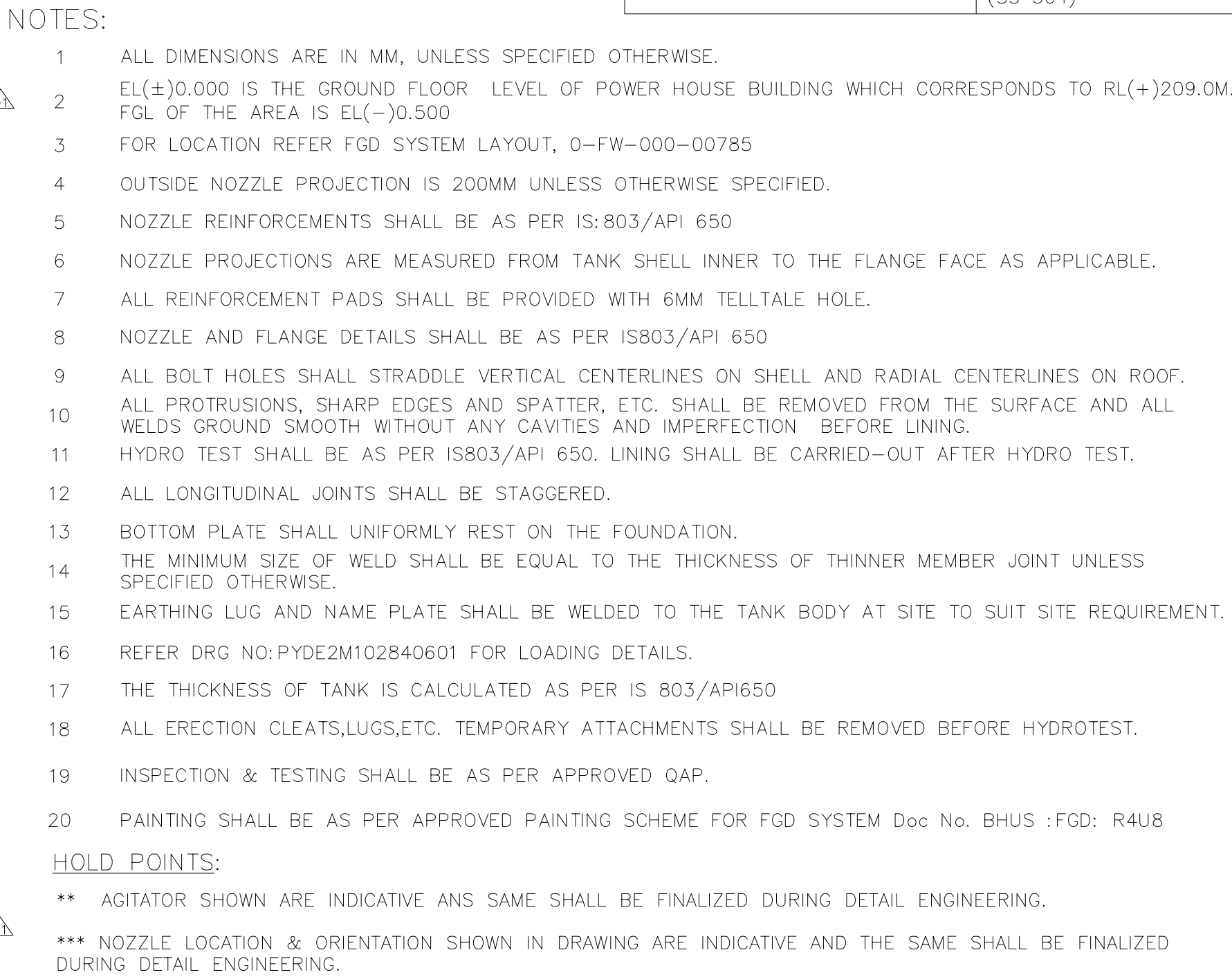
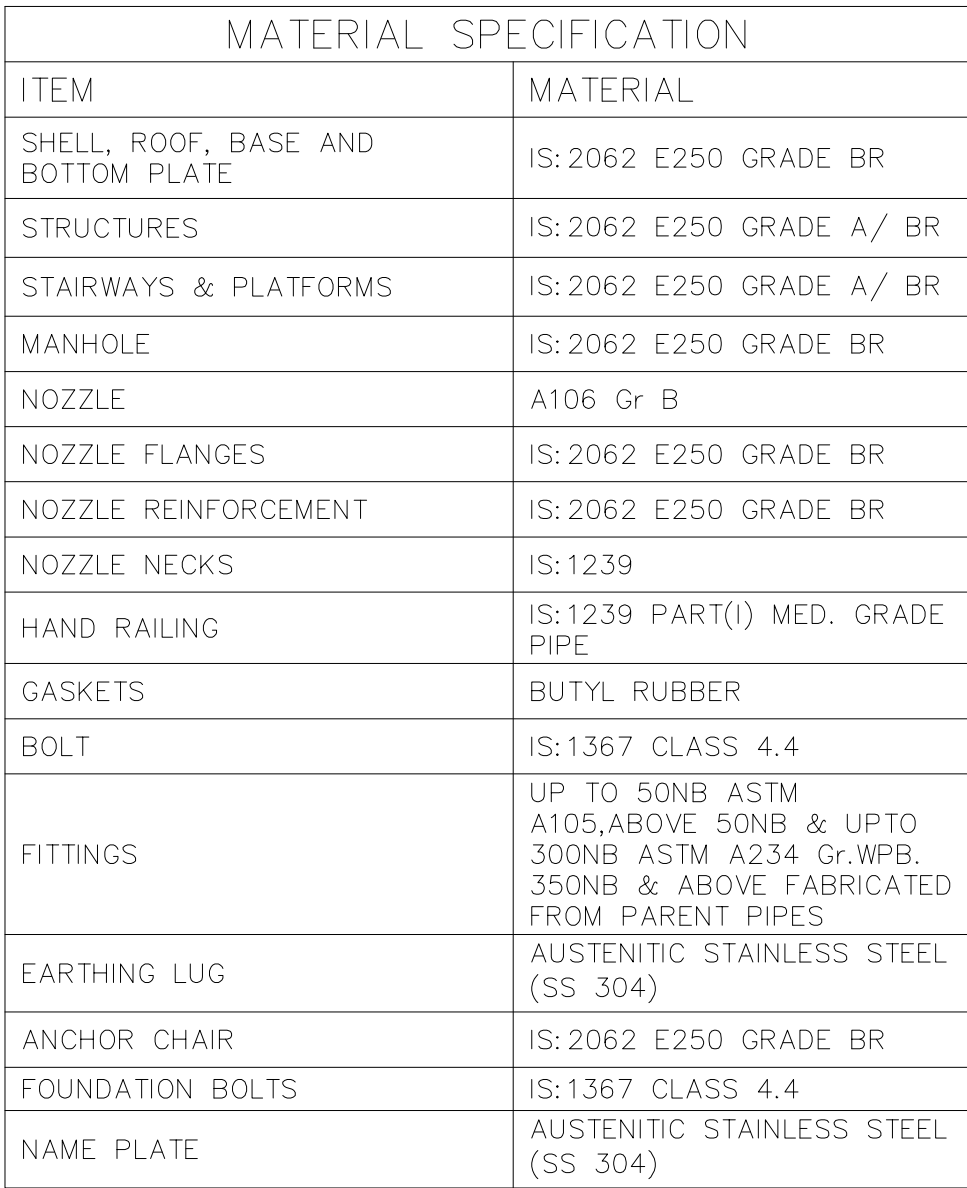
Rev. No.	Date	Revision Details	Revised By	Approved By
00	04.03.21	First Issue	-----	M S S NAGESH

• **VARIANT TABLE:**

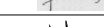
<u>Variant</u>	<u>Item</u>	<u>Material Code</u>
01	Fabrication of FGD Storage Tanks	995444

Annexure - 1
(To Spec PY 51681)

GENERAL ARRANGEMENT DRAWINGS OF SLURRY AND WATER
STORAGE TANKS

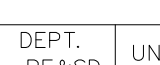


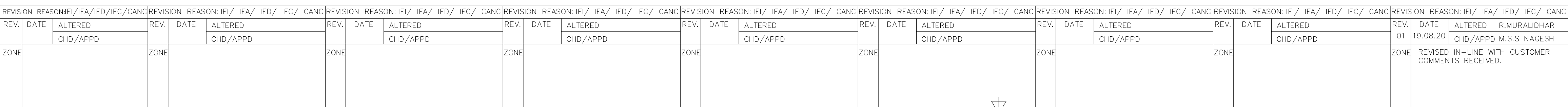
REFERENCE DRAWINGS		
S.NO.	DRAWING/DOCUMENT	DRG.DOC NO.
1	PROCESS P&ID AUXILIARY ABSORBENT TANK	B240-00710
2	DESIGN CALCULATIONS OF AUXILIARY ABSORBENT TANK	PY-CD-4-M102-8406-01
3	FGD- SIZING CALCULATION & SELECTION PARAMETER FOR SLURRY TANK	4-FW-000-00742
4	FGD DESIGN BASIS-PROCESS	4-FW-000-00773
5	FOUNDATION INPUT DETAIL DRAWING OF AUXILIARY ABSORBENT STORAGE TANK	PYDE2M102840601
6	PLOT PLAN FOR FGD SYSTEM	0-FW-000-00785
7	FGD MATERIAL SELECTION	F-FW-000-00779
8	PAINTING SYSTEM FOR FGD SYSTEM	BHUS.FGD:R4U8

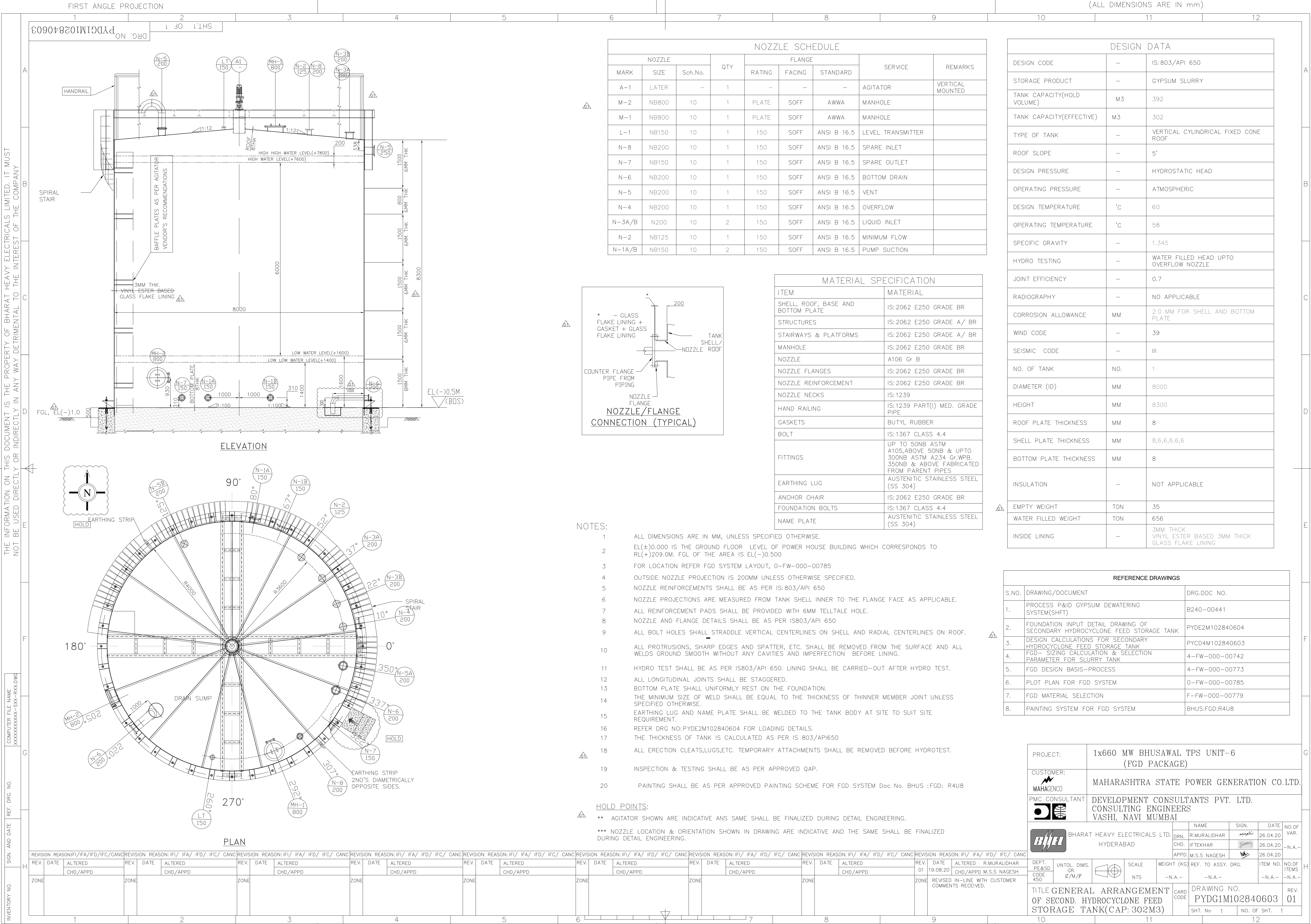
PROJECT:		IX660 MW BHUSAWAL TPS UNIT-6 (FGD PACKAGE)															
CUSTOMER:		MAHARASHTRA STATE POWER GENERATION CO.LTD.															
																	
PMC CONSULTANT		DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI															
																	
		BHARAT HEAVY ELECTRICALS LTD. HYDERABAD															
DEPT. REASD CODE 450		UNTL. DIMS. GR. G/W/F				SCALE NTS		WEIGHT (KG) —N.A.—		DRN. NAME R.MURALIDHAR CHD. FTEKHAR APPD. M.S.S NAGESH		SIGN.   		DATE 26.04.20 26.04.20 26.04.20		NO OF VAR. —N.A.— —N.A.— —N.A.—	
TITLE GENERAL ARRANGEMENT OF AUXILIARY ABSORBENT STORAGE TANK(CAP: 1497M3)										CARD CODE		DRAWING NO. PYDG1M02840601				REV. 01	
										SHT. NO		1		NO OF SHT.		1	

[illegible]

51

PROJECT:		IX660 MW BHUSAWAL TPS UNIT-6 (FGD PACKAGE)																	
CUSTOMER:		MAHARASHTRA STATE POWER GENERATION CO.LTD.																	
MAHACENCO																			
PMC CONSULTANT		DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI																	
																			
																			
		BHARAT HEAVY ELECTRICALS LTD. HYDERABAD																	
DEPT. REASD CODE 450		UNTL. DIMS. GR. G/W/F				SCALE NTS		WEIGHT (KG) —N.A.—		DRN. NAME R.MURALIDHAR		SIGN. 		DATE 26.04.20		NO.OF VAR.			
										CHD. ISTEKHAR				26.04.20		—N.A.—			
										APPD. M.S.S NAGESH				26.04.20					
										REF. TO ASSY. DRG.									
TITLE GENERAL ARRANGEMENT OF LIMESTONE SLURRY STORAGE TANK(CAP:357M3)										CARD CODE		DRAWING NO. PYDG1M02840602						REV. 01	
												SHT. No 1						NO.OF SHT. 1	







* — GLASS FLAKE LINING + GASKET + GLASS FLAKE LINING

200

TANK SHELL/ ROOF

NOZZLE

COUNTER FLANGE
PIPE FROM
PIPING

NOZZLE
FLANGE

**NOZZLE/FLANGE
CONNECTION (TYPICAL)**

DESIGN DATA		
DESIGN CODE	—	IS: 803/API 650
STORAGE PRODUCT	—	WATER
TANK CAPACITY(HOLD VOLUME)	M3	135
TANK CAPACITY(EFFECTIVE)	M3	97
TYPE OF TANK	—	VERTICAL CYLINDRICAL FIXED CONE ROOF
ROOF SLOPE	—	5'
DESIGN PRESSURE	—	HYDROSTATIC HEAD
OPERATING PRESSURE	—	ATMOSPHERIC
DESIGN TEMPERATURE	'C	60
OPERATING TEMPERATURE	'C	58
SPECIFIC GRAVITY	—	1.012
HYDRO TESTING	—	WATER FILLED HEAD UPTO OVERFLOW NOZZLE
JOINT EFFICIENCY	—	0.7
RADIOGRAPHY	—	NO APPLICABLE
CORROSION ALLOWANCE	MM	2.0 MM FOR SHELL AND BOTTOM PLATE
WIND CODE	—	39
SEISMIC CODE	—	III
NO. OF TANK	NO.	1
DIAMETER (ID)	MM	5500
HEIGHT	MM	6200
ROOF PLATE THICKNESS	MM	8
SHELL PLATE THICKNESS	MM	6,6,6,6
BOTTOM PLATE THICKNESS	MM	8
INSULATION	—	NOT APPLICABLE
EMPTY WEIGHT	TON	22
WATER FILLED WEIGHT	TON	187
INSIDE LINING	—	3MM THICK VINYL ESTER BASED 3MM THICK GLASS FLAKE LINING

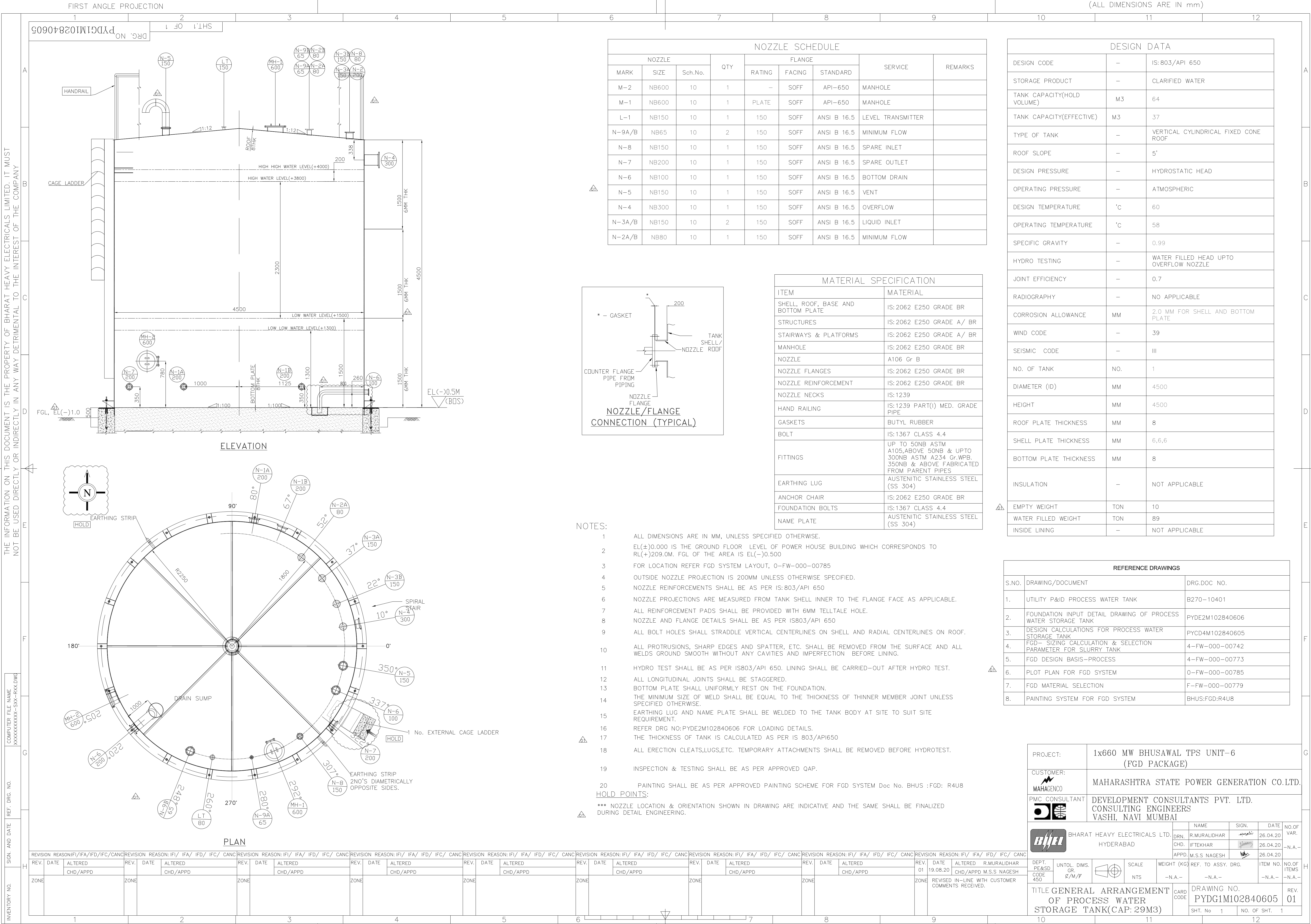


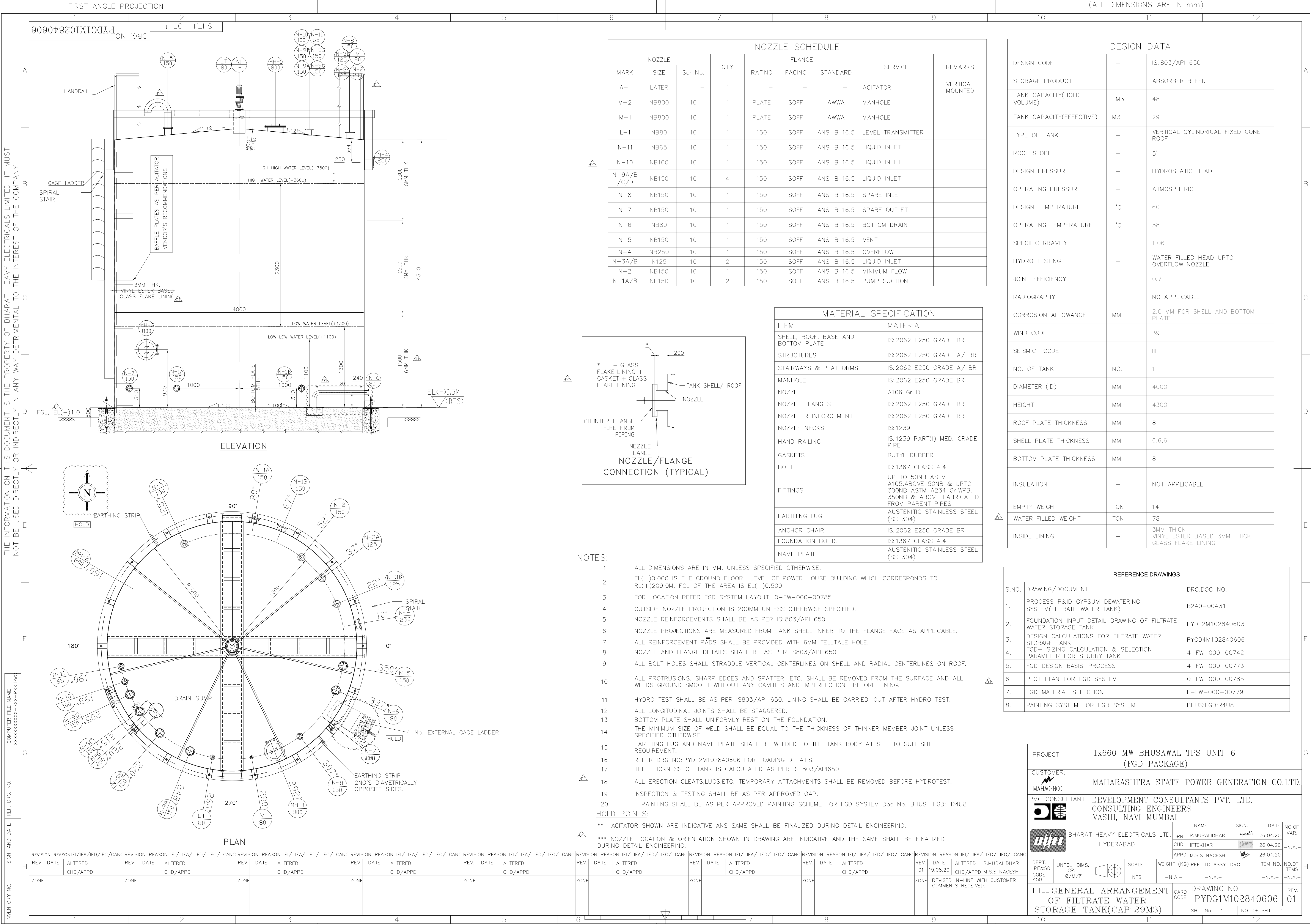
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0.1

REFERENCE DRAWINGS		
S.NO.	DRAWING/DOCUMENT	DRG.DOC NO.
1.	PROCESS P&ID GYPSUM DEWATERING SYSTEM(WASTE WATER TANK)	B240-00451
2.	FOUNDATION INPUT DETAIL DRAWING OF WASTE WATER STORAGE TANK	PYDE2M102840605
3.	DESIGN CALCULATIONS FOR WASTE WATER STORAGE TANK	PYCD4M102840604
4.	FGD- SIZING CALCULATION & SELECTION PARAMETER FOR SLURRY TANK	4-FW-000-00742
5.	FGD DESIGN BASIS-PROCESS	4-FW-000-00773
6.	PLOT PLAN FOR FGD SYSTEM	0-FW-000-00785
7.	FGD MATERIAL SELECTION	F-FW-000-00779
8.	PAINTING SYSTEM FOR FGD SYSTEM	BHUS:FGD:R4U8

PROJECT:		ix660 MW BHUSAWAL TPS UNIT-7 (FGD PACKAGE)					
CUSTOMER:  MAHAGENCO		MAHARASHTRA STATE POWER GENERATION CO.LTD.					
PMC CONSULTANT 		DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI					
 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		DRN.	NAME	SIGN.	DATE	NO.OF VAR.	
		CHD.	R.MURALIDHAR		26.04.20		
		APPD.	M.S.S NAGESH		26.04.20	-N.A.-	
					26.04.20		
DEPT. PE&SD CODE 450	UNTOL. DIM. GR. G/M/F		SCALE NTS	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG. -N.A.-	ITEM NO. -N.A.-	NO.OF ITEMS -N.A.-
TITLE GENERAL ARRANGEMENT OF WASTE WATER STORAGE TANK(CAP:97M3)				CARD CODE	DRAWING NO. PYDG1M102840604		REV. 01
SHT. No 1					NO.OF SHT. 1		





ANNEXURE-2 (TO PY51681)
TECHNICAL DATASHEET FOR SLURRY & WATER STORAGE TANKS

Sl. No	Description	Unit	Value/Specification					
			Auxiliary Absorbent Storage Tank	Lime Stone Slurry Storage Tank	Secondary Hydro Cyclone Feed Storage Tank	Waste Water Storage Tank	Filtrate Water Storage Tank	Process Water Storage Tank

1.0	General							
1.1	Type of Tank		Vertical Cylindrical supported cone roof type					
1.2	Quantity of Tanks	No	1	1	1	1	1	1
1.3	Fluid stored		Gypsum Slurry	Lime Slurry	Gypsum Slurry	Gypsum Slurry	Gypsum Slurry	Water
2	Design Features							
2.1	Tank Design Code		IS 803, API 650 2016 Ed					
2.2	Wind Load		Calculation for wind effect shall be in accordance with IS: 875-1987(part-3).					
2.3	Earthquake Consideration		Seismic Zone-III					
2.4	Design Liquid		Gypsum Slurry	Lime Slurry	Gypsum Slurry	Gypsum Slurry	Gypsum Slurry	Water
2.5	Net Capacity of Tank	m ³	1497	357	302	97	29	37
2.6	Maximum Capacity	m ³	1546	437	392	135	48	64
2.6	Dimension of tank (Dia x Height)	m X m	12.5 x 13.4	8 x 9.4	8 x 8.3	5.5 x 6.2	4 x 4.3	4.5 x 4.5
	Agitator		Horizontal (3 Nos)	Vertical (1 No.)	Vertical (1 No.)	Vertical (1 No.)	Vertical (1 No.)	Not Applicable
2.7	Design Metal Temperature	°C	80	80	80	80	80	80
2.8	Design Pressure	KPa	0.62	0.62	0.62	0.62	0.62	0.62
2.9	Density of Design liquid	kg/ m ³	1214	1215	1345	1012	1060	990
2.10	Thickness provided for							
	Shell	mm	10 (2 courses) 8 (2 courses) 6 (5 courses)	8 (2 courses) 6 (5 courses)	8 (1 course) 6 (5 courses)	6 (5 courses)	6 (3 courses)	6 (3 courses)
	Roof plate	mm	8	8	8	8	8	8
	Bottom plate	mm	8	8	8	8	8	8

ANNEXURE-2 (TO PY51681)
TECHNICAL DATASHEET FOR SLURRY & WATER STORAGE TANKS

Sl. No	Description	Unit	Value/Specification					
			Auxiliary Absorbent Storage Tank	Lime Stone Slurry Storage Tank	Secondary Hydro Cyclone Feed Storage Tank	Waste Water Storage Tank	Filtrate Water Storage Tank	Process Water Storage Tank

	Corrosion Allowances	mm	2 (INCLUDED IN THE ROOF/SHEEL/BOTTOM PLATE THICKNESS)					
	Joint Efficiency of weld joints		0.7	0.7	0.7	0.7	0.7	0.7
	Design wind speed	m/s	39	39	39	39	39	39
3	Material of Construction							
3.1	Shell, Roof & Bottom plate	IS 2062 GR E 250 B						
3.2	Shell & Roof appurtenances							
a	For Manholes							
	Size and location	As per Annexure-1 (GADs of Slurry and Water Storage Tanks)						
	Necks, flanges and cover plates	IS2062 Gr.E250 B, conform to IS803						
	Bolts & Nuts	IS1367 Cl 4.6/4, Galvanized.						
b	For Nozzles							
	No. and size of Shell, Roof, Vent and Drain Nozzles	As per Annexure-1 (GADs of Slurry and Water Storage Tanks)						
	No. and size of spare nozzles	As per Annexure-1 (GADs of Slurry and Water Storage Tanks)						
	Location of Inlet Nozzles	As per Annexure-1 (GADs of Slurry and Water Storage Tanks)						
	Nozzle necks	Up to 150NB IS1239 PART-I HEAVY GRADE, ERW. 200NB & Above IS3589 Gr.Fe330, ERW with 6.35thk						
	Flanges and counter-flanges	IS2062 Gr.E250 B, conform to ASME B16.5, #150.						
	Bolts & Nuts	IS1367 Cl 4.6/4, Galvanized.						
c	Fittings							

ANNEXURE-2 (TO PY51681)
TECHNICAL DATASHEET FOR SLURRY & WATER STORAGE TANKS

Sl. No	Description	Unit	Value/Specification					
			Auxiliary Absorbent Storage Tank	Lime Stone Slurry Storage Tank	Secondary Hydro Cyclone Feed Storage Tank	Waste Water Storage Tank	Filtrate Water Storage Tank	Process Water Storage Tank
	Dimensional standard	Up to 150NB-IS1239 PART-II, 200NB & Above-fabricated from parent pipe.						
	End connection	Up to 50NB SW, Above 50NB BW.						
3.4	Gaskets	Butyl Rubber						
3.5	Structural, stairways and platforms	IS2062 Gr.E250 A						
3.6	Foundation bolts & Nuts	IS1367 Cl 4.6/4, Galvanized.						
3.7	Hand rail	32NB, IS:1239 MEDIUM CLASS (GI)						
3.8	Earthing lugs & Nameplate	Austenitic Stainless Steel (SS304)						
4	Accessories							
4.1	Spiral stair case/Ladder (Refer Annexure-1)	--	Spiral Staircase (1No.)	Spiral Staircase (1No.)	Spiral Staircase (1No.)	Spiral Staircase (1No.)	Ladder (1No.)	Ladder (1No.)
4.2	Hand railing	As per Annexure-1 (GADs of Slurry and Water Storage Tanks)						
4.3	Anchor chairs & foundation bolts	As per Annexure-1 (GADs of Slurry and Water Storage Tanks)						
4.4	Mechanical Level Gauge	Not Applicable for the storage tanks						
4.5	Level Transmitter	As per Annexure-1 (GADs of Slurry and Water Storage Tanks)						
4.6	Gauge Hatch Nozzle with hinged cover	Not Applicable for the storage tanks						
4.7	Earthing lugs	2 No's for each tank						
4.8	Cathodic Protection	Not required						
5	Painting	Surface Finish SA 2 ½, Primer and First coat of painting is in bidder scope. Refer Annexure-13 for details of painting.						

ANNEXURE-3: DATASHEET FOR PLATES AND STRUCTURAL STEEL

1.0	Make	:	As indicated in the vendor list(Refer Annexure-9)
2.0	Quantity of Structural Steel	:	As per approved BOQ
A.0	MS Plate		
1.0	Material	:	IS:2062 E250, Gr. BR
2.0	Width	:	1500 mm and 2000 mm
3.0	Length	:	6300 mm
4.0	Thickness (minimum)	:	As specified in Technical Datasheet of Storage Tanks(Refer Annexure-2)
5.0	Chemical Composition	:	As per IS:2062
6.0	Mechanical Composition	:	As per IS:2062
7.0	Inspection & Testing	:	As per approved ICP/QAP
B.0	Structurals Angle, Channel, Beam, Bar and Flat		
1.0	Material	:	As per IS:2062 E250, Gr. A
2.0	Size	:	As per IS Structural Hand Book

Annexure - 4
(To Spec PY 51681)

SITE FACILITIES PROVIDED BY PURCHASER(BHEL)

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/ BHEL
(Scope Matrix)

Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1	PART I ESTABLISHMENT			
3.1.1	FOR CONSTRUCTION PURPOSE:			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner .
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipments, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Fire fighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	FOR LIVING PURPOSES OF THE BIDDER			
a	Open space for labour colony (as per availability)		Yes	
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	ELECTRICITY			
3.2.1	Electricity For construction purposes			
a	Single point source (of Voltage 415 V, A.C.,3 Phase , 50 Hz)	Yes		FREE (however any taxes, duties, levy etc. as charged by customer, shall be paid by contractor.) At a distance of 1000 M from site (Distance is only tentative, it may vary up-to an extent depending on site condition)
b	Further distribution including all materials, Energy Meter , Protection devices and its service		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/ BHEL
(Scope Matrix)

Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
	PART I			
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	Electricity for the office, stores, canteen etc of the bidder			
a	Single point source	Yes		FREE (however any taxes, duties, levy etc. as charged by customer, shall be paid by contractor.) At a distance of 1000 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc		YES	
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3.0	WATER SUPPLY			
3.3.1	For construction purposes:			
a	Making the water available at single point	Yes		FREE (however any taxes, duties, levy etc. as charged by customer, shall be paid by contractor.) At a distance of 1000 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	<u>Water supply for bidder's office, stores, canteen etc.</u>			

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/ BHEL
(Scope Matrix)

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
a	Making the water available at single point	Yes		FREE (however any taxes, duties, levy etc. as charged by customer, shall be paid by contractor.) At a distance of 1000 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	<u>Water supply for Living Purpose</u>			
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4.0	LIGHTING			
a.	For construction work (supply of all the necessary materials) 1. At office/ storage area 2. At the preassembly area 3. At the construction site / area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/ storage area 2. At the preassembly area 3 At the construction site / area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER			
a	Telephone, fax, internet, wi-fi, e-mail services etc		Yes	
3.6.0	COMPRESSED AIR wherever required for the work		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/ BHEL
(Scope Matrix)

Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
	PART I			
a	Supply of Compressor and all other equipments required for compressor & compressed air system including pipes, valves, storage systems etc		Yes	
b	Installation of above system and operation & maintenance of the same		Yes	
c	Supply of the all the consumables for the above system during the contract period		Yes	
3.7.0	Demobilization of all the above facilities		YES	
3.8.1	TRANSPORTATION			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	
3.8.2	Other			
a	Adequate water less urinal for both male & female and toilet facilities		Yes	

ANNEXURE - 6: CHECK LIST (Tender Spec No. PY51681 Rev 00)
(TO BE SUBMITTED BY THE BIDDER ALONG WITH THE OFFER)

Note: Bidder to note that Check List shall be completely filled and the data required in-line with Check List shall be submitted along with their Offer will all the necessary data/drawings/documents to enable Purchaser to evaluate the offer submitted.

<u>S.N</u> <u>o</u>	<u>Description</u>	Enclosed with Bidder's Offer [Yes/No]	Remarks/Comments By Bidder
1	Bidder to confirm that all the data meeting Pre-Qualification Criteria of NIT is submitted along with their offer.		
2	Bidder to confirm compliance with PY-51681 and its annexures without any deviations and price implications.		
3	Refer Cl. NO. 3(a) of PY 51681: Plates and Structural Steel (Angles, Channels, Beams, Rods, Flats, etc) (in standard running lengths, commercially available) will be <u>FREE issued</u> by BHEL for all the 6 Nos of storage tanks to Bidder at site for carrying out the fabrication of bottom plates (including draw-off sump) shell plates and roof plates, Staircase Structure, Roof Structure, Agitator Structure, Anchor Chair assembly, Baffle Plates of slurry and water storage tanks Bidder to Confirm.		
4	Refer Cl. NO. 3(b & d) of PY 51681: Supply of Paints for primer and first coat is by Bidder. Further surface preparation, primer and first coat of all the tank components shall be carried out by bidder. Painting specification (Annexure-13) to be followed. Bidder to Confirm.		
5	Refer Cl. No. 3(c) of PY 51681: Fabrication works of shell plates, bottom plates (including draw-off sump) shell plates, roof plates, Staircase Structure, Roof Structure, Agitator Structure,		

	Anchor Chair assembly, Baffle Plates, Reinforcement Pad Plates for nozzles of slurry and water storage tanks at site as per the specifications. Bidder to Confirm.		
6	Refer Cl. No. 3.1.1 of PY 51681, Fabrication activities includes but not limited to following a) Marking, b) Rolling, c) Forming, d) Bending(for Shell Plates) e) Edge Preparation f) Surface Preparation and Painting etc. Above is clearly understood by bidder. Bidder to confirm.		
7	Refer Cl. NO. 3.2 of PY 51681: The shell plates are bent and made to the courses(1st(bottom), 2nd, 3rd, etc as applicable) by completely welding and positioned to the internal diameter of the tank. Bidder has understood the scope clearly. Bidder to confirm.		
8	Refer Cl. NO. 3.2 of PY 51681: Bidder has to make the staircase structure, roof structure, agitator structure, anchor assembly, baffle plate, Reinforcement Pad Plates for nozzles to the erectable form including support steel for staircase, roof structure and agitator structure and handed over to the erection agency at site. Bidder to confirm.		
9	Refer Cl. NO. 3.2.1 of PY 51681: Fabrication drawings for bottom, shell, roof plate cutting layouts, roof structure, staircase assembly, agitator structure, anchor chair assembly, baffle plates, Reinforcement Pad Plates for nozzles shall be issued by BHEL to the bidder. Further bidder shall carry out the fabrication of bottom plates (including draw-off sump) shell plates, roof plates, Staircase Structure, Roof Structure, Agitator Structure, Anchor Chair assembly, Baffle		

	Plates, Reinforcement Pad Plates for nozzles. Bidder to confirm.		
10	Refer Cl. NO. 5.10 of PY 51681: Required materials (Plates and Structural) for fabrication shall be handed over to the L1-bidder at site. Bidder shall cautiously carryout the fabrications works in their scope confirming to dimensions and tolerances given in various fabrication drawings provided by BHEL. If any portion of work is found to be defective in workmanship or due to work instruction which is not conforming to drawings or other stipulations, the bidder shall dismantle and redo the work including supply of the defective materials at his own cost, failing which the job will be carried out by BHEL by engaging other agencies / departmentally and recoveries will be effected from bidder's bill towards expenditure incurred for rectification including BHEL's overhead charges. Bidder to confirm.		
11	Refer Cl. NO. 5.11 of PY 51681: Bidder shall execute the fabrication work of tanks as per the chronological sequence indicated by BHEL site based on availability of site fronts. Fabrication works shall be as carried out as per the fabrication drawings only. Any failure to comply with the above, which might lead to rework and cost for the same including replacement of defective material shall be borne by the bidder only. No claims for extra payment from the bidder will be entertained on the grounds of deviation w.r.t method of fabrication adopted or for any reason whatsoever. Bidder to confirm.		
12	Refer Annexure-14: Scope of Work in Fabrication Agency(Bidder) is clearly understood by the bidder. Bidder to Confirm.		
13	Bidder to confirm compliance with Annexure-		

	11(Sub- Vendor List).		
14	Bidder has already raised pre-bid queries (if any) on Technical specification for Storage tanks through Annexure-7(Pre-Bid Clarifications). Pre-Bid Clarifications Received from purchaser and the same are Agreed/ Accepted without any price implication (If any). The offer is submitted without any deviations and price implication.		
15	Bidder to Confirm Compliance with Technical Datasheet for Slurry & Water Storage Tanks (Annexure-2). Signed and stamped copy of Annexure-2 is enclosed with Bidder's offer.		
16	Refer Cl. No. 3.2.9, bidder to follow the IS:803, API-650, IS:816, IS:817 and IS: 823. Bidder to Confirm.		
17	Bidder to Confirm Compliance with Cl. No. 3 Scope of Supply, Scope Of Services, Exclusions And Terminal Point Details .		
18	Master Document List (MDL): Bidder to confirm that all the documents figuring in MDL as per Annexure-8 of Technical Specification PY-51681 shall be submitted during detailed engineering.		
19	Bidder shall submit Annexure-18 indicating as NO DEVIATION along with their offer. Any specific deviations, which are impractical, shall be raised in form of pre-bid queries as per Annexure-7 before submission of Techno Commercial offer. Any deviation/ queries raised during technical bid submission shall not be entertained. Bidder to Confirm.		
20	Bidder to Confirm Compliance with Annexure-10(Typical Field QAP) with purchase specification PY-51681.		
21	Refer Annexure-4: Site facilities in Bidder's and BHEL's Scope are indicated clearly. Bidder has understood these details clearly. Bidder to Confirm.		
22	Filled and stamped copy of un-priced bid format(Annexure-5) is enclosed with the offer. Bidder to Confirm.		
23	Bidder has to mobilize all the machines, skilled and unskilled man power, tools & tackles,		

	measuring instruments etc. for carrying out the fabrication activities as per the specification PY 51681. Bidder to confirm		
24	Refer Cl. No. 6.3: Inspection agency. BHEL/Third Party appointed by BHEL/Customer/customer's consultant. Bidder to note the same. Charges for this inspection is not being considered by the bidder in their offer. Bidder to confirm.		

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

COMPANY: _____

DATE: _____

COMPANY SEAL

ANNEXURE-7: PRE-BID QUERIES FORMAT
[To Technical Specification, PY 51681, Rev00]

Sl. No.	Section / Part/Subsection	Page No.	Clause No.	Bid Specification	Bidder's Query	Purchaser's Reply

Note: During Preparation of Pre-Bid Queries, Complete Tender Specification Doc. No. PY-51681(along with all Annexures) shall also be referred.

ANNEXURE-8 - MASTER DOCUMENTATION LIST													
	Vendor Name:							Supplier Doc- No:					
	Vendor Contact Person:		PO Dly. Date:					Rev- No.	0				
	Vendor contact No.							Date:					
	SYSTEM/PACKAGE:		Submission status to BHEL										
Sl.No	DRG/DOC. NAME		Rev-0			Rev-1			Rev-2			Final Rev-(R)	REMARKS
		Scheduled Date of Submission	SD	AD	APP.CAT	SD	AD	APP.CAT	SD	AD	APP.CAT	Date	
1.0 Mechanical													
1	Field QAP for Fabrication Works of Tank	Within 2 Weeks from PO Date											
2	Job Procedure for Pre-fabrication	Within 2 Weeks from PO Date											
3	Schedule of activities for Pre-fabrication	Within 2 Weeks from PO Date											
									Approved By:				
									Sign :				
									Date :				

ANNEXURE-9: DEVIATION FORMAT
[To Technical Specification, PY-51681, Rev00]

Sl. No.	Section / Part/Subsection	Page No.	Clause No.	Bid Specification Requirement	Bidder's Deviation

Notes:

1. Bidder to furnish duly filled format along with SEAL & SIGN along with their offer.
2. All the pre-bid queries (if any) shall be raised before submission of the offer as per pre-bid query format (Annexure- 11).

3. Deviations, which are impractical, and the same were raised during pre-bid stage as per pre-bid query format (Annexure-11), but still purchaser's reply/clarifications could not be met shall only be raised in this format.
4. If there are no deviations, bidders shall indicate as "No deviation" and submit the same along with their offer.
5. Deviations indicated elsewhere in bidders offer except raised through this format shall not be considered and reviewed during technical evaluation of their offer.

SIGNATURE : _____
NAME : _____
DESIGNATION : _____
COMPANY : _____
DATE : _____

COMPANY SEAL

ANNEXURE-10 TYPICAL FIELD QUALITY PLAN

SL. NO.	COMPONENTS / CHARACTERISTICS	CLASS	TYPE / METHOD OF CHECK	QUANTUM OF	REFERENCE DOCUMENT/ ACCEPTANCE NORMS	FORMAT OF RECORD	REMARKS
1	2	3	4	5	6	7	8
3.5	Fabrication of Shell Plate (Alignment, Circularity, Verticality, Nozzle orientation, Elevations & Dimensions)	B	Visual	100%	Approved Drawing / Cutting Layouts	Log Book	
3.6	Reinforcement Pad Plates welding	B	Leak Test	100%	As per Technical Specification/ Relevant standards	Log Book	
3.7	Inside fillet weld between first course of shell & Bottom Plates	B	Kerosene spray and chalk test	100%	As per Technical Specification/ Approved Drawing	Log Book	
4.0	NDT						
4.1	Butt Joints / Groove Welds	B	RT (NDT)	As per Tech Spec/ Appd Drg	As per Technical Specification/ Approved Drawing	Log Book	
4.1.1	Fillet Welds	B	DP (NDT)	As per Tech Spec/ Appd Drg	As per Technical Specification/ Approved Drawing	Log Book	
5.0	Visual Dimensions of Tank	B	Visual, Measurement	100%	As per Approved Drawing/ Technical Specification	Inspection Report	
6.0	Hydro Test of Tank	B	Hydro Test	100%	As per Approved Drawing/ Technical Specification	Inspection Report	
7.0	PAINTING						
7.1	Surface Preparation	B	Visual	100%	As per Technical Specification/ Approved Drawing	Log Book	
7.2	Painting Checks (Shade, DFT)	B	Visual, Measurement	Random	As per Approved Drawing/ Technical Specification	Inspection Report	
LEGEND:							
Class	Checking Authority	Accepting Authority					
A (Critical)	BHEL & Customer	Customer					
B (Major)	BHEL	BHEL					
C (Minor)	Vendor	Vendor					

Annexure-11 : Sub Vendor List

S.No.	Item	Vendor Name
1	PAINTS	ASIAN PAINTS INDIA) LTD.,
		SHALIMAR PAINTS LTD.,
		BERGER PAINTS INDIA LTD.,
		NEROLAC
		JHONSON & NICHOLSON

ANNEXURE-12: BoQ Break-Up for Plates and Structural Steel for FGD Storage Tanks

S.No.	Description	Tank	Quantity [MT]	Total Tonnage [MT]	Remarks
			Q (arrived as per Engg. Drawings)	T =summation of all the S.Nos of 'Q'	
1	Bottom Plate	Auxiliary Absorbent Tank (with Horizontal Agitator)	10	72	
2	Shell Plate		38		
3	Roof Plate		10		
4	Roof Structure		6		
5	Agitator Structure		0.5		
6	Staircase Structure, Handrail		3		
7	Others(Anchor Chair,Baffle Plates Supporting Structural)		4.5		
8	Bottom Plate	Limestone Slurry Tank (with Vertical Agitator)	4.5	50.5	
9	Shell Plate		16		
10	Roof Plate		4.5		
11	Roof Structure		5		
12	Agitator Structure		15		
13	Staircase Structure, Handrail		2.5		
14	Others(Anchor Chair,Baffle Plates Supporting Structural)		3		
15	Bottom Plate	Secondary Hydrocyclone Feed Tank (with Vertical Agitator)	4	44.5	
16	Shell Plate		13		
17	Roof Plate		4		
18	Roof Structure		4		
19	Agitator Structure		14		
20	Staircase Structure, Handrail		2.5		
21	Others(Anchor Chair,Baffle Plates Supporting Structural)		3		
22	Bottom Plate	Waste Water Tank (with Vertical Agitator)	2	20	
23	Shell Plate		7		
24	Roof Plate		2		
25	Roof Structure		1		
26	Agitator Structure		4		
27	Staircase Structure, Handrail		2		
28	Others(Anchor Chair,Baffle Plates Supporting Structural)		2		
29	Bottom Plate		1.5		

30	Shell Plate	Process Water Tank	4	10.5	
31	Roof Plate		1.5		
32	Roof Structure		1		
33	Agitator Structure		NA		Agitator Structure is not applicable for process water tank
34	Staircase Structure, Handrail		1.5		
35	Others(Anchor Chair, Supporting Structural)		1		
36	Bottom Plate	Filtrate Water Tank (with Vertical Agitator)	1.25	13.5	
37	Shell Plate		3.5		
38	Roof Plate		1.25		
39	Roof Structure		1		
40	Agitator Structure		4		
41	Staircase Structure, Handrail		1.5		
42	Others(Anchor Chair,Baffle Plates Supporting Structural)		1		

Notes

- The above BoQ to be considered by the bidder and price for the same shall be quoted as per price bid format(Annexure-5)

Enclosures

Nil.

Annexure-13: Painting

				Intermediate coat (solid by volume- 80% (min)) DFT = 100 µm per coat				
35	Lime stone Silo- Inside surfaces	FW 731	Blast cleaning to Sa 2½ (Near white metal) with surface profile 35-50µm	Primer Coat: Two coats of Red Oxide Zinc phosphate primer to IS 12744 DFT- 70µm (min) (SS lining is inside the Limestone silo, hence primer is only envisaged)	70	NIL	--	70
36	Lime stone Mill- Outside surfaces & Accessories	FW 735	Power tool cleaning to St3(SSPC-SP3	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two Coats)	70	Synthetic enamel to IS 2932 grey shade 692 of IS 5 (Two coats)	70	140
37	Lime stone Mill- Inside surfaces	FW 735	Power Tool Cleaning to St3 (SSPC-SP3)	Primer: Two coats of Red Oxide Zinc phosphate primer to IS: 12744	70	--	--	70
38	Gypsum belt filter and accessories- Structural Mechanical items	FW 738	Power tool cleaning to St3(SSPC-SP3	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two Coats)	70	Synthetic enamel to IS 2932 grey shade 692 of IS 5 (Two coats)	70	140
39	Lime stone slurry storage tank, Auxiliary absorber tank, Filtrate tank, Wastage water tank, Secondary Hydro cyclone feed tank, Process Water tank, Belt filter washing tank, Clarified water tank Neutralization Tank Outside surfaces	FW 742 FW 743 FW 744 FW 745 FW 747 FW 748 FW 785 FW 800 FW 802	Blast Cleaning to Sa 2.5 Near White metal with surface roughness profile to 40-60 µm	Primer: One coat of Inorganic Zinc silicate primer to IS 14946, (Solid by volume- 60% (min)), DFT = 75 µm per coat; DFT- 75µm Intermediate: One coat of Polyamide cured Epoxy based MIO pigmented Intermediate coat (solid by volume- 80% (min)) DFT = 100 µm per coat	75 100	Finish: One coat of Polyamide cured Epoxy based finish coat (solid by volume- 40% (min)) DFT = 40 µm per coat Shade: Grey white RAL9002	40	215

Annexure-14: Scope of Work in Vendor(Fabrication Agency) Scope.

Sheet-1

"Scope Matrix" for Fabrication and Erection of FGD Storage Tanks for 1X660MW Mahagenco Bhusawal Project

Sl. No.	Item	PE&SD Scope (By Fabrication Agency)	PSWR Scope (By Erection Agency)
A.	Bottom Plates, Shell Plates, Roof Plates and Anchor Chair		
1	Bottom Plates	Marking, cutting, edge preparation, of bottom plates are fabricated as per fabrication drawings by fabrication agency and the same shall be handed over to erection agency at site. Surface finishing, primer and first coat is also done by fabrication agency.	Erection of Bottom Plates including welding shall be carried out by erection agency.
2	Shell Plates	Marking, cutting, Bending, edge preparation of shell plates are fabricated as per fabrication drawings by fabrication agency and the same shall be handed over to erection agency at site. Surface finishing, primer and first coat is also done by fabrication agency.	Erection of Shell Plates including transverse and longitudinal welding of each course shall be carried out by erection agency
3	Roof Plates	Marking, cutting, edge preparation of roof plates are fabricated as per fabrication drawings by fabrication agency and the same shall be handed over to erection agency at site. Surface finishing, primer and first coat is also done by fabrication agency.	Erection of roof Plates including welding shall be carried out by erection agency.
4	Anchor Chair	Anchor chair is fabricated as per fabrication drawings by fabrication agency and same shall be handed over to erection agency at site. Surface finishing, primer and first coat is also done by fabrication agency.	Erection of Anchor chair shall be carried out by erection agency.
B.	Roof Structure	Roof structure is fabricated by fabrication agency as per fabrication drawings and the same is handed over to erection agency in fit to erection form. Surface finishing, primer and first coat is also done by fabrication agency.	Erection of roof structure is in erection agency scope.
C	Agitator Structure	Agitator structure is fabricated by fabrication agency as per fabrication drawings and the same is handed over to erection agency in fit to erection form. Surface finishing, primer and first coat is also done by fabrication agency.	Erection of agitator structure is in erection agency scope.
D.	Staircase Material		
1	Treds, landing platforms & Handrails	Pre-fabricated treds, landing platforms & handrails will be supplied by PE&SD to fabrication agency. Fabrication agency shall fabricate the staircase in segmented form(~ 2.5 mtr) and make it fit to erection. These segment shall be handed over at site to erection agency for final erection. Surface finishing, primer and first coat is also done by fabrication agency.	Final erection of staircase including support structural steel and welding shall be carried out by erection agency.
2	Supports Structural Steel for staircase material.	Raw material required for support structural steel for staircase will be supplied by PE&SD in running lengths available in market.	Final erection of staircase including welding, cutting support structurals from raw material supplied by PE&SD shall be carried out by erection agency.

Sl. No.	Item	PE&SD Scope (By Fabrication Agency)	PSWR Scope (By Erection Agency, M/s Indwell)
E.	Nozzles with flanges, gaskets, fastners	Complete fabrication of nozzle assembly with pipe, flange, counter flange, gasket, fastners, etc shall be handedover to erection agency. Surface finishing, primer and first coat is also done by fabrication agency.	Erection of nozzle assembly, its supports and RF Pad shall be carried out by erection agency.
F.	Drain Valve assembly.	Complete fabrication of drain valve assembly with pipe, flange, counter flange, gasket, fastners, etc shall be handedover to erection agency. Surface finishing, primer and first coat is also done by fabrication agency.	Erection of drain valve assembly, its supports and RF Pad supports shall be carried out by erection agency.
G.	Drain Sump	Complete drain sump shall be handedover to Erection agency. Surface finishing, primer and first coat is also done by fabrication agency.	Erection of drain sump shall be carried out by erection agency.
H.	Earthing Lugs, Fastners, Foundation Bolts, Name Plates	Finished components/items are loose supplied by PE&SD.	Erection of these components shall be carried out by erection agency.
I.	Agitators	Agitators shall be supplied to site by PE&SD/HPEP.	Erection of agitators shall be carried out by Erection agency.
J	Baffle Plates for Agitator	Fabrication of baffle plates structure as per agitator vendor recommendation shall be carried out by fabrication agency and the same will be handed over to erection agency. Surface finishing, primer and first coat is also done by fabrication agency.	Erection of baffle plates structure shall be carried out by Erection agency.
K	Ladder and Access Platforms to Agitator	No separator ladder and access platforms.	--
L	Instrumentation	--	Instrumentation is supplied by EDN to site. Installation of this instrumentation will be carried out by erection agency.

M. Fabrication of Reinforcement Pad Plates for all the nozzles of all the storage tanks is in Fabrication Agency Scope.