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**INVITATION TO TENDER**

Ref : OS/19-20/7857/47/098

Date : 05.03.2020

Sub : **Balance Fabrication of Deaerator Heater against S.O. 7857 at ADM site of BHEL - HPVP, Visakhapatnam.**

Dear Sir,

Sealed tenders are invited for the subject work in **two part bid** system from Vendors who are experienced in / capable of fabrication of similar jobs. **Bidders shall enclose supporting documents in support of work experience in execution of similar type of jobs.**

**ELIGIBILITY CRITERIA**

- 1) Bidders shall be **IBR approved** and must have an experience of executing similar works (i.e. Fabrication of De-aerator storage Tank and Heater or Similar Equipments) for a minimum of One project as on 29<sup>th</sup> Feb'2020. Bidders shall have to enclose relevant Work Orders, Work Completion Certificates and IBR registration document, Details & documents of IBR Qualified Welders in support of the same.
- 2) Bidders shall have to enclose the documents of Registration of Firm, Udyog Aadhar, EPF, ESI, PAN & GST.
- 3) The works executed in the name of individual / firm of the tenderer will only be considered for eligibility criteria.

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**1. VENDOR'S SCOPE OF WORK :**

- Details of the equipment is to be fabricated is as follows :

**(a) Deaerator Heater (PGMA 02-000) : 1 No. – 50 MT (approx.)**

This equipment has been partly fabricated in HPVP shops and balance fabrication is outsourced to meet the delivery commitments made to the customer.

- Balance fabrication of the above equipment which includes fabrication and installation of CS & SS Internals as per the approved drawings, QAP, WPS, Painting Schedule, NDE program, Standard Procedures, Specifications etc. and it includes the following activities but not limited to the same : -
- **For detailed item wise scope of work, Annexure – II (A) may be referred.**
- Collection of shell section in all L-seams & C-seams welded condition, dished ends in formed condition and all other free issue materials / components from HPVP Stores / Shops and Transportation of the same to ADM site including unloading at site
- Assembly & Welding of Dished Ends with Shell Section
- Fabrication of Heater Support Assembly, Downcomer Assembly, Man Hole Assembly, Water Box Assembly, Valve Plate Assembly and Fit-up & Welding with the Shell
- Fabrication of Tray Assembly and insertion of the same into the equipment
- Assembly & Welding of all Nozzles, Flanges, RF Pads, Fittings, etc. with the shell section
- Assembly & Welding of Saddles & Supports with the Shell Section

- NDT like DPT, MPI, RT & UT, RF Pad Testing, wherever applicable, shall be carried out as per approved ITP / QAP / NDE plan / Procedures etc.
- Transportation of Shell Section with one Dished end in welded condition and 2<sup>nd</sup> dished end in tack welded condition after Assembly, Welding & NDT from ADM Site to HPVP Shops for SR and back to ADM Site after SR
- Local SR of the final / closing C-Seam of Dished End with the shell section
- Hydro testing of Complete equipment.
- Surface Preparation by Blast Cleaning and Painting as per approved Painting Schedule / Standards & Specifications of BHEL-Hyderabad. DFT checks are to be carried out by deploying required instruments as per the applicable procedure.
- Free issue items cleared by QC shall be collected within 3 days from the date of intimation without failure. Any delay beyond the 3 days shall be considered for levying of L.D.
- Scaffolding & Staging materials, if required, are to be arranged and installed at vendor cost for safe working at heights
- Hydra Crane up to 14 MT capacity required for fabrication, unloading & loading at ADM site
- Obtaining approval of drawings from Director of Boilers (DOB), if required
- Co-ordination with IBR officials for Stage wise & Final Inspection and obtaining inspection clearance.
- IBR Fees / Charges shall be borne by the vendor
- Welding is to be carried out by IBR qualified welders along with Production Test Coupons strictly as per relevant drawings, QAP / ITP & WPS. Welding Test Coupons shall be provided as free issue by BHEL.

Qualification of IBR welders shall be the sole responsibility of the. However, Test Pieces shall be provided by BHEL as free issue.

- Preparation of necessary documentation with IBR certification
- Vendors shall have to engage sufficient man power for fabrication of the equipment to meet HPVP delivery schedules.
- All tools & tackles required for completion of the job
- Handing over of the finished equipments to Logistics at ADM site and loading onto the trailer for dispatch to the project site
- Qualified personnel shall be deployed as Site In-charge, Engineers & Supervisors for proper co-ordination of the job. All the QC related documents are to be prepared & submitted to BHEL (QC) / TPIA / Customer for stage wise inspection & final dimension clearances.
- Stenciling & Letter painting of Dispatch particulars in a prescribed / specified format.
- It may be noted that fabrication of the equipment is to be taken up on priority immediately after placement of order and sufficient man power shall be deployed (if required round the clock) for completion of the equipment to meet HPVP delivery schedules committed to the customer.
- Any modification work due to revision of drawings during fabrication is to be carried out by the vendor without any extra cost.
- Though not mentioned specifically, any activity which is required for completion of the work is deemed to be included in the scope of work of vendors.

**2. BHEL'S SCOPE :** BHEL – HPVP shall provide the following as free issue :

- Applicable approved drawings, GMS, ITP / QAP & WPS, Painting Schedule, NDE Plan, Standard Procedures / Specifications etc.
- Welding Test Coupons shall be provided as free issue by BHEL.
- Shell Section with all L-seams and C-seams in welded condition including NDT Clearance as per approved ITP / QAP / NDE Plan / Procedures etc.
- Dished ends in formed condition including NDE clearances as per approved QAP / ITP / NDE Plan / Procedures etc.
- Plate Formed Nozzles in tack welded condition as per drawings
- Flanges in finished condition
- Pads / RF Pads in pressed condition
- Plates and Structural Sections in full / off-cuts
- Stress Relieving of equipment with one Dished end in welded condition and 2<sup>nd</sup> Dished end in tack welded condition
- BOCs like Trays, Fasteners, Gaskets etc. as per GMS and Paints as per the requirement
- Blind Flanges, Gaskets and Fasteners required for Hydro test
- 300 MT & 75 MT crane along with operator and fuels will be provided by BHEL free of charge for fabrication, loading & unloading at ADM site. Maintenance of the crane including spares shall also be in the scope of BHEL. However, Riggers required for handling the job shall have to be provided by the vendor. Helpers are to be provided by the vendor for maintenance of the cranes whenever required.
- Area required for fabrication will be provided free of charge.
- Power, Water shall also be provided free of charge at one point but all arrangement for further distribution to desired location is in vendor's scope.

Bidder's scope shall include arranging Distribution Board with 250A Switch Fuse unit as incomer, all outgoings with necessary safe trips as per the industrial safety norms and their installation, all outgoing cables from Distribution Board, termination at the distribution board, Working Area Lighting.

In case of power failure, the vendor shall have to make alternative arrangement for smooth functioning of the work without any extra cost to BHEL.

**3. INSPECTION :**

- a) Inspection shall be carried out by M/s. BHEL / BHEL Authorized Inspection Agency / IBR / DOB (A.P.) as per approved QAP.
- b) Vendor's scope includes co-ordination with IBR officials for Stage wise and Final Inspection and obtaining inspection clearance along with all necessary documentation.

**4. DELIVERY :**

Finished items along with all inspection documents and all other related certificates are to be handed over to HPVP Logistics as per the following schedule : -

Within **3 weeks** from the date of issue of last consignment of free issue materials / components. However, the delivery period should meet the delivery schedules committed to the customer.

**Note :** For intermediate operations like SR, the time period from the date of handing over to the date of taking over will be excluded from the delivery period for the purpose of computation of LD.

**5. PRICE :**

The price shall be quoted as per the Schedule of Rates enclosed at Annexure – I for the detailed scope of work of each item. The prices shall be fixed & firm without any escalation during the entire period of contract and till completion of the work.

The quoted price shall be inclusive of all applicable taxes & duties except GST and Income tax will be deducted at applicable rates from RA & Final bills. GST shall be reimbursable to the vendor as detailed in Clause – 6 and as per Annexure – GST.

**6. GOODS & SERVICES TAX (GST) :**

Bidders shall make a note of the following points of GST before submission of their offer :-

- Vendors shall have to mention their GSTIN no. (15 Digits) in their Technical Bid. If any specific exemption is available, a declaration with due supporting documents need to be furnished for considering the offer.
- Semi-finished goods are to be delivered by the Vendors in BHEL, HPVP premises within a maximum period of one year from the date of issue of the material, failing which the whole transaction will be considered as Supply and Sale and GST is required to be paid along with interest (calculated @ SBI Base Rate + 6%) along with penalty, if any, from the date of Challan on the whole value of materials. Hence vendors shall have to ensure that materials issued to them are returned within 365 days.
- After fabrication, the vendors shall have to deliver the Semi - finished Goods by fulfilling the following formalities:

GST invoice should be raised by the vendors by paying GST on job work charges at applicable rates and by incorporating the HPVP GSTIN no. in the invoice for availing the reimbursement of GST from HPVP.

The vendor shall also have to enter in their GST Return -1 (GSTR-1) the details of invoice raised for payment of GST so as to enable HPVP to avail input credit

**7. REVERSE AUCTION :**

BHEL reserves the right to opt for Reverse Auction at its discretion instead of opening the price bids submitted in sealed envelope and any information regarding the reverse auction shall be decided after technical evaluation and shall be intimated to the bidders at appropriate time. The bidders are requested to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids in case BHEL decides to go for RA.

In case BHEL decides to go for RA, only those bidders who give their acceptance will be allowed to participate in RA and these bidders shall have to necessarily submit 'Online Sealed Bid' in the RA.

**Non-submission of 'Online Sealed Bid' by the bidder will be considered as tampering of the tendering process and will invite action by BHEL as per extent guidelines in vogue.**

**8. RISK PURCHASE :**

In case the contractor fails to execute the work within the scheduled time or due to any other reasons, BHEL - HPVP reserves the right to get the same completed through some other party at the risk & cost of the contractor and any additional expenditure incurred due to the same shall be charged to the contractor.

**9. Other Terms & Conditions shall be as per Annexure – III enclosed.**

**10. VALIDITY OF OFFER :**

The offer shall be valid for a period of **3 months** from the last date for tender submission.

**11. GENERAL :**

- The bidders shall study the Tender documents, Drawings, Quality Documents and all other relevant documents in detail for understanding the scope of work and the processes involved before submission of offers. One complete set of drawings shall be made available in the office of DGM (Outsourcing) and the same shall be referred during working hours. Drawings, QAP, WPS etc. shall be sent to vendor's e-mail address.
- For any clarifications required on this tender document, scope of work etc., **the bidders shall depute their authorized representatives to BHEL, Visakhapatnam to visit the HPVP shops for better understanding of the scope of work and getting clarifications** from concerned authorities between 09:00 AM and 04:30 PM.
- Bidders shall confirm their acceptance to all the terms & conditions of the tender enquiry. Any deviations to the tender terms & conditions are not acceptable and BHEL reserves the right to reject such offers without further correspondence
- BHEL reserves the right to modify or cancel the tender enquiry at any stage without assigning any reasons thereof.

**12. The following documents shall form part of the tender enquiry:**

- |  |                    |
|--|--------------------|
| i) Schedule of Rates   | : Annexure – I     |
| ii) Item wise Scope of Work  | : Annexure – II(A) |
| iii) List of Drawings & Documents  | : Annexure – II(B) |
| <b>(Drawings, QAP / ITP, Painting Schedule, Specifications, Standard Procedures, WPS etc. shall be sent by e-mail to vendor's e-mail address on request)</b> |                    |
| iv) General Terms & Conditions   | : Annexure – III   |
| v) Acceptance to tender terms & conditions   | : Annexure – IV    |
| vi) Reverse Auction Rules & Regulations  | : Annexure – V     |
| vii) Procedure for GST Payment   | : Annexure – GST   |

**13. TENDER SUBMISSION :**

Techno-commercial bids shall be submitted along with the **tender document duly signed by the bidder on all pages**. Techno-Commercial Bid and Price bid shall be placed in two separate envelopes and both shall be kept in another big envelope.

Tenders completed in all respects **along with a covering letter on Company's Letter Head shall be addressed to DGM (Outsourcing)** and shall be sent to or dropped in the **Outsourcing Tender Box, Reception counter, Admn. Building, BHEL - HPVP, Visakhapatnam, PIN – 530 012** so as to reach on or before 14.00 hrs. on 10.03.2020 duly super scribing the Subject, Tender Ref. No. and Technical / Price Bid on the envelopes.

Contact Information – Outsourcing Department : 0891 – 668 1332 / 1348 / 1358

**TENDERS RECEIVED AFTER THE DUE DATE & TIME ARE NOT ACCEPTABLE.**

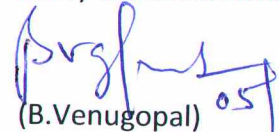
**Note : Offers sent in any other form will be treated as invalid and will be summarily rejected.**

**14. OPENING OF TENDERS :**

Techno-commercial Bids will be opened on **10.03.2020 at 14.00 Hrs.** at Customer Cell, Admn. Building, BHEL - HPVP, Visakhapatnam. The price bid of the techno-commercially qualified bidders will be opened in presence of representatives of the bidders and the date & time of opening of price bids will be intimated later. The bidders may depute their representatives at the time of opening.

In case of opting for Reverse Auction, intimation shall be given to the qualified bidders in advance at appropriate time.

for Bharat Heavy Electricals Limited,

  
(B.Venugopal) 05/03/2020  
Manager (OS)

**Schedule of Rates****Ref : OS/19-20/7857/47/098, dated 05.03.2020****Sub : Balance Fabrication of Deaerator Heater against S.O. 7857 at ADM site of BHEL - HPVP, Visakhapatnam**

Sl. No.	S.O. No.	Description of Work	Unit	Qty.	Total Amount (in ₹)
1	7857	Balance Fabrication of Deaerator Heater as detailed in annexure - II as per the Drawings, Specifications, QAP & WPS including Collection of FIMs from HPVP stores / shops, transportation to HPVP-ADM site, transportation of equipment from HPVP-ADM site to Shops for SR and back to HPVP-ADM site, Handing over of the finished equipments to HPVP Logistics dept. and loading of equipments onto the trailers & welding of supports for transportation, etc. complete in all respects as per the detailed scope of work mentioned in the tender document.	LS	1	
		Deaerator Heater (PGMA 02-000) (Approx. Wt. 50MT)			
Total Amount in Words :					

**Notes :**

- 1) The quantity and weights indicated above are approximate and may slightly vary on both sides subject to revision or addition or deletion of drawings. However, payment shall be made for the actual weights as per the applicable drawings / BOM.
- 2) The prices shall be fixed & firm without any escalation during the entire period of contract and till completion of work.
- 3) The quoted price shall be inclusive of all applicable taxes & duties except GST and Income tax will be deducted from Vendor's bills at applicable rates. However, GST shall be reimbursed by BHEL on submission of proof of GST payment.
- 4) The bidders are advised to go through all the drawings & documents before quoting the tender.
- 5) BHEL reserves the right to go for Reverse auction as per the applicable guidelines instead of opening price bids.
- 6) Tenderer should quote the amount in figures & words. It may be noted that corrections, overwriting etc. are not allowed. If there is a discrepancy between amount in figures & words, the amount in words shall prevail unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail. If there is an error in the total corresponding to the addition or subtraction of sub-totals, the sub-totals shall prevail and total shall be corrected accordingly.

In case of any mismatch between rate and amount in figures, rate in figures shall be taken into consideration for further evaluation and processing.

**Signature of the Bidder with Stamp**

**ANNEXURE -II(A)**

Ref : OS/19-20/7857/47/098

Date : 05.03.2020

**Itemwise Scope of Work****Sub : Balance Fabrication of Deaerator Heater against S.O. 7857 at ADM site of BHEL - HPVP, Visakhapatnam**

Sl. No.	S.O. No.	Eqpt. ID / PGMA No.	Description of Item / Work	BHEL's Scope	Bidder's Scope
I	7857	02-000	De-aerator Heater		
1			Dished Ends & Spherical Dishes	Will be issued in formed condition	Height Marking, Cutting & Edge Preparation Fit up and Welding of D'Ends with Shell section
2			Shell Sections	Will be Issued in all L-seams & C-seams welded condition with NDT clearance	
3			Nozzle Sub-assemblies	Plate formed Nozzles in tack welded condition	Assembly & Welding of Nozzles, R/F pads, Flanges, Fittings, CS / SS Piping
4			RF pads	Will be issued in Pressed condition	Bevelling, Shape Cutting, Fit-up & Welding with Shell
5			Flanges	Will be issued in finished condition	Fit-up & Welding of Flanges with Plate formed Nozzles
6			Heater Support Assy	Cut to size parts as per drawing will be issued	Fit-up & Welding of Saddles and Support Assemblies
7			Valve plate Assy	Will be issued as Full Plates / Off-cuts	Pressing, Drilling, Boring, Bevelling, Assembly & Welding with Shells
8			Water Box Assy	Cut to size Plates / Off-cuts will be issued	(i) Plates like Liner plate, J-stiffener and End plates shall be Pressed, Drilled, Assembled & Welded with Job (ii) Spray Valves to be drawn from Stores and Assembled with Valve plates
9			Tray Assemblies	Channels, Angles, Bar Gratings and Plates shall be issued as Full Lengths/RM or Off-cuts	(i) To be cut to size & drilled wherever required (ii) Trays to be drawn from Stores (iii) Fabrication of complete Tray Assembly (iii) Total insertion of Tray Assly. into Heater



Sl. No.	S.O. No.	Eqpt. ID / PGMA No.	Description of Item / Work	BHEL's Scope	Bidder's Scope
10			<b>One Dished End Sub-assembly</b>		(i) Assembly & Welding of C-seam of (one Dished end sub-assembly + Shell section) and transportation of the same to HPVP-Shops for SR and back to the ADM site for further works (ii) Transportation cost is in Vendor's scope (iii) Local SR of closing C-Seam (Shell section + Dished end) is in Vendor's scope
11			<b>Hydro Test</b>	All dummies will be issued as Cut to Size Blanks	Drilling of required holes and Hydro testing of the Deaerator Heater
12			<b>Paints</b>	Required Paints shall be supplied as free issue	Collection of free issue Paints from HPVP stores and Blast cleaning and Painting as per drawings & applicable Painting Schedule

Note : Collection of all Free Issue Materials from HPVP Stores / Shops and transportation of the same to HPVP-ADM site is in Vendor's scope.

**ANNEXURE - II (B)****LIST OF REFERENCE DRAWINGS & DOCUMENTS**

**Sub : Balance Fabrication of Deaerator Heater against S.O. 7857 at ADM site of BHEL - HPVP, Visakhapatnam**

**Ref : OS/19-20/7857/47/098, dated 05.03.2020**

Sl. No.	S.O. No.	PGMA	Description of Drg. / Document	Drg. / Doc. No.	Rev. No.	No. of Sheets
01	<b>7857</b>	<b>02-000</b>	Shell Assly. for Deaerator Heater	3-163-16-11772	1	1
02			Heater Assembly	3-163-16-11773	0	1
03			Tray Assembly for Deaerator	1-163-16-11503	0	1
04			Nozzle Assembly	1-163-16-11530	0	1
05			Heater Support	3-163-11-12044	0	1
06			Anti Surge Baffle Assembly	3-163-11-11566	0	1
07			Man Hole Assembly	3-163-11-11588	0	1
08			J-Stiffener	3-163-16-11727	0	1
09			Water Box Assembly	1-163-16-11502	0	1
10			Valve Plate Assembly	1-163-16-11500	0	1
11			Dished End	4-163-16-13238	0	1
12			Spherical Dish with 2:1 Ellipsoidal Dished End	4-163-10-00614	0	1
13		-	Quality Assurance Plan	HYQA/SSMQP/HE/468/5014	1	8
14			Product Standard (Specification for Deaerators)	HE 5 1474	2	8
15			Heat Treatment Technology Sheet	H-073-19	0	1
16			Welding Procedure Specification	M.1.1.01	0	2
17				M.S.1.1.03	0	2
18				T.M.1.1.01	0	2
19				M.1.8.08	0	2
20				T.M.1.8.12	0	2
21				M.S.1.1.06	0	2
22				M.8.8.23	0	2
23				M.1.1.54	0	2

**Note :** The drawings & documents mentioned above are indicative only and scope of work may vary as per actual detailed drawings /documents issued for fabrication.

**GENERAL TERMS & CONDITIONS****1. TECHNICAL DELIVERY CONDITIONS :**

The work should conform to the technical data given in our drawings, GMS, Shipping List Specifications, QAP, WPS etc.

**2. PARTY'S SCOPE :**

The scope of the party shall be as follows: -

- a) All welding equipments, baking oven, tools, jigs and fixtures, measuring instruments duly calibrated, handling facilities, testing facilities etc.
- b) All materials other than those mentioned under "Free Issue Materials", which are required for completion of the work.
- c) All consumables such as electrodes, gases, grinding wheels etc.

**3. REVISION OF DRAWINGS :**

There may be minor changes in the drawings during execution. In such a case, party should accommodate the same without any extra claim.

**4. WELDING QUALIFICATION :** Qualification of required number of Welders is party's responsibility at their cost.**5. X-RAY :**

All welding shall be of X-ray quality where specified on drawings. Inspection would specify the quantum of X-ray based on drawings / code requirement. Party should strictly follow the WPS and QAP supplied by BHEL during welding. Getting the welds radiographed and getting them cleared by inspection is the responsibility of the party.

**6. RECTIFICATIONS / REJECTIONS :**

Any rectification due to defective work, if required, shall be done by the party free of charge with a suitable technology approved before hand by BHEL in writing. The cost of material, if any used for rectification work / rejection work, will be estimated by BHEL and the same shall be debited to party's account. In case any rectification / rework is to be carried out due to defective material supplied by BHEL, the replacement material and consumables will be supplied by BHEL free of Cost.

**7. SECURITY DEPOSIT :**

Vendors shall have to submit a Bank Guarantee for **10%** of the order value in case of **HPVP ADM site** or **25%** of the material cost in case of Vendor works towards Security Deposit and safe custody of materials within one week from the date of issue of Order. The BG shall be valid for the contract period with a claim period of 3 months. This Bank Guarantee shall be released to the contractor after completion of work and on acceptance of the same by BHEL / Owner and on submission of Performance BG for 10 % of the order value covering for the defects liability period. If PBG is not submitted, 10% of the order value shall be deducted towards PBG from final bill.

**8. RAW MATERIALS ISSUE :**

Raw materials shall be issued with appropriate processing allowance and invisible wastage over the theoretical requirement of raw materials (**Plates, Sheets, Sections and Pipes**).

**9. TRANSFER / RETURN OF LEFT OVER MATERIALS :**

Party should maintain proper records for receipt & use of all free issue materials. The left over materials & scrap as per the material accounting statement shall be returned to HPVP stores along with finished job. Material Transfer Vouchers (MTV) from one order to another or from one vendor to another and Material Return Vouchers should be submitted immediately after transfer / return. The material reconciliation statement shall be submitted by the contractor after verification and certification by BHEL along with the final bill **within 30 days from the date of completion of work**. Otherwise, recovery for the balance materials shall be made from any of their pending bills without further intimation.

**10. MATERIAL RECONCILIATION :**

Orders issued to the vendors have to be completed in all respects including Material Accounting within a maximum of **180 days** from the **date of issue of the first material** from BHEL - HPVP stores.

**Maximum of 0.5 %** on the requirement of materials (**Plates, Sections and Pipes**) is admitted towards **process allowance and invisible wastage**.

Scrap quantity is permissible up to a **maximum of 1% on Structurals (Beams, Channels, Angles, Rods, Pipes etc.), 2% on Sheets, 3% for Plates** on the theoretical requirement of materials.

**If wastage and scrap is beyond the above limits**, it should be fully justified with cutting diagrams etc. which are to be approved in advance by BHEL. **Otherwise, the cost of raw materials beyond approved limits will be recovered from the contractor as per BHEL recovery rates including applicable taxes & duties.**

Material reconciliation including return of balance materials, off-cuts is to be completed within 20 days from the date of completion of the order. The material reconciliation statement shall be submitted by the contractor after verification and certification by BHEL-HPVP along with the final bill **within 30 days from the date of completion of work**. Otherwise, recovery for the balance materials shall be made from any of their pending bills without further intimation,

Repeated occurrence of inordinate delays in returning and settling the material accounting will entail BHEL the right to terminate the contract forthwith or impose a temporary suspension on further loading at the discretion of BHEL.

**11. SCRAP & OFFCUT NORMS :**

Sl. No.	Description	Scrap Size (in mm)	Off-Cut (in MM)
1.	CS/AS Sheets & Plates	Below 500 × 250	500 × 250 & above
2.	Rolled sections Rod, angles etc. (other than -tubes, pipes)	Below 1000	1000 & above
3.	Tubes & Pipes	Below 500	500 & above
4.	Universal column	Below 1000	1000 & Above
5.	SS Sheets & Plates	Below 500 × 250	500 × 250 & above
6.	SS Structural, Rods, Tubes, Pipes	Below 250	250 & above
7.	Non – ferrous: sheets & plates, rods & tubes	Below 500 × 250 (S & PL), Below 250 (Rods & Tubes)	500 × 250 & above, 250 & above
8.	Big size Scrap	(2500 & above) × (150 to 249)	-

**12. INSPECTION :**

Party shall contact our Quality Control Dept. for stages of inspection before commencement of job and should strictly follow the stages of inspection as per QAP.

**13. WORKMANSHIP GUARANTEE :**

The vendors should give workmanship guarantee for fabricated items for a period of 18 months from the date of last delivery of the order. Any defects due to incomplete work, faulty workmanship found in the fabricated items after delivery during the defects liability period shall be rectified / replaced by the vendor free of cost. Otherwise, the expenditure incurred towards the same will be recovered from the pending bills of vendors.

**14. WORK PROGRESS :**

The fabricator shall furnish a weekly report on the progress of work along with the status of availability of free issue materials and requirement of further materials, if any.

Outsourcing dept. personnel will visit vendor's works from time to time to assess and review the work progress. Free access shall be provided to BHEL or its inspection agency at all reasonable times of the day / night.

In case the progress is not satisfactory or supplies are delayed abnormally beyond the contractual delivery date, BHEL-HPVP, Visakhapatnam reserves the right to cancel the order in part or full or get the balance job in as is where is condition completed elsewhere by another agency at the risk and cost of Fabricator. The value of the work carried out by the party will be assessed by BHEL and the same shall be final. No compensation will be given to the fabricator in case of cancellation of order or diversion of balance job even if the jobs have been processed partly.

**15. DELIVERY :**

Finished items should be handed over to the Logistics dept. on party's delivery challans along with Job completion certificate / Final Inspection Report from inspection agency / HPVP-QC department.

**16. PENALTY :**

If delivery exceeds the stipulated delivery schedule, penalty 1/2 % of the total value of order per week or part there of subject to a maximum of 10% on the total value of the order will be levied. However, time taken for the following will not be considered as delay on the part of the Sub-Contractor.

- 1) Intermediate operations, if any, carried out by BHEL.
- 2) Waiting time for BHEL / Third party Inspection beyond a normal time of 3 days.

**17. PAYMENT TERMS :**

100% payment will be made against delivery of the finished items, duly inspected & cleared by Inspection authority along with all inspection documents, to Logistics dept. Payment shall be made within 45 days from the date of submission of RA Bill.

RA Bills are not allowed for orders of value less than Rs. 5 lakh. RA Bills are allowed for Order values of more than 5 lakh and in such cases, each RA bill value shall not be less than Rs. 5 lakh.

Vendors shall have to submit the bills in the formats specified by HPVP-Outsourcing and the bills submitted in the specified format along with necessary supporting documents are only admitted for processing. The following documents shall be submitted along with the Final Bill: -

1. No Claim Certificate from the contractor
2. No Dues Certificate from BHEL
3. Work Completion Certificate from BHEL
4. Material Reconciliation Statement submitted by the Contractor and certified by concerned authority of BHEL (if applicable)
5. Workmanship Guarantee Certificate from the contractor

**18. SECRECY :**

All the documents of BHEL inclusive of Drawings, GMS, Standards and Procedures made available to the fabricator should be kept in strict confidence and under no circumstance be made available to others or allow others to make use of them. Such documents shall be returned to BHEL on demand after completion of the job. This secrecy clause is binding on the employees of the fabricators also. Violation of the same may lead to suspension of business with the vendor and necessary legal action.

**19. SUB-LETTING :**

In general, sub-letting of jobs will not be permitted. But in special circumstances, this may be allowed. In such case, the party should obtain written approval from BHEL-HPVP, Visakhapatnam before sub-letting.

**20. FACTORY RULES AND REGULATIONS :**

Party shall abide by all the rules and statutory regulations in force from time to time as per factories act. It shall be party's responsibility to ensure the safety of their workmen and fulfilling the ESI, PF and other relevant statutory regulations.

**21. SAFETY :**

- a) Contractor shall adhere to safe construction practices, guard against hazardous & unsafe working conditions and shall comply with the safety rules of BHEL and local authorities. He shall maintain First Aid facilities for all his employees and labour. Contractor's responsibility includes supply of welder kit, all safety items such as safety belts, white and colour glasses, goggles, safety helmets, safety shoes etc.
- b) *Contractor and his employees shall follow all fire & safety, security regulations of BHEL.*

**22. HOUSE KEEPING :**

During execution of work, the contractor at all times keep the working place and storage area clean and free from accumulation of waste materials, rubbish etc.,

**23. ACCIDENT / DAMAGE / CONDUCT ETC. :**

Contractor will be held responsible for any disorderly conduct / misconduct, indiscipline, theft, smoking etc., on the part of his men. He will ensure summary eviction of such men from his premises failing which BHEL would remove them from the factory on his responsibility. Any damage to and or loss of equipment, machinery, building etc., to BHEL or BHEL employees, visitors or other contractors resulting from his own or any of his men's negligence shall be liable to be made good by him. Contractor shall be solely responsible for any accident in which you or your men or your equipment may be involved during the execution of contract on account of any reason what so ever.

**24. TERMINATION OF CONTRACT :**

In the event of any failure on the part of the contractor, BHEL reserves the right to terminate the contract by giving a notice of 2 weeks for any of the following lapses and contractual violations: -

- a) Failure to make labour payments in time as per the rules
- b) Failure to progress the job according to the agreed schedule
- c) Failure to mobilize adequate man power, tools & tackles and consumables in time
- d) Failure to adhere to Quality Standards of BHEL
- e) Refused to co-operate with other agencies working in the same area
- f) Failure to resolve labour disputes like strikes etc., within 7 days of occurrence
- g) Failure to comply with statutory regulations applicable at BHEL

BHEL shall also be free to intervene and take necessary remedial measures. All costs incurred with interest and overheads shall be recovered from contractor by such foreclosing or off-loading any part of the contract work.

**25. DISPUTES :**

Head of BHEL- HPVP Unit will be the final authority for any disputes arising out of this contract. The disputes / arbitration / settlement of contractual or legal issues shall be under the Jurisdiction of Visakhapatnam Court.

- 26.** For this procurement, Public Procurement (Preference to Make in India), Order 2017 dated 15.06.2017 & 28.05.2018 and subsequent Orders issued by the respective Nodal Ministry shall be applicable even if issued after issue of this NIT but before finalization of Contract / PO / WO against this NIT.

In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and / or local content in respect of this procurement, same shall be applicable.

**Signature of the Bidder with Stamp**

**Acceptance to Tender Terms & Conditions**

I / We hereby confirm that the Tender documents, Drawings, Quality documents etc. have been studied in detail and we have fully understood the scope of work.

I / We accept to all the Terms and Conditions of the Tender Enquiry and the prices quoted are in accordance with the same.

I / We give our acceptance to participate in reverse auction in case BHEL decides to opt for reverse auction for this tender.

Tender documents duly signed on all the pages by the Owner / authorized representative of the bidder are attached herewith.

**Signature of the Bidder with Stamp**

**GENERAL TERMS AND CONDITIONS OF RA (REVERSE AUCTION)**

BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on [www.bhel.com](http://www.bhel.com)) instead of opening the sealed envelope price bid, submitted by the bidder.

This will be decided after techno-commercial evaluation. Bidders have to give their acceptance with their offer for participation in RA. Non-acceptance to participate in RA may result in non . consideration of their bids, in case BHEL decides to go for RA.

Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit ~~Process compliance form~~(to the designated service provider) as well as ~~Online sealed bid~~in the Reverse Auction. Non-submission of ~~Process compliance form~~or ~~Online sealed bid~~by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of the business dealings with suppliers/ contractors (as available on [www.bhel.com](http://www.bhel.com)).

The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer. **The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.**

If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers / contractors (as available on [www.bhel.com](http://www.bhel.com)).+

As a reminder to the bidders, system will flash following message (**in RED Colour**) during the course of ~~online sealed bid~~

~~Bidders to submit online sealed bid less than or equal to their envelope sealed bid already submitted to BHEL~~+

**Signature of the Bidder with Stamp**



**GST COMPLIANCE FOR INDIGENOUS SUPPLIERS**

1. In Response to Tenders for Indigenous supplier will be entertained only if the vendor has a valid GSTIN which should be clearly mentioned in the offer. If any specific exemption is available, a declaration with due supporting documents need to be furnished for considering the offer.
2. Supplier shall mention their GSTIN in all their invoices and invoices shall be in the format as specified/prescribed under GST laws. Invoices shall necessarily contain Invoice number (in case of multiple numbering system is being followed for billing like SAP invoice no, commercial invoice no etc., then the Invoice No which is linked/uploaded in GSTN network shall be clearly indicated), item description as per PO, Quantity, Rate, Value, applicable taxes with nomenclature (like IGST, SGST, CGST & UTGST) separately, HSN/ SAC Code, etc.
3. All invoices shall bear the HSN Code for each item separately (Harmonized System of Nomenclature)/ SAC code (Services Accounting Code).
4. A declaration to the effect that all invoice particulars are/were uploaded in the GSTN network/ portal & all tax liability as per GST rules and regulations have been and will be discharged, shall be mentioned in the invoice. If not mentioned in the invoice, a separate declaration shall be submitted as per the requirement of BHEL.
5. All documents like Test Certificate, LR copy, Guarantee/Warranty certificate, work completion certificate, any other document mentioned in PO, shall be sent along with the vehicle/consignment where ever applicable. For all consignments received within the calendar month, input credit will be availed within that month in line with monthly returns filing cycle. In case of any discrepancy in the document or non-submission of documents mentioned in the PO, then BHEL will not be able to accept or account the material, in such case availing of tax credit will be deferred to next month or so.
6. In case of discrepancy in the data uploaded by supplier in the GSTN portal or in case of any shortages or rejection in the supply, then BHEL will not be able to avail the tax credit and will notify the supplier of the same. Supplier has to rectify the data discrepancy in the GSTN portal or issue credit note (details to be uploaded in GSTN portal) for the shortages or rejections in the suppliers, within the calendar month notified by BHEL.
7. For any such delay in availing of tax credit for reasons attributable to supplier (as mentioned above), interest (calculated @ SBI Base Rate + 6%) along with penalty if any will be deducted for the delayed period i.e. from the month of receipt till the month tax credit is availed, from the running bills.
8. Under GST regime, BHEL has to discharge GST liability on LD recovered from suppliers/contractors. Hence applicable GST shall also be recoverable from suppliers/contractors on LD amount. For this Debit note will be issued by BHEL indicating the respective supply invoice number.
9. This is to inform that GST portion of invoice, shall be released only upon Vendor declaring such invoice in his GSTR-1 and receipt of goods and Tax invoice by BHEL and Confirmation of payment of GST thereon by vendor on GSTN portal. Alternatively, BG of appropriate value may be obtained from vendor which shall be valid At least one month after the confirmation of date of payment of GST by vendor on GSTN portal and receipt of Tax invoice and receipt of goods, whichever is later. Above is subject to receipt of goods/service and tax invoice thereof along with vendor declaring invoice in his return and paying GST within timeline prescribed for availing ITC by BHEL.
10. That in case vendor delays Declaring such invoice in his return and GST credit availed by BHEL is denied or reversed subsequently as per GST law, GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from vendor/contractor along with interest levied/ leviable on BHEL.

***Note : The above will be followed strictly for processing vendor payments to ensure GST Compliance.***

**Signature of the Bidder with Stamp**



**BHARAT HEAVY  
ELECTRICALS LIMITED**  
R.C.PURAM, HYDERABAD

# **MANUFACTURING QUALITY PLAN**

**ITEM: DEAERATOR  
HEATER & STORAGE  
TANK**  
TYPE: 800 MW

QP No: HYQA/SSMQP/HE/468/5014  
Rev. No.: 01  
DATE: 30.05.2018  
SHEET 1 of 1

**CUSTOMER:** TSGENCO  
**CONSULTANT:** M/S TCE  
**PROJECT:** 5X800 MW TSGENCO YADADRI TPS  
**BHEL SALE ORDER NO.:** M-PA-1052-001,002,003,004,005  
**BHEL WORK ORDER NO.:** W-1-0-324-162-00,W-1-0-324-163-00,W-1-0-324-164-00,W-1-0-324-165-00,W-1-0-324-166-00

SL. No.	COMPONENT & OPERATIONS	CHARACTERISTICS	Class	Type of Check	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										M	B	C	
<b>1.0</b>	<b>MATERIAL</b>												
1.1	At Suppliers works												
1.1.1	Shell Plates & Plates for Dished Ends	a. Chemical composition	Critical	Chem.	1/ lot	SA 516 Gr.70	SA 516 Gr.70	Suppliers TC	✓	P	V		
		b. Mechanical properties	Critical	Mech.	1/ lot	SA 516 Gr.70	SA 516 Gr.70	- do -	✓	P	V		
		c. UT Exam. as per Drg	Critical	NDE	100%	SA 435	SA 435	- do -	✓	P	V		
		d. Dimensional examination	Major	Measrt.	100%	PO/ Spec	PO/ Spec	- do -		P	V		
<b>1.2</b>	<b>At BHEL</b>												
1.2.1	Shell Plates & Plates for Dished Ends	a. Verification & correlation of material with TC	Major	Visual	100%	SA 516 Gr.70	SA 516 Gr.70	Insp. Record	✓		V	V	
		b. Dimensional conformity	Major	Measrt.	100%	PO/Spec	PO/Spec	Insp. Record			V		
		c. Surface examination	Major	Visual	100%	PO/Spec	PO/Spec	Insp. Record			V		
1.2.2	Pipes	a. Verification & correlation of material with TC, Dim. & surface exam.	Major	Visual	100%	SA 106 GR.B	SA 106 GR.B	Insp. Record	✓		V	V	R-01
1.2.3	Flanges	a. Verification & correlation of material with TC, Dim. & surface exam.	Major	Visual	100%	SA105	SA105	Insp. Record	✓		V	V	R-01
1.2.4	Plates for pads	a. Verification & correlation of material with TC & surface exam.	Major	Visual	100%	SA516 R.70	SA516GR.70	Insp. Record	✓		V		
1.2.5	Tray Assemblies	a. Verification & correlation of material TC with Spn. & PO	Major	Visual	100%	Spec & PO	Spec & PO	Inspn. Record	✓		V	V	R-01

## LEGEND:

**M: MANUFACTURER / VENDOR B: BHEL /BHEL NOMMNATED INSPECTION AGENCY,**  
**C:CUSTOMER / CUSTOMER'S CONSULTANT / CUSTOMER NOMINATED INSPECTION AGENCY**  
P: PERFORM, W: WITNESS V: VERIFICATION, \* D: RECORDS IDENTIFIED WITH TICK (✓) SHALL BE ESSENTIALLY INCLUDED IN QA DOCUMENTATION.

Prepared by:

*Alok Behera*

**ALOK BEHERA**  
SR.ENGR/QA

Reviewed by:

*D S Stapute*

**D S STAPUTE**  
AGM/QA

Approved by:

*D S Stapute*

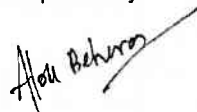
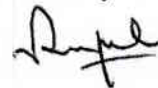


**D S STAPUTE**  
AGM/QA

Approved by:

*Executive Director*

**Executive Director**  
Customer / Consultant  
TSGENCO, Vidyut Soudha,  
Khairatabad, Hyderabad-500 082.

SL. No.		COMPONENT & OPERATIONS	CHARACTERISTICS	Class	Type of Check	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
											M	B	C	
1.2.6		Spray Valves	a. Verification & correlation of material TC with Spec. and PO	Major	Visual & Measrt.	100%	Spec & PO	Spec & PO	Inspn. Record	✓		V	V	R-01
1.3		Shell Dished Ends (with single plate or Butt welded plates)												
1.3.1		At Supplier's Works	a. Verification & correlation of matl. Specification & TC	Major	Visual	As per Spec	SA 516 GR.70	SA 516 GR.70	Suppliers TC		P	W		
			b. Dimensional conformity after forming including min. thickness measurement	Major	Measrt. by D meter	100%	Drawing	Drawing	Supplier's TC		P	W		
			c. RT of Butt welds before forming	Critical	NDE	100%	ASME Sec.VArt.2	ASME Sec.VIII Div I UW51	Suppliers TC	✓	P	V		
			d. UT on outer surface area after forming and HT	Critical	NDE	100%	SA435	SA435	Suppliers TC	✓	P	W		
			e. PT on entire outer surface including welds after forming &SR	Critical	NDE	100%	ASME Sec V Art .7/6	ASME Sec.VIII Appx.6/8	Suppliers TC	✓	P	W		
			f. Stress Relieving/Normalizing after forming	Critical	Visual	100%	ASME Sec.VII Div.1 UCS 56	ASME Sec.VIII Div.1 UCS 56	Suppliers TC	✓	P	V		
			g. Tensile testing of production test coupon heat treated along with dished ends.	Critical	Visual	As per Spec	SA 516 GR.70	SA 516 GR.70	Suppliers TC	✓	P	V		
1.3.2		AT BHEL	a. Verification and correlation of matl. with spec. and TC. & attestation	Major	Visual	100%	SA 516 GR.70& PO	SA 516 GR.70& PO	Insp. Record	✓		V	V	
			b. Dimensional conformity	Major	Visual	100%	Drawing	Drawing	Insp. Record			V	V	

<b>LEGEND:</b> <b>M: MANUFACTURER / VENDOR B: BHEL /BHEL NOMMNATED INSPECTION AGENCY,</b> <b>C: CUSTOMER / CUSTOMER'S CONSULTANT / CUSTOMER NOMINATED INSPECTION AGENCY</b> <b>P: PERFORM, W: WITNESS V: VERIFICATION, * D: RECORDS IDENTIFIED WITH TICK (✓) SHALL BE</b> <b>ESSENTIALLY INCLUDED IN QA DOCUMENTATION.</b>	Prepared by:	Reviewed by:	Approved by:	Approved by:
	 <b>ALOK BEHERA</b> <b>SR.ENGR/QA</b>	 <b>D S STAPUTE</b> <b>AGM/QA</b>	 <b>D S STAPUTE</b> <b>AGM/QA</b>	 <b>Executive Director</b> <b>Customer's Consultant</b> <b>Thermal Projects Construction</b> <b>TSGENCO, Vidyut Soudha,</b> <b>Khairatabad, Hyderabad-500 08</b>



**BHARAT HEAVY  
ELECTRICALS LIMITED**  
R.C.PURAM, HYDERABAD

**ITEM: DEAERATOR  
HEATER & STORAGE  
TANK**  
TYPE: 800 MW

# **MANUFACTURING QUALITY PLAN**

QP No: HYQA/SSMQP/HE/468/5014  
Rev. No.: 01  
DATE: 30.05.2018  
SHEET 3 of 1

**CUSTOMER: TSGENCO**  
**CONSULTANT: M/S TCE**  
**PROJECT: 5X800 MW TSGENCO YADADRI TPS**  
**BHEL SALE ORDER NO.: M-PA-1052-001,002,003,004,005**  
**BHEL WORK ORDER NO.: W-1-0-324-162-00,W-1-0-324-163-00,W-1-0-324-164-00,W-1-0-324-165-00,W-1-0-324-166-00**

SL. No.	COMPONENT & OPERATIONS	CHARACTERISTICS	Class	Type of Check	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										M	B	C	
2.0	IN PROCESS INSPECTION												
2.1	Shell Fabrication	a. Transfer of identification marks and check for dimensional marking	Major	Visual	100%	TC & Drg	TC & Drg	Insp. Record		P	W		
		b. Surface exam. of plates after rolling & edge preparation	Major	Visual	100%	ASME Sec VIII Div.I	ASME Sec VIII Div.I	Insp. Record		P	V		
		c. Verification of approved WPS, PQR & WQR	Major	Visual	100%	As per Sec.IX	As per Sec.IX	-		P	V		
		d. Fit up of L & C seams including shell to Dished ends	Major	Measrt.	100%	Drg & ASME Sec.VIII Div.I	Drg & ASME Sec.VIII Div.I	Insp. Record		P	V		
		e. PT after back chip	Major	NDE	100%	ASME Sec.V ART.6	ASME Sec.VIII Appx.8	Insp. Record	✓	P	V		
		f. Identification of all welds (weld No. punched for correlation with welder)	Major	Visual	100%	-	-	Insp. Record		P	V		
		g. RT of welds	Critical	NDE	100%	ASME Sec.V Art.2	ASME Sec.VIII DIV.1 UW 51	Insp. Record	✓	P	V	V	Review of RT film
		h. PT exam. of L & C seams of the outer shell welds	Major	NDE	10%	ASME Sec.V Art.6	ASME Sec.VIII Div.1 Appx.8	Insp. Record	✓	P	W		
		i. Visual exam. of all welds	Major	Visual	10%	ASME Sec.VIII Div.1	ASME Sec.VIII Div.1	-		P	W	V	

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P: PERFORM, W: WITNESS V: VERIFICATION, \* D: RECORDS IDENTIFIED WITH TICK (✓) SHALL BE ESSENTIALLY INCLUDED IN QA DOCUMENTATION.

Prepared by:

*Alok Behera*

**ALOK BEHERA**  
SR.ENGR/QA

Reviewed by:

*D S Stapute*

**D S STAPUTE**  
AGM/QA

Approved by:

*D S Stapute*


**D S STAPUTE**  
AGM/QA

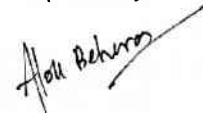



Approved by:

*Executive Director*

**Executive Director**  
Customer / Consultant  
TSGENCO, Vidyut Soudha,  
Khairatabad, Hyderabad-500 082.



		<b>BHARAT HEAVY ELECTRICALS LIMITED</b> R.C.PURAM, HYDERABAD		<b>MANUFACTURING QUALITY PLAN</b>				<b>CUSTOMER:</b> TSGENCO <b>CONSULTANT:</b> M/S TCE <b>PROJECT:</b> 5X800 MW TSGENCO YADADRI TPS <b>BHEL SALE ORDER NO.:</b> M-PA-1052-001,002,003,004,005 <b>BHEL WORK ORDER NO.:</b> W-1-0-324-162-00,W-1-0-324-163-00,W-1-0-324-164-00,W-1-0-324-165-00,W-1-0-324-166-00					
				<b>ITEM:</b> DEAERATOR HEATER & STORAGE TANK <b>TYPE:</b> 800 MW		<b>QP No:</b> HYQA/SSMQP/HE/468/5014 <b>Rev. No.:</b> 01 <b>DATE:</b> 30.05.2018 <b>SHEET</b> 4 of 1							
SL. No.	COMPONENT & OPERATIONS	CHARACTERISTICS	Class	Type of Check	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
		J. Dimensional conformity Including ovality.	Major	Measrt.	10%	ASME Sec.VIII Div.1 & Drg	ASME Sec.VIII Div.1 & Drg	Insp. Record	✓	P	W		
<b>2.2</b>	<b>Nozzle Fabrication</b>												
2.2.1	Nozzle Fabrication with Plate Material	a. Transfer of identification marks	Major	Visual	100%	TC	TC	Insp. Record		P	W		
		b. Fit up of 'L' seams	Major	Visual	100%	Drawing	Drawing	Insp. Record		P	V		
		c. PT after back chip	Major	NDE	100%	ASME Sec.V Art .6	ASME Sec.VIII Div.I Appx.8	Inspn. Record	✓	P	V		
		d. RT of the above weld	Critical	NDE	100%	ASME Sec.V Art.2	ASME Sec.VIII Div.I UW 51	Inspn. Record	✓	P	V	V	Review of RT film, R-01
		e. Dimensional conformity	Major	Measrt.	100 %	Drawing	Drawing	-	✓	P	V		
2.2.2	Fabrication of Nozzles with shell	a. Check markings of nozzle openings prior to cutting	Major	Visual	100%	Drawing	Drawing	-		P	W		
		b. Transfer of identification marks on nozzles	Major	Visual	100%	TC T	TC	Inspn. Record		P	W		

<b>LEGEND:</b> M: MANUFACTURER / VENDOR B: BHEL /BHEL NOMMNATED INSPECTION AGENCY, C: CUSTOMER / CUSTOMER'S CONSULTANT / CUSTOMER NOMINATED INSPECTION AGENCY P: PERFORM, W: WITNESS V: VERIFICATION, * D: RECORDS IDENTIFIED WITH TICK (✓) SHALL BE ESSENTIALLY INCLUDED IN QA DOCUMENTATION.	Prepared by:  <b>ALOK BEHERA</b> SR.ENGR/QA	Reviewed by:  <b>D S STAPUTE</b> AGM/QA	Approved by:  <b>D S STAPUTE</b> AGM/QA	Approved by:  <b>Executive Director</b> Customer / Consultant TSGENCO, V Khairatabad, Hy.
	Format no. : HYQA/QP/MQP-1 Rev.00			



**BHARAT HEAVY  
ELECTRICALS LIMITED**  
R.C.PURAM, HYDERABAD

**ITEM: DEAERATOR  
HEATER & STORAGE  
TANK**  
TYPE: 800 MW

# **MANUFACTURING QUALITY PLAN**

QP No: HYQA/SSMQP/HE/468/5014  
Rev. No.: 01  
DATE: 30.05.2018  
SHEET 5 of 1

**CUSTOMER: TSGENCO**  
**CONSULTANT: M/S TCE**  
**PROJECT: 5X800 MW TSGENCO YADADRI TPS**  
**BHEL SALE ORDER NO.: M-PA-1052-001,002,003,004,005**  
**BHEL WORK ORDER NO.: W-1-0-324-162-00,W-1-0-324-163-00,W-1-0-324-164-00,W-1-0-324-165-00,W-1-0-324-166-00**

SL. No.	COMPONENT & OPERATIONS	CHARACTERISTICS	Class	Type of Check	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										M	B	C	
		c. Check for Dimn. conformity of Nozzle welds; visual and dimen. exam of weld	Major	Measrt	100%	Drawing	Drawing.	Inspn. Record		P	W		
		d. Fit up of Flange to pipe	Major	Measrt.	100%	Drawing	Drawing	Insp. Record		P	W		
		e. Branches to shell fit up	Major	Measrt.	100%	Drawing	Drawing	Insp. Record		P	W		
		f. MT exam of nozzle to shell welds & weld edge preparation >40mm	Major	NDE	100%	ASME Sec.V Art.6/7	ASME Sec.VIII Appx.8/6	Insp. Record	✓	P	W		
		g. Dimn. & visual exam of nozzles	Major	Measrt	100%	Drawing	Drawing	Insp. Record	✓	P	V	V	
2.3	Saddle fabrication & internal support & Tray enclosures	a. Fit up of pads to shell	Major	Measrt.	100%	Drawing	Drawing	Insp. Record		P	V		
		b. Fit up of saddle to the shell	Major	Measrt.	100%	Drawing	Drawing	Insp. Record		P	V		
		c. Dim. exam. of external supports	Major	Measrt.	100%	Drawing	Drawing	Insp. Record		P	V		
		d. Fit up of internal connection	Major	Measrt.	100%	Drawing	Drawing	Inspn. Record		P	V		
		e. Check for clearance / fit up of tray enclosure	Major	Measrt.	100%	Drawing	Drawing	Inspn. Record		P	V		
		f. Visual exam. of all welds	Major	Visual	100%	ASME Sec.VIII Div.I	ASME Sec.VIII Div.I	Insp. Record		P	W		

## **LEGEND:**

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P: PERFORM, W: WITNESS V: VERIFICATION, \* D: RECORDS IDENTIFIED WITH TICK (✓) SHALL BE ESSENTIALLY INCLUDED IN QA DOCUMENTATION.

Prepared by:

*Alok Behera*

**ALOK BEHERA**  
SR.ENGR/QA

Reviewed by:

*D S Stapute*

**D S STAPUTE**  
AGM/QA

Approved by:

*D S Stapute*

**D S STAPUTE**  
AGM/QA


Approved by:

*Executive Director*

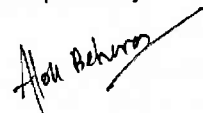
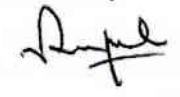


**Executive Director**  
Customer's Consultant

Format no. : HYQA/QP/MQP-1 Rev.00

**TSGENCO, Vidyut Soudha,**  
**Khairatabad, Hyderabad-500 082.**


		<b>MANUFACTURING QUALITY PLAN</b>						<b>CUSTOMER: TSGENCO</b> <b>CONSULTANT: M/S TCE</b> <b>PROJECT: 5X800 MW TSGENCO YADADRI TPS</b> <b>BHEL SALE ORDER NO.: M-PA-1052-001,002,003,004,005</b> <b>BHEL WORK ORDER NO.: W-1-0-324-162-00,W-1-0-324-163-00,W-1-0-324-164-00,W-1-0-324-165-00,W-1-0-324-166-00</b>							
<b>BHARAT HEAVY ELECTRICALS LIMITED</b> <b>R.C.PURAM, HYDERABAD</b>		<b>ITEM: DEAERATOR HEATER &amp; STORAGE TANK</b> <b>TYPE: 800 MW</b>		<b>QP No: HYQA/SSMQP/HE/468/5014</b> <b>Rev. No.: 01</b> <b>DATE: 30.05.2018</b> <b>SHEET 6 of 1</b>											
SL. No.	COMPONENT & OPERATIONS	CHARACTERISTICS	Class	Type of Check	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS		
										M	B	C			
		g. Visual & dimensional exam of tray enclosure	Major	Visual	100%	Drawing	Drawing	Insp. Record	✓	P	W				
		h. PT exam of Pads & saddle support	Major	NDE	100%	ASME Sec.V Art.6	ASME Sec.VIII Div.I Appx.8	Insp. Record	✓	P	V				
2.4	Final Inspection	a. Soap solution test for pads	Major	NDE	100%	HE-7-1022 /01	HE-7-1022 /01	Inspn. Record	✓	P	W				
		b. Visual exam of all welds	Major	Visua	100%	ASME Sec.VIII Div.I	ASME Sec.VIII Div.I	Inspn. Record		P	W				
		c. Check for stacking	Major	Visua	100%	Procedure & Drg	Procedure & Drg	Inspn. Record		P	V	V			
		d. Visual & dimn. check of complete tray assemblies	Major	Measrt	100%	Drawing	Drawing	Inspn. Record	✓	P	W	V			
		e. Matching of interconnecting nozzles of FST & heater with fixture	Major	Visual	100%	Drg. & Fixture	Drg. & Fixture	Inspn. Record	✓	P	W	W	R-01		
		f. Hydro Test of Deaerator Heater & storage tank	Major	Visual	100%	HY0852061 & Drg	HY0852061 & Drg	Hydrostatic Test Report	✓	P	W	W	Refer Special Note-3		
3.0	Pre-despatch Inspection	a. Dimensional inspection of Heater & storage Tank	Major	Visual	100%	Drg	Drg	As built Drg.	✓	P	W	W			
		b. Marking of axes on all Sections of storage tank for site assembly.	Major	Visual & Measrt.	-	Drawing & procedure	Drawing & procedure	Inspn. Record	✓	P	W	V	Refer Special Note-4		

<b>LEGEND:</b> <b>M: MANUFACTURER / VENDOR B: BHEL /BHEL NOMMNATED INSPECTION AGENCY,</b> <b>C: CUSTOMER / CUSTOMER'S CONSULTANT / CUSTOMER NOMINATED INSPECTION AGENCY</b> <b>P: PERFORM, W: WITNESS V: VERIFICATION, * D: RECORDS IDENTIFIED WITH TICK (✓) SHALL BE ESSENTIALLY INCLUDED IN QA DOCUMENTATION.</b>	<b>Prepared by:</b>  <b>ALOK BEHERA</b> <b>SR.ENGR/QA</b>	<b>Reviewed by:</b>  <b>D S STAPUTE</b> <b>AGM/QA</b>	<b>Approved by:</b>  <b>D S STAPUTE</b> <b>AGM/QA</b>	<b>Approved by:</b>  <b>Executive Director</b> <b>Thermal Projects Construction</b> <b>TSGENCO Customer / Consultant</b> <b>Airatabad, Hyderabad-500 032.</b>
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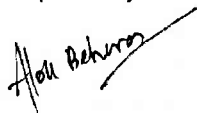
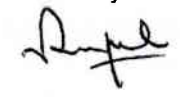


Format no. : HYQA/QP/MQP-1 Rev.00




		<b>BHARAT HEAVY ELECTRICALS LIMITED</b> R.C.PURAM, HYDERABAD		<b>MANUFACTURING QUALITY PLAN</b>					<b>CUSTOMER:</b> TSGENCO <b>CONSULTANT:</b> M/S TCE <b>PROJECT:</b> 5X800 MW TSGENCO YADADRI TPS <b>BHEL SALE ORDER NO.:</b> M-PA-1052-001,002,003,004,005 <b>BHEL WORK ORDER NO.:</b> W-1-0-324-162-00,W-1-0-324-163-00,W-1-0-324-164-00,W-1-0-324-165-00,W-1-0-324-166-00				
				<b>ITEM:</b> DEAERATOR HEATER & STORAGE TANK <b>TYPE:</b> 800 MW		<b>QP No:</b> HYQA/SSMQP/HE/468/5014 <b>Rev. No.:</b> 01 <b>DATE:</b> 30.05.2018 <b>SHEET</b> 7 of 1							
SL. No.	COMPONENT & OPERATIONS	CHARACTERISTICS	Class	Type of Check	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										M	B	C	
		c. Check for completeness, verification of test / inspection records	Critical	Visual	100%	QP, Tech. Spec. drg & data sheet	QP, Tech. Spec. drg & data sheet	Manufacturer TC		P	V		
		d. Cleanliness after sand/ shot blasting of internal/ external surfaces of FST & external surface of heater	Major	Visual	100%	HE-7-1023	HE-7-1023	Inspn. Record		P	V		
		e. Cleaning, Painting & packing for dispatch including blanking of all openings	Major	Visual	100%	HE-7-1023	HE-7-1023	Insp. Record		P	V		
		f. Preservation of weld edge preparation	Major	Visual	100%	HE-7-1023	HE-7-1023	Inspn. Record		P	V		
		g. Identification markings including heat no. on assemblies & loose items prior to transport	Major	Visual	100%	Drg./ QP /Spec.	Drg./ QP /Spec.	-		P	V		

**SPECIAL NOTES:**

1. IN CASE OF ANY INCONSISTENCY BETWEEN QUALITY PLAN AND DRAWING/SPECIFICATION, THE LATTER SHALL PREVAIL.
2. ALL MATERIALS SHALL BE PROCURED AS PER BHEL SPECIFICATION/DRAWING/P.O
3. HYDRO TEST AT MANUFACTURERS WORKS ONLY IF STORAGE TANK IS IN SINGLE PIECE.
4. MARKING OF AXES FOR SITE ASSEMBLY IS NOT APPLICABLE IF STORAGE TANK IS IN SINGLE PIECE
5. For NDE Verification offered above, Verification of Report by Customer/Customer TPIA.
6. Verification of TCs offered to Customer shall be performed during Witness of Hydrostatic test.

<b>LEGEND:</b> M: MANUFACTURER / VENDOR B: BHEL /BHEL NOMINATED INSPECTION AGENCY, C: CUSTOMER / CUSTOMER'S CONSULTANT / CUSTOMER NOMINATED INSPECTION AGENCY P: PERFORM, W: WITNESS V: VERIFICATION, * D: RECORDS IDENTIFIED WITH TICK (✓) SHALL BE ESSENTIALLY INCLUDED IN QA DOCUMENTATION.	Prepared by:  <b>ALOK BEHERA</b> SR.ENGR/QA	Reviewed by:  <b>D S STAPUTE</b> AGM/QA	Approved by:  <b>D S STAPUTE</b> AGM/QA	Approved by:  <b>Executive Director</b> Customer / Consultant TSGENCO, Vidyut Soudha, Khairatabad, Hyderabad-500 082.
	Format no. : HYQA/QP/MQP-1 Rev.00			



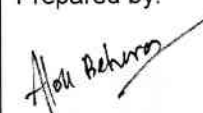
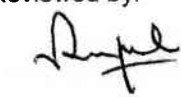
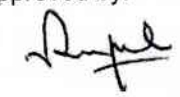
		<b>BHARAT HEAVY ELECTRICALS LIMITED</b> R.C.PURAM, HYDERABAD	<b>MANUFACTURING QUALITY PLAN</b>					<b>CUSTOMER:</b> TSGENCO <b>CONSULTANT:</b> M/S TCE <b>PROJECT:</b> 5X800 MW TSGENCO YADADRI TPS <b>BHEL SALE ORDER NO.:</b> M-PA-1052-001,002,003,004,005 <b>BHEL WORK ORDER NO.:</b> W-1-0-324-162-00,W-1-0-324-163-00,W-1-0-324-164-00,W-1-0-324-165-00,W-1-0-324-166-00					
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SL. No.	COMPONENT & OPERATIONS	CHARACTERISTICS	Class	Type of Check	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY M   B   C			REMARK S

**NOTES FOR FIXING TRAY ASSEMBLIES & SPRAY VALVES:**

1. CLOSING DISHED END SHALL BE ASSEMBLED ONLY AFTER ASSEMBLY OF SPRAY VALVES AND TRAY ASSEMBLIES.
2. SPRAY VALVES ARE TO BE ASSEMBLED PRIOR TO ASSEMBLY OF TRAYS.
3. QC TO ENSURE WELDING OF STOPPERS FOR HOLD DOWN RODS AND ASSEMBLY OF HOLD DOWN ANGLES WITH CLEATS.
4. QC TO ENSURE TACK WELDING OF DOUBLE LOCK NUTS FOR SPRAY VALVE FIXING TO VALVE PLATE.
5. QC TO ENSURE AVAILABILITY OF SPLIT PIN THROUGH THE TOP LOCK NUT AND STEM OF THE SPRAY VALVE BEFORE ASSEMBLY OF SPRAY VALVE.
6. QC TO ENSURE POSITIONING OF SPLIT PIN AT THE BOTTOM OF HOLD DOWN ROD DURING TRAY ASSEMBLY.

REV HISTORY				
SL	REV	DATE	DESCRIPTION	NATURE OF REVISION
1	00	11.12.2017	FIRST SUBMISSION	
2	01	30.05.2018	FIRST REVISION	1. VERIFICATION POINTS INCLUDED FOR CUSTOMER FOR CL 1.2.2,1.2.3,1.2.5,1.2.6,2.2.1D 2. WITNESS POINT INCLUDED FOR CUSTOMER FOR CL 2.4.E

  
Executive Director  
Thermal Projects Construction  
TSGENCO, Vidyut Soudha,  
Khairatabad, Hyderabad-500 082.

<b>LEGEND:</b> M: MANUFACTURER / VENDOR B: BHEL /BHEL NOMMNATED INSPECTION AGENCY, C: CUSTOMER / CUSTOMER'S CONSULTANT / CUSTOMER NOMINATED INSPECTION AGENCY P: PERFORM, W: WITNESS V: VERIFICATION, * D: RECORDS IDENTIFIED WITH TICK (✓) SHALL BE ESSENTIALLY INCLUDED IN QA DOCUMENTATION.	Prepared by:  <b>ALOK BEHERA</b> SR.ENGR/QA	Reviewed by:  <b>D S STAPUTE</b> AGM/QA	Approved by:  <b>D S STAPUTE</b> AGM/QA	Approved by:  Customer / Consultant
	Format no. : HYQA/QP/MQP-1 Rev.00			

**BHARAT HEAVY ELECTRICALS LIMITED**

HPVP-VISAKHAPATNAM 530012

DEPARTMENT OF WELDING TECHNOLOGY

**HEAT TREATMENT TECHNOLOGY SHEET****HT CYCLE NO.****H-073-19****DATE****04-06-2019**

Name of the Equipment		W.O.NO.	Assem bly	Drawing no.		Customer	
DEAERATOR HEATER CLOSING JOINT		7855, 7856, 7857, 7858 & 7859 (02 000)	---	3-163-16-11772 REV.1 3-163-16-11773 REV.0		M/s. BHEL-HYD (TSGENCO – YADADRI – 5X800MW)	
Part Name	Part No.	Material Spec.	Principle Dimensions (mm)			DESIGN PRESSURE	DESIGN TEMP.
---	---	SA516GR70	OD	ID	THK	As per Drawing	As per Drawing
			--	3000	28		

CODE: AS PER DRAWING

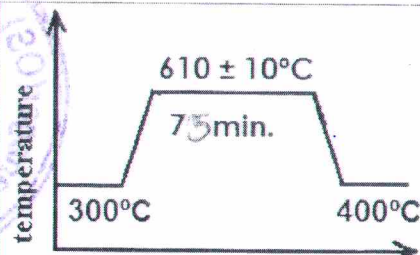
INSPN. AGENCY: AS PER DRAWING

NOMINAL WELD THICKNESS = 28 mm

TYPE OF HEAT TREATMENT\*

LOCAL STRESS RELIEVING: ✓

POSTWELD HEAT TREATMENT AFTER ASSEMBLY AND CIRCUMFERENTIAL SEAM WELDING OF HEATER SHELL AND CLOSING DISHED END.



1) Heat at the rate of 100°C/hr (Max) by electrical means up to the temperature of 610 ± 10°C.

2) Soak at 610 ± 10°C for 75 minutes.

3) Cool at the rate of 100°C/hr (Max) up to 400°C and controlled cooling rates are not applicable from 400°C.

\* as per BHEL HYD email DT. 03-06-2019.

**GENERAL PRECAUTIONS:**

- Sufficient number of thermocouples shall be placed in consultation with shop inspector / inspection agency on the vessel at bottom, centre And top of the charge by covering the areas of maximum and minimum thickness and other areas as possible variation. It shall be ensured that distance between any two thermocouples along with length of equipment is not more than 4.6 meters.
- Thermocouple (TC) shall be tack welded to the plate on consultation with shop inspector / inspection agency and the same TC shall be removed by grinding.
- Material temperature shall be recorded with the help of calibrated automatic recorder and calibrated thermocouples only.
- During heating period, the temperature difference shall not exceed 138°C over any length of 4.6 metres.
- Technology department shall incorporate necessary precautions to be followed in shop floor to avoid distortion.

Prepared by:

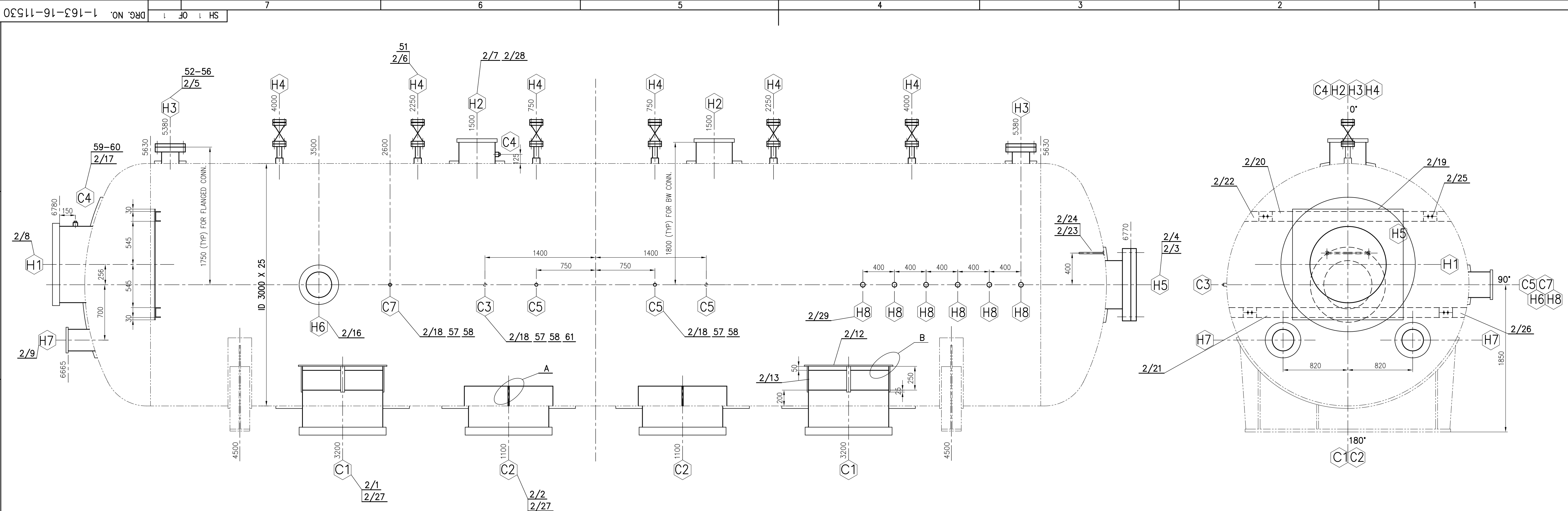
D. Deekhab  
4/6/15  
DY. ENGINEER (WT)

Approved by:

P. D. Ramishu  
4/6/15  
DY.MGR (WT)

CC TO: DY.MGR.(P&amp; TECH)





PREFIX 1/ TO ALL POS. NOS., EXCEPT POS. NOS. 51 TO 61.

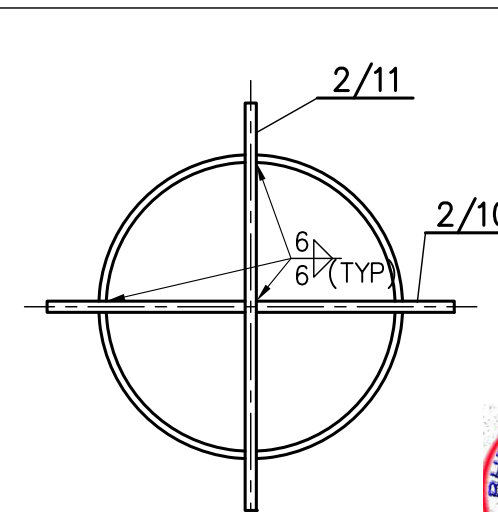
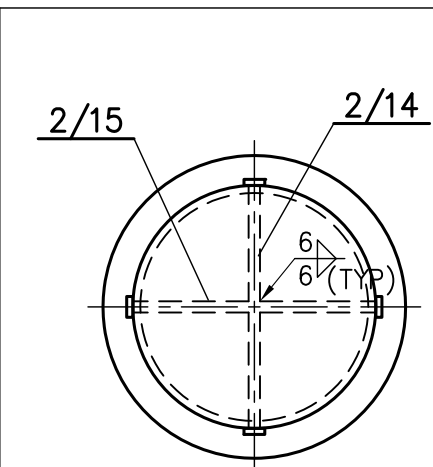
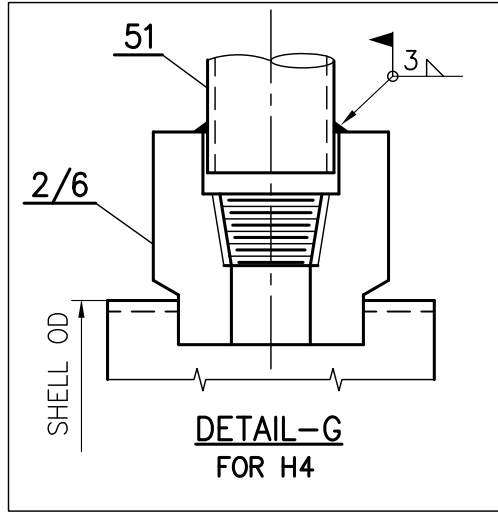
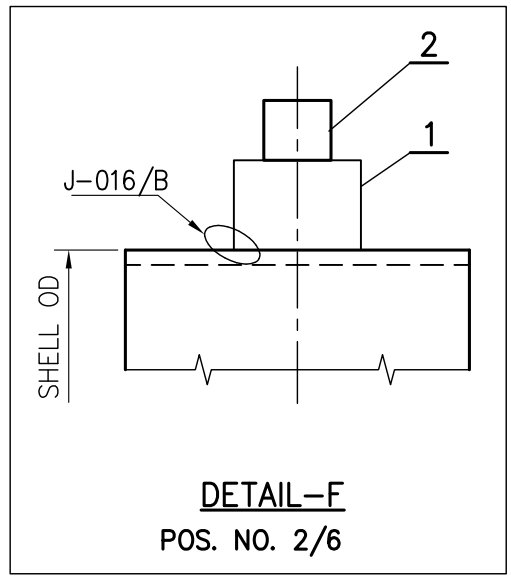
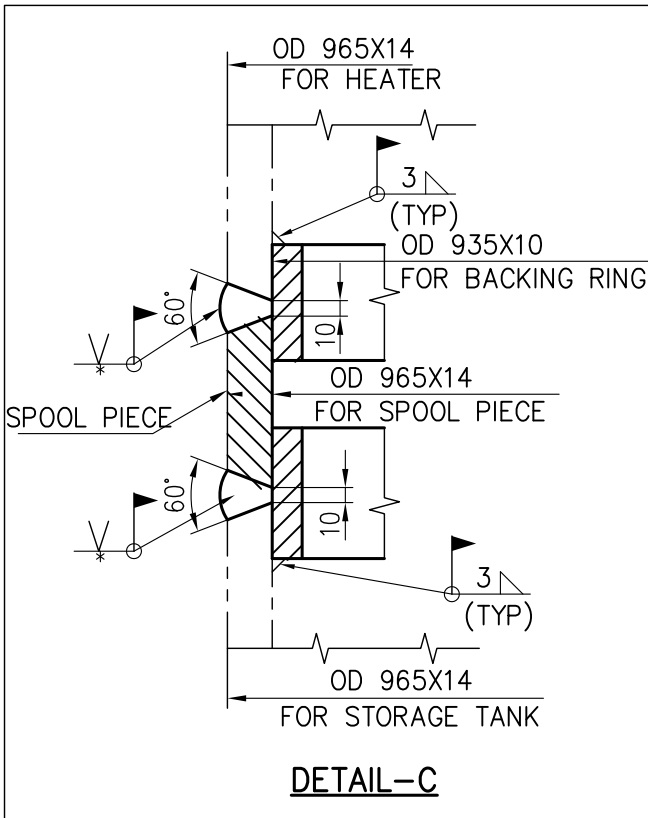
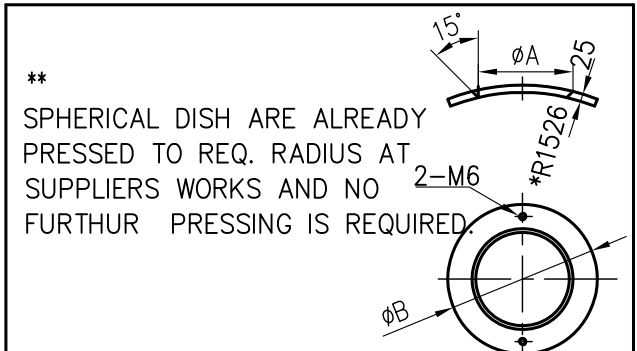
NOTES:-

- 1) ALL FLANGE BOLT HOLES SHALL STRADDLE NORMAL CENTRE LINES OF VESSEL.
- 2) ALL FABRICATED NOZZLES TO BE FULLY RADIOGRAPHED.
- 3) HYDROTEST BLANKING PLATES SHALL BE REMOVED ONLY AT SITE.
- 4) WPS FOR FILLET WELDS ON SHELL SHALL BE AS PER J-002/A.
- 5) ALL LONGITUDINAL AND CIRCUMFERENTIAL WELDS ARE TO BE BACK-GOUGED TO SOUND METAL.
- 6) MAGNETIC PARTICLE TEST REQUIRED ONLY AT NOZZLE TO HEAD WELDS AND NOZZLE TO SHELL WELDS.
- 7) VESSEL WILL BE DESPATCHED IN SINGLE PIECE.
- 8) INSIDE EDGES OF ALL PROJECTED NOZZLES SHALL BE ROUNDED OFF.
- 9) BOLTING TO SECURE HEATER TO STORAGE TANK IS 8 No's OF M27x160
- 10) HYDRAULIC TEST: AS PER HY0852061 & IBR REGULATION 601.
- 11) NOZZLE H4 SHALL BE PLUGGED AT WORKS FOR HYDROTEST PURPOSE. WHICH SHALL THEN BE REMOVED AT SITE AND VENT ORIFICE ASSLY (POS. NO. 51) AS PER RELEVANT DRG. SHALL BE WELDED AS PER DET-G FOR H4.
- 12) F INDICATES SITE WELDING.
- 13) TEST COUPONS REQUIRED FOR ALL LONGITUDINAL SEAM OF ROLLED PIPES.

IMPORTANT NOTES ON DEAERATOR VENT PIPING

- 1) NO SHARP BENDS AND TRAPS ARE ALLOWED IN VENT PIPING.
- 2) VENT PIPE SHALL RISE VERTICALLY FROM DEAERATOR HEATER IN A SHORT LENGTH OF PIPE
- 3) AVOID LONG LINES WITH GREAT NUMBERS OF TURNS
- 4) HORIZONTAL RUNS SHALL BE AVOIDED IN VENT PIPING.
- 5) DO'NT JOIN INDIVIDUAL VENT LINES WITH A COMMON HEADER.

LIST OF NOZZLE CONNECTIONS										WELDING DETAILS			
REF.	DESCRIPTION	NPS	OD x THK	TYPE	QTY	NOZZLE *	AT WORKS *	AT SITE *	REMARKS	ØA	ØB	REF.	VAR.
H1	STEAM INLET	38	965 X 16	BW	1	DET-D1	DET-D1	DET-D5		981	1700	H1	01
H2	CONDENSATE INLET	18	457 X 14	BW	2	DET-D1	DET-D1	DET-D5		473	700	H2	02
H3A,B	SAFETY RELIEF VALVE	8	219.1 X 12.7	FLG. CL.300 RF	2	DET-D8	DET-D8	DET-D8		235	400	H3A,B	03
H4	VENT CONN.	2	COUPLING CL.6000	SW	6	DET-G	DET-G	DET-F				H4	04
H5	TRAY REMOVAL OPENING	24	610 X 14	FLG. CL.300 RF	1	J-007/A	J-015/A			626	950	H5	05
H6	SPARE CONN.	12	323.9 X 12.7	BW	1	DET-D1	DET-D1		WITH DISPERSER	340	500	H6	06
H7	HPH DRAIN CONN.	10	273.1 X 12.7	BW	2	DET-D10	DET-D10	DET-D5		289	450	H7	07
H8	HPH VENT CONN.	2	60.3 X 8.74	BW	6	DET-D17	DET-D17	DET-D21				H8	08
C1	EUALISER CONN.	40	1016 X 14	BW	2	DET-D1	DET-D1	DET-D5 & DET-C		1032	1690	C1	21
C2	DOWN COMMOM CONN.	40	1016 X 14	BW	2	DET-D2	DET-D2	DET-D5 & DET-C		1032	1690	C2	22
C3	PRESSURE GAUGE CONN.	1/2	COUPLING 6000#	SW	1	DET-D6	DET-D6	DET-D31	**			C3	23
C4	TEMPERATURE GAUGE CONN.	M33X2	COUPLING	SCREWED	2	J-008/A	***	SCREW THERMOWELL	SPECIAL COUPLING			C4	24
C5	PRESSURE TRANSMITTER CONN.	1/2	COUPLING CL.6000	SW	3	DET-D6	DET-D6	DET-D31	**			C5	23
C7	PG TEST PRESS. TAP POINT CONN.	1/2	COUPLING CL.6000	SW	1	DET-D6	DET-D6	DET-D31	**			C7	23



SO7855

\*\* SW PIPE TO COUPLING AFTER REMOVING PLUG  
\*\*\* SCREW PLUG WITH WASHER

\* NOTES FOR LIST OF NOZZLE CONN. TABLE

- 1) FOR DETAILS D1 TO D31 REFER DRG. 1-163-10-11178.
- 2) FOR DETAILS J-001/A, J-002/A, J-007/A, J-008/A, J-015/A, J-014/B & J-016/B REFER DRG. 2-163-10-00014.
- 3) FOR DET-A, B, C, F & G REFER THIS DRG.

REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD
ZONE					ZONE					ZONE					ZONE					ZONE					ZONE					ZONE					ZONE				

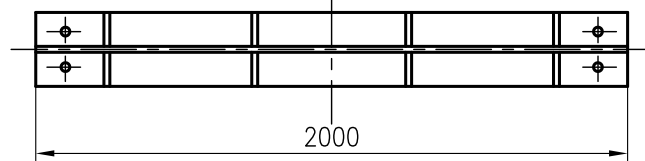
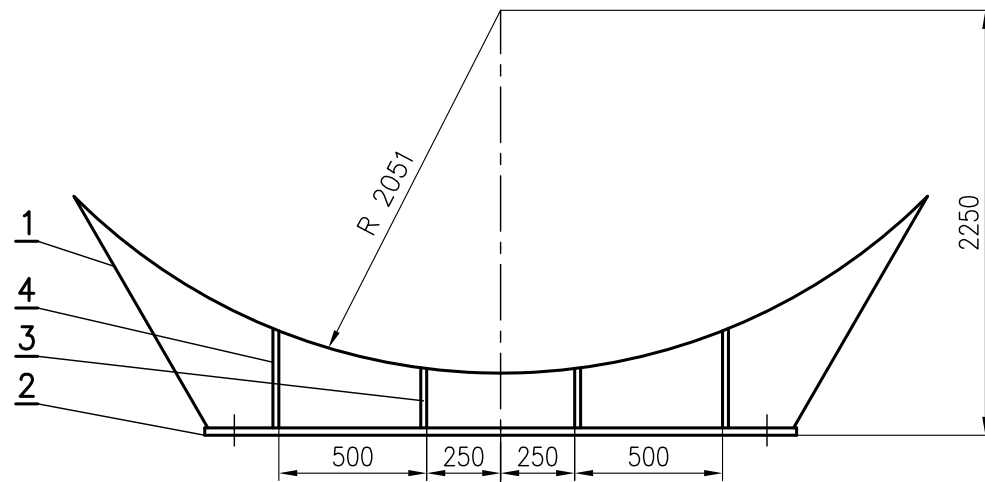
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		TSGENCO-YADADRI 5X800MW			
BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		DRN. B UMA	NAME UMESH MENON	DATE 25.07.15	NO. OF VAR. N.A.
APPD. TSN BHARGAV		CHD. UMESH MENON	DATE 25.07.15	NO. OF N.A.	REV. 25.07.15
DEPT. HEE	GRADE OF TOLDIM. C/M/F	SCALE NTS	WEIGHT (KG) NA	REF. TO ASSY DRG. NA	ITEM NO. N.A.
CODE 405					
TITLE NOZZLE ASSEMBLY (FOR DEAERATOR HEATER)		CARD CODE	DRAWING NO. 1-163-16-11530		REV. 00
SHEET No. 1		NO OF SHEETS 1			

INVENTORY NO. SIGN. AND DATE REF. DRG. NO. THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

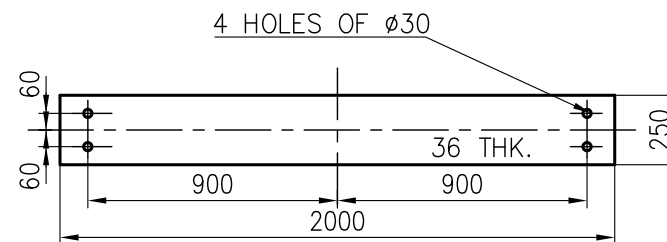
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

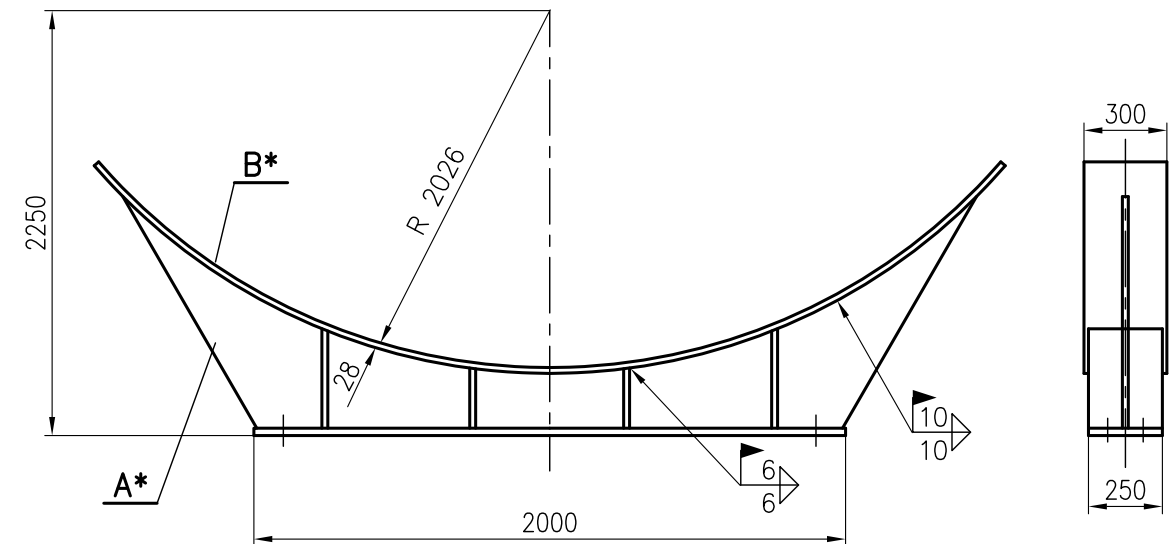
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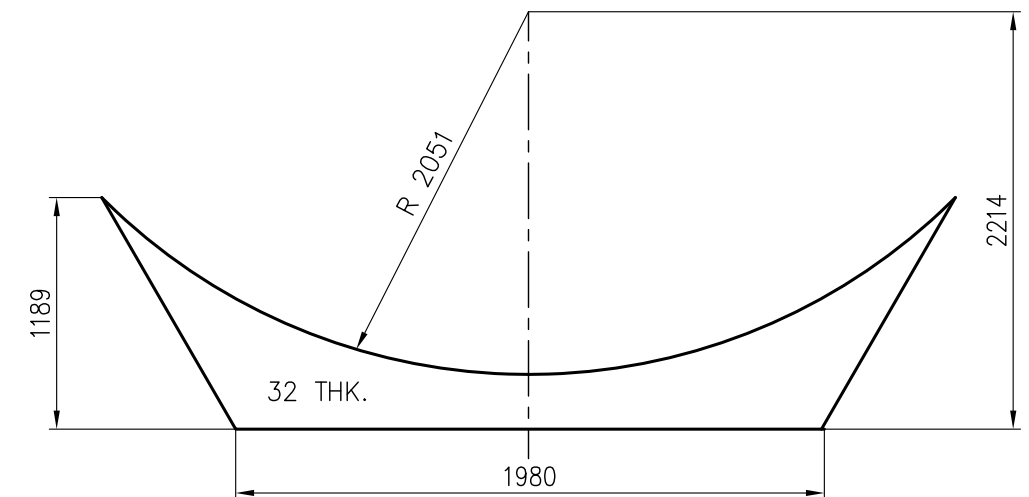
ASSEMBLY OF POS. NO. A



POS. NO. A/2



ASSEMBLY OF POS. NO. A & B

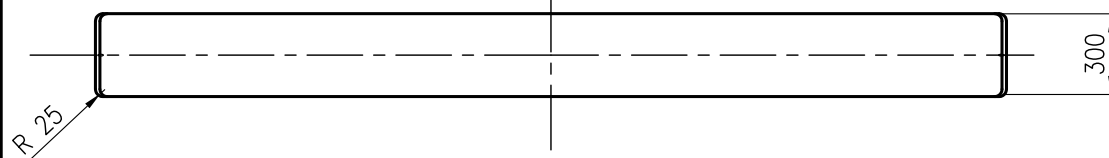
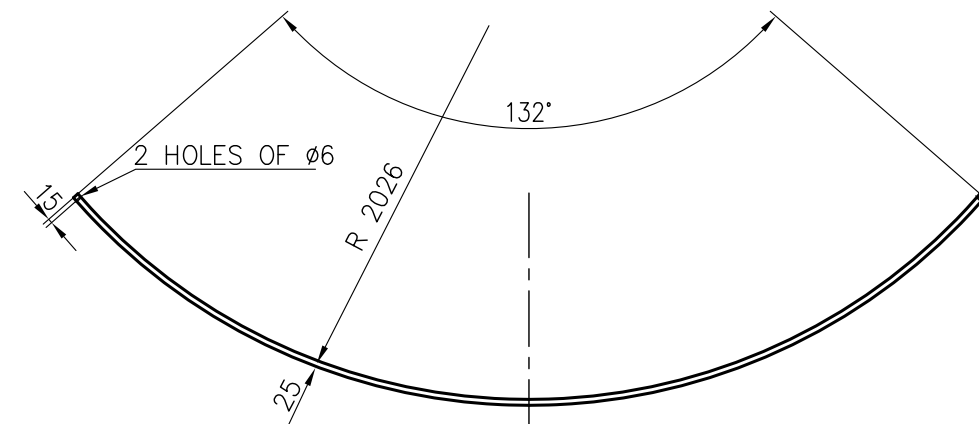


POS. NO. A/1

\* FOR POS. NOS. A & B REFER SHELL ASSLY. DRG.

NOTE: -

1. WELD ONLY POS. No. B i.e. SADDLE SUPPORT PAD TO SHELL.
2. POS. No. A i.e. SADDLE ASSEMBLY SHALL BE DESPATCHED LOOSE TO SITE.



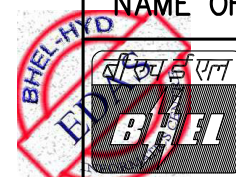
DEVELOPED LENGTH= 4696

POS. NO. B

REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD
ZONE					ZONE				

SO7855

TYPE OF PRODUCT  
OR  
NAME OF CUSTOMER/PROJECT



BHARAT HEAVY ELECTRICALS LTD.  
HYDERABAD

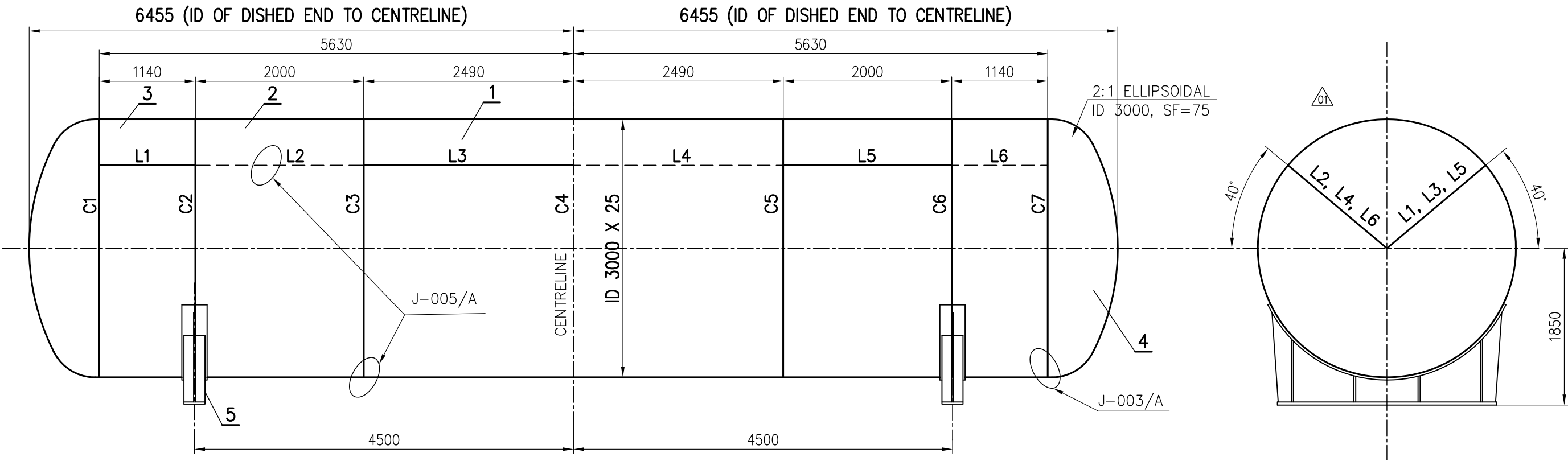
DEPT. HEE	GRADE OF TOL.DIM. C/M/F	SCALE NTS	WEIGHT (KG) NA	REF. TO ASSY DRG. NA	ITEM NO. NA	NO.OF ITEMS NA
CODE 405						
TITLE HEATER SUPPORT			CARD CODE	DRAWING NO. 3-163-11-12044		REV. 00
				SHEET No.		NO OF SHEETS

INVENTORY NO. SIGN. AND DATE REF. DRG. NO. THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 3-163-16-11772



NOTE: -

1. DETAIL OF WELDS & WPS. NOS. REF. DRG. NO. 2-163-10-00014
2. RADIO GRAPHY ----- 100 %.
3. ALL LONGITUDINAL & CIRCUMFERENTIAL WELDS ARE TO BE BACK GOUGED TO SOUND METAL.
4. DURING THE FIT UP OF DISHED END TO SHELL A REFERENCE LINE SHALL BE MARKED ON THE SHELL AT A DISTANCE OF 100MM FROM THE END OF THE SHELL , WHICH SHALL BE TRANSFERED BACK AFTER WELDING, TO IDENTIFY WELD LINE.
5. DEVELOPED LENGTH OF POS. NO. 1, 2 & 3= 9503.
6. TEST COUPONS REQUIRED FOR ALL LONGITUDINAL SEAMS OF SHELL & DISHED ENDS.

SO7855


TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT TSGENCO-YADADRI 5X800MW



BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

DRN.	NAME B UMA	SIGN.	DATE 25.07.15	NO.OF VAR.
CHD.	UMESH MENON		25.07.15	NA
APPD.	TSN BHARGAVA		25.07.15	

REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD
					01	21.09.15	Uma		TSN
ZONE					ZONE	NO. OF L-SEAMS REDUCED TO 1 FROM 2.			

DEPT. HEE	GRADE OF TOL.DIM. C/M/F		SCALE NTS	WEIGHT (KG) NA	REF. TO ASSY DRG. NA	ITEM NO. NA	NO.OF ITEMS NA
CODE 405							
TITLE SHELL ASSLY. (FOR DEAERATOR HEATER)				CARD CODE	DRAWING NO. 3-163-16-11772		REV. 01
					SHEET No. 1 NO OF SHEETS 1		



INVENTORY NO. SIGN. AND DATE REF. DRG. NO. THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

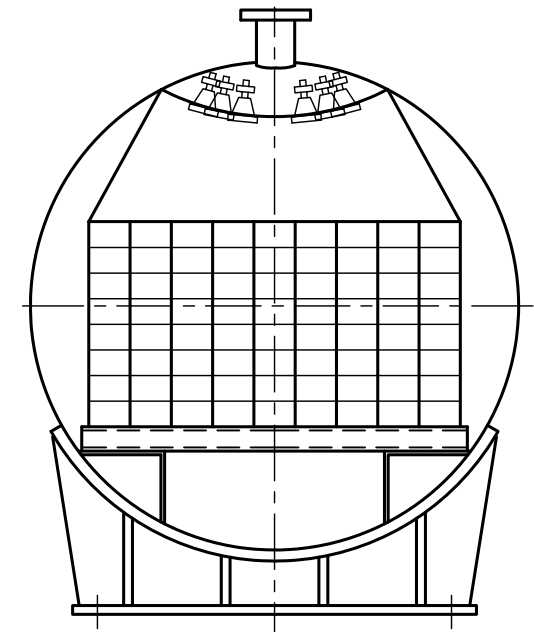
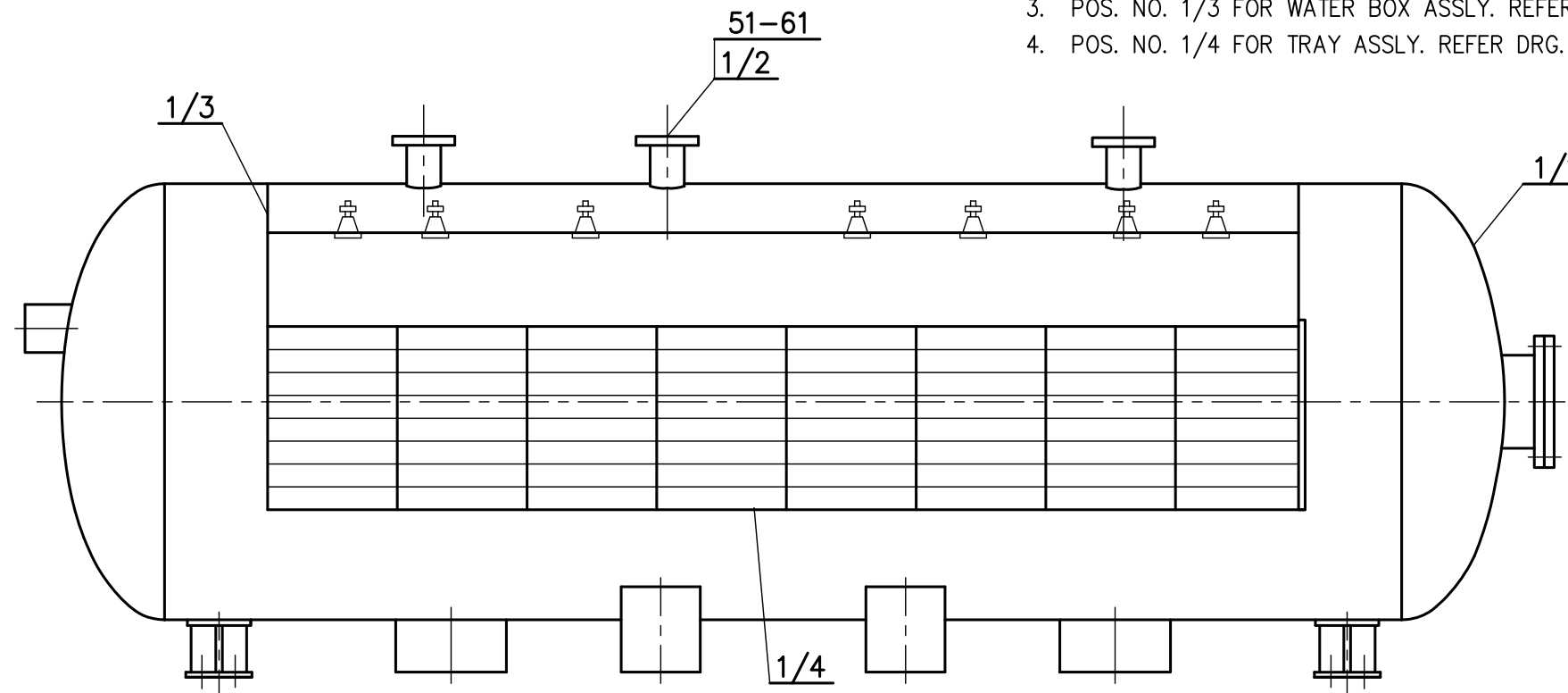
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 3-163-16-11773

NOTES:

1. POS. NO. 1/1 FOR SHELL ASSLY. REFER DRG NO. 3-163-16-11772
2. POS. NOS. 1/2, 51-61 FOR NOZZLE ASSLY. REFER DRG. NO. 1-163-16-11530
3. POS. NO. 1/3 FOR WATER BOX ASSLY. REFER DRG. NO. 1-163-16-11502
4. POS. NO. 1/4 FOR TRAY ASSLY. REFER DRG. NO. 1-163-16-11503



DESIGN DATA

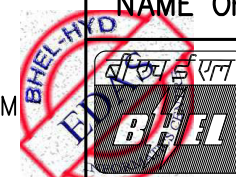
DESCRIPTION		
DESIGN PRESSURE	Kg/sq.cm (g)	14.0 & FULL VACUUM
TEST PRESSURE	Kg/sq.cm (g)	23.8
DESIGN TEMPERATURE MAX/MIN	°C	395/0
TEST TEMPERATURE MAX/MIN	°C	AMBIENT/ 20
CORROSION ALLOW.	SHELL/ HEADS	3.2
	RF PADS/ NOZZLES/ FLANGES mm	1.6
RADIO GRAPHY		100%
JOINT EFFICIENCY		1.0
INSPECTION		APPROVED QP & IBR/DOB
TOTAL WEIGHT OF HEATER	KG	48798
DESPATCH WEIGHT	KG	47613
PWHT		REQUIRED

IMPORTANT NOTE:-

- 1) PAINTING INSIDE: NIL  
OUTSIDE: ONE COAT OF ZINC SILICATE PRIMER & TWO COATS OF HEAT RESISTANT ALUMINIUM PAINT AS PER AA56134.

DESIGN, FABRICATION & TESTING CODE	IBR CHAPTER-XII (CLASS-1 BOILER), ASME SEC VIII DIV.1-2013, HEI-2011
W.O WBSE	W-10324162/63/64/66/66 00
S.O WBSE	M-PA-1052
CUSTOMER DRG.No. / VESSEL NO.	HY-DG-1-16310-88301/ 1880/84/88/92/96
WELD DET.& WPS DRG.No.	2 163 10 00014
NOZZLE DETAIL DRG. No.	1 163 10 11178
HEADER MATERIAL NO.	T31631611773-00

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT TSGENCO-YADADRI 5X800MW



BHARAT HEAVY ELECTRICALS LTD.  
HYDERABAD

DRN.	B UMA	NAME	Uma	SIGN.	DATE	NO.OF VAR.
CHD.	UMESH MENON				25.07.15	NA
APPD.	TSN BHARGAVA				25.07.15	

REV.	DATE	ALTERED	CHECKED	APPD	DEPT. HEE	GRADE OF TOL.DIM. C/M/F	SCALE NTS	WEIGHT (KG) NA	REF. TO ASSY DRG. NA	ITEM NO. NA	NO.OF ITEMS NA
					CODE 405						
ZONE					TITLE HEATER ASSLY. (DEAERATOR)			CARD CODE	DRAWING NO. 3-163-16-11773		
									REV. 00		
									SHEET No. NO OF SHEETS		

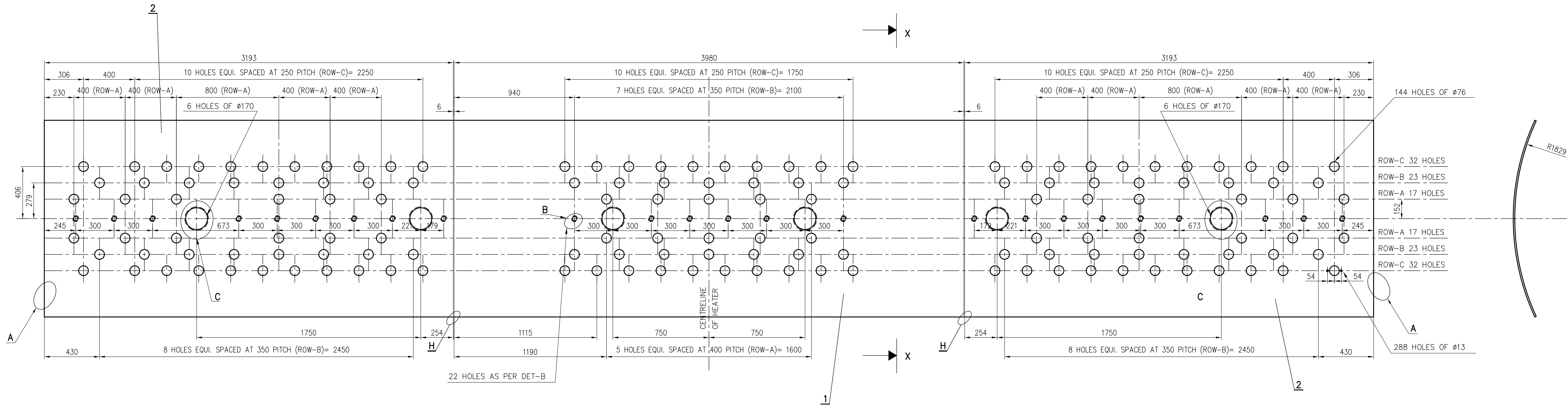
SO7855

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IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

INVENTORY NO. SIGN AND DATE REF. DRG. NO. COMPUTER FILE NAME

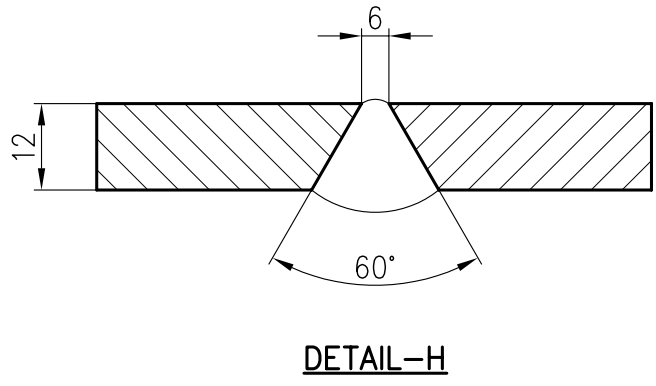
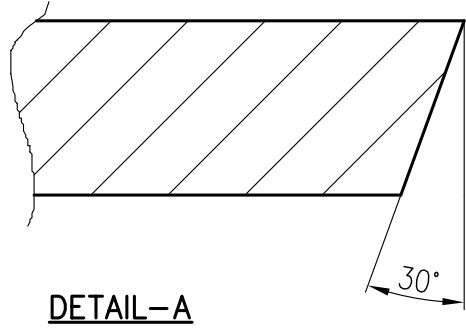
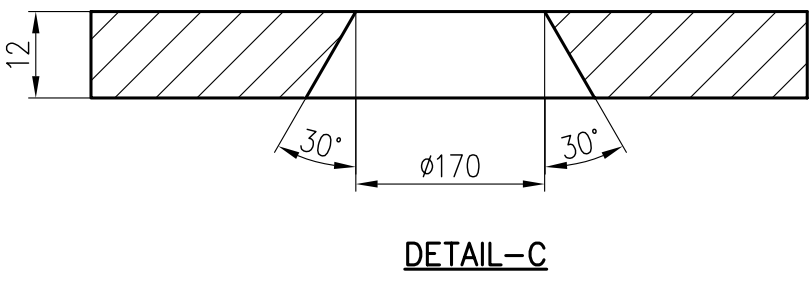
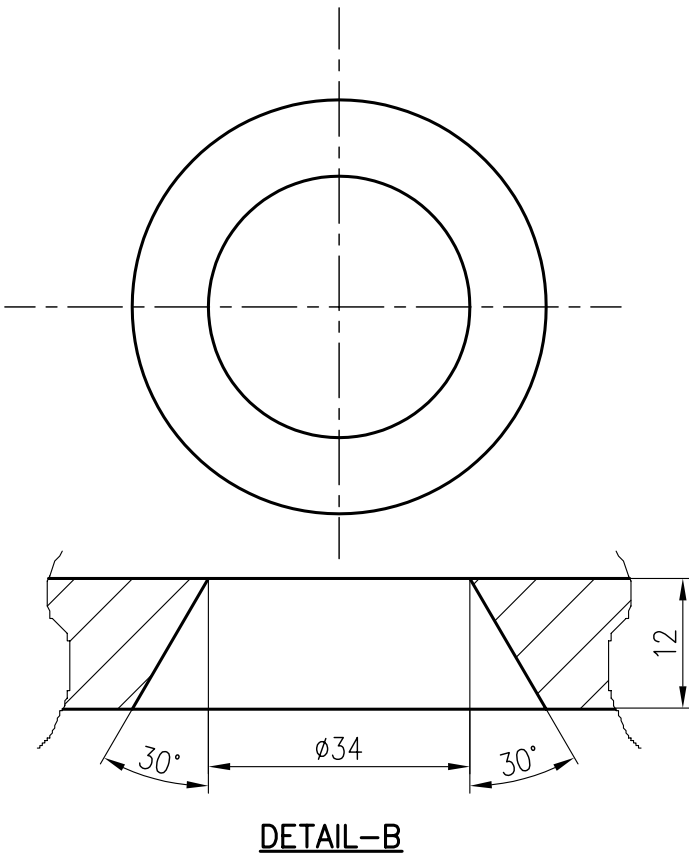
GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

REV.	DATE	ALTERED	CHECKED	APPD.	REV.	DATE	ALTERED	CHECKED	APPD.	REV.	DATE	ALTERED	CHECKED	APPD.	REV.	DATE	ALTERED	CHECKED	APPD.	REV.	DATE	ALTERED	CHECKED	APPD.	REV.	DATE	ALTERED	CHECKED	APPD.	REV.	DATE	ALTERED	CHECKED	APPD.	REV.	DATE	ALTERED	CHECKED	APPD.
ZONE					ZONE					ZONE					ZONE					ZONE					ZONE					ZONE					ZONE				



SECTION X-X

DEVELOPED LENGTH OF THE PLATE = 1579  
CHORD LENGTH OF THE PLATE = 1534



SO7855

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		NAME		SIGN.	DATE	OF
BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		DRN.	A.L. RAJAM		23.11.11	VAR.
		CHD.	UMESH MENON		23.11.11	N.A.
		APPD.	TSN BHARGAV		23.11.11	N.A.
DEPT. HEE	GRADE OF TOL. DIM. C/M/F	SCALE NTS	WEIGHT (KG)	REF. TO ASSY DRG.		ITEM NO. N.A.
CODE 405						NO. OF ITEMS N.A.
TITLE VALVE PLATE ASSLY.		CARD CODE	DRAWING NO. 1-163-16-11500		REV. 00	
			SHEET No. 1		NO OF SHEETS	



1. AFTER ASSEMBLY OF SPRAY VALVES TO WATER BOX, ALL BOTTOM NUTS OF THE SPRAY NOZZLES SHALL BE TACK WELDED TO THE VALVE BODY AT TWO POSITIONS 180° APART, AFTER ENSURING PERFECT LOCKING OF DOUBLE SELF LOCKING NUTS.
2. i) END PLATE WITH A HOLE (WITH A PLUG INSERTED IN IT) IS FOR VENTING AIR DURING HYDRO TEST PURPOSE, HENCE IT SHOULD BE WELDED ON MAN HOLE SIDE ONLY.  
ii) REMOVE THE PLUG POS. NO. 18, DURING HYDRO TEST AND KEEP IT BACK IN POSITION AFTER HYDROTEST
3. BEFORE CUTTING THE MATERIAL FOR J-STIFFENERS (POS. NO. 7,8,9,20,21,22) ACTUAL HEIGHT FOR J-STIFFENERS SHALL BE PHYSICALLY MEASURED INSIDE THE SHELL. THIS IS TO TAKE CARE OF ANY CHANGE IN J-STIFFENER HEIGHT DUE TO OVALITY OF THE SHELL.
4. \* REFER DEAERATOR HEATER ASSLY. DRG. FOR REQUIREMENT OF PWMT.

SECTION X-X

### LINER TO LINER JOINT

DETAIL-C

DETAIL-D

DETAIL-E

DETAIL-F

DETAIL-S  
VALVE FIXING ARRGT

DETAIL-A

DETAIL-E

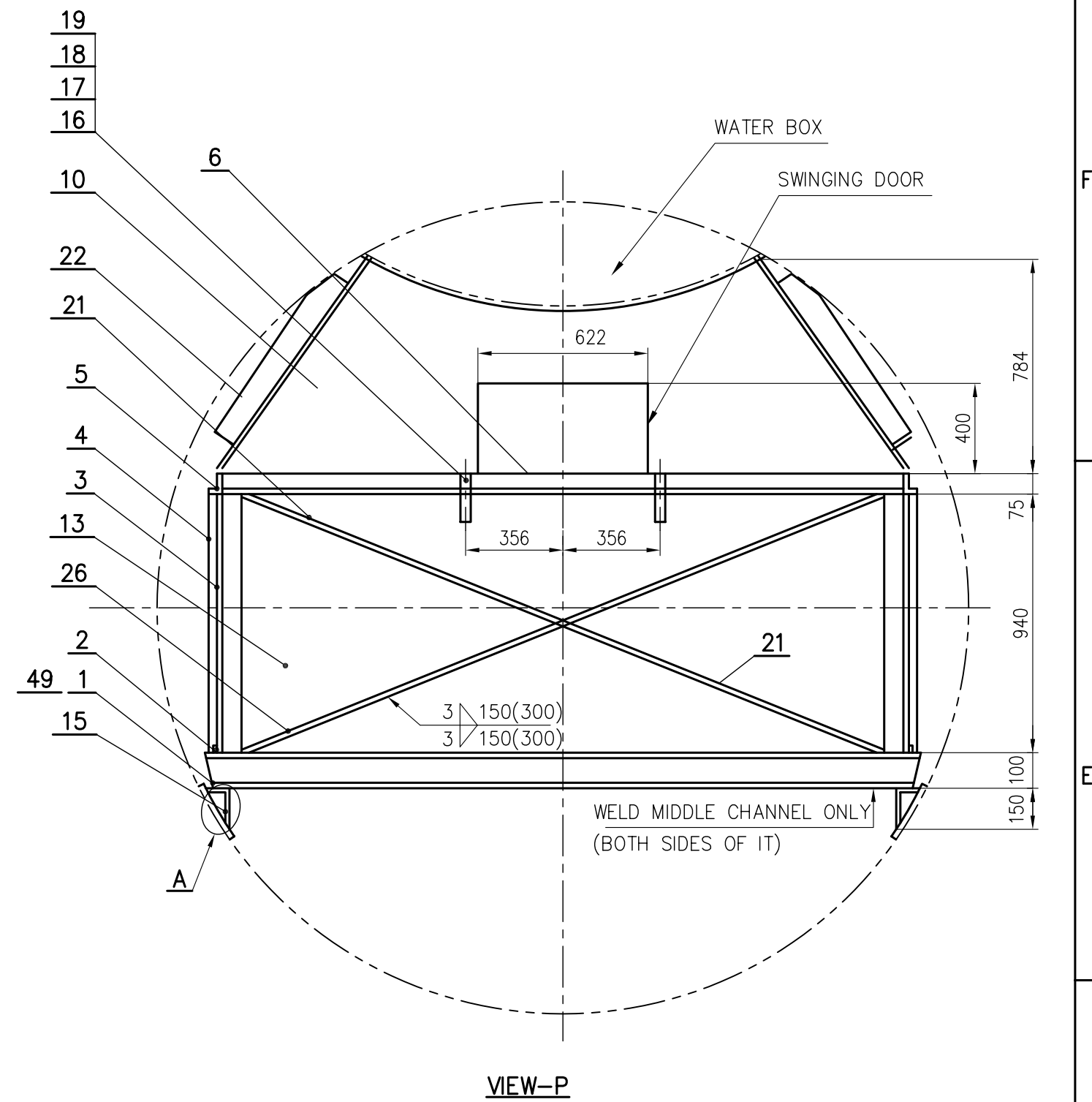
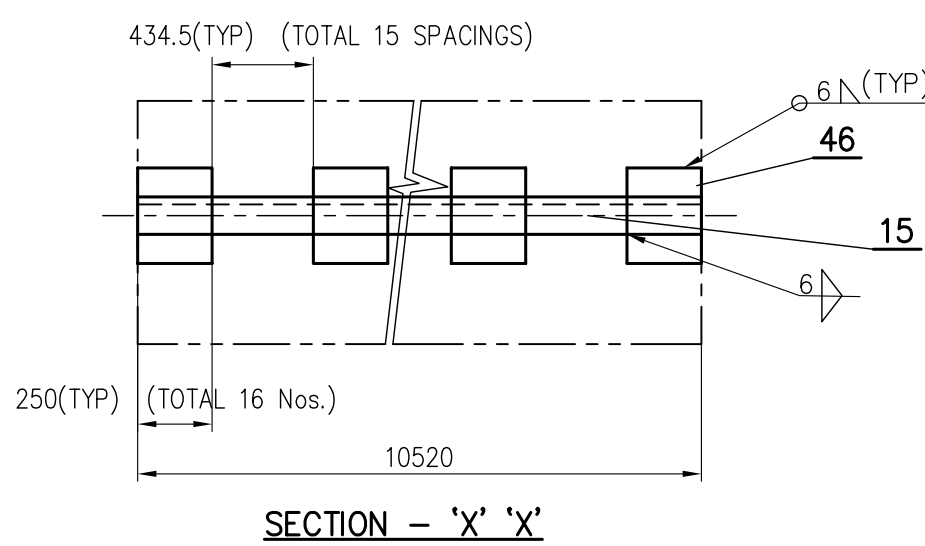
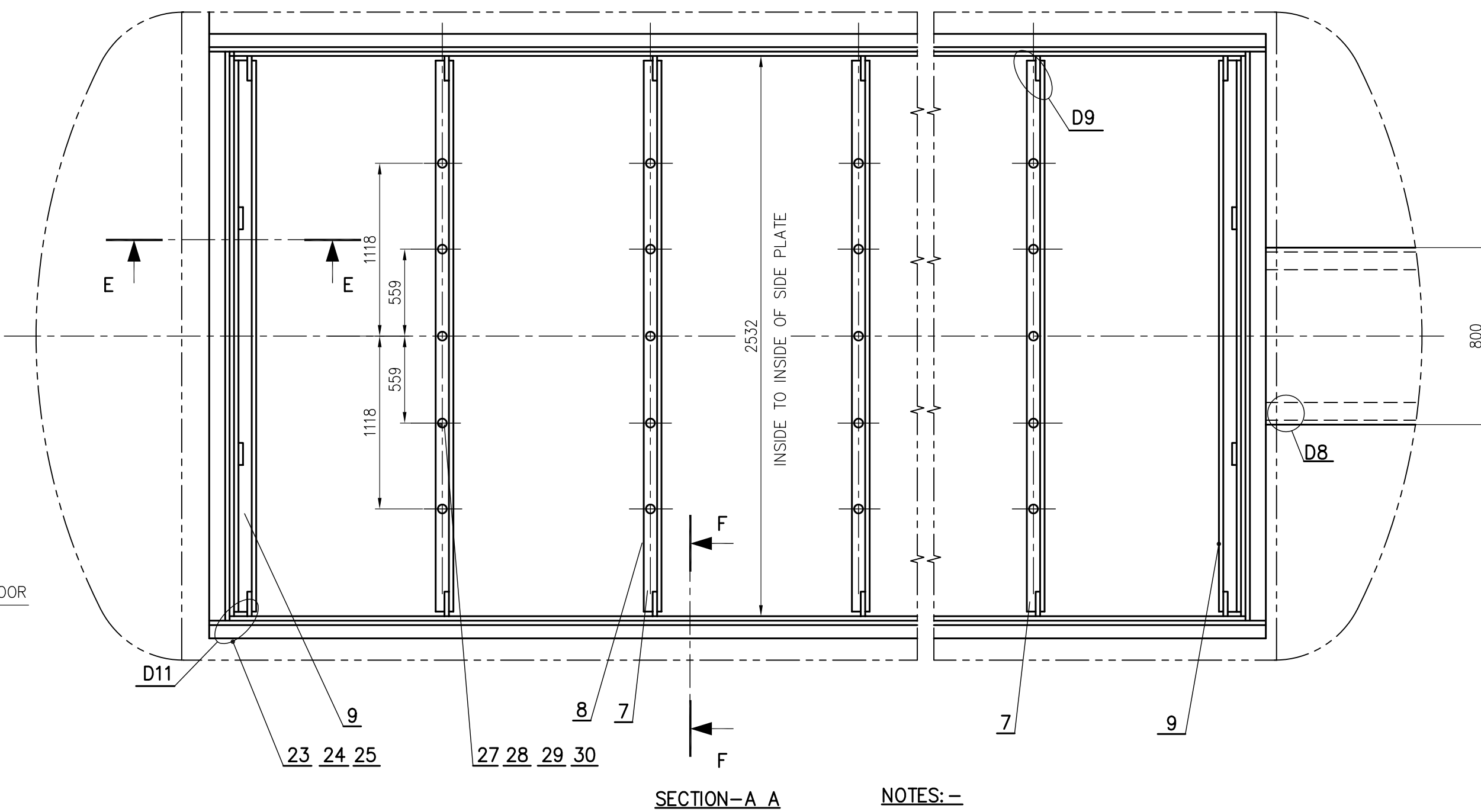
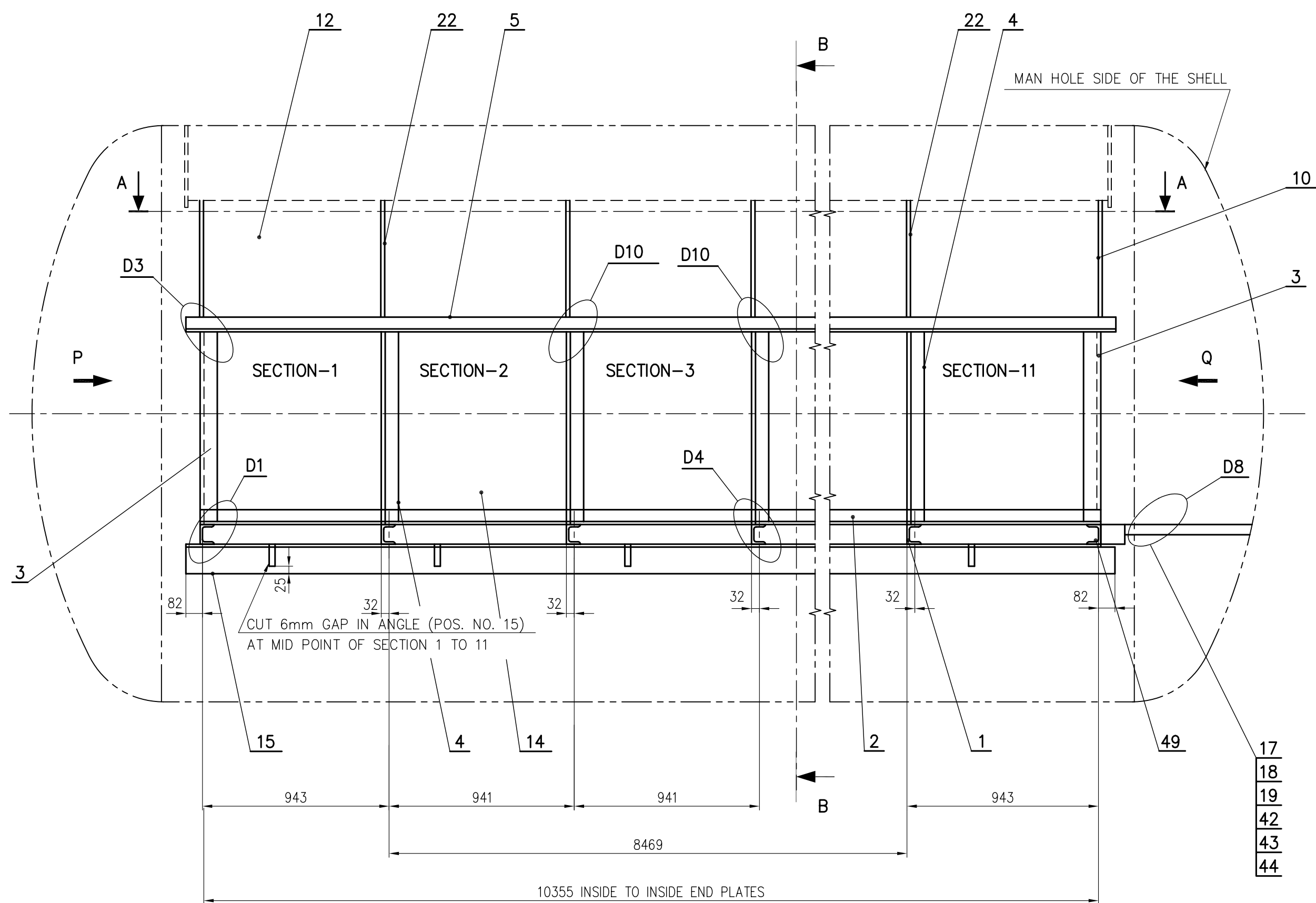
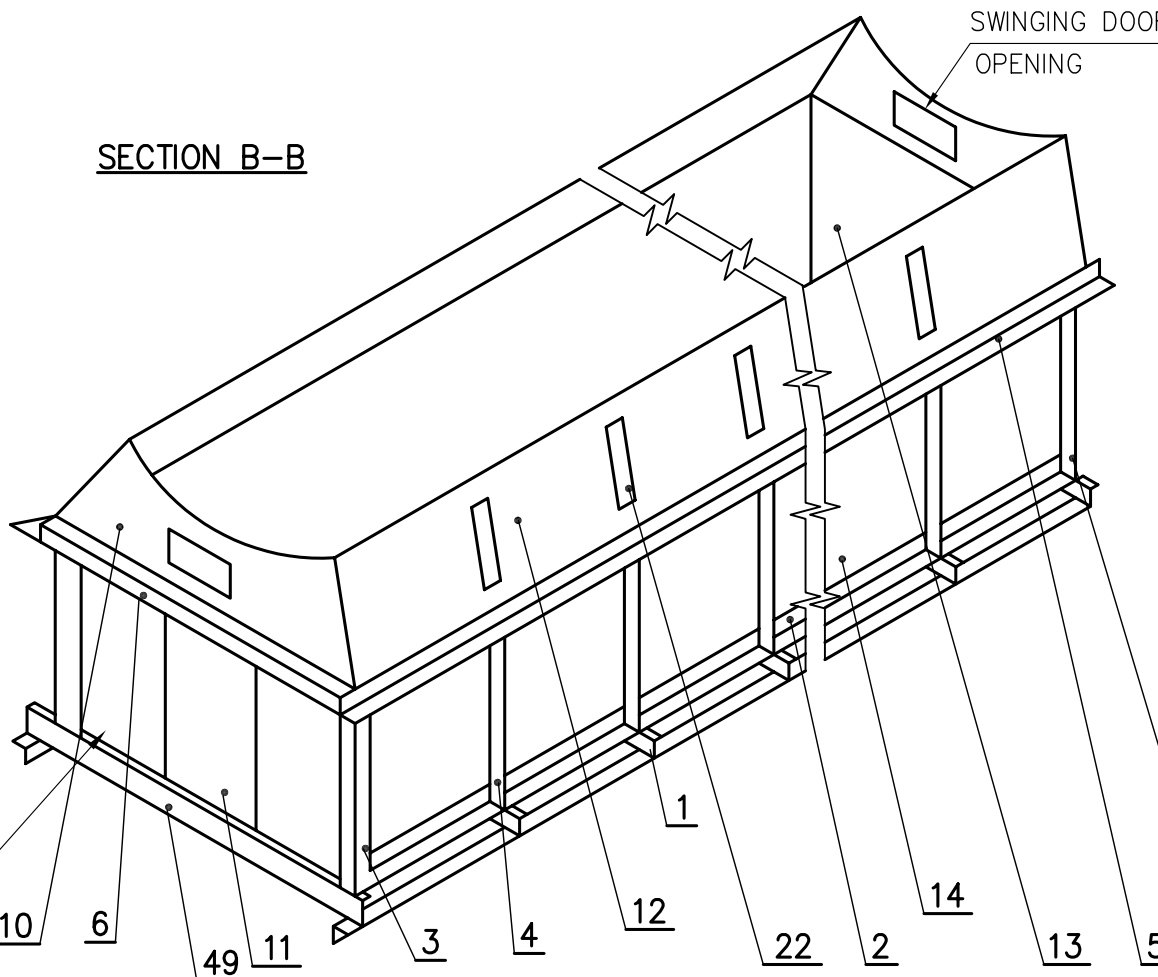
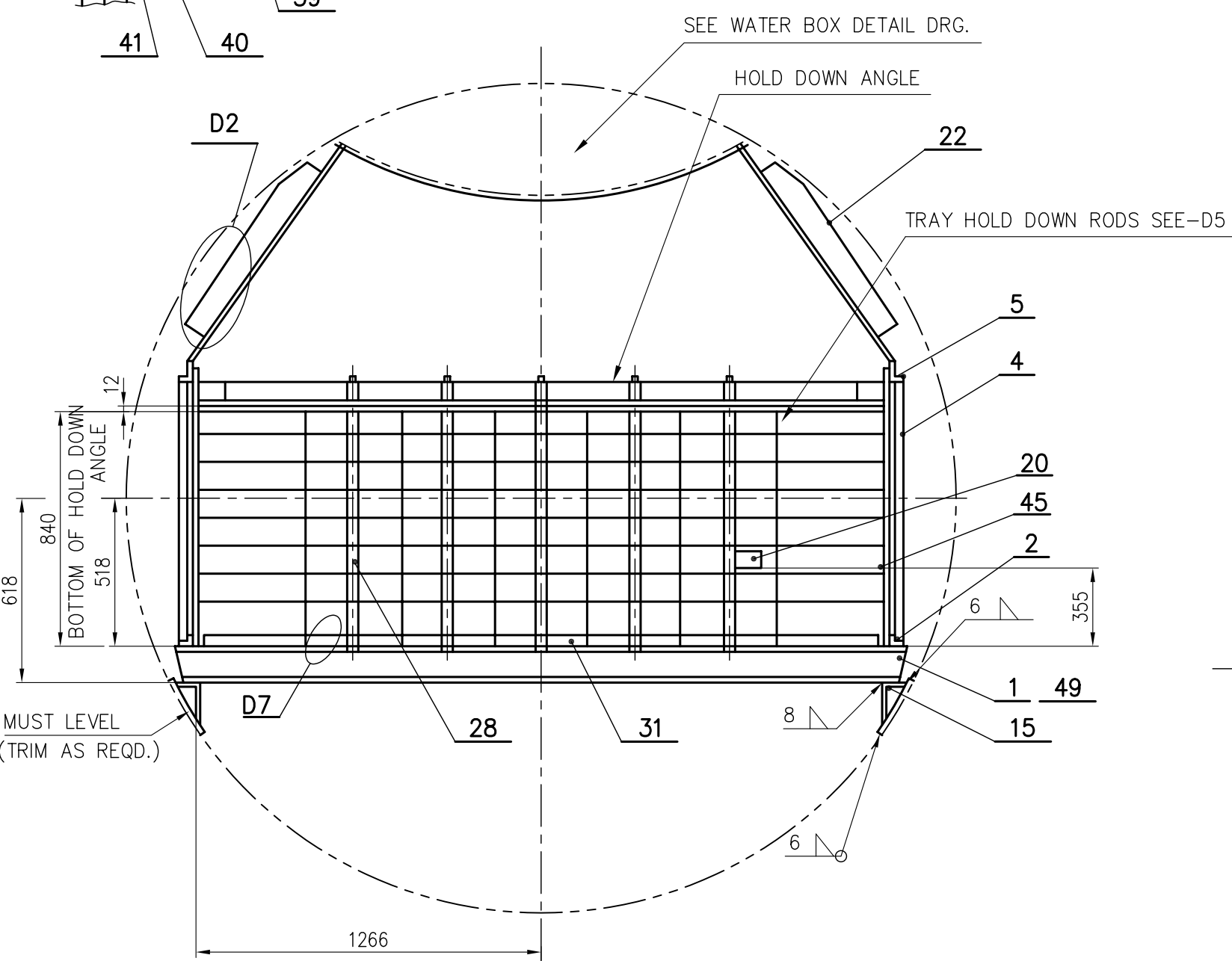
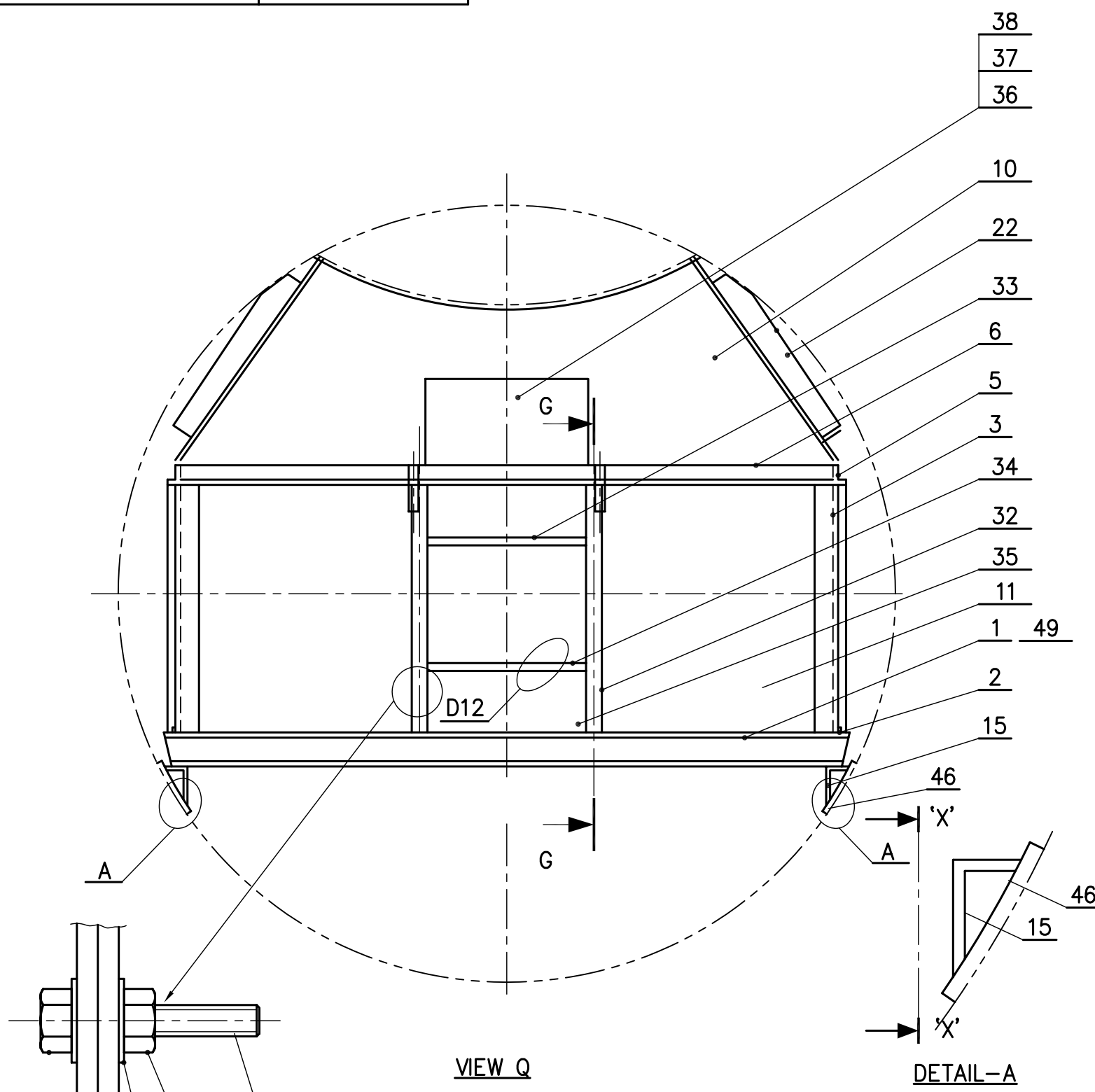
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TYPE OF PRODUCT OR OF CUSTOMER/PROJECT		NAME A.L.RAJAM		DATE 23.11.11	NO. OF VAR.
DRN. BHRAT HEAVY ELECTRICALS LTD. CHD. HYDERABAD		NAME UMESH MENON		DATE 23.11.11	NO. OF VAR.
APPD. TSN BHARGAVA		NAME JSN		DATE 23.11.11	NO. OF VAR.
DEPT. HEE	GRADE OF TOL.DIM. C/M/F	SCALE NTS	WEIGHT (KG) NA	REF. TO ASSY DRG. NA	ITEM NO. N.A
CARD CODE 405			CARD CODE	DRAWING NO. 1-163-16-11502	REV. 00
TITLE WATER BOX ASSLY.			SHEET No. 1 NO. OF SHEETS 1		



SO7855

REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD
ZONE					ZONE					ZONE					ZONE					ZONE					ZONE					ZONE				



#### TRAY ASSEMBLY PROCEDURE

1. COMPLETE SHELL SEGMENT FABRICATION COVERING THE ENTIRE LENGTH
2. UN-EQUAL ANGLES (POS. NO. 15) ARE WELDED TO SHELL CHANNELS (POS. NO. 1 & 49) IS LAID OUTSIDE THE SHELL.
3. BARGRATING (POS. NO. 31) IS PLACED ON THE CHANNELS AND FILLET WELDED
4. BOTTOM SIDE ANGLES (POS. NO. 2) ARE WELDED TO THE CHANNELS (POS. NO. 1) AND WELDED TO THE SIDE POST (POS. NO. 4) AS PER DETAIL-D4
5. CORNER POSTS (POS. NO. 3) ARE WELDED TO SIDE ANGLE (POS. NO. 2) AND CHANNEL (POS. NO. 49)
6. TOP SIDE ANGLES (POS. NO. 5) ARE WELDED SIDE AND CORNER POSTS AND WELDED AS PER DETAIL D3 & D5
7. SIDE PLATE (POS. NO. 14) IS KEPT NEAR THE SIDE POST (POS. NO. 4)
8. STIFFENER (POS. NO. 22) IS WELDED TO THE SIDE SHEET (POS. NO. 12)
9. END ANGLES ARE KEPT IN POSITION AND WELDED AS PER SECTION-AA
10. BACK END PLATE AND FRONT END PLATE (POS. NO. 11 & 13) ARE KEPT IN POSITION AND FILLET WELDED BACK STIFFENERS ARE ALSO WELDED (POS. NO. 21, 26) ASSEMBLY IS PUSHED INSIDE HEADER WELD SIDE SHEET TO SIDE SHEET FROM INSIDE AND ALSO WELD END SHEET (POS. NO. 10)
11. INSTALL ONE ROW TRAY ACROSS BACK OF ENCLOSURE OPPOSITE MANHOLE END AND INSTALL ONE ROW LONG TO ENSURE PROPER FIT IN TO ENCLOSURE
12. STACK ONE ROW TRAYS ACROSS THE ENCLOSURE 8 DEEP AND 9 WIDE. TRAYS SHOULD BE FLUSH WITH ENCL. WALL LOCATE SIDE CLIP (POS. NO. 7)
13. ATTACH ANGLES (POS. NO. 9) TO SIDE CLIPS (POS. NO. 7). FLAT BAR LOCATED BELOW ANGLE (POS. NO. 9) SHOULD FIT BETWEEN BACK SIDE SECTION-BB
14. AFTER POSITIONING ANGLE LOCATE SHIMS FOR THESE DETAILS SEE SECTION-BB
15. BEFORE LOCATING SECOND ROW OF TRAYS HOLDDOWN ROD (POS. NO. 28) WITH WASHER AND NUT IS PASSED THROUGH ANGLE (POS.NO.8) AND GUIDED THROUGH TRAY SIDE HOLES TO THE HOLE IN CHANNEL (POS.NO.1). IT IS TIGHTEND AT THE BOTTOM WITH A BEVELLED WASHER (HAND TIGHTEN ONLY)
16. SECOND ROW IS THEN BUTTED UP AGAINST THE FIRST ROW.
17. THE PROCEDURE IS CONTINUED UNTIL THE LAST ROW.
18. AFTER INSTALLING THE LAST ROW, ONE CAN TIGHTEN NUTS OR CHANNELS FROM THE BOTTOM OF THE ENCLOSURE WHILE A SECOND PERSON CAN TIGHTEN NUTS ON ANGLES FROM THE TOP OF THE ENCLOSURE. THIS CAN BE ACCOMPLISHED BY ENTERING THROUGH THE SWINGING DOOR
19. IMPORTANT:- TRAY SHOULD FIT SNUGLY SO THAT PROCEDURES DOES NOT HAVE TO BE REPEATED
20. HOLES FOR RECEIVING HOLD DOWN RODS SHALL TO BE DRILLED ON BOTTOM CHANNELS (POS. NO. 1) ONLY AND NOT ON END BOTTOM CHANNELS (POS. NO. 49)

#### NOTES:-

1. TRAY CONFIGURATION 9 WIDE x 11 LONG x 8 HIGH.
2. DIMENSION OF POS. NO. 10 & 11 TO BE ADJUSTED TO MATCH WITH WATER BOX & TRAY ASSEMBLY.
3. FOR DETAILS REFER DRG. NO. 1-163-16-11293
4. POS. NO. 10 & 12 SHALL BE CUT TO SIZE ONLY WITH EXACT MESUREMENTS TAKEN, AFTER PLACING THE TRAY ENCLOSURE INSIDE THE HEADER SHELL.
5. FOR POS. NO. 47 REFER DETAIL-D12 OF DRG. 1-163-16-11293.
6. FOR POS. NO. 48 REFER DETAIL-D5 OF DRG. 1-163-16-11293.
7. BAR GRATINGS PROVIDED AT THE BOTTOM, SHALL TOUCH ALL THE SIDES OF TRAY ENCLOSURE WITHOUT ANY GAP, TO PREVENT TRAYS FROM FALLING DOWN.

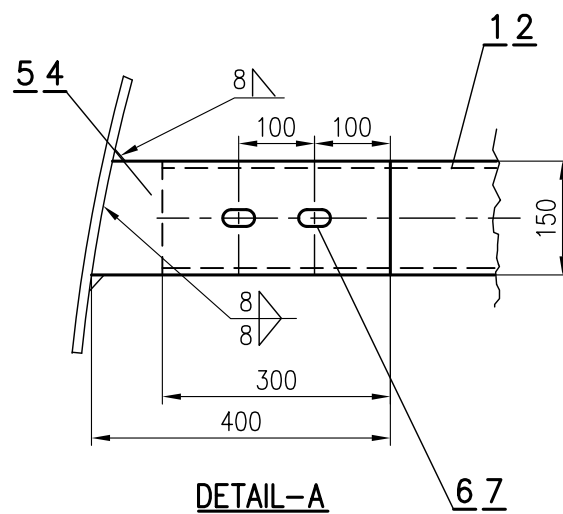
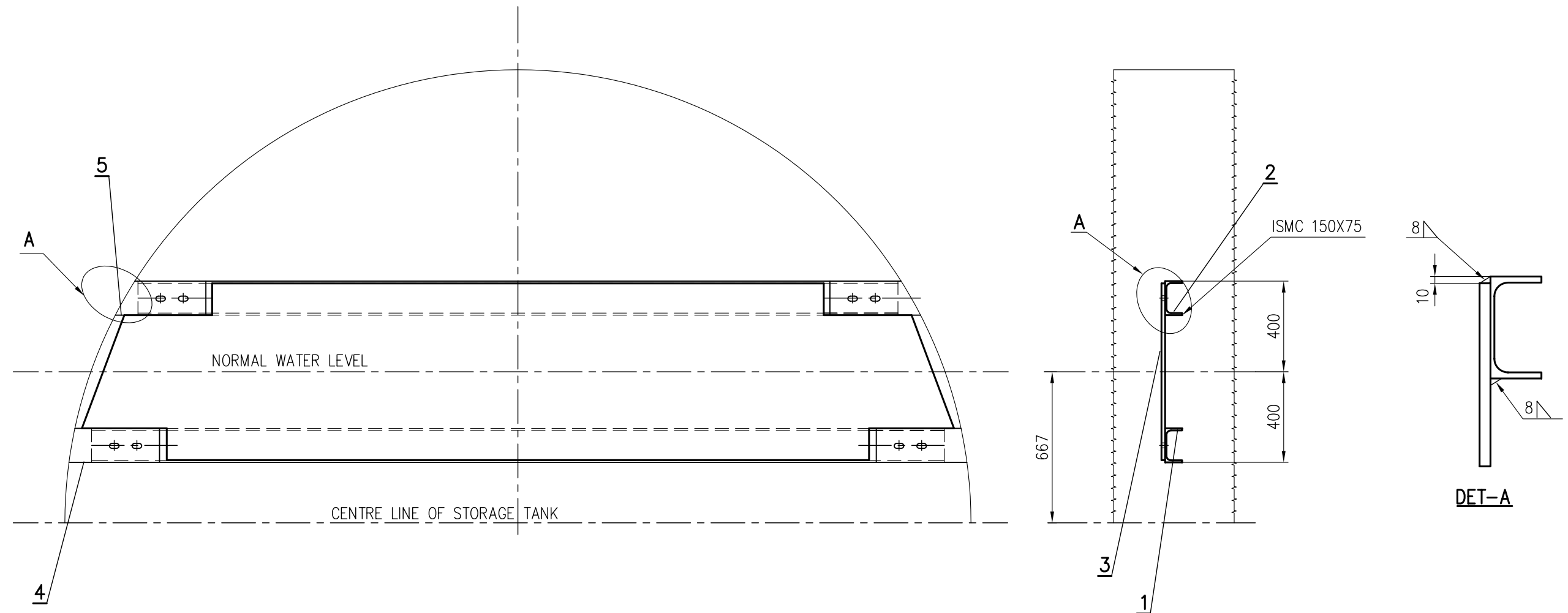
TYPE OF PRODUCT OR OF CUSTOMER/PROJECT		BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		DRN. A.L RAJAM	NAME	DATE	NO.OF VAR.
CHD. UMESH MENON		23.11.11		23.11.11	NA		
APPD. TSN BHARGAV		23.11.11		23.11.11	NA		
DEPT. HEE	GRADE OF TOLDIM. C/M/F	SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS	
CODE 405	N.T.S			NA			
TITLE		CARD CODE	DRAWING NO.		REV.		
TRAY ASSEMBLY			1-163-16-11503		00		
SHEET No. 1		NO OF SHEETS		1			

INVENTORY NO. SIGN. AND DATE REF. DRG. NO. THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

DRG. NO. 3-163-11-11566

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)



NOTE

FILLET WELD BETWEEN BAFFLE PLATE (POS. NO. 3) AND CHANNELS (POS. NO. 1 & 2) SHALL BE 8

TYPE OF PRODUCT  
OR  
NAME OF CUSTOMER/PROJECT

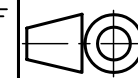
BHARAT HEAVY ELECTRICALS LTD.  
HYDERABAD

DRN.	NAME A.L.RAJAM	DATE 27.11.03	NO.OF VAR.
CHD.	UMESH MENON	27.11.03	NA
APPD.	TSN.BHARGAV	27.11.03	NA

REV.	DATE	ALTERED	CHECKED	APPD

DEPT.  
HEE  
CODE  
405

GRADE OF  
TOL.DIM.  
C/M/F



SCALE  
NTS

WEIGHT (KG)

REF. TO ASSY DRG.  
NA

ITEM  
NO.  
NA  
NO.OF  
ITEMS  
NA

TITLE  
ANTI SURGE BAFFLE  
ASSLY

CARD  
CODE

DRAWING NO.  
3-163-11-11566

REV.  
00

SHEET No. 1 NO OF SHEETS 1

SO7855

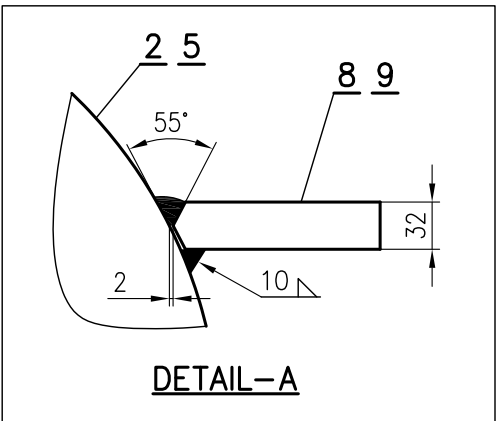
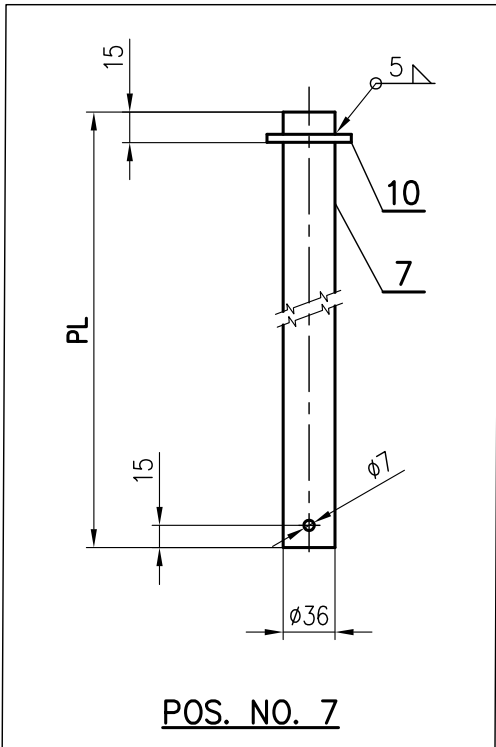
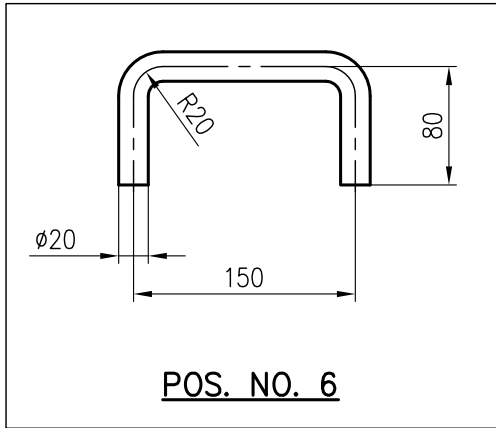
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Therefore signatures are not essentially required.

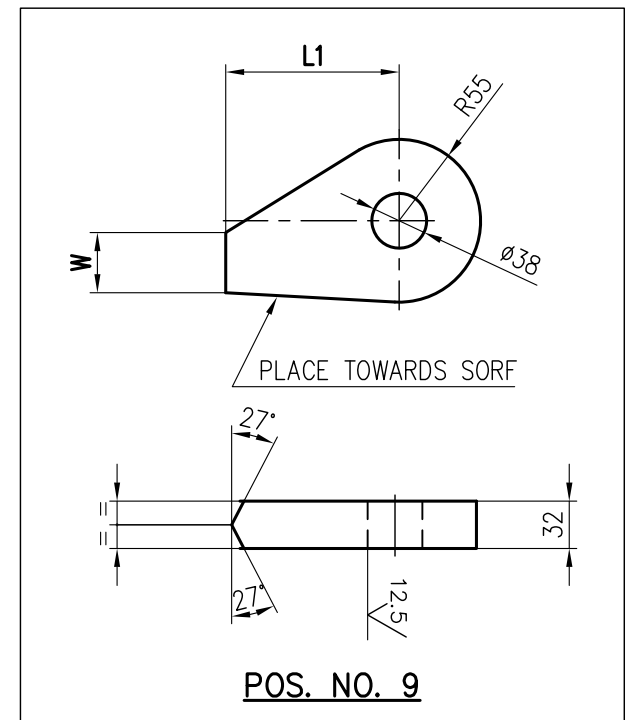
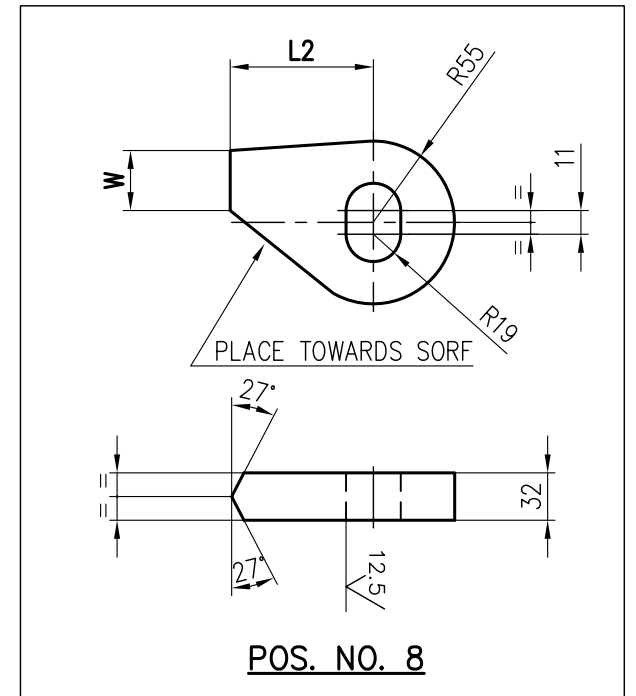
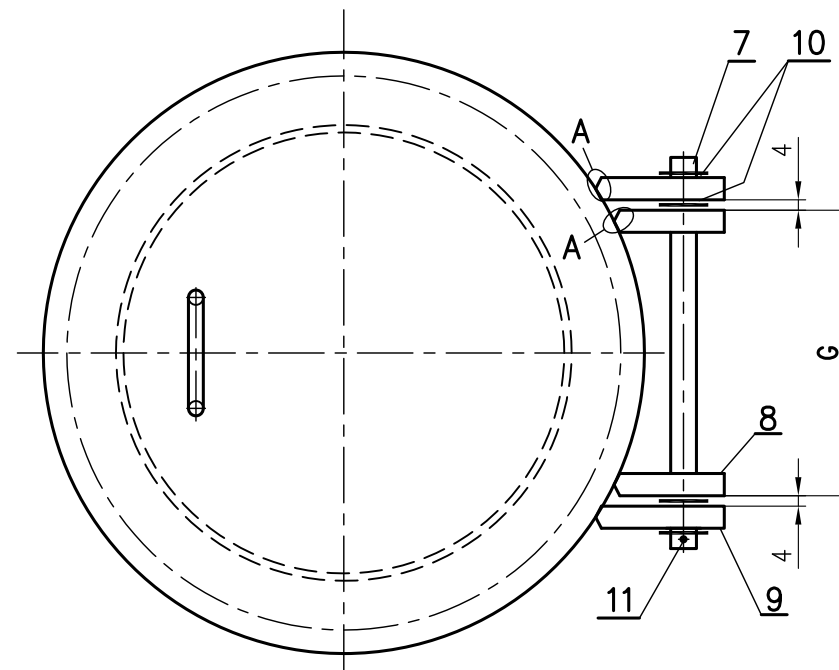
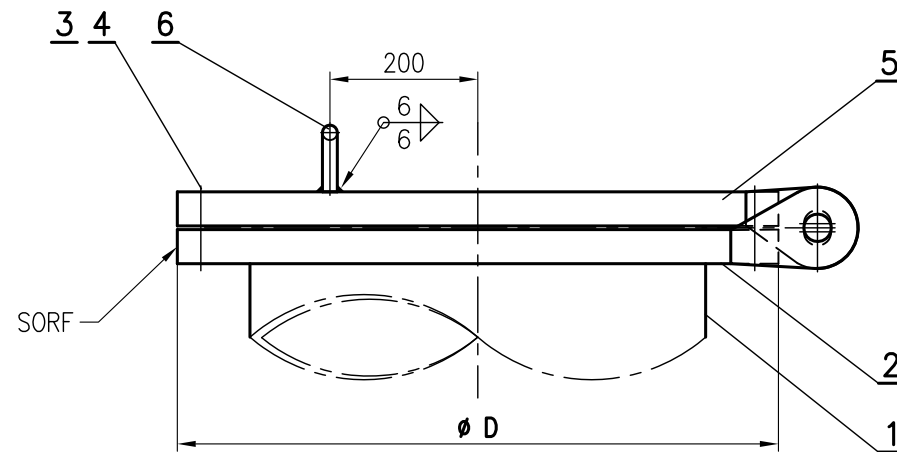
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DRG. NO. 3-163-11-11588



FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)



VARIANT TABLE

VAR.NO.	FOR ANSI 150# NOZZLES				FOR ANSI 300# NOZZLES			
	01	02	03	04	05	06	07	08
SIZE	16"	18"	20"	24"	16"	18"	20"	24"
D	596.9	430	698.5	812.8	647.7	711.2	774.7	914.4
G	300	320	350	400	320	350	380	460
W	35	37	40	45	55	58	61	67
L1	109	112	115	121	112	115	119	131
L2	90	93	96	102	92	96	100	111
PL	410	418	460	510	430	460	490	570

TYPE OF PRODUCT  
OR  
NAME OF CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.  
HYDERABAD

DRN.	ASHOK A	SIGN.	DATE	NO.OF VAR.
CHD.	UMESH MENON		28.02.04	NA
APPD.	TSN.BHARGAVA		28.02.04	

REV.	DATE	ALTERED	CHECKED	APPD

DEPT. HEE	GRADE OF TOL.DIM. C/M/F	SCALE NTS	WEIGHT (KG) NA	REF. TO ASSY DRG. NA	ITEM NO. NA	NO.OF ITEMS NA
CODE 405						

SO7855

TITLE  
MANHOLE ASSLY.  
(FOR HINGE TYPE)

CARD CODE	DRAWING NO. 3-163-11-11588	REV. 00
	SHEET No.	NO OF SHEETS

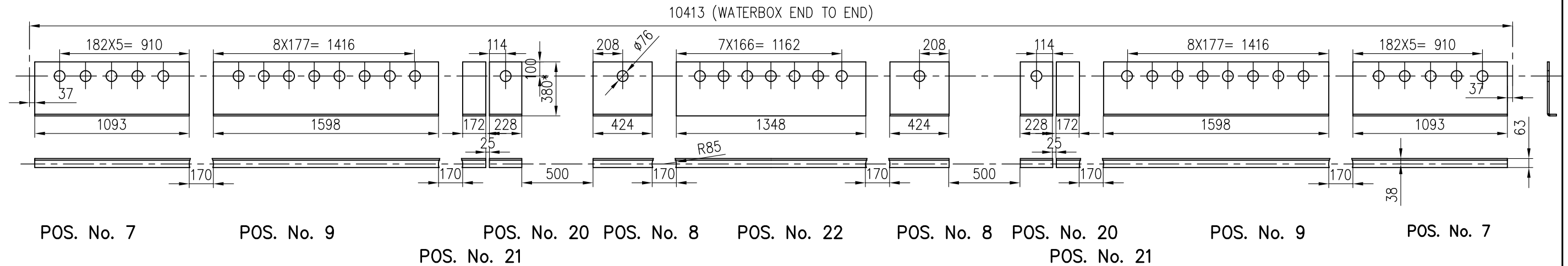


INVENTORY NO. SIGN. AND DATE REF. DRG. NO. THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 3-163-16-11727

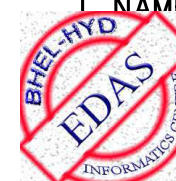


NOTE :-

1. DEVELOPED LENGTH= 435
2. \* CRITICAL DIMENSION.
3. CENTRELINE BEND RADIUS OF STIFFENER= 10

SO7855

TYPE OF PRODUCT  
OR  
NAME OF CUSTOMER/PROJECT



BHARAT HEAVY ELECTRICALS LTD.  
HYDERABAD

DRN.	NAME A.L. RAJAM	DATE 23.11.11	NO. OF VAR.
CHD.	UMESH MENON	23.11.11	NA
APPD.	TSN BHARGAVA	23.11.11	NA

REV.	DATE	ALTERED	CHECKED	APPD.	REV.	DATE	ALTERED	CHECKED	APPD.
ZONE					ZONE				

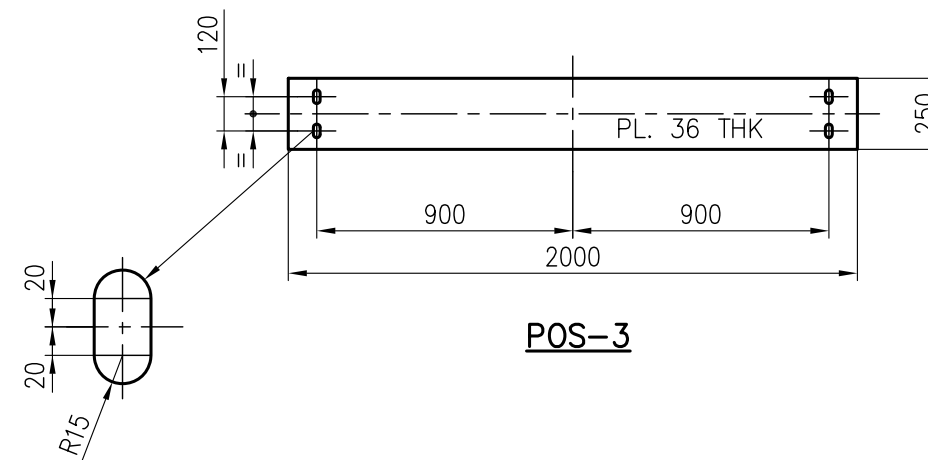
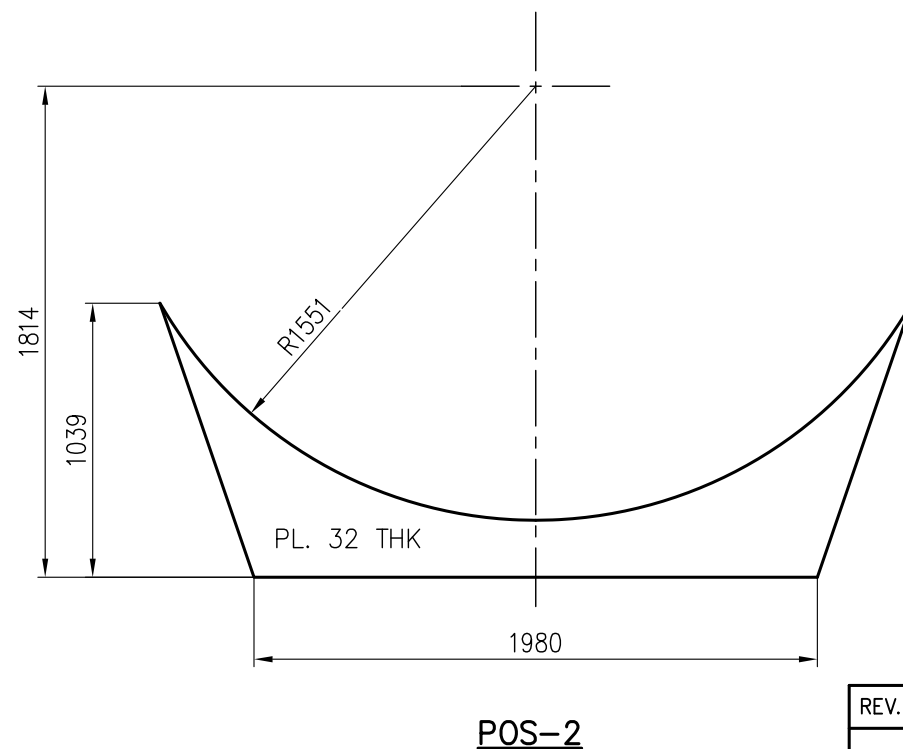
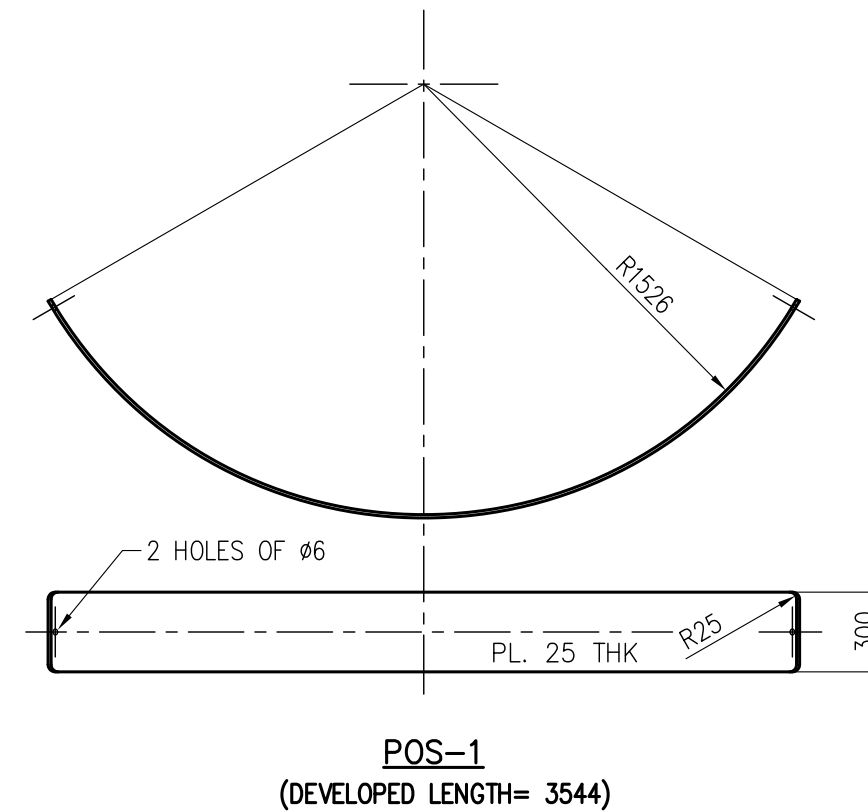
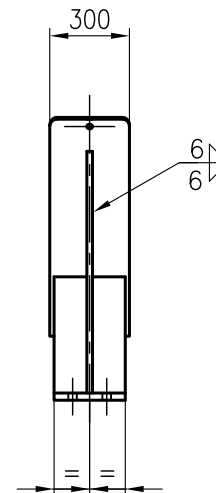
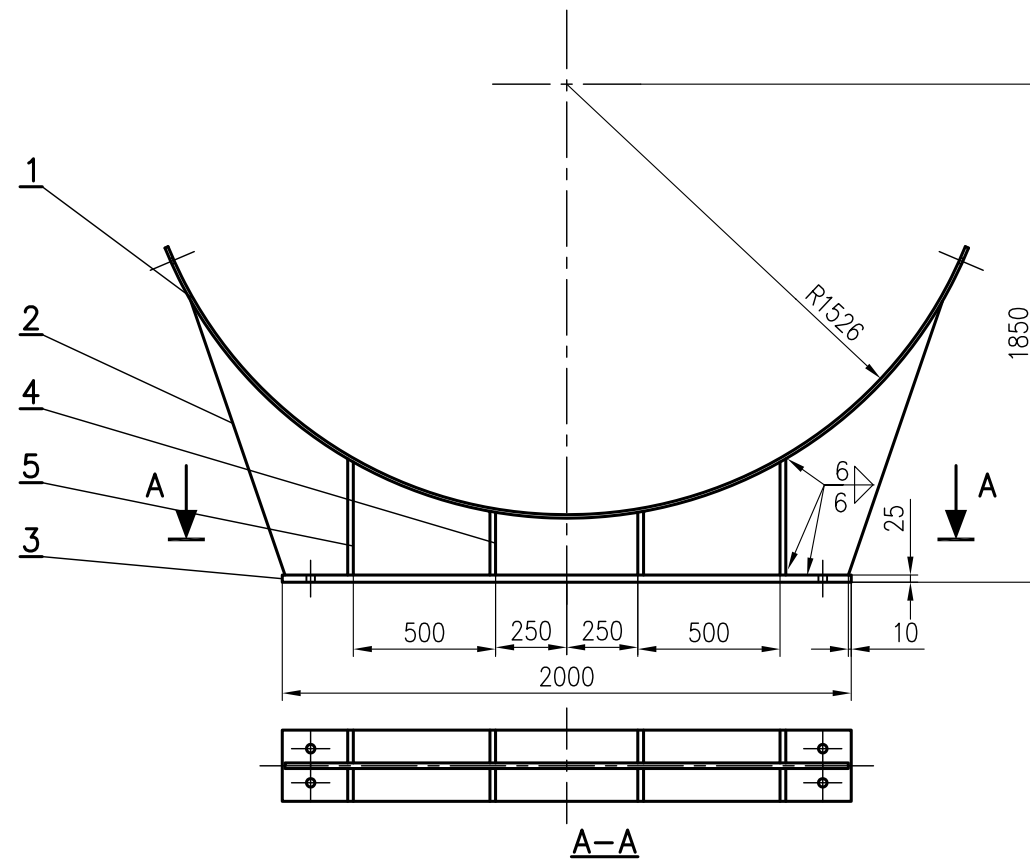
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CODE 405						
TITLE J-STIFFENER			CARD CODE	DRAWING NO. 3-163-16-11727		REV. 00
SHEET No. 1			NO OF SHEETS 1			

INVENTORY NO. SIGN. AND DATE REF. DRG. NO. THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 3-163-16-11758



TYPE OF PRODUCT  
OR  
NAME OF CUSTOMER/PROJECT



BHARAT HEAVY ELECTRICALS LTD.  
HYDERABAD

DRN.	NAME	SIGN.	DATE	NO.OF VAR.
CHD.	B UMA	U	28.01.15	NA
APPD.	UMESH MENON	U	28.01.15	NA
	ACS	U	28.01.15	NA

REV.	DATE	ALTERED	CHECKED	APPD
ZONE				

DEPT. HEE	GRADE OF TOL.DIM. C/M/F	SCALE NTS	WEIGHT (KG) NA	REF. TO ASSY DRG. NA	ITEM NO. NA	NO.OF ITEMS NA
CODE 405						
TITLE HEATER SUPPORT			CARD CODE	DRAWING NO. 3-163-16-11758		
				REV. 00		
				SHEET No. 1 NO OF SHEETS 1		

SO7855

Jan Fri 30 09:04 2015

Printed by : B. VENKANNA-FME3159 / 6007767 on 11-09-18 11:15:13

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Therefore signatures are not essentially required.

## FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

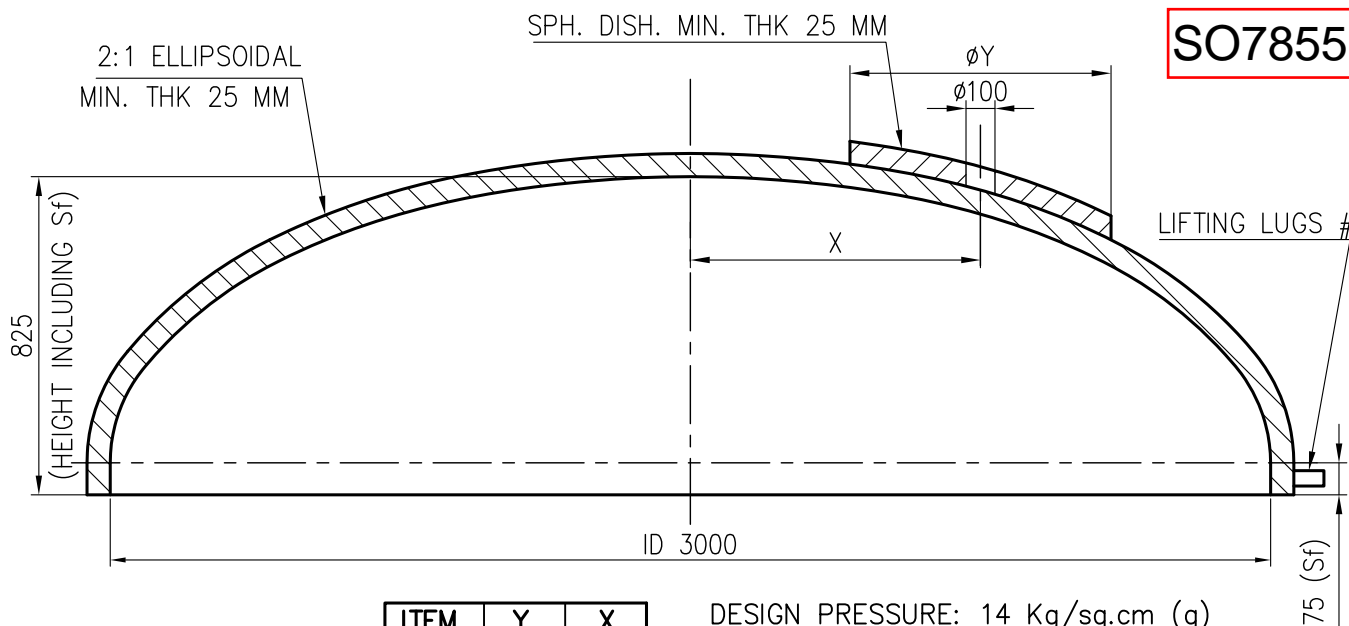
BHARAT HEAVY ELECTRICALS LIMITED.

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INVENTORY NO. SIGN. AND DATE REF. DRG. NO.

REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	ADDITIONAL INFORMATION
										STATUS OF DRAWING
										DISTURIBUTION OF PRINTS

SO7855



ITEM	Y	X
01	1700	256
02	950	0
03	500	700

DESIGN PRESSURE: 14 Kg/sq.cm (g)  
DESIGN TEMPERATURE: 395° C

## NOTES

- MATERIAL SHALL CONFIRM TO SA516 Gr.70 OF ASME SEC-II PART-A YEAR OF EDITION AS PER INDENT/ PO.
- INSPECTION: BY M/s IBR/DOB & BHEL APPROVED TPIA.
- CERTIFICATION: IBR FORM III-C.
- DESIGN CODE: IBR REGULATIONS (CLASS-1 BOILER).
- PLATE SHALL BE UT TESTED BEFORE FORMING (NOT REQUIRED IF ALREADY UT TESTED AT MILLS)
- SPHERICAL DISH SHALL BE OF SEAMLESS CONSTRUCTION & PROFILE SHOULD MATCH WITH DISHED DISHED END OD AS SHOWN IN THE DRG.
- NORMALISING SHALL BE DONE FOR SPHERICAL DISH ALSO AFTER PRESSING.
- TEST COUPON TESTING IS REQUIRED.
- TECHNICAL & DELIVER CONDITIONS: AS PER PRODUCT STANDARD HE51370.

FOR PLATE WELDING REFER DRG. 4-163-10-00621.

# 3 NOS. LIFTING LUGS TO BE WELDED ON Sf AT 120° AND TO BE DP CHECKED AFTER WELDING.

ITEM NO.	DESCRIPTION	DRAWING NO.	MATL. CODE	UNIT Wt.
			MATL. SPEN.	QTY.

BHARAT HEAVY ELECTRICALS LTD.		DRN.	B UMA	SIGN.	DATE	NO.OF VAR.
HYDERABAD		CHD.	UMESH MENON		14.05.15	
		APPD.	ACS		14.05.15	

DEPT. HED	GRADE OF TOL.DIM. C/M/F	SCALE NTS	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS
CODE 405						

TITLE	SPHERICAL DISH WITH 2:1 ELLIPSOIDAL DISHED END	CARD CODE	DRAWING NO. 4-163-10-00614	REV. 00
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Printed by : B. VENKANNA-FME3159 / 607767 on 11-09-18

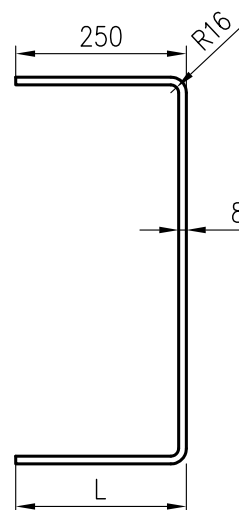
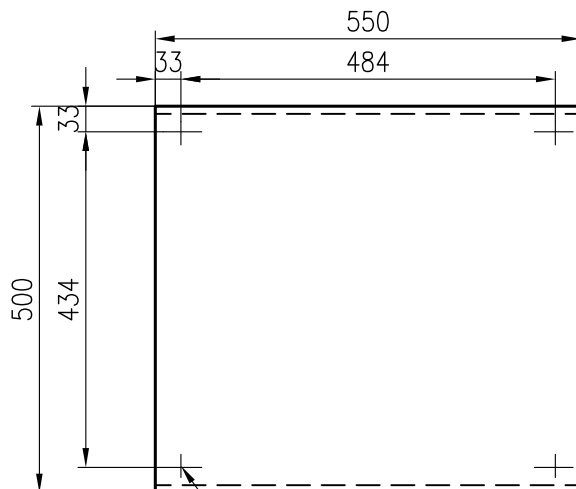
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## FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

INVENTORY NO. T SIGN. AND DATE T REF. DRG. NO. THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	ADDITIONAL INFORMATION
										STATUS OF DRAWING
										DISTURIBUTION OF PRINTS

**SO7855**

4 TAPED HOLES OF M6

## VARIANT TABLE

VAR.NO	L	VAR.NO	L	VAR.NO	L	VAR.NO	L
01	250	16	220	31	190	46	160
02	248	17	218	32	188	47	158
03	246	18	216	33	186	48	156
04	244	19	214	34	184	49	154
05	242	20	212	35	182	50	152
06	240	21	210	36	180	51	150
07	238	22	208	37	178	52	148
08	236	23	206	38	176	53	146
09	234	24	204	39	174	54	144
10	232	25	202	40	172	55	142
11	230	26	200	41	170	56	140
12	228	27	198	42	168	57	138
13	226	28	196	43	166	58	136
14	224	29	194	44	164	59	134
15	222	30	192	45	162	60	132

ITEM NO.	DESCRIPTION	DRAWING NO.	MATL. CODE	UNIT Wt.
			MATL. SPEN.	QTY.

		BHARAT HEAVY ELECTRICALS LTD.		DRN.	B UMA	Umas SIGN.	DATE	NO.OF
		HYDERABAD		CHD.	UMESH MENON		10.04.15	VAR.
		APPD.	ACS		10.04.15			
DEPT. HED	GRADE OF TOL.DIM. C/M/F		SCALE NTS	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS	
CODE 405								
TITLE				CARD CODE	DRAWING NO.		REV.	
NAME PLATE HOLDER					4-163-11-14136			
Apr Thu 16 10:38 2015 Printed by : B. VENKANNA-FME3159 / 6007767 on 11-09-18				This Drawing is printed from Engineering Digital Archive System (EDAS). Therefore signatures are not essentially required.		SHEET NO.		NO OF SHEETS

FIRST ANGLE PROJECTION

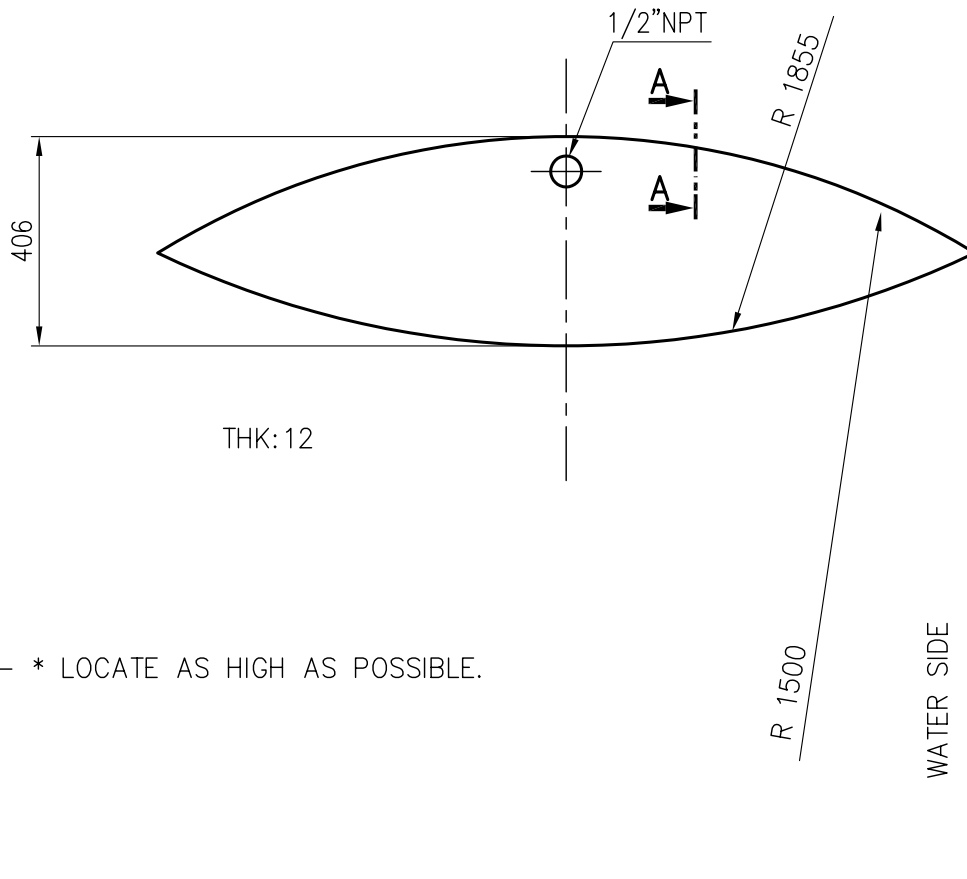
(ALL DIMENSIONS ARE IN mm)

BHARAT HEAVY ELECTRICALS LIMITED.

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REV.	DATE	ALTERED	CHECKED	APPD	REV.	DATE	ALTERED	CHECKED	APPD	ADDITIONAL INFORMATION
										STATUS OF DRAWING
										DISTURIBUTION OF PRINTS



NOTE: - \* LOCATE AS HIGH AS POSSIBLE.

SECTION A-A

SO7855

ITEM	DESCRIPTION	DRAWING NO.	MATL. CODE	UNIT Wt.
			MATL. SPEN.	QTY.
BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		DRN. AL RAJAM	SIGN.	DATE 20.06.02
		CHD. UMESH MEN		20.06.02
		APPD. TSN BHARGAV		20.06.02
DEPT. HED	GRADE OF TOL.DIM. C/M/F	SCALE	WEIGHT (KG)	REF. TO ASSY DRG.
CODE 405				ITEM NO.
TITLE END PLATE		CARD CODE	DRAWING NO. 4-163-16-12563	
			REV. 00	

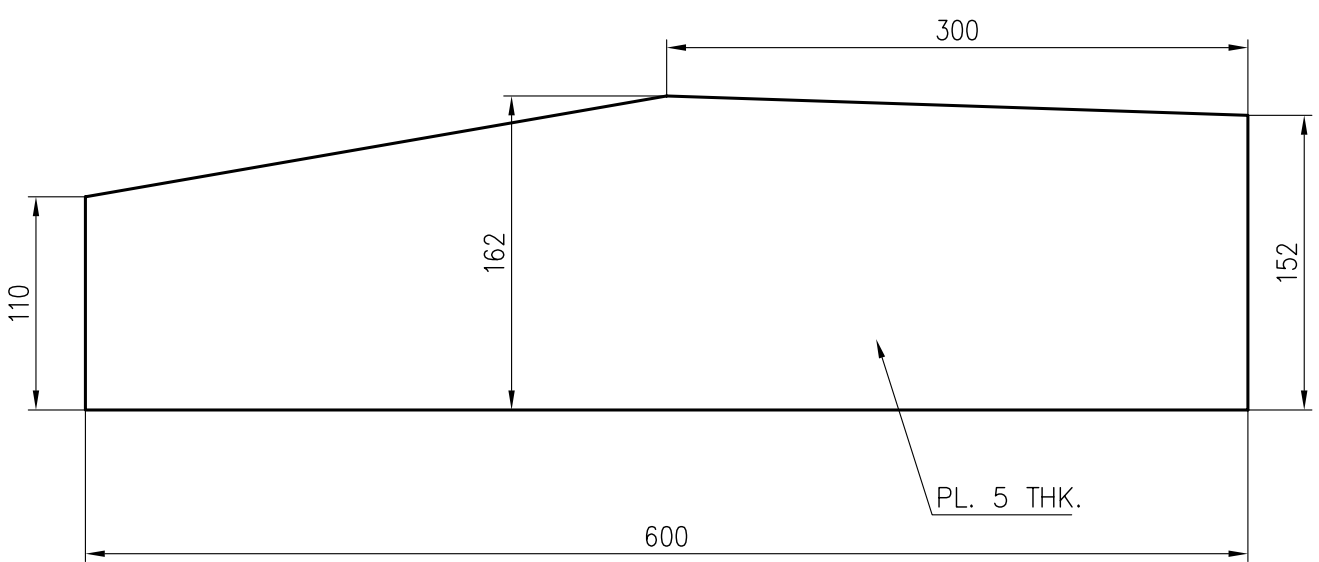
05-04-2008 14:37:42

Printed by : B. VENKANNA-FME3159 / 6007767 on 11-09-18 14:51

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SHEET NO. 1 NO OF SHEETS 1



FIRST ANGLE PROJECTION										(ALL DIMENSIONS ARE IN mm)									
REV. DATE ALTERED CHECKED APPD REV. DATE ALTERED CHECKED APPD										ADDITIONAL INFORMATION									
										STATUS OF DRAWING									
										DISTURIBUTION OF PRINTS									
<div>INVENTORY NO. T.SIGN. AND DATE T.REF. DRG. NO.</div> <div>THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTREST OF THE COMPANY</div>																			
SO7855																			
ITEM DESCRIPTION DRAWING NO.										MATL. CODE UNIT Wt.									
										MATL. SPEN. QTY.									
BHARAT HEAVY ELECTRICALS LTD. HYDERABAD										DRN. NAME SIGN. DATE NO.OF VAR.									
										CHD. UMESH MEN 23.12.03									
										APPD. TSN.BHARGAV 23.12.03									
DEPT. HED GRADE OF TOL.DIM. C/M/F										SCALE WEIGHT (KG) REF. TO ASSY DRG. ITEM NO. NO.OF ITEMS									
CODE 405																			
TITLE STIFFENER										DRAWING NO. 4-163-16-12710									
										REV. 00									
05-04-2008 14:42:10										This Drawing is printed from Engineering Digital Archive System (EDAS) 11-09-18 14:52:07. Therefore signatures are not essentially required.									
Printed by : B. VENKANNA-FME3159 / 6007767										SHEET NO. NO OF SHEETS 1									

(ALL DIMENSIONS ARE IN mm)

INVENTORY NO.	T SIGN.	ANF	DATE	TRF	ORG. NO.
42					

Technical drawing of a rectangular plate with the following dimensions and features:

- Overall width: 3457
- Overall height: 603.5
- Distance from top edge to first row of holes: 378.5
- Distance between rows of holes: 450
- Distance from last row of holes to bottom edge: 378.5
- Distance from left edge to first column of holes: 152
- Distance between columns of holes: 152
- Distance from last column of holes to right edge: 152
- Total distance between first and last columns of holes: 793
- Radius of curvature: R1495
- Thickness: 5
- 20 HOLES OF  $\phi 20$

**NOTE:**  
DEVELOPED LENGTH= 806

**SO7855**

24-11-2011  
15:49:45

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

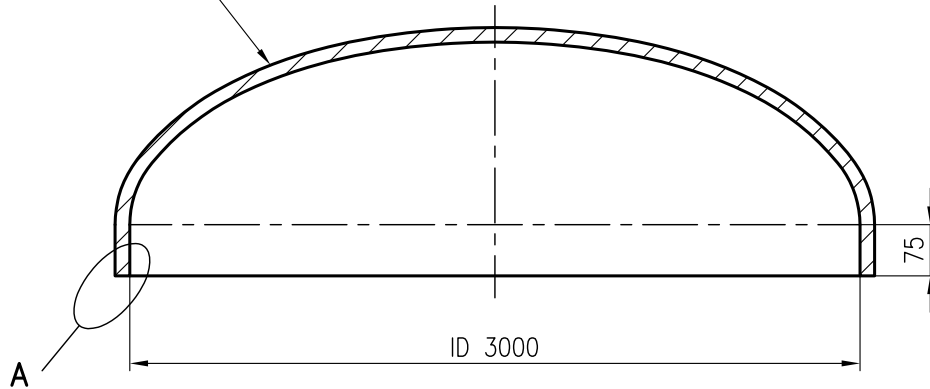
BHARAT HEAVY ELECTRICALS LIMITED.

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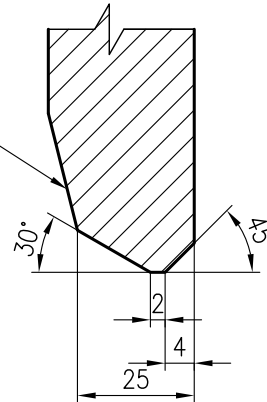
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

REV.	DATE	ALT.	CHECK.	APPD.	REV.	DATE	ALT.	CHECK.	APPD.	ADDITIONAL INFORMATION
										STATUS OF DRAWING
										DISTURBUTION OF PRINTS

12.5/

2:1 ELLIPSOIDAL  
MIN. THK 25mm

TAPER 1: 4



DETAIL-A

SO7855

ITEM NO.		DESCRIPTION		DRAWING NO.		MATL. CODE		UNIT Wt.	
						MATL. SPEN.		QTY.	
BHEL		BHARAT HEAVY ELECTRICALS LTD. HYDERABAD				DRN.	B UMA	SIGN.	DATE
						CHD.	UMESH MENON		28.01.15
						APPD.	ACS		28.01.15
DEPT. HED	GRADE OF TOL.DIM. C/M/F	SCALE		WEIGHT (KG)		REF. TO ASSY DRG.			NO.OF VAR.
CODE 405									
TITLE DISHED END					CARD CODE	DRAWING NO. 4-163-16-13238			REV. 00
SHEET NO.					NO OF SHEETS				

Feb Tue 3 07:49 2015

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