

## INVITATION TO TENDER

Ref : OS/20-21/2436 & 2437/DE/07/021

Date : 14.07.2020

### **Sub : Cold Forming of CS Dished Ends (With & Without Clad) against S.O. 2436 & 2437.**

Dear Sir,

Sealed tenders are invited for the subject work in **two part bid** system from vendors who are experienced in execution of similar jobs (i.e. in Cladded Dished ends and non-Cladded Dished ends). Bidders shall enclose Work Orders, Work Completion Certificates and all other relevant documents in support of their experience in execution of similar jobs.

#### **1) VENDOR'S SCOPE OF WORK :**

a) Details of the D'Ends to be formed are given in the Annexure-II and are briefed below :

<b>S.O. No.</b>	<b>Description of Item</b>	<b>Quantity</b>	<b>Total Wt.</b>
2436	2:1 Ellipsoidal D'End - CS (Without Clad)	6 Nos.	31.567 MT
2437	2:1 Ellipsoidal D'End - CS with SS Clad	10 Nos.	4.888 MT
	<b>TOTAL</b>	<b>16 Nos.</b>	<b>36.455 MT</b>

b) Cold Forming of the dished ends with Cut to Size blanks as per applicable Drawings, approved QAP / ITP and Specifications. Wherever blanks are made from segments, Cut to Size blanks will be issued after welding with radiography clearance.

c) DP check on outside and inside surface of the Knuckle Area & SF etc.

d) Intermediate heat treatment, if required after initial pressing, shall be carried out as per applicable standards & specifications.

e) Collection of blanks from HPVP shops, Visakhapatnam, Transportation of (i) Blanks from BHEL – HPVP to Vendor works and (ii) Formed D 'ends back to Visakhapatnam including transit insurance and Delivery at HPVP shops.

f) Free issue items i.e. Cut to Size Blanks cleared by QC (Shops) are to be collected within 5 days from the date of intimation by OS official without any failure. Any delay beyond 5 days shall be considered for levy of LD.

g) D'end supplier shall verify & confirm in their offer the blank diameter required to meet overall dimensions and minimum thickness.

h) Dimensions, ID & Thickness of formed dished ends shall be strictly within the tolerances given in the drawings, QAP / ITP.

i) Offering for Stage wise & Final Inspection as per approved QAP / ITP and obtaining inspection clearance.

j) Material identification no. is to be maintained by Dish End manufacturer before, during & after forming operation.

k) Though not mentioned specifically, any activity which is required for completion of the work is deemed to be included in the scope of bidders.

**1) The following activities indicated in the drawings are not included in the vendor's scope :**

- Heat Treatment after Dished End formation
- Edge Preparation at SF, RT & UT after Heat Treatment
- Plugging of Central Hole, if any on the dished end
- Surface Cleaning & Painting of the formed dished ends

**2) LOCATION OF WORK SPOT :**

Cold Forming of D' ends shall be carried out **at Vendor's Works**.

**3) BHEL's SCOPE :**

- a) Issue of Drawings, Approved QAP/ ITP, etc.
- b) Issue of Cut to Size Blanks

Two segment Blanks shall be issued in welded condition with radiography clearance

- c) Loading of Blanks and unloading of finished Dished ends at BHEL – HPVP, Visakhapatnam

**4) INSPECTION :**

Inspection shall be carried out at Vendor's works by M/s. BHEL / M/s. BHEL Authorized Inspection Agency / Customer as per Approved QAP / ITP.

QAP / ITP enclosed with the tender is tentative only. Changes, if any made while approving the QAP, shall also be taken care by the Vendor for execution of the job. Approved QAP / ITP issued to the vendor after ordering shall only be followed for execution and inspection of the job.

Dished End vendor shall furnish Inspection Reports / Test Certificates for (a) Method of Forming (b) Heat Treatment carried out, if any (c) Dimensional Report including minimum thickness (d) NDE Reports (if applicable), etc. to BHEL as per approved QAP / ITP.

All the documentation related to inspection such as BHEL / TPI / Customer Clearance, Generation of Inspection Reports, Preparation of Final Documents as per BHEL standard formats etc., is in the scope of vendor and soft copy as well as hard copy of the same are to be submitted to BHEL-QA

**5) DELIVERY :**

Finished D'ends along with all the relevant inspection documents as per approved QAP / ITP and all other certificates are to be delivered to HPVP, Visakhapatnam progressively within **4 weeks from the date of issue of blanks**.

The delivery period will be calculated from the date of issue of blanks at HPVP, Visakhapatnam to the date of delivery of finished items at HPVP, Visakhapatnam.

**6) PRICE :**

The prices shall be quoted for the detailed scope of work in the Schedule of Rates enclosed at Annexure-I. 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. Income tax shall be deducted at applicable rates from the vendor's bills. GST shall be reimbursable to the vendor as detailed in the Clause – 7.

**7) GOODS & SERVICES TAX (GST) :**

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

- a) 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.
- b) 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.
- c) 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.

**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) REVERSE AUCTION :**

BHEL shall be resorting to Reverse Auction (RA) for this tender. RA shall be conducted among all the techno-commercially qualified bidders. Guidelines of Reverse Auction are given as Annexure – V and are also available on our website, [www.bhel.com](http://www.bhel.com).

Sealed envelope / E-mail Price bids of all the techno-commercially qualified bidders shall be opened and the same shall be considered as initial bids of the bidders in RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking.

BHEL will inform bidders the details of service provider who will provide business rules, all necessary training and assistance before commencement of online bidding. The bidders participating in the Reverse Auction shall have to necessarily submit '**Process Compliance Form**' (PCF) to the designated Service Provider.

Bidders are advised to read the 'Business Rules' (Annexure – V) indicating details of RA event carefully, before reverse auction event.

10) Other Terms & Conditions shall be as per Annexure – III enclosed herewith.

**11) GENERAL :**

12) 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 offer. Bidders shall get clarifications, if any, on the scope of work or any other details of the tender document, over phone or through e-mail from concerned officials.

13) 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.

14) BHEL reserves the right to modify or cancel the tender enquiry at any stage without assigning any reasons thereof.

15) The following documents shall form part of the tender enquiry: -

a) Schedule of Rates	: Annexure – I (A) & I (B)
b) Details of Dished Ends to be formed	: Annexure – II
c) General Terms & Conditions	: Annexure – III
d) Acceptance to Tender terms & conditions	: Annexure – IV
e) Business Rules for Reverse Auction	: Annexure – V
f) GST Compliance for Indigenous Suppliers	: Annexure – GST
g) Applicable Drawings	
h) Tentative QAP / ITP	

16) **VALIDITY OF OFFER :**

The offer shall be valid for a period of **3 months** from the date of reverse auction.

17) **TENDER SUBMISSION (Through E - Mail) :**

Techno-commercial bids along with the **tender document duly signed by the bidder on all pages** and a covering letter on Company's Letter Head addressed to DGM (Outsourcing), BHEL –HPVP, Visakhapatnam shall be sent through an e-mail to [technicalbid-hpvp@bhel.in](mailto:technicalbid-hpvp@bhel.in).

Both Price bids (i.e. Annexure - I(A) & Annexure – I(B)) shall also be sent separately through e-mail to another e-mail ID [pricebid-hpvp@bhel.in](mailto:pricebid-hpvp@bhel.in).

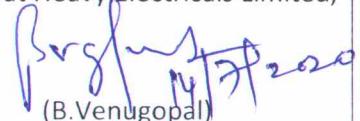
Offers completed in all respects along with the supporting documents shall be sent through the above e-mails only latest by **14.00 Hrs. on 24.07.2020** duly mentioning the Name of Work, Tender Ref. No. & Date and Technical Bid / Price Bid – I / Price Bid – II in the subject of the e-mail.

**TENDERS RECEIVED AFTER THE DUE DATE & TIME ARE NOT ACCEPTABLE. OFFERS SENT IN ANY OTHER FORM WILL BE TREATED AS INVALID AND WILL BE SUMMARILY REJECTED.**

18) **TENDER OPENING :**

Techno-commercial Bids will be opened on **24.07.2020 at 14.00 Hrs.** The bidders may depute their representatives at the time of opening of Technical bids. After evaluation of the Techno-commercial Bids, Intimation regarding the date and procedure of conducting Reverse Auction shall be given to the techno – commercial qualified bidders through an e-mail in advance at appropriate time.

For Bharat Heavy Electricals Limited,

  
(B. Venugopal)

Manager (OS)

SCHEDULE OF RATES

Sl. No.	S.O.	Description of Item	Unit	Qty.	Unit Rate (in ₹)	Total Amount (in ₹)
1		Cold Forming of <b>CS 2:1 Ellipsoidal Dished Ends (without Clad)</b> including DP check on outside and inside surface of KR & SF, Intermediate Heat Treatment , etc. as per applicable Drawings, approved QAP, Specifications, Procedures, etc., Co-ordination with BHEL / TPI officials for Stagewise & Final inspection and obtaining necessary inspection clearance along with relevant documentation and Collection & transportation of cut to size blanks from HPVP Shops to Vendor's works, Transportion & Delivery of Finished dished ends back to HPVP Shops, Visakhapatnam etc., as per the detailed scope of work mentioned in the tender.				
		<b>CS Dished Ends (Without Clad)</b>				
1.1		ID 2600 mm x 45 mm (Min.) thk. from a blank of Dia 3300 x 56 mm thk. @ 3755 Kg. each of matl. <b>SA516 Gr 70</b>	No.	2		
1.2	<b>2436</b>	ID 4100 mm x 34 mm (Min) thk. from a blank of Dia 4950 mm x 40 mm thk. @ 6030 Kg. each of matl. <b>SA516 Gr 70</b>	No.	2		
1.3		ID 2700 mm x 40 mm (Min) thk. from a blank of Dia 3370 mm x 45 mm thk. @ 3145 Kg. each of matl. <b>SA516 Gr 70</b>	No.	2		
		<b>Total (CS Dished Ends without Clad)</b>		6		
<b>Total Amount (in Words) :</b>						

Notes :

- 1) L1 status will be evaluated on the total quoted value of SOR Item (1)
- 2) The quantity indicated above is tentative and may vary on both sides subject to the requirement at the time of ordering / execution. However, payment shall be made for the actual quantity only.
- 3) The bidders are advised to go through all the drawings & documents before quoting the tender. Drawings mentioned in the annexure - II are tentative and may be subject to revision or modification as per the comments of the approving authority.
- 4) BHEL shall be resorting to Reverse auction as per the applicable guidelines.
- 5) 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 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

## SCHEDULE OF RATES

Sl. No.	S.O.	Description of Item	Unit	Qty.	Unit Rate (in ₹)	Total Amount (in ₹)
2		Cold Forming of CS 2:1 Ellipsoidal Dished Ends with SS Clad including DP check on outside and inside surface of KR & SF, Intermediate Heat Treatment, etc. as per applicable Drawings, approved QAP, Specifications, Procedures, etc., Co-ordination with BHEL / TPI officials for Stagewise & Final inspection and obtaining necessary inspection clearance along with relevant documentation and Collection & transportation of cut to size blanks from HPVP Shops to Vendor's works, Transportion & Delivery of Finished dished ends back to HPVP Shops, Visakhapatnam etc., as per the detailed scope of work mentioned in the tender.				
		<b>CS Dished Ends with SS Clad</b>				
2.1		ID 1300 mm x 10 mm (Min.) thk. with 3 mm SS Clad from a blank of Dia 1650 mm x 12 mm thk. with 3 mm SS Clad @ 255 Kg. each of matl. SA516 Gr 70 + SS 304L Clad	No.	2		
2.2		ID 1600 mm x 10 mm (Min.) thk. with 3 mm SS Clad from a blank of Dia 1990 mm x 12 mm thk. with 3 mm SS Clad @ 366 Kg. each of matl. SA516 Gr 70 + SS 304L Clad	No.	2		
2.3	2437	ID 1900 mm x 10 mm (Min.) thk. with 3 mm SS Clad from a blank of Dia 2350 mm x 12 mm thk. with 3 mm SS Clad @ 514 Kg. each of matl. SA516 Gr 70 + SS 304L Clad	No.	2		
2.4		ID 2100 mm x 10 mm (Min.) thk. with 3 mm SS Clad from a blank of Dia 2560 mm x 12 mm thk. with 3 mm SS Clad @ 609 Kg. each of matl. SA516 Gr 70 + SS 304L Clad	No.	2		
2.5		ID 2200 mm x 10 mm (Min.) thk. with 3 mm SS Clad from a blank of Dia 2675 mm x 12 mm thk. with 3 mm SS Clad @ 661 Kg. each of matl. SA516 Gr 70 + SS 304L Clad	No.	2		
		<b>Total (CS Dished Ends with SS Clad)</b>		<b>10</b>		
<b>Total Amount (in Words) :</b>						

**Notes :**

- 1) L1 status will be evaluated on the total quoted value of SOR Item (2)
- 2) The quantity indicated above is tentative and may vary on both sides subject to the requirement at the time of ordering / execution. However, payment shall be made for the actual quantity only.
- 3) The bidders are advised to go through all the drawings & documents before quoting the tender. Drawings mentioned in the annexure - II are tentative and may be subject to revision or modification as per the comments of the approving authority.
- 4) BHEL shall be resorting to Reverse auction as per the applicable guidelines.
- 5) 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 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

### Details of Dished Ends to be formed

Sub : Cold Forming of CS Dished Ends against S.O. No. 2436 & 2437

Ref : Tender Enquiry no. OS/20-21/2436 & 2437/DE/07/21 Dated 11.07.2020

**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.

**Note : Electrodes of specification mentioned in the drawings / WPS and of BHEL approved brands only shall be used and MTCs of the same shall be submitted to BHEL for verification before use.**

**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 issued 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 the final bill and shall be refundable after performance guarantee period, if no defects are found during this period.

**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 Structural (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 thereof 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 :**

Payment shall be made against RA Bills within 45 days from the date of submission of Bill.

90% payment will be made after handing over of the finished items along with all inspection documents to HPVP shops / Logistics dept. / ADM site, duly inspected & cleared by Inspection authority. Balance 10% payment shall be made along with the Final Bill against completion of total order in all respects including documentation.

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. SECURITY :**

All the documents of BHEL inclusive of Drawings, GMS and Standards 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 summarily 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 Bidder with Stamp**

**Acceptance to the 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 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**

**BUSINESS RULES FOR REVERSE AUCTION (RA)**

This has reference to tender no. **OS/20-21/2436 & 2437/DE/07/021, dated 14.07.2020**. BHEL shall finalise the Rates for the supply of **Cold Formed CS Dished Ends** through RA mode. BHEL has made arrangement with an authorized Service provider (details will be shared before reverse auction) for conducting RA. Bidders should go through the instructions given below and submit acceptance of the same.

The technical & commercial terms are as per (a) BHEL Tender Enquiry No. **OS/20-21/2436 & 2437/DE/07/021, dated 14.07.2020**, (b) Bidders' technical & commercial bid (in case of two-part bid) and (c) subsequent correspondence between BHEL and the bidders, if any.

**1. Procedure of Reverse Auctioning**

- i. Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered as initial bids of bidders in RA.
- ii. **Online Reverse Auction:** The 'bid decrement' will be decided by BHEL.
- iii. If BHEL decides the lowest sealed envelope price bid as the starting price, then the lowest bidder in sealed envelope price bid shall be shown as current L1 automatically by the system and no acceptance of that price is required. System shall have the provision to indicate this bid as current L1.
- iv. Bidders by offering a minimum bid decrement or the multiples thereof can displace a standing lowest bid and become "L1" and this continues as an iterative process. However, no bidder shall be allowed to lower its bid below the current L1 by more than 5 decrements at one go.
- v. After the completion of the online reverse auction, the Closing Price (CP) shall be available for further processing.
- vi. Wherever the evaluation is done on total cost basis, after Reverse Auction, prices of individual line items shall be reduced on pro-rata basis.

**2. Schedule for reverse auction:** The Reverse Auction schedule will be intimated to all the techno-commercially qualified bidders at a later stage.

**3. Auction extension time:** If a bidder places a bid in the last {...} minutes of closing of the Reverse Auction and if that bid gets accepted, then the auction's duration shall get extended automatically for another {...} minutes, for the entire auction (i.e. for all the items in the auction), from the time that bid comes in. Please note that the auto-extension will take place only if a bid comes in those last {...} minutes and if that bid gets accepted as the lowest bid. If the bid does not get accepted as the lowest bid, the auto extension will not take place even if that bid might have come in the last {...} minutes. In case, there is no bid in the last {...} minutes of closing of Reverse Auction, the auction shall get closed automatically without any extension. However, bidders are advised not to wait till the last minute or last few seconds to enter their bid during the auto-extension period to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc. The above process will continue till completion of Reverse Auction. Complaints/ Grievances, if any, regarding denial of service or any related issue should be given in writing thru e-mail/ fax to M/s. {Service provider} with a copy to BHEL within 15 minutes prior to initial closing time of Online Reverse Auction.

**4. Bid price :** The Bidder has to quote the {.....} Price inclusive of Packing & Forwarding charges, all the routine & type tests as per tender scope, taxes, duties, freight and insurance except GST as specified in tender document including loading (if indicated by BHEL due to deviations in technical/commercial terms) for the Items specified. Details are as shown in Excel Sheet for calculation of total cost to BHEL (To be specified by Unit as per NIT conditions).

**5. Bidding currency and unit of measurement:** Bidding will be conducted in Indian Rupees per Unit of the material as per the specifications mentioned in the tender.

In case of foreign currency bids, exchange rate (TT selling rate of State Bank of India) as on scheduled date of tender opening (Part-I bid) shall be considered for conversion in Indian Rupees. If the relevant day happens to be a Bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken.

**6. Validity of bids:** Price shall be valid for {90 days} from the date of reverse auction. These shall not be subjected to any change whatsoever.

**7. Lowest bid of a bidder:** In case the bidder submits more than one bid, the lowest bid at the end of Online Reverse Auction will be considered as the bidder's final offer to execute the work.

**8. Unique user IDs** shall be used by bidders during bidding process. All bids made from the Login ID given to the bidders will be deemed to have been made by the bidders/ bidders' company. MSEs and Bidders qualified under PPP-MII, Order 2017 would see their category at all time in their login. Purchase preference, however, is subject to falling within the purchase preference criteria.

**9. Post auction procedure:** BHEL will proceed with the Lowest Bid in the Reverse Auction for further processing.

**10.** Any commercial/ technical loading shall be intimated to bidders prior to RA. The excel sheet provided in this regard shall cover all these aspects. Commercial/ technical loading if any, shall be added by the respective bidder in its price during online sealed bid & Online Reverse Auction. Modalities of loading & de-loading shall be separately intimated to the bidders. The responsibility for correctness of total cost to BHEL shall lie with the bidders.

**11.** Computerized reverse auction shall be conducted by BHEL (through M/s. {Service Provider}), on pre-specified date, while the bidders shall be quoting from their own offices/ place of their choice. Internet connectivity shall have to be ensured by bidders themselves.

During the RA process if a bidder is not able to bid and requests for extension of time by FAX/ email/ phone then time extension of additional 15 minutes will be given by the service provider provided such requests come before 5 minutes of auction closing time. However, only one such request per bidder can be entertained.

In order to ward-off contingent situation of connectivity failure bidders are requested to make all the necessary arrangements/ alternatives whatever required so that they are able to circumvent such situation and still be able to participate in the reverse auction successfully. Failure of power or loss of connectivity at the premises of bidders during the Reverse auction cannot be the cause for not participating in the reverse auction. On account of this, the time for the auction cannot be extended and neither BHEL nor M/s. {Service provider} is responsible for such eventualities.

**12. Proxy bids:** Proxy bidding feature is a pro-bidder feature to safe guard the bidder's interest of any internet failure or to avoid last minute rush. The proxy feature allows bidders to place an automated bid in the system directly in an auction and bid without having to enter a new amount each time a competing bidder submits a new offer. The bid amount that a bidder enters is the minimum that the bidder is willing to offer. Here the software bids on behalf of the bidder. This obviates the need for the bidder participating in the bidding process until the proxy bid amount is decrementally reached by other bidders. When proxy bid amount is reached, the bidder (who has submitted the proxy bid) has an option to start participating in the bidding process.

The proxy amount is the minimum amount that the bidder is willing to offer. During the course of bidding, the bidder cannot delete or change the amount of a proxy bid.

Bids are submitted in decrements (decreasing bid amounts). The application automates proxy bidding by processing proxy bids automatically, according to the decrement that the auction originator originally established when creating the auction, submitting offers to the next bid decrement each time a competing bidder bids, regardless of the fact whether the competing bids are submitted as proxy or standard bids. However, it may please be noted that if a manual bid and proxy bid are submitted at the same instant manual bid will be recognized as the L1 at that instant.

In case of more than one proxy bid, the system shall bid till it crosses the threshold value of 'each lowest proxy bid' and thereafter allow the competition to decide the final L1 price.

Proxy bids are fed into the system directly by the respective bidders. As such this information is privy only to the respective bidder(s).

13. Bidders are advised to get fully trained and clear all their doubts such as refreshing of Screen, quantity being auctioned, tender value being auctioned etc. from M/s. {Service provider}.
14. M/s. {Service provider}, shall arrange to demonstrate/ train the bidder or bidder's nominated person(s), without any cost to bidders. M/s. {Service provider}, shall also explain the bidders, all the business rules related to the Reverse Auction. Bidders are required to submit their acceptance to the terms/ conditions/ modalities before participating in the Reverse Auction in the process compliance form as enclosed. Without this, the bidder will not be eligible to participate in the event.
15. Successful bidder shall be required to submit the final prices (L1) in prescribed format (Annexure – VI) for price breakup, quoted during the Online Reverse Auction, duly signed and stamped as token of acceptance without any new condition (other than those already agreed to before start of auction), after the completion of auction to M/s. {Service provider} besides BHEL within two working days of Auction without fail.
16. Any variation between the final bid value and that in the confirmatory signed price breakup document will be considered as tampering the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings (as available on [www.bhel.com](http://www.bhel.com) ).
17. Bidders' bid will be taken as an offer to execute the work/ supplies the item as per tender enquiry no. OS/2438/CS DE/20-21/04/014, dated 18.06.2020. Bids once made by the bidder, cannot be cancelled/ withdrawn and bidder shall be bound to execute the work as mentioned above at bidder's final bid price. Should bidder back out and not execute the contract as per the rates quoted, BHEL shall take action as per extant guidelines for suspension of business dealings (as available on [www.bhel.com](http://www.bhel.com) ).
18. Bidders shall be able to view the following on their screen along with the necessary fields during Online Reverse Auction:
  - a. Leading (Running Lowest) Bid in the Auction (only total price of package)
  - b. Bid Placed by the bidder
  - c. Start Price
  - d. Decrement value
  - e. Rank of their own bid during bidding as well as at the close of auction.
19. BHEL's decision on award of contract shall be final and binding on all the Bidders.
20. BHEL reserves the right to extend, reschedule or cancel the Reverse Auction process at any time, before ordering, without assigning any reason, with intimation to bidders.
21. BHEL shall not have any liability to bidders for any interruption or delay in access to the site irrespective of the cause. In such cases, the decision of BHEL shall be binding on the bidders.

22. Other terms and conditions shall be as per bidder's techno-commercial offers and other correspondences, if any, till date.
23. If there is any clash between this business document and the FAQ available, if any, in the website of M/s. {Service provider}, the terms & conditions given in this business document will supersede the information contained in the FAQs. Any changes made by BHEL/ service provider (due to unforeseen contingencies) after the first posting shall be deemed to have been accepted if the bidder continues to access the portal after that time.
24. Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action as per extant BHEL guidelines for suspension of business dealings (as available on [www.bhel.com](http://www.bhel.com)), shall be initiated by BHEL.

**Signature of the Bidder with Stamp**

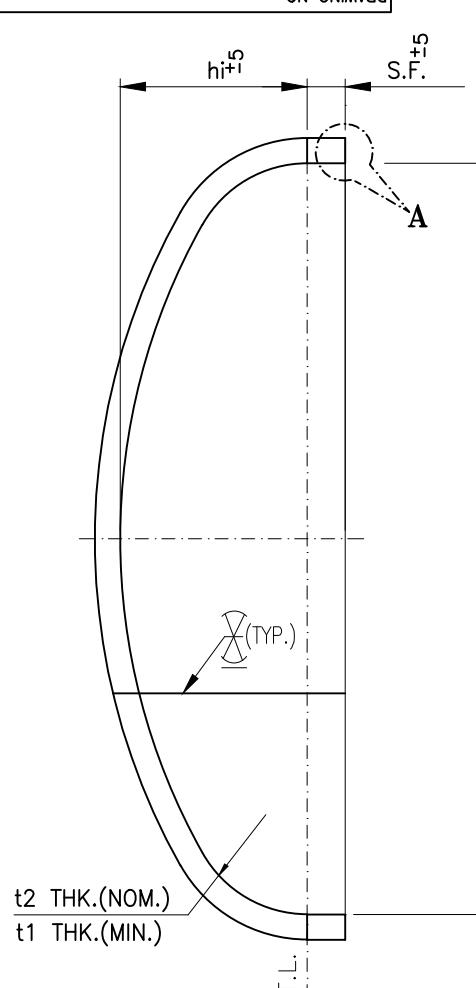
**GST COMPLIANCE FOR INDIGENOUS SUPPLIERS**

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 P0, 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/Warranteer 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.

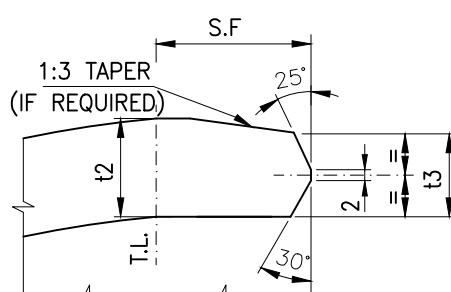
***Note : The above will be followed strictly for processing vendor payments to ensure GST Compliance.***

**Signature of the Bidder with Stamp**

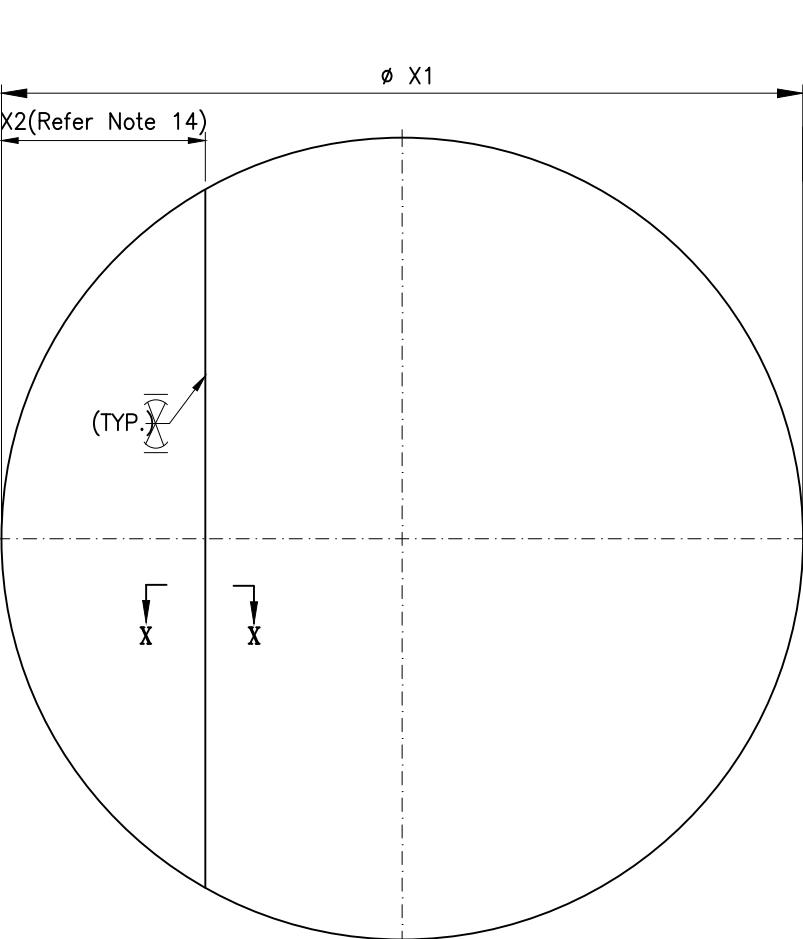
4-PV-010-U0028



(PROFILE - 2:1 ELLIPSOIDAL)



DETAIL-“A”



DETAIL OF BLANK

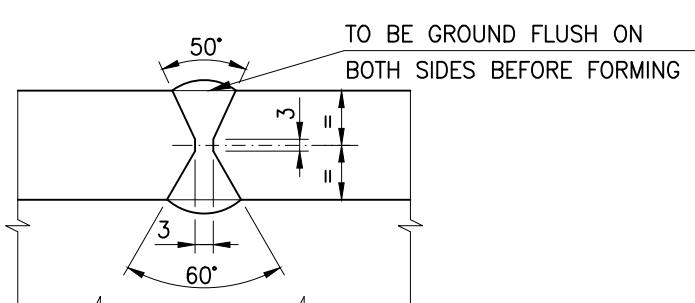
SECTION X-X  
(WELD DETAIL OF CHORDAL JOINT)

TABLE-1:

01	11-V-4901 CN	2600	45	56	50	45	3300	810	3755	2
S.No	EQUIPMENT NO	ØDi	t1 (MIN.)	t2 (NOM.)	SF	t3	BLANK DIA (ØX1)	X2	WEIGHT (Kg.)	QTY.

02		THE WORD "DISHED END VENDOR/SUPPLIER" HAS BEEN REPLACED BY "DISHED END MANUFACTURER" IN THE NOTES.	SATISH	PRASANNA	SK.BISWAS	11-07-20
01		NOTES ADDED	SATISH	PRASANNA	SK.BISWAS	09-07-20
REV NO.	ZONE	BRIEF RECORD OF REVISIONS	PPD.	CHD.	APPD.	DATE

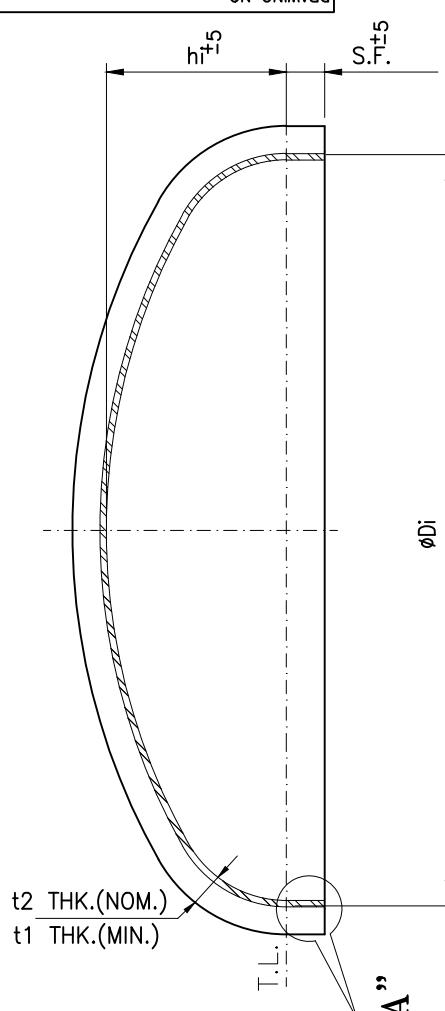
## NOTES:-

1. MATERIAL TO BE SA 516 Gr.70 (IMPACT TESTED) OF ASME SEC-II PART-A; 2017 (SHALL COMPLY WITH TDC:PV-PL-TDC-007).
2. DISHED END TO BE COLD FORMED FROM TWO (02) MAX. PIECES AS SHOWN WITH EDGE PREPARATION AS PER SECTION. X-X : FOLLOWING ACTIVITIES NEED TO BE CARRIED OUT BEFORE & AFTER HEAT TREATMENT.
- [A] SCOPE OF WORK DURING THE FORMATION OF BLANK FOR DISHED END : BEFORE HEAT TREATMENT & DISH FORMATION
  - (a) BASE PLATE WELD EDGE PREPARATION AS PER SECTION X-X.
  - (b) WELD EDGE PREPARATION OF BASE PLATE TO BE DP TESTED.
  - (c) WELDING OF BASE PLATES BY ASME QUALIFIED WELDERS USING APPROVED WPS AND POR FOLLOWED BY GROUND FLUSH OF THE WELD.
  - (d) D.P TEST OF BASE PLATE WELD TO BE CARRIED OUT FOLLOWED BY 100% RT.
- [B] SCOPE OF WORK DURING DISHED END FORMATION : BEFORE HEAT TREATMENT

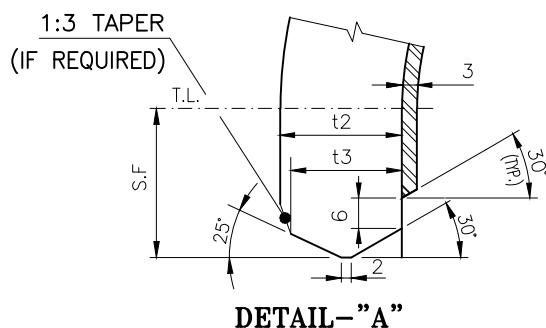
FORMATION OF DISH USING COLD FORMING (MEETING THE DIMENSIONS AS SHOWN) FOLLOWED BY HEAT TREATMENT AS PER THE PROCEDURE DULY APPROVED BY BHEL SEE NOTE-3 BELOW ALSO.
- [C] SCOPE OF WORK DURING DISHED END MANUFACTURE : AFTER HEAT TREATMENT
  - (a) COMPLETE DISHED END TO BE 100% UT AS PER SA 578 LEVEL-B.
  - (b) EDGE PREP. AT SF IS REQUIRED AS PER DETAIL 'A' SHOWN.
  - (c) BOTH INSIDE AND OUTSIDE OF THE KNUCKLE AND EDGE PREPARATION TO BE DP TESTED FOLLOWED BY 100% RT FOR WELD SEAM.
3. HEAT TREATMENT :– DISHED END TO BE STRESS RELIEVED AT MANUFACTURER WORKS AFTER FORMING AS PER THE FOLLOWING CYCLE.
  - (a) MAX. RATE OF HEATING – °C/HR ABOVE 400 °C : 90 FOR THE PLATE THICKNESS OF 56 MM.
  - (a) MAX. RATE OF COOLING – °C/HR UPTO 400 °C : 120 FOR THE PLATE THICKNESS OF 56 MM.
  - AFTER COMPLETION OF SOAKING PERIOD DISHED END TO BE COOLED IN STILL AIR.
  - (c) MIN. SOAKING TIME – MINUTE : 150 FOR THE PLATE THICKNESS OF 56 MM.
  - (d) SOAKING TEMPERATURE : 610 ± 15 DEGREE CENTIGRADE.
- DISHED ENDS TO BE PLACED ON BLOCKS IN FURNACE TO ENSURE UNIFORM HEATING AND COOLING.
- MINIMUM TWO THERMOCOUPLES SHALL BE PROVIDED. HOWEVER ASME REQUIREMENT TO BE MET.
4. CENTRAL HOLE IF ANY ON DISHED END NEED NOT TO BE PLUGGED. PLUG HOLE DIA SHOULD NOT EXCEED 50MM.
5. PAINTING AFTER SURFACE CLEANING (AT THE WORKS OF DISHED END MANUFACTURER- INSIDE & OUTSIDE BOTH) : ONE COAT OF RED OXIDE ZINC PHOSPHATE PRIMER ON INSIDE & OUT SIDE SURFACE LEAVING 50 MM FROM EDGE.
6. TOLERANCE : (i) OVALITY SHOULD NOT EXCEED 1.0% OF DISHED END ID. (DIFFERENCE MAX. & MIN. I.D.)  
(ii) MEASURED CIRCUMFERENCE SHOULD BE  ${}^0_{+6}$  MM OF CALCULATED CIRCUMFERENCE UPTO 1500MM I.D. AND  ${}^0_{+10}$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. ABOVE 1500MM.
7. CODE OF CONSTRUCTION ASME SECTION VIII DIV. 1; 2017.
8. INSPECTION BY M/S BHEL / BHEL APPOINTED TPIA AND END CUSTOMER(IF ANY).
9. TEMPLATE REQUIREMENT AS PER UG-81 (a).  
THE INNER SURFACE OF DISHED END SHALL NOT DEVIATE OUTSIDE OF THE SPECIFIED SHAPE BY MORE THAN 1.25% OF THE DISHED END I.D AND SHALL NOT DEVIATE INSIDE OF THE SPECIFIED SHAPE BY MORE THAN 0.625% INSIDE OF THE SPECIFIED SHAPE, EXCEPT FOR KNUCKLE RADIUS WHICH SHALL NOT BE LESS THAN THAT SPECIFIED.
10. MATERIAL IDENTIFICATION NO. TO BE MAINTAINED AT D'END MANUFACTURER'S END BEFORE DURING & AFTER FORMING OPERATION.
11. DISHED END MANUFACTURER TO FURNISH TEST CERTIFICATES INCLUDING (a) METHOD OF FORMING, (b) HEAT TREATMENT CARRIED OUT IF ANY, (c) DIMENSIONAL REPORT INCLUDING MINIMUM THICKNESS, (d) NDE REPORTS & (e) RESULTS OF TEMPLATE CHECK. QAP DULY APPROVED BY BHEL SHALL ALSO REQUIRED TO BE REFERRED FOR OTHER DOCUMENTS.
12. D'END MANUFACTURER SHALL CONFIRM THE BLANK DIAMETER TO MEET OVER ALL DIMENSIONS & MIN THK TO BE ACHIEVED AS PER TABLE 1.
13.  $h_i = Di / 4$
14. THE DIMENSION OF X2 AS SHOWN IS TENTATIVE AND IT MAY BE CHANGED BASED ON THE AVAILABILITY OF PLATE.  
BUT CONFIRMATION SHALL REQUIRED TO BE OBTAINED BEFORE PROCEEDING FOR BLANK FORMATION.
15. DP TEST & RT ALWAYS SHALL BE CARRIED OUT AS PER AS PER APPENDIX-8 & UW-51 RESPECTIVELY OF ASME SECTION VIII DIVISION-I; 2017.

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.		Bharat Heavy Electricals Ltd		NAME	DATE
		UNIT: HEAVY PLATES & VESSELS PLANT		ANAND	22.10.19
		VISAKHAPATNAM-530012		D.SATISH	22.10.19
DEPT	ALL DIMENSIONS	PROJECTION	SCALE	REF TO ASSY / OLD DWG	
P.P.ENGG	ARE IN MM		1 : 25	XXXX	
CODE					
031					
TITLE DISHED ENDS FOR PRESSING (SA516 Gr 70 IMPACT TESTED)					DRAWING NO :
					4-PV-010-U0028
					REV 02

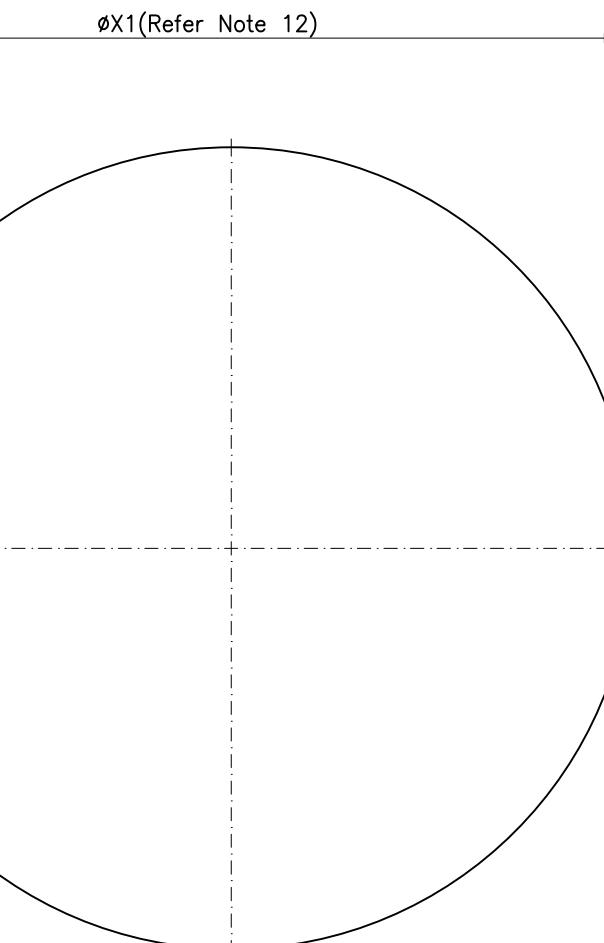
DRAWING NO: 4-PV-010-U0033



(PROFILE - 2:1 ELLIPSOIDAL)



DETAIL OF BLANK



## NOTES:-

- MATERIAL TO BE SA 264 (SA 516 Gr 70+SS 304 L clad) OF ASME SEC-II PART-A; 2017 (SHALL COMPLY WITH TDC:PV-PL-TDC-008).
- FOLLOWING ACTIVITIES NEED TO BE CARRIED OUT BEFORE & AFTER HEAT TREATMENT.
  - SCOPE OF WORK DURING THE FORMATION OF BLANK FOR DISHED END: BLANK SHALL BE FORMED AS SHOWN.
  - SCOPE OF WORK DURING FORMATION OF DISHED END: BHEL APPROVED PROCEDURE TO BE REFERRED FOR MATERIAL HANDLING, PROTECTION WHILE FORMATION OF DISH, FORMATION OF DISH USING COLD FORMING (MEETING THE DIMENSIONS AS SHOWN) FOLLOWED BY HEAT TREATMENT AS PER THE PROCEDURE DULY APPROVED BY BHEL. SEE NOTE-3 BELOW ALSO.
  - SCOPE OF WORK DURING DISHED END MANUFACTURE : AFTER HEAT TREATMENT
    - COMPLETE DISHED END TO BE 100% UT AS PER SA 578 LEVEL-C.
    - EDGE PREP. AT SF IS REQUIRED AS PER DETAIL 'A' SHOWN.
    - BOTH INSIDE AND OUTSIDE OF THE KNUCKLE AND EDGE PREPARATION TO BE DP TESTED.
- HEAT TREATMENT :- DISHED END TO BE STRESS RELIEVED AT MANUFACTURER WORKS AFTER FORMING AS PER THE FOLLOWING CYCLE.
  - MAX. RATE OF HEATING - °C/HR ABOVE 400 °C : 210 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - MAX. RATE OF COOLING - °C/HR UPTO 400 °C : 270 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - AFTER COMPLETION OF SOAKING PERIOD DISHED END TO BE COOLED IN STILL AIR.
  - MIN. SOAKING TIME - MINUTE : 45 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - SOAKING TEMPERATURE :  $610 \pm 15$  DEGREE CENTIGRADE.
  - DISHED ENDS TO BE PLACED ON BLOCKS IN FURNACE TO ENSURE UNIFORM HEATING AND COOLING.
  - MINIMUM TWO THERMOCOUPLES SHALL BE PROVIDED. HOWEVER ASME REQUIREMENT TO BE MET.
- CENTRAL HOLE IF ANY ON DISHED END NEED NOT TO BE PLUGGED. PLUG HOLE DIA SHOULD NOT EXCEED 50MM.
- PAINTING AFTER SURFACE CLEANING : ONE COAT OF RED OXIDE ZINC PHOSPHATE PRIMER ON OUT SIDE SURFACE LEAVING 50 MM FROM EDGE.
- TOLERANCE : (i) OVALITY SHOULD NOT EXCEED 1.0% OF DISHED END ID. (DIFFERENCE MAX. & MIN. I.D.)
  - MEASURED CIRCUMFERENCE SHOULD BE  ${}^0_{-6}$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. UPTO 1500MM.
  - AND  ${}^0_{+10}$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. ABOVE 1500MM.
- CODE OF CONSTRUCTION ASME SECTION VIII DIV. 1; 2017.
- INSPECTION BY M/S BHEL / BHEL APPOINTED TPIA AND END CUSTOMER(IF ANY).
- TEMPLATE REQUIREMENT AS PER UG-81 (a).
 

THE INNER SURFACE OF DISHED END SHALL NOT DEVIATE OUTSIDE OF THE SPECIFIED SHAPE BY MORE THAN 1.25% OF THE DISHED END I.D AND SHALL NOT DEVIATE INSIDE OF THE SPECIFIED SHAPE BY MORE THAN 0.625% EXCEPT FOR KNUCKLE RADIUS WHICH SHALL NOT BE LESS THAN THAT SPECIFIED.
- MATERIAL IDENTIFICATION NO. TO BE MAINTAINED AT D'END MANUFACTURER'S END BEFORE DURING & AFTER FORMING OPERATION.
- DISHED END MANUFACTURER TO FURNISH TEST CERTIFICATES INCLUDING (a) METHOD OF FORMING, (b) HEAT TREATMENT CARRIED OUT IF ANY, (c) DIMENSIONAL REPORT INCLUDING MINIMUM THICKNESS, (d) NDE REPORTS & (e) RESULTS OF TEMPLATE CHECK. QAP DULY APPROVED BY BHEL SHALL ALSO REQUIRED TO BE REFERRED FOR OTHER DOCUMENTS.
- D'END MANUFACTURER SHALL CONFIRM THE BLANK DIAMETER TO MEET OVER ALL DIMENSIONS & MIN THK TO BE ACHIEVED AS PER TABLE 1.
- hi = Di / 4
- DP TEST & RT ALWAYS SHALL BE CARRIED OUT AS PER AS PER APPENDIX-8 & UW-51 RESPECTIVELY OF ASME SECTION VIII DIVISION-I; 2017.

TABLE-1:

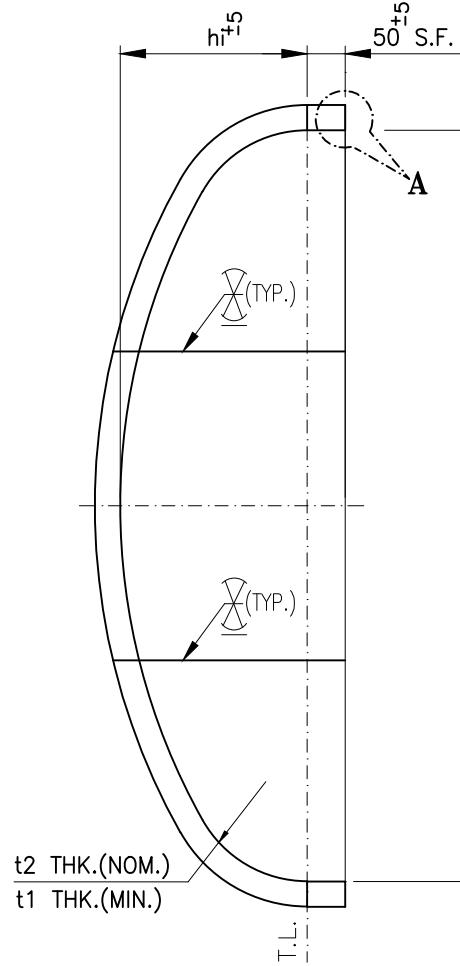
01	42-V-532R	1300	10+3	12+3	50	12+3	1650	255	2	PV-010
S.No	EQUIPMENT NO	φDi	t1+clad (MIN.)	t2+clad (NOM.)	SF	t3+clad	BLANK DIA (φX1)	WEIGHT (Kg.)	QTY.	PG-MA

02		THE WORD "DISHED END VENDOR/SUPPLIER" HAS BEEN REPLACED BY "DISHED END MANUFACTURER" IN THE NOTES.	SATISH	PRASANNA	SK.BISWAS	11-07-20
01		NOTES ADDED	SATISH	PRASANNA	SK.BISWAS	09-07-20
REV NO.	ZONE	BRIEF RECORD OF REVISIONS	PPD.	CHD.	APPD.	DATE

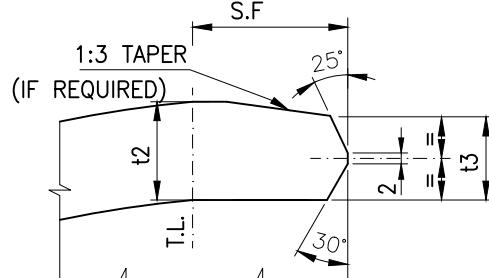
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

DEPT P.P.ENGG CODE 031	ALL DIMENSIONS ARE IN MM	PROJECTION ICON	SCALE 1 : 25	WEIGHT (Kg) XXXX	REF TO ASSY / OLD DWG
TITLE DISHED ENDS FOR PRESSING (SA516 Gr 70+SS304L clad)					DRAWING NO : 4-PV-010-U0033 REV 02

4-PV-020-U0030



(PROFILE - 2:1 ELLIPSOIDAL)



DETAIL - "A"

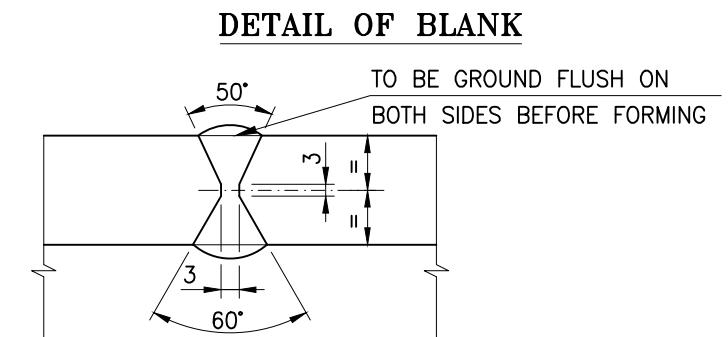
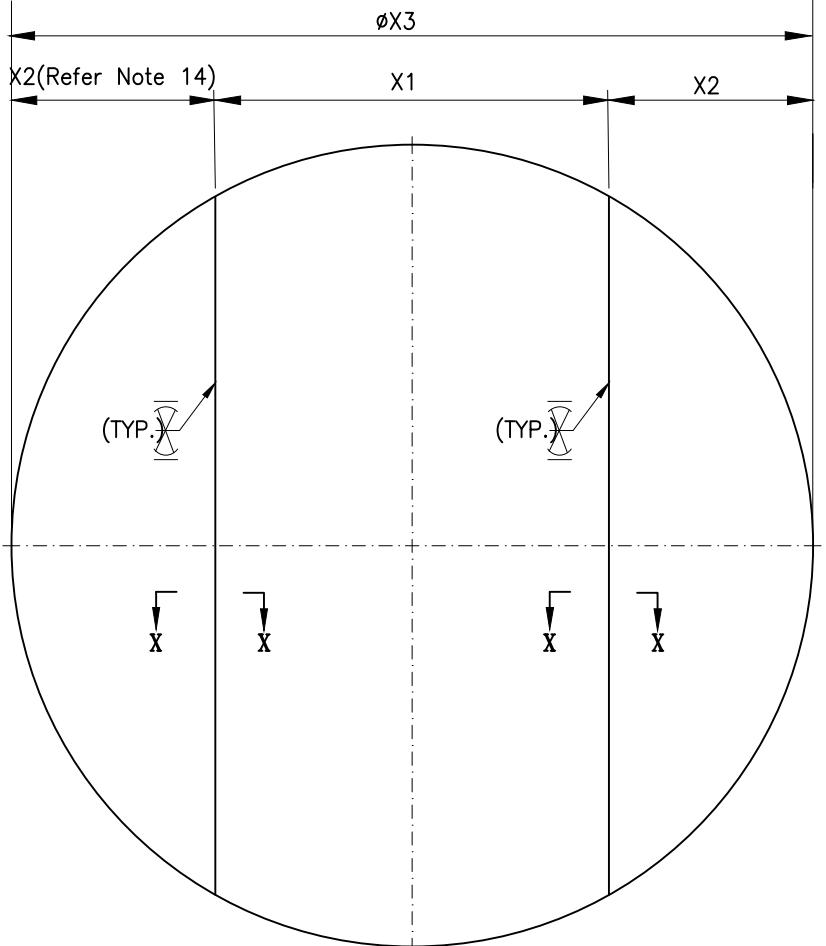
SECTION X-X  
(WELD DETAIL OF CHORDAL JOINT)

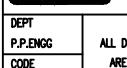
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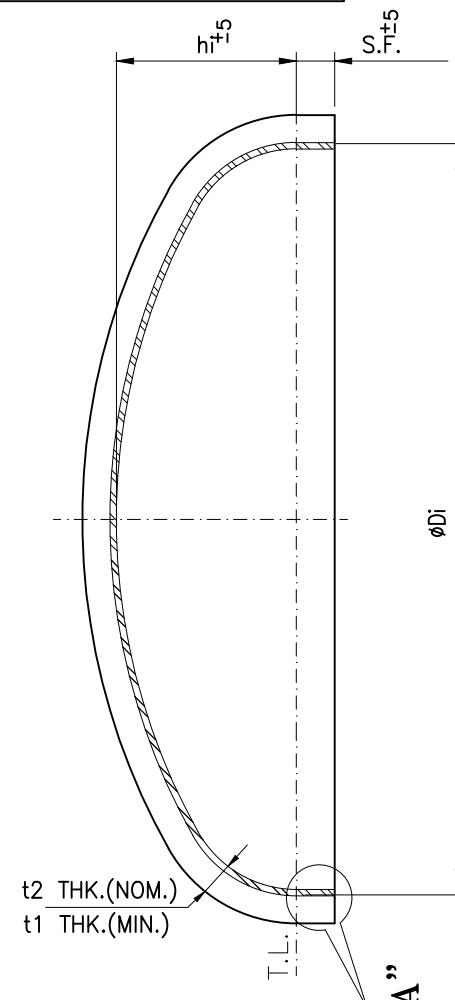
01	17-V-9203	4100	34	40	50	36	4950	2490	1230	6030	2
S.No	EQUIPMENT NO	ØDi	t1 (MIN.)	t2 (NOM.)	SF	t3	BLANK DIA (ØX3)	X1	X2	WEIGHT (Kg.)	QTY.

02		THE WORD "DISHED END VENDOR/SUPPLIER" HAS BEEN REPLACED BY "DISHED END MANUFACTURER" IN THE NOTES.	SATISH	PRASANNA	SK.BISWAS	11-07-20
01		NOTES ADDED, TOP & BOTTOM DISHED ENDS CLUBBED	SATISH	PRASANNA	SK.BISWAS	09-07-20
REV NO.	ZONE	BRIEF RECORD OF REVISIONS	PPD.	CHD.	APPD.	DATE

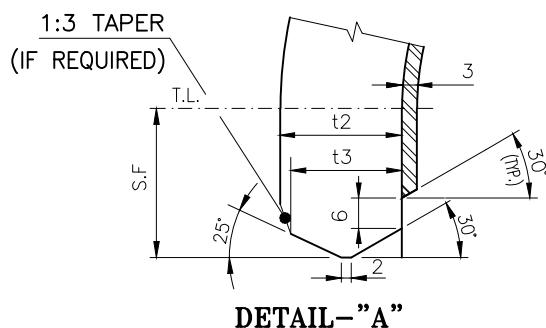
## NOTES:-

1. MATERIAL TO BE SA 516 Gr.70 (IMPACT TESTED) OF ASME SEC-II PART-A; 2017 (SHALL COMPLY WITH TDC:PV-PL-TDC-007).
2. DISHED END TO BE COLD FORMED FROM THREE (03) MAX. PIECES AS SHOWN WITH EDGE PREPARATION AS PER SECTION. X-X : FOLLOWING ACTIVITIES NEED TO BE CARRIED OUT BEFORE & AFTER HEAT TREATMENT.
- [A] SCOPE OF WORK DURING THE FORMATION OF BLANK FOR DISHED END : BEFORE HEAT TREATMENT & DISH FORMATION
  - (a) BASE PLATE WELD EDGE PREPARATION AS PER SECTION X-X.
  - (b) WELD EDGE PREPARATION OF BASE PLATE TO BE DP TESTED.
  - (c) WELDING OF BASE PLATES BY ASME QUALIFIED WELDERS USING APPROVED WPS AND PQR FOLLOWED BY GROUND FLUSH OF THE WELD.
  - (d) D.P TEST OF BASE PLATE WELD TO BE CARRIED OUT FOLLOWED BY 100% RT.
- [B] SCOPE OF WORK DURING DISHED END FORMATION : BEFORE HEAT TREATMENT  
FORMATION OF DISH USING COLD FORMING (MEETING THE DIMENSIONS AS SHOWN) FOLLOWED BY HEAT TREATMENT AS PER THE PROCEDURE DULY APPROVED BY BHEL. SEE NOTE-3 BELOW ALSO.
- [C] SCOPE OF WORK DURING DISHED END MANUFACTURE : AFTER HEAT TREATMENT
  - (a) COMPLETE DISHED END TO BE 100% UT AS PER SA 578 LEVEL-B.
  - (b) EDGE PREP. AT SF IS REQUIRED AS PER DETAIL 'A' SHOWN.
  - (c) BOTH INSIDE AND OUTSIDE OF THE KNUCKLE AND EDGE PREPARATION TO BE DP TESTED FOLLOWED BY 100% RT FOR WELD SEAM.
3. HEAT TREATMENT : - DISHED END TO BE STRESS RELIEVED AT MANUFACTURER WORKS AFTER FORMING AS PER THE FOLLOWING CYCLE.
  - (a) MAX. RATE OF HEATING - °C/HR ABOVE 400 °C : 130 FOR THE PLATE THICKNESS OF 40 MM.
  - (b) MAX. RATE OF COOLING - °C/HR UPTO 400 °C : 165 FOR THE PLATE THICKNESS OF 40 MM.  
AFTER COMPLETION OF SOAKING PERIOD DISHED END TO BE COOLED IN STILL AIR.
  - (c) MIN. SOAKING TIME - MINUTE : 100 FOR THE PLATE THICKNESS OF 40 MM.
  - (d) SOAKING TEMPERATURE :  $610 \pm 15$  DEGREE CENTIGRADE.
- DISHED ENDS TO BE PLACED ON BLOCKS IN FURNACE TO ENSURE UNIFORM HEATING AND COOLING.
- MINIMUM TWO THERMOCOUPLES SHALL BE PROVIDED. HOWEVER ASME REQUIREMENT TO BE MET.
4. CENTRAL HOLE IF ANY ON DISHED END NEED NOT TO BE PLUGGED. PLUG HOLE DIA SHOULD NOT EXCEED 50MM.
5. PAINTING AFTER SURFACE CLEANING (AT THE WORKS OF DISHED END MANUFACTURER- INSIDE & OUTSIDE BOTH) : ONE COAT OF RED OXIDE ZINC PHOSPHATE PRIMER ON INSIDE & OUTSIDE SURFACE LEAVING 50 MM FROM EDGE.
6. TOLERANCE : (i) OVALITY SHOULD NOT EXCEED 1.0% OF DISHED END ID. (DIFFERENCE MAX. & MIN. I.D.)  
(ii) MEASURED CIRCUMFERENCE SHOULD BE  ${}^0_{-6}$  MM OF CALCULATED CIRCUMFERENCE UPTO 1500MM I.D.  
AND  ${}^0_{+10}$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. ABOVE 1500MM.
7. CODE OF CONSTRUCTION ASME SECTION VIII DIV. 1; 2017.
8. INSPECTION BY M/S BHEL / BHEL APPOINTED TPIA AND END CUSTOMER(IF ANY).
9. TEMPLATE REQUIREMENT AS PER UG-81 (a).  
THE INNER SURFACE OF DISHED END SHALL NOT DEVIATE OUTSIDE OF THE SPECIFIED SHAPE BY MORE THAN 1.25% OF THE DISHED END I.D AND SHALL NOT DEVIATE INSIDE OF THE SPECIFIED SHAPE BY MORE THAN 0.625% INSIDE OF THE SPECIFIED SHAPE, EXCEPT FOR KNUCKLE RADIUS WHICH SHALL NOT BE LESS THAN THAT SPECIFIED.
10. MATERIAL IDENTIFICATION NO. TO BE MAINTAINED AT D'END MANUFACTURER'S END BEFORE DURING & AFTER FORMING OPERATION.
11. DISHED END MANUFACTURER TO FURNISH TEST CERTIFICATES INCLUDING (a) METHOD OF FORMING, (b) HEAT TREATMENT CARRIED OUT IF ANY, (c) DIMENSIONAL REPORT INCLUDING MINIMUM THICKNESS, (d) NDE REPORTS & (e) RESULTS OF TEMPLATE CHECK. QAP DULY APPROVED BY BHEL SHALL ALSO REQUIRED TO BE REFERRED FOR OTHER DOCUMENTS.
12. D'END MANUFACTURER SHALL CONFIRM THE BLANK DIAMETER TO MEET OVER ALL DIMENSIONS & MIN THK TO BE ACHIEVED AS PER TABLE 1.
13.  $h_i = Di / 4$
14. THE DIMENSION OF X2 AS SHOWN IS TENTATIVE AND IT MAY BE CHANGED BASED ON THE AVAILABILITY OF PLATE.  
BUT CONFIRMATION SHALL REQUIRED TO BE OBTAINED BEFORE PROCEEDING FOR BLANK FORMATION.
15. DP TEST & RT ALWAYS SHALL BE CARRIED OUT AS PER AS PER APPENDIX-8 & UW-51 RESPECTIVELY OF ASME SECTION VIII DIVISION-I; 2017.

<small>CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.</small>		 <b>Bharat Heavy Electricals Ltd</b> UNIT: HEAVY PLATES & VESSELS PLANT VISAKHAPATNAM-530012				NAME	DATE
		DEPT	ALL DIMENSIONS	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
		P.P.ENGG CODE 031	ARE IN MM		1 : 25	--	
TITLE <b>DISHED ENDS FOR PRESSING</b> (SA516 Gr 70 IMPACT TESTED)						DRAWING NO :	REV
4-PV-020-U0030						02	



(PROFILE - 2:1 ELLIPSOIDAL)



DETAIL OF BLANK

TABLE-1:

01	42-V-533R	1600	10+3	12+3	50	12+3	1990	366	2	PV-020
S.No	EQUIPMENT NO	ØDi	t1+clad (MIN.)	t2+clad (NOM.)	SF	t3+clad	BLANK DIA (ØX1)	WEIGHT (Kg.)	QTY.	PG-MA

02		THE WORD "DISHED END VENDOR/SUPPLIER" HAS BEEN REPLACED BY "DISHED END MANUFACTURER" IN THE NOTES.	SATISH	PRASANNA	SK.BISWAS	11-07-20
01		NOTES ADDED	SATISH	PRASANNA	SK.BISWAS	09-07-20
REV NO.	ZONE	BRIEF RECORD OF REVISIONS	PPD.	CHD.	APPD.	DATE

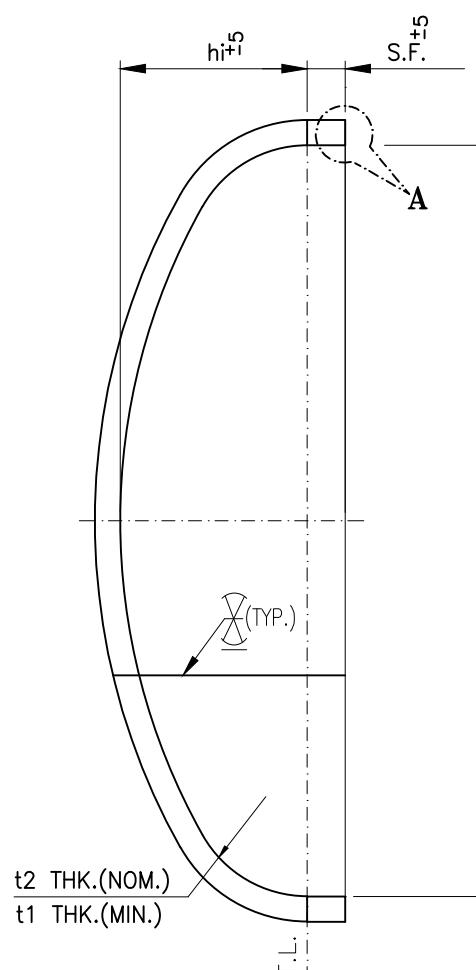
## NOTES:-

- MATERIAL TO BE SA 264 (SA 516 Gr 70+SS 304 L clad) OF ASME SEC-II PART-A; 2017 (SHALL COMPLY WITH TDC:PV-PL-TDC-008).
- FOLLOWING ACTIVITIES NEED TO BE CARRIED OUT BEFORE & AFTER HEAT TREATMENT.
  - SCOPE OF WORK DURING THE FORMATION OF BLANK FOR DISHED END:BLANK SHALL BE FORMED AS SHOWN.
  - SCOPE OF WORK DURING FORMATION OF DISHED END: BHEL APPROVED PROCEDURE TO BE REFERRED FOR MATERIAL HANDLING, PROTECTION WHILE FORMATION OF DISH, FORMATION OF DISH USING COLD FORMING (MEETING THE DIMENSIONS AS SHOWN) FOLLOWED BY HEAT TREATMENT AS PER THE PROCEDURE DULY APPROVED BY BHEL. SEE NOTE-3 BELOW ALSO.
  - SCOPE OF WORK DURING DISHED END MANUFACTURE : AFTER HEAT TREATMENT
    - COMPLETE DISHED END TO BE 100% UT AS PER SA 578 LEVEL-C.
    - EDGE PREP. AT SF IS REQUIRED AS PER DETAIL 'A' SHOWN.
    - BOTH INSIDE AND OUTSIDE OF THE KNUCKLE AND EDGE PREPARATION TO BE DP TESTED.
- HEAT TREATMENT :- DISHED END TO BE STRESS RELIEVED AT MANUFACTURER WORKS AFTER FORMING AS PER THE FOLLOWING CYCLE.
  - MAX. RATE OF HEATING - °C/HR ABOVE 400 °C : 210 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - MAX. RATE OF COOLING - °C/HR UPTO 400 °C : 270 FOR COMPOSITE PLATE THICKNESS OF 15 mm. AFTER COMPLETION OF SOAKING PERIOD DISHED END TO BE COOLED IN STILL AIR.
  - MIN. SOAKING TIME - MINUTE : 45 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - SOAKING TEMPERATURE :  $610 \pm 15$  DEGREE CENTIGRADE.
  - DISHED ENDS TO BE PLACED ON BLOCKS IN FURNACE TO ENSURE UNIFORM HEATING AND COOLING.
  - MINIMUM TWO THERMOCOUPLES SHALL BE PROVIDED. HOWEVER ASME REQUIREMENT TO BE MET.
- CENTRAL HOLE IF ANY ON DISHED END NEED NOT TO BE PLUGGED. PLUG HOLE DIA SHOULD NOT EXCEED 50MM.
- PAINTING AFTER SURFACE CLEANING : ONE COAT OF RED OXIDE ZINC PHOSPHATE PRIMER ON OUT SIDE SURFACE LEAVING 50 MM FROM EDGE.
- TOLERANCE : (i) OVALITY SHOULD NOT EXCEED 1.0% OF DISHED END ID. (DIFFERENCE MAX. & MIN. I.D.)
  - MEASURED CIRCUMFERENCE SHOULD BE  ${}^+0$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. UPTO 1500MM.
  - AND  ${}^-0$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. ABOVE 1500MM.
- CODE OF CONSTRUCTION ASME SECTION VIII DIV. 1; 2017.
- INSPECTION BY M/S BHEL / BHEL APPOINTED TPIA AND END CUSTOMER(IF ANY).
- TEMPLATE REQUIREMENT AS PER UG-81 (a).
 

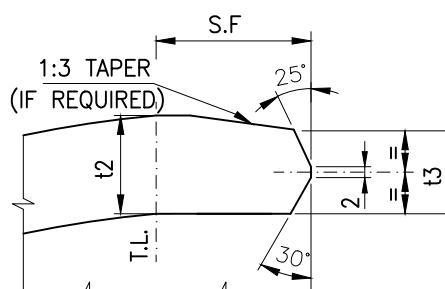
THE INNER SURFACE OF DISHED END SHALL NOT DEVIATE OUTSIDE OF THE SPECIFIED SHAPE BY MORE THAN 1.25% OF THE DISHED END I.D AND SHALL NOT DEVIATE INSIDE OF THE SPECIFIED SHAPE BY MORE THAN 0.625% INSIDE OF THE SPECIFIED SHAPE, EXCEPT FOR KNUCKLE RADIUS WHICH SHALL NOT BE LESS THAN THAT SPECIFIED.
- MATERIAL IDENTIFICATION NO. TO BE MAINTAINED AT D'END MANUFACTURER'S END BEFORE DURING & AFTER FORMING OPERATION.
- DISHED END MANUFACTURER TO FURNISH TEST CERTIFICATES INCLUDING (a) METHOD OF FORMING, (b) HEAT TREATMENT CARRIED OUT IF ANY, (c) DIMENSIONAL REPORT INCLUDING MINIMUM THICKNESS, (d) NDE REPORTS & (e) RESULTS OF TEMPLATE CHECK. QAP DULY APPROVED BY BHEL SHALL ALSO REQUIRED TO BE REFERRED FOR OTHER DOCUMENTS.
- D'END MANUFACTURER SHALL CONFIRM THE BLANK DIAMETER TO MEET OVER ALL DIMENSIONS & MIN THK TO BE ACHIEVED AS PER TABLE 1.
- DP TEST & RT ALWAYS SHALL BE CARRIED OUT AS PER APPENDIX-8 & UW-51 RESPECTIVELY OF ASME SECTION VIII DIVISION-I; 2017.

 <b>Bharat Heavy Electricals Ltd</b> UNIT: HEAVY PLATES & VESSELS PLANT VISAKHAPATNAM-530012		NAME	DATE
		DRN	22.01.20
CHD	D.SATISH	22.01.20	
APPD	D.SATISH	22.01.20	
REF TO ASSY / OLD DWG			
DEPT	ALL DIMENSIONS	PROJECTION	SCALE
P.P.ENGG	ARE IN MM		1 : 25
CODE			XXXX
031			
TITLE DISHED ENDS FOR PRESSING (SA516 Gr 70+SS304L clad)			DRAWING NO : 4-PV-020-U0034
REV	02		

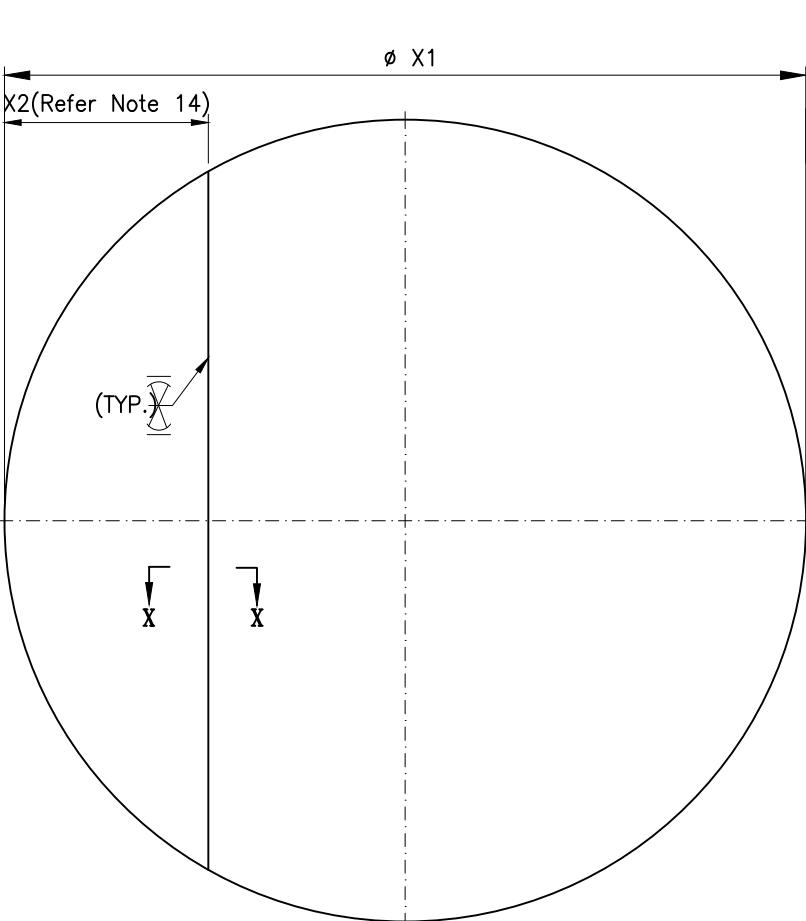
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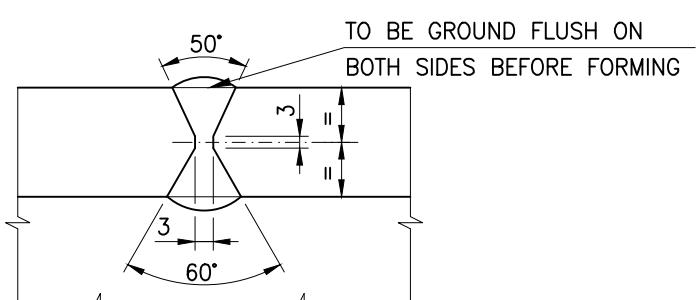
(PROFILE - 2:1 ELLIPSOIDAL)



DETAIL-“A”



DETAIL OF BLANK

SECTION X-X  
(WELD DETAIL OF CHORDAL JOINT)

## NOTES:-

- MATERIAL TO BE SA 516 Gr.70 (IMPACT TESTED) OF ASME SEC-II PART-A; 2017 (SHALL COMPLY WITH TDC:PV-PL-TDC-007).
- DISHED END TO BE COLD FORMED FROM TWO (02) MAX. PIECES AS SHOWN WITH EDGE PREPARATION AS PER SECTION. X-X : FOLLOWING ACTIVITIES NEED TO BE CARRIED OUT BEFORE & AFTER HEAT TREATMENT.
- [A] SCOPE OF WORK DURING THE FORMATION OF BLANK FOR DISHED END : BEFORE HEAT TREATMENT & DISH FORMATION**
  - BASE PLATE WELD EDGE PREPARATION AS PER SECTION X-X.
  - WELD EDGE PREPARATION OF BASE PLATE TO BE DP TESTED.
  - WELDING OF BASE PLATES BY ASME QUALIFIED WELDERS USING APPROVED WPS AND PQR FOLLOWED BY GROUND FLUSH OF THE WELD.
  - D.P TEST OF BASE PLATE WELD TO BE CARRIED OUT FOLLOWED BY 100% RT.
- [B] SCOPE OF WORK DURING DISHED END FORMATION : BEFORE HEAT TREATMENT**  
FORMATION OF DISH USING COLD FORMING (MEETING THE DIMENSIONS AS SHOWN) FOLLOWED BY HEAT TREATMENT AS PER THE PROCEDURE DULY APPROVED BY BHEL SEE NOTE-3 BELOW ALSO.
- [C] SCOPE OF WORK DURING DISHED END MANUFACTURE : AFTER HEAT TREATMENT**
  - COMPLETE DISHED END TO BE 100% UT AS PER SA 578 LEVEL-B.
  - EDGE PREP. AT SF IS REQUIRED AS PER DETAIL 'A' SHOWN.
  - BOTH INSIDE AND OUTSIDE OF THE KNUCKLE AND EDGE PREPARATION TO BE DP TESTED FOLLOWED BY 100% RT FOR WELD SEAM.
- HEAT TREATMENT :-- DISHED END TO BE STRESS RELIEVED AT MANUFACTURER WORKS AFTER FORMING AS PER THE FOLLOWING CYCLE.
  - MAX. RATE OF HEATING - °C/HR ABOVE 400 °C : 115 FOR THE PLATE THICKNESS OF 45 MM.
  - MAX. RATE OF COOLING - °C/HR UPTO 400 °C : 145 FOR THE PLATE THICKNESS OF 45 MM.
 AFTER COMPLETION OF SOAKING PERIOD DISHED END TO BE COOLED IN STILL AIR.
  - MIN. SOAKING TIME - MINUTE : 120 FOR THE PLATE THICKNESS OF 45 MM.
  - SOAKING TEMPERATURE :  $610 \pm 15$  DEGREE CENTIGRADE.
- DISHED ENDS TO BE PLACED ON BLOCKS IN FURNACE TO ENSURE UNIFORM HEATING AND COOLING.
- MINIMUM TWO THERMOCOUPLES SHALL BE PROVIDED. HOWEVER ASME REQUIREMENT TO BE MET.
- CENTRAL HOLE IF ANY ON DISHED END NEED NOT TO BE PLUGGED. PLUG HOLE DIA SHOULD NOT EXCEED 50MM.
- PAINTING AFTER SURFACE CLEANING (AT THE WORKS OF DISHED END MANUFACTURER- INSIDE & OUTSIDE BOTH) : ONE COAT OF RED OXIDE ZINC PHOSPHATE PRIMER ON INSIDE & OUTSIDE SURFACE LEAVING 50 MM FROM EDGE.
- TOLERANCE :**
  - OVALITY SHOULD NOT EXCEED 1.0% OF DISHED END ID. (DIFFERENCE MAX. & MIN. I.D.)
  - MEASURED CIRCUMFERENCE SHOULD BE  ${}^0_{+6}$  MM OF CALCULATED CIRCUMFERENCE UPTO 1500MM I.D. AND  ${}^0_{+10}$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. ABOVE 1500MM.
- CODE OF CONSTRUCTION ASME SECTION VIII DIV. 1; 2017.
- INSPECTION BY M/S BHEL / BHEL APPOINTED TPRA AND END CUSTOMER(IF ANY).
- TEMPLATE REQUIREMENT AS PER UG-81 (a). THE INNER SURFACE OF DISHED END SHALL NOT DEVIATE OUTSIDE OF THE SPECIFIED SHAPE BY MORE THAN 1.25% OF THE DISHED END I.D AND SHALL NOT DEVIATE INSIDE OF THE SPECIFIED SHAPE BY MORE THAN 0.625% INSIDE OF THE SPECIFIED SHAPE, EXCEPT FOR KNUCKLE RADIUS WHICH SHALL NOT BE LESS THAN THAT SPECIFIED.
- MATERIAL IDENTIFICATION NO. TO BE MAINTAINED AT D'END MANUFACTURER'S END BEFORE DURING & AFTER FORMING OPERATION.
- DISHED END MANUFACTURER TO FURNISH TEST CERTIFICATES INCLUDING (a) METHOD OF FORMING, (b) HEAT TREATMENT CARRIED OUT IF ANY, (c) DIMENSIONAL REPORT INCLUDING MINIMUM THICKNESS, (d) NDE REPORTS & (e) RESULTS OF TEMPLATE CHECK. QAP DULY APPROVED BY BHEL SHALL ALSO REQUIRED TO BE REFERRED FOR OTHER DOCUMENTS.
- D'END MANUFACTURER SHALL CONFIRM THE BLANK DIAMETER TO MEET OVER ALL DIMENSIONS & MIN THK TO BE ACHIEVED AS PER TABLE 1.
- $h_1 = D_i / 4$
- THE DIMENSION OF X2 AS SHOWN IS TENTATIVE AND IT MAY BE CHANGED BASED ON THE AVAILABILITY OF PLATE. BUT CONFIRMATION SHALL REQUIRED TO BE OBTAINED BEFORE PROCEEDING FOR BLANK FORMATION.
- DP TEST & RT ALWAYS SHALL BE CARRIED OUT AS PER AS PER APPENDIX-8 & UW-51 RESPECTIVELY OF ASME SECTION VIII DIVISION-I; 2017.

TABLE-1:

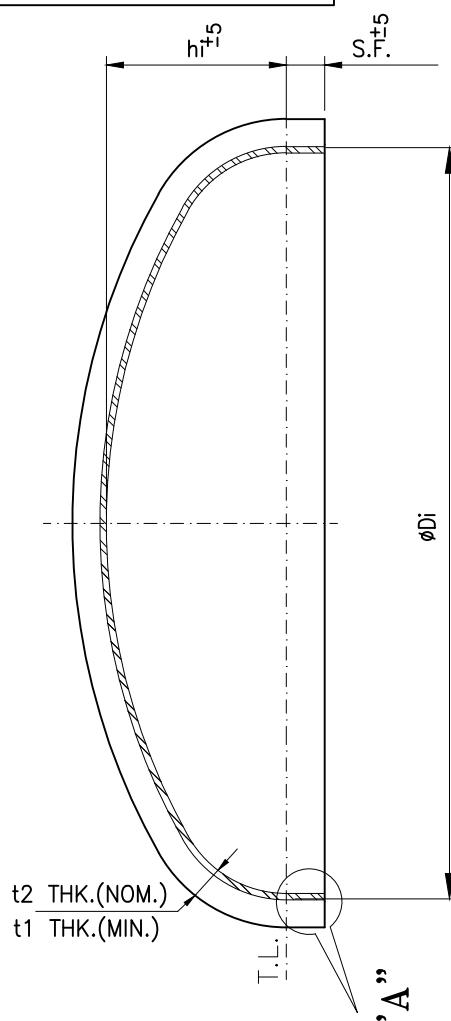
01	17-V-9204	2700	40	45	50	40	3370	880	3145	2
S.No	EQUIPMENT NO	ØDi	t1 (MIN.)	t2 (NOM.)	SF	t3	BLANK DIA (ØX1)	X2	WEIGHT (Kg.)	QTY.

02	THE WORD "DISHED END VENDOR/SUPPLIER" HAS BEEN REPLACED BY "DISHED END MANUFACTURER" IN THE NOTES.	SATISH	PRASANNA	SK.BISWAS	11-07-20
01	NOTES ADDED, TOP & BOTTOM DISHED ENDS CLUBBED	SATISH	PRASANNA	SK.BISWAS	09-07-20
REV NO.	ZONE	BRIEF RECORD OF REVISIONS	PPD.	CHD.	APPD.

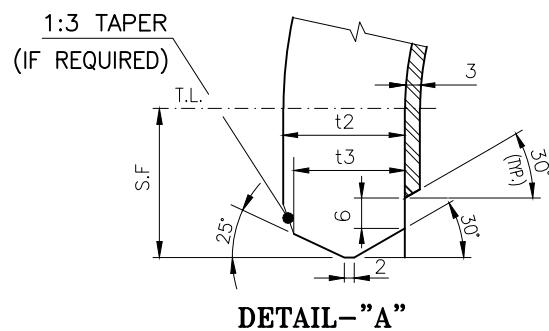
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DEPT P.P.ENGG CODE 031	ALL DIMENSIONS ARE IN MM	PROJECTION ICON	SCALE 1 : 25	WEIGHT (Kg) XXXX	REF TO ASSY / OLD DWG
TITLE DISHED ENDS FOR PRESSING (SA516 Gr 70 IMPACT TESTED)					DRAWING NO : 4-PV-030-U0023 REV 02

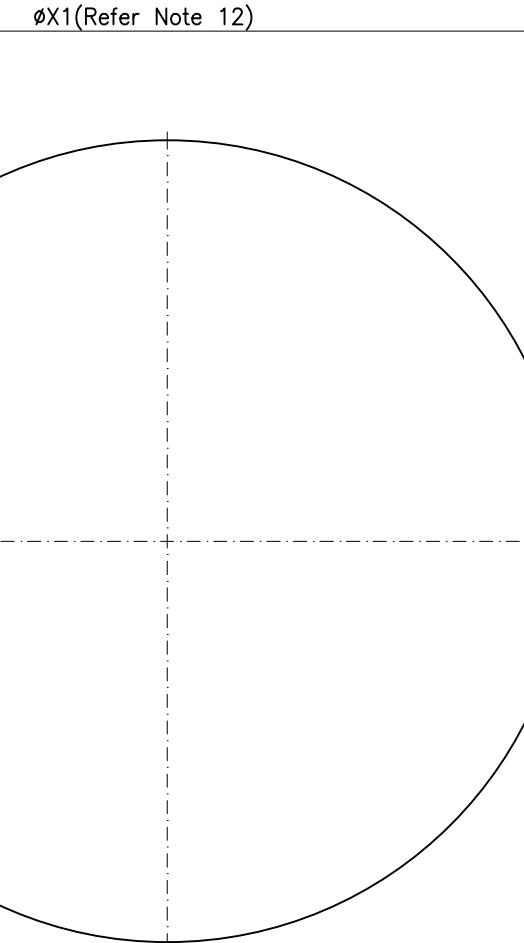
DRAWING NO: 4-PV-030-U0035



(PROFILE - 2:1 ELLIPSOIDAL)



DETAIL OF BLANK



## NOTES:-

1. MATERIAL TO BE SA 264 (SA 516 Gr 70+SS 304 L clad) OF ASME SEC-II PART-A; 2017 (SHALL COMPLY WITH TDC:PV-PL-TDC-008).
2. FOLLOWING ACTIVITIES NEED TO BE CARRIED OUT BEFORE & AFTER HEAT TREATMENT.
  - [A] SCOPE OF WORK DURING THE FORMATION OF BLANK FOR DISHED END: BLANK SHALL BE FORMED AS SHOWN.
  - [B] SCOPE OF WORK DURING FORMATION OF DISHED END: BHEL APPROVED PROCEDURE TO BE REFERRED FOR MATERIAL HANDLING, PROTECTION WHILE FORMATION OF DISH, FORMATION OF DISH USING COLD FORMING (MEETING THE DIMENSIONS AS SHOWN) FOLLOWED BY HEAT TREATMENT AS PER THE PROCEDURE DULY APPROVED BY BHEL. SEE NOTE-3 BELOW ALSO.
  - [C] SCOPE OF WORK DURING DISHED END MANUFACTURE : AFTER HEAT TREATMENT
    - (a) COMPLETE DISHED END TO BE 100% UT AS PER SA 578 LEVEL-C.
    - (b) EDGE PREP. AT SF IS REQUIRED AS PER DETAIL 'A' SHOWN.
    - (c) BOTH INSIDE AND OUTSIDE OF THE KNUCKLE AND EDGE PREPARATION TO BE DP TESTED.
3. HEAT TREATMENT :-- DISHED END TO BE STRESS RELIEVED AT MANUFACTURER WORKS AFTER FORMING AS PER THE FOLLOWING CYCLE.
  - (a) MAX. RATE OF HEATING - °C/HR ABOVE 400 °C : 210 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - (b) MAX. RATE OF COOLING - °C/HR UPTO 400 °C : 270 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - (c) MIN. SOAKING TIME - MINUTE : 45 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - (d) SOAKING TEMPERATURE :  $610 \pm 15$  DEGREE CENTIGRADE.
  - DISHED ENDS TO BE PLACED ON BLOCKS IN FURNACE TO ENSURE UNIFORM HEATING AND COOLING.
  - MINIMUM TWO THERMOCOUPLES SHALL BE PROVIDED. HOWEVER ASME REQUIREMENT TO BE MET.
4. CENTRAL HOLE IF ANY ON DISHED END NEED NOT TO BE PLUGGED. PLUG HOLE DIA SHOULD NOT EXCEED 50MM.
5. PAINTING AFTER SURFACE CLEANING : ONE COAT OF RED OXIDE ZINC PHOSPHATE PRIMER ON OUT SIDE SURFACE LEAVING 50 MM FROM EDGE.
6. TOLERANCE : (i) OVALITY SHOULD NOT EXCEED 1.0% OF DISHED END ID. (DIFFERENCE MAX. & MIN. I.D.)
  - (ii) MEASURED CIRCUMFERENCE SHOULD BE  ${}^{+0}_{-6}$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. UPTO 1500MM. AND  ${}^{+0}_{-10}$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. ABOVE 1500MM.
7. CODE OF CONSTRUCTION ASME SECTION VIII DIV. 1; 2017.
8. INSPECTION BY M/S BHEL / BHEL APPOINTED TPIA AND END CUSTOMER(IF ANY).
9. TEMPLATE REQUIREMENT AS PER UG-81 (a).
 

THE INNER SURFACE OF DISHED END SHALL NOT DEVIATE OUTSIDE OF THE SPECIFIED SHAPE BY MORE THAN 1.25% OF THE DISHED END I.D AND SHALL NOT DEVIATE INSIDE OF THE SPECIFIED SHAPE BY MORE THAN 0.625% INSIDE OF THE SPECIFIED SHAPE, EXCEPT FOR KNUCKLE RADIUS WHICH SHALL NOT BE LESS THAN THAT SPECIFIED.
10. MATERIAL IDENTIFICATION NO. TO BE MAINTAINED AT D'END MANUFACTURER'S END BEFORE DURING & AFTER FORMING OPERATION.
11. DISHED END MANUFACTURER TO FURNISH TEST CERTIFICATES INCLUDING (a) METHOD OF FORMING, (b) HEAT TREATMENT CARRIED OUT IF ANY, (c) DIMENSIONAL REPORT INCLUDING MINIMUM THICKNESS, (d) NDE REPORTS & (e) RESULTS OF TEMPLATE CHECK. QAP DULY APPROVED BY BHEL SHALL ALSO REQUIRED TO BE REFERRED FOR OTHER DOCUMENTS.
12. D'END MANUFACTURER SHALL CONFIRM THE BLANK DIAMETER TO MEET OVER ALL DIMENSIONS & MIN THK TO BE ACHIEVED AS PER TABLE 1.
13.  $h_1 = D_i / 4$
14. DP TEST & RT ALWAYS SHALL BE CARRIED OUT AS PER AS PER APPENDIX-8 & UW-51 RESPECTIVELY OF ASME SECTION VIII DIVISION-I; 2017.

TABLE-1:

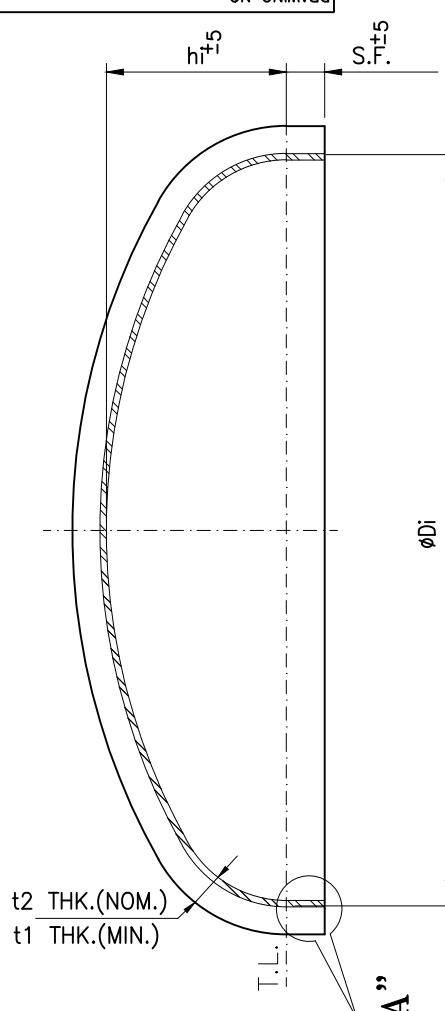
01	42-V-534R	1900	10+3	12+3	50	12+3	2350	514	2	PV-030
S.No	EQUIPMENT NO	ØDi	t1+clad (MIN.)	t2+clad (NOM.)	SF	t3+clad	BLANK DIA (ØX1)	WEIGHT (Kg.)	QTY.	PG-MA

02		THE WORD "DISHED END VENDOR/SUPPLIER" HAS BEEN REPLACED BY "DISHED END MANUFACTURER" IN THE NOTES.	SATISH	PRASANNA	SK.BISWAS	11-07-20
01		NOTES ADDED	SATISH	PRASANNA	SK.BISWAS	09-07-20
REV NO.	ZONE	BRIEF RECORD OF REVISIONS	PPD.	CHD.	APPD.	DATE

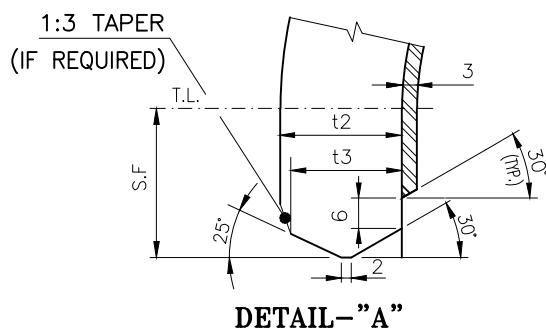
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DEPT P.P.ENGG CODE 031	ALL DIMENSIONS ARE IN MM	PROJECTION ICON	SCALE 1 : 25	WEIGHT (Kg) XXXX	REF TO ASSY / OLD DWG
TITLE DISHED ENDS FOR PRESSING (SA516 Gr 70+SS304L clad)					DRAWING NO : 4-PV-030-U0035
					REV 02

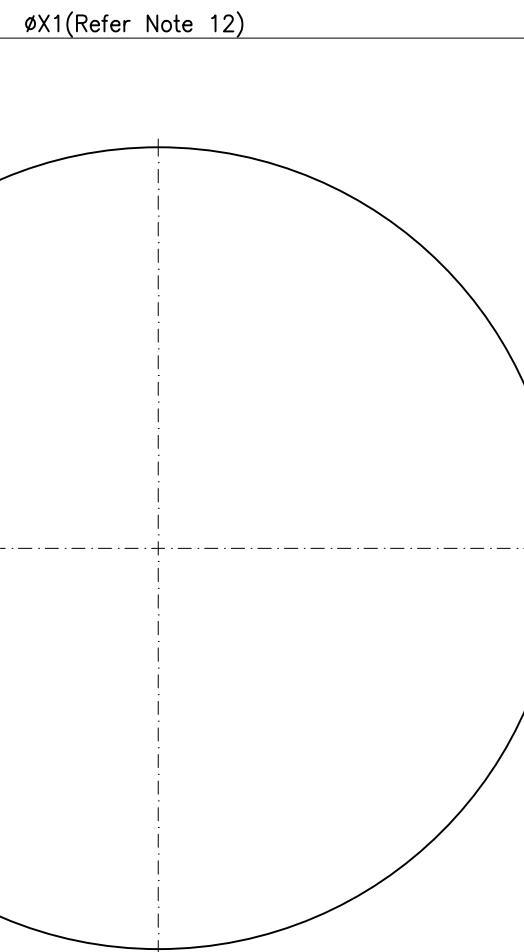
DRAWING NO: 4-PV-040-U0036



(PROFILE - 2:1 ELLIPSOIDAL)



DETAIL OF BLANK



## NOTES:-

- MATERIAL TO BE SA 264 (SA 516 Gr 70+SS 304 L clad) OF ASME SEC-II PART-A; 2017 (SHALL COMPLY WITH TDC:PV-PL-TDC-008).
- FOLLOWING ACTIVITIES NEED TO BE CARRIED OUT BEFORE & AFTER HEAT TREATMENT.
  - SCOPE OF WORK DURING THE FORMATION OF BLANK FOR DISHED END: BLANK SHALL BE FORMED AS SHOWN.
  - SCOPE OF WORK DURING FORMATION OF DISHED END: BHEL APPROVED PROCEDURE TO BE REFERRED FOR MATERIAL HANDLING, PROTECTION WHILE FORMATION OF DISHED END USING COLD FORMING (MEETING THE DIMENSIONS AS SHOWN) FOLLOWED BY HEAT TREATMENT AS PER THE PROCEDURE DULY APPROVED BY BHEL. SEE NOTE-3 BELOW ALSO.
  - SCOPE OF WORK DURING DISHED END MANUFACTURE : AFTER HEAT TREATMENT
    - COMPLETE DISHED END TO BE 100% UT AS PER SA 578 LEVEL-C.
    - EDGE PREP. AT SF IS REQUIRED AS PER DETAIL 'A' SHOWN.
    - BOTH INSIDE AND OUTSIDE OF THE KNUCKLE AND EDGE PREPARATION TO BE DP TESTED.
- HEAT TREATMENT : - DISHED END TO BE STRESS RELIEVED AT MANUFACTURER WORKS AFTER FORMING AS PER THE FOLLOWING CYCLE.
  - MAX. RATE OF HEATING - °C/HR ABOVE 400 °C : 210 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - MAX. RATE OF COOLING - °C/HR UPTO 400 °C : 270 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - AFTER COMPLETION OF SOAKING PERIOD DISHED END TO BE COOLED IN STILL AIR.
  - MIN. SOAKING TIME - MINUTE: 45 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - SOAKING TEMPERATURE :  $610 \pm 15$  DEGREE CENTIGRADE.
- DISHED ENDS TO BE PLACED ON BLOCKS IN FURNACE TO ENSURE UNIFORM HEATING AND COOLING.
- MINIMUM TWO THERMOCOUPLES SHALL BE PROVIDED. HOWEVER ASME REQUIREMENT TO BE MET.
- CENTRAL HOLE IF ANY ON DISHED END NEED NOT TO BE PLUGGED. PLUG HOLE DIA SHOULD NOT EXCEED 50MM.
- PAINTING AFTER SURFACE CLEANING : ONE COAT OF RED OXIDE ZINC PHOSPHATE PRIMER ON OUT SIDE SURFACE LEAVING 50 MM FROM EDGE.
- TOLERANCE : (I) OVALITY SHOULD NOT EXCEED 1.0% OF DISHED END ID. (DIFFERENCE MAX. & MIN. I.D.)
  - MEASURED CIRCUMFERENCE SHOULD BE  ${}^0_{+6}$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. UPTO 1500MM.
  - ${}^0_{+10}$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. ABOVE 1500MM.
- CODE OF CONSTRUCTION ASME SECTION VIII DIV. 1; 2017.
- INSPECTION BY M/S BHEL / BHEL APPOINTED TPIA AND END CUSTOMER(IF ANY).
- TEMPLATE REQUIREMENT AS PER UG-81 (a).
 

THE INNER SURFACE OF DISHED END SHALL NOT DEVIATE OUTSIDE OF THE SPECIFIED SHAPE BY MORE THAN 1.25% OF THE DISHED END I.D AND SHALL NOT DEVIATE INSIDE OF THE SPECIFIED SHAPE BY MORE THAN 0.625% INSIDE OF THE SPECIFIED SHAPE, EXCEPT FOR KNUCKLE RADIUS WHICH SHALL NOT BE LESS THAN THAT SPECIFIED.
- MATERIAL IDENTIFICATION NO. TO BE MAINTAINED AT D'END MANUFACTURER'S END BEFORE DURING & AFTER FORMING OPERATION.
- DISHED END MANUFACTURER TO FURNISH TEST CERTIFICATES INCLUDING (a) METHOD OF FORMING, (b) HEAT TREATMENT CARRIED OUT IF ANY, (c) DIMENSIONAL REPORT INCLUDING MINIMUM THICKNESS, (d) NDE REPORTS & (e) RESULTS OF TEMPLATE CHECK. QAP DULY APPROVED BY BHEL SHALL ALSO REQUIRED TO BE REFERRED FOR OTHER DOCUMENTS.
- D'END MANUFACTURER SHALL CONFIRM THE BLANK DIAMETER TO MEET OVER ALL DIMENSIONS & MIN THK TO BE ACHIEVED AS PER TABLE 1.
- $h_1 = D_i / 4$
- DP TEST & RT ALWAYS SHALL BE CARRIED OUT AS PER AS PER APPENDIX-8 & UW-51 RESPECTIVELY OF ASME SECTION VIII DIVISION-I; 2017.

TABLE-1:

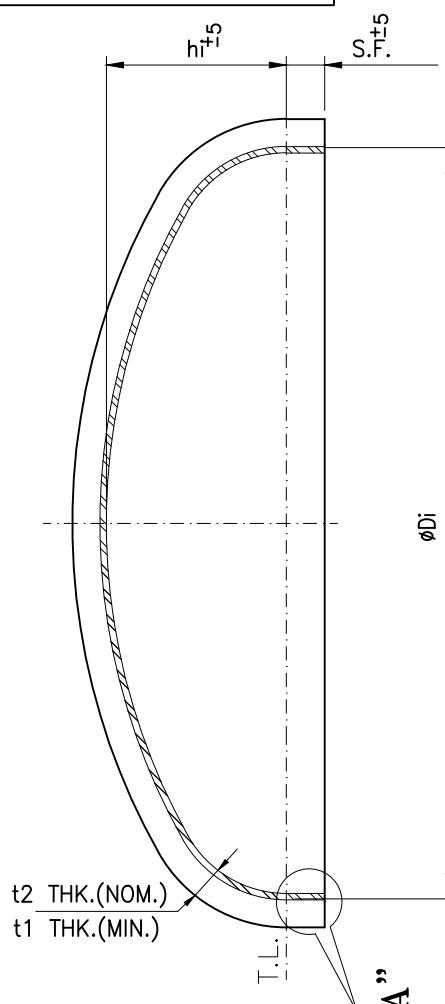
01	42-V-535R	2100	10+3	12+3	50	12+3	2560	609	2	PV-040
S.No	EQUIPMENT NO	φDi	t1+clad (MIN.)	t2+clad (NOM.)	SF	t3+clad	BLANK DIA (φX1)	WEIGHT (Kg.)	QTY.	PG-MA

02		THE WORD "DISHED END VENDOR/SUPPLIER" HAS BEEN REPLACED BY "DISHED END MANUFACTURER" IN THE NOTES.	SATISH	PRASANNA	SK.BISWAS	11-07-20
01		NOTES ADDED	SATISH	PRASANNA	SK.BISWAS	09-07-20
REV NO.	ZONE	BRIEF RECORD OF REVISIONS	PPD.	CHD.	APPD.	DATE

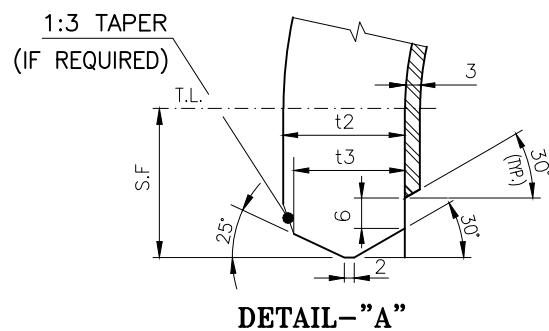
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DEPT P.P.ENGG CODE 031	ALL DIMENSIONS ARE IN MM	PROJECTION ICON	SCALE 1 : 25	WEIGHT (Kg) XXXX	REF TO ASSY / OLD DWG
TITLE DISHED ENDS FOR PRESSING (SA516 Gr 70+SS304L clad)	DRAWING NO : 4-PV-040-U0036				REV 02

DRAWING NO: 4-PV-050-U0037



(PROFILE - 2:1 ELLIPSOIDAL)

**DETAIL OF BLANK**

ØX1(Refer Note 12)

**NOTES:-**

- MATERIAL TO BE SA 264 (SA 516 Gr 70+SS 304 L clad) OF ASME SEC-II PART-A; 2017 (SHALL COMPLY WITH TDC:PV-PL-TDC-008).
- FOLLOWING ACTIVITIES NEED TO BE CARRIED OUT BEFORE & AFTER HEAT TREATMENT.
  - [A] SCOPE OF WORK DURING THE FORMATION OF BLANK FOR DISHED END: BLANK SHALL BE FORMED AS SHOWN.
  - [B] SCOPE OF WORK DURING FORMATION OF DISHED END: BHEL APPROVED PROCEDURE TO BE REFERRED FOR MATERIAL HANDLING, PROTECTION WHILE FORMATION OF DISHED END USING COLD FORMING (MEETING THE DIMENSIONS AS SHOWN) FOLLOWED BY HEAT TREATMENT AS PER THE PROCEDURE DULY APPROVED BY BHEL. SEE NOTE-3 BELOW ALSO.
  - [C] SCOPE OF WORK DURING DISHED END MANUFACTURE : AFTER HEAT TREATMENT
    - (a) COMPLETE DISHED END TO BE 100% UT AS PER SA 578 LEVEL-C.
    - (b) EDGE PREP. AT SF IS REQUIRED AS PER DETAIL 'A' SHOWN.
    - (c) BOTH INSIDE AND OUTSIDE OF THE KNUCKLE AND EDGE PREPARATION TO BE DP TESTED.
- HEAT TREATMENT :-- DISHED END TO BE STRESS RELIEVED AT MANUFACTURER WORKS AFTER FORMING AS PER THE FOLLOWING CYCLE.
  - (a) MAX. RATE OF HEATING - °C/HR ABOVE 400 °C : 210 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - (a) MAX. RATE OF COOLING - °C/HR UPTO 400 °C : 270 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - AFTER COMPLETION OF SOAKING PERIOD DISHED END TO BE COOLED IN STILL AIR.
  - (c) MIN. SOAKING TIME - MINUTE : 45 FOR COMPOSITE PLATE THICKNESS OF 15 mm.
  - (d) SOAKING TEMPERATURE :  $610 \pm 15$  DEGREE CENTIGRADE.
  - DISHED ENDS TO BE PLACED ON BLOCKS IN FURNACE TO ENSURE UNIFORM HEATING AND COOLING.
  - MINIMUM TWO THERMOCOUPLES SHALL BE PROVIDED. HOWEVER ASME REQUIREMENT TO BE MET.
- CENTRAL HOLE IF ANY ON DISHED END NEED NOT TO BE PLUGGED. PLUG HOLE DIA SHOULD NOT EXCEED 50MM.
- PAINTING AFTER SURFACE CLEANING : ONE COAT OF RED OXIDE ZINC PHOSPHATE PRIMER ON OUT SIDE SURFACE LEAVING 50 MM FROM EDGE.
- TOLERANCE : (i) OVALITY SHOULD NOT EXCEED 1.0% OF DISHED END ID. (DIFFERENCE MAX. & MIN. I.D.)  
 (ii) MEASURED CIRCUMFERENCE SHOULD BE  ${}^0_{-6}$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. UPTO 1500MM.  
 AND  ${}^0_{+10}$  MM OF CALCULATED CIRCUMFERENCE FOR I.D. ABOVE 1500MM.
- CODE OF CONSTRUCTION ASME SECTION VIII DIV. 1; 2017.
- INSPECTION BY M/S BHEL / BHEL APPOINTED TPIA AND END CUSTOMER(IF ANY).
- TEMPLATE REQUIREMENT AS PER UG-81 (a).  
 THE INNER SURFACE OF DISHED END SHALL NOT DEVIATE OUTSIDE OF THE SPECIFIED SHAPE BY MORE THAN 1.25% OF THE DISHED END I.D AND SHALL NOT DEVIATE INSIDE OF THE SPECIFIED SHAPE BY MORE THAN 0.625% INSIDE OF THE SPECIFIED SHAPE, EXCEPT FOR KNUCKLE RADIUS WHICH SHALL NOT BE LESS THAN THAT SPECIFIED.
- MATERIAL IDENTIFICATION NO. TO BE MAINTAINED AT D'END MANUFACTURER'S END BEFORE DURING & AFTER FORMING OPERATION.
- DISHED END MANUFACTURER TO FURNISH TEST CERTIFICATES INCLUDING (a) METHOD OF FORMING, (b) HEAT TREATMENT CARRIED OUT IF ANY, (c) DIMENSIONAL REPORT INCLUDING MINIMUM THICKNESS, (d) NDE REPORTS & (e) RESULTS OF TEMPLATE CHECK. QAP DULY APPROVED BY BHEL SHALL ALSO REQUIRED TO BE REFERRED FOR OTHER DOCUMENTS.
- D'END MANUFACTURER SHALL CONFIRM THE BLANK DIAMETER TO MEET OVER ALL DIMENSIONS & MIN THK TO BE ACHIEVED AS PER TABLE 1.
- DP TEST & RT ALWAYS SHALL BE CARRIED OUT AS PER AS PER APPENDIX-8 & UW-51 RESPECTIVELY OF ASME SECTION VIII DIVISION-I; 2017.

**TABLE-1:**

01	42-V-536R	2200	10+3	12+3	50	12+3	2675	661	2	PV-050
S.No	EQUIPMENT NO	ØDi	t1+clad (MIN.)	t2+clad (NOM.)	SF	t3+clad	BLANK DIA (ØX1)	WEIGHT (Kg.)	QTY.	PG-MA

02		THE WORD "DISHED END VENDOR/SUPPLIER" HAS BEEN REPLACED BY "DISHED END MANUFACTURER" IN THE NOTES.	SATISH	PRASANNA	SK.BISWAS	11-07-20
01		NOTES ADDED	SATISH	PRASANNA	SK.BISWAS	09-07-20
REV NO.	ZONE	BRIEF RECORD OF REVISIONS	PPD.	CHD.	APPD.	DATE

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DEPT P.P.ENGG CODE 031	ALL DIMENSIONS ARE IN MM	PROJECTION ICON	SCALE 1 : 25	WEIGHT (Kg) XXXX	REF TO ASSY / OLD DWG
TITLE DISHED ENDS FOR PRESSING (SA516 Gr 70+SS304L clad)					DRAWING NO : 4-PV-050-U0037
					REV 02

**STANDARD QUALITY ASSURANCE PLAN for  
Dished Ends of Columns & Pressure Vessels**

SQP:

Page 1 of 4

**Prepared by**

**Quality Assurance**

<b>Reviewed by</b>	<b>Signature</b>
<b>Engineering</b>	
<b>Production, Planning &amp; Technology</b>	
<b>Outsourcing</b>	
<b>Quality</b>	

<b>Rev. No</b>	<b>Date</b>	<b>Approved by</b>	<b>Signature</b>

<b>STANDARD QUALITY PLAN for Dished Ends of Columns &amp; Pressure Vessels</b>					SQP: Page 2 of 4			
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S. No	Description	Type of Checks	Reference Documents and Acceptance Criteria	Format of Record	Inspection			Remarks
					Sub- Vendor	BHEL/ B-TPIA	Customer/ C-TPIA/ AI	

1.0	Verification & Correlation of Material Spec. & TC	Properties, Material Spec & Heat No. etc	Drawing & TDC	Inspection Report	-	P/H	H	
2.0	Transfer of Marking and Heat Number	Material Spec & Heat Number	Drawing & TDC	Inspection Report	-	P/H	H	
3.0	Weld Edge Preparation & DPT	Detection of flaws	Drawing/PT Procedure	Inspection Report	-	P/H	-	
4.0	Fit up & Welding of L-Seam along with PTC (if weld is applicable)		ASME Sec VIII Div.1 & Drawing	Inspection Report	-	P/H	-	
5.0	100% PT on chipped back L-Seam weld (if weld is applicable)	Detection of flaws	ASME Sec VIII Div.1 & Drawing	Inspection Report	-	P/H	-	
6.0	100% RT of L-Seam weld (if weld is applicable) before forming and heat treatment	Detection of flaws	ASME Sec VIII Div.1 & Drawing	RT Films / Records	-	P/H	-	Refer enclosed Appendix in case of Clad material
7.0	Forming of Dished End	Dimensional & Template check	As per Drawing	Inspection Report	P/H	-		Refer enclosed Appendix before forming in case of Clad material
8.0	100% RT of L-Seam weld (if weld is applicable) after forming and before heat treatment	Detection of flaws			P/H	H	R	As Final Record Applicable for Carbon Steel/ SS materials only.
9.0	Heat Treatment (along with PTC)	Time & Temperature	ASME Sec VIII Div.1 & Drawing	HT Chart / Report	P/H	R	R	HT procedure duly approved by BHEL to be followed.

STANDARD QUALITY PLAN for Dished Ends of Columns & Pressure Vessels					SQP: Page 3 of 4			
S. No	Description	Type of Checks	Reference Documents and Acceptance Criteria	Format of Record	Inspection			Remarks
					Sub- Vendor	BHEL/ B-TPIA	Customer/ C-TPIA/ AI	
10.0	100% PT on entire Knuckle area region (both inside & outside) including welds (if applicable) and weld edge preparation after forming & heat treatment	Detection of flaws	ASME Sec VIII Div.1 & Drawing	Inspection Report	P/H	H	R	100% MPI for LAS materials
11.0	100% RT of L-Seam weld (if weld is applicable) after forming and heat treatment	Soundness of Welds Detection of flaws	ASME Sec VIII Div.1 & Drawing	RT Films / Records	P/H	H	R	As Final Record, only for Low Alloy Steel materials
12.0	100% UT after forming & heat treatment	Detection of flaws In Formed Head	ASME Sec VIII Div.1 & Drawing	UT Reports	P/H	H	R	Refer enclosed Appendix before Final Inspection in case of Clad material
13.0	Final Inspection (minimum thickness, profile, ovality, Depth etc)	Visual & dimensional	ASME Sec VIII Div.1 & Drawing	Inspection Report	P/H	H	H	Dimensional check including minimum thickness using UT-D meter.
14.0	Documentation	Record		Document Book.	P/H	H	R	Documents folder comprise reports as per this QP and shall be prefixed with an Index sheet .

Notes:

- 1) In case of conflict, more stringent requirement shall prevail.
- 2) Check the applicability of this SQP before proceeding.
- 3) All the measuring instruments / equipment shall have valid calibration records as on the date of use, from NABL / equivalent accredited bodies.

STANDARD QUALITY PLAN for Dished Ends of Columns & Pressure Vessels					SQP: Page 4 of 4			
S. No	Description	Type of Checks	Reference Documents and Acceptance Criteria	Format of Record	Inspection			Remarks
					Sub- Vendor	BHEL/ B-TPIA	Customer/ C-TPIA/ AI	

**APPENDIX SHEET CONTAINING ADDITIONAL REQUIREMENTS APPLICABLE IN CASE OF CLAD MATERIAL:**

1.0	Clad Restoration on L-Seam weld & test coupon (if weld is applicable in Clad Plate)	Continuity of Clad	Approved procedure	Inspection Report	-	P/H	-	
2.0	100% PT on Clad restoration each layer (if the Material of Construction is Clad Plate)	Detection of flaws	ASME Sec VIII Div.1 & Drawing	Inspection Report	-	P/H	R	
3.0	Copper Sulphate test on L-seam after barrier layer deposition and preparation before start of deposition of subsequent layers (if M O C is from clad Plate)	Detection of flaws	Approved Procedure	Inspection Report	-	P/H	R	
4.0	Ferroxyl Test after L-seam Clad restoration	No iron contamination	Approved Procedure	Inspection Report	-	P/H	R	
5.0	Disbondment check (100% UT) for rolled sections of clad and weld overlay	Lack of bonding	ASME Sec VIII Div.1 & Drawing	UT Reports	P/H	R	R	
	Ferrite Number	Microstructure % Delta Ferrite	ASTM	Report				Using Ferrite Scope
	Chemical Analysis after Clad Restoration and before forming & heat treatment	Chemical properties	Approved Procedure	Inspection Report				