



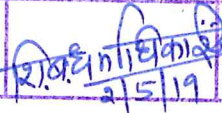


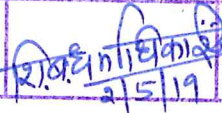


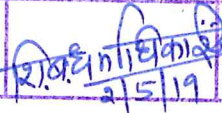

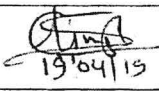
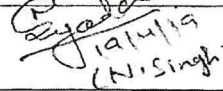
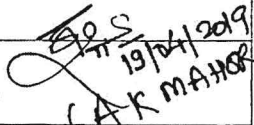

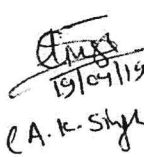
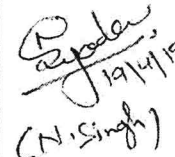
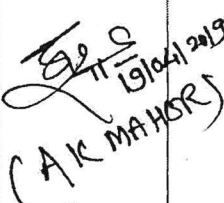


MAIN SUPPLIER'S NAME: BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL (A GOVERNMENT OF INDIA UNDERTAKING) <div style="float: right; text-align: right;">  </div>											
NAME OF SUB-VENDOR: N/A											
NPCIL PO NO.: CMM/FTP/10-33-1-1149/e-PO/30599, DTD: 25.01.19											
QA REF. NOs.: MAIN VENDOR: 2190190 SUB VENDOR: N/A											
CUSTOMER: NUCLEAR POWER CORPORATION OF INDIA LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) <div style="float: right; text-align: right;">  </div>											
PROJECT: 2x700MW GORAKHPUR HARYANA ANU VIDYUT PARIYOJANA (UNIT 1&2)											
EQUIPMENT: D2O HEAT EXCHANGERS											
DOCUMENT NO.: BHEL / NPCIL / 30599 / CS DISHED END/ CDE-19-3425											
TITLE: TECHNICAL SPECIFICATION FOR CS DISHED END											
<div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <div style="display: flex; justify-content: space-between; align-items: center;">  <div> न्यूक्लियर पावर कॉर्पोरेशन ऑफ इंडिया लिमिटेड Nuclear Power Corporation of India Limited </div> </div> <div style="margin-top: 10px;"> <input checked="" type="checkbox"/> अनुमोदित / APPROVED <input type="checkbox"/> टिप्पणी के अनुसार अनुमोदित / APPROVED AS NOTED <input type="checkbox"/> संशोधन को आगे बढ़ाएं / सेटें / PROCEED WITH/HOLD FABRICATION <input type="checkbox"/> अंतिम ट्रांसपैरेंसी एवं प्रतियों भेजें / SEND FINAL TRANSPARENCIES & PRINTS <input type="checkbox"/> संशोधन करें एवं अनुमोदन के लिए पुनः प्रस्तुत करें REVISE & RESUBMIT FOR APPROVAL </div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 33%;">जॉचकर्ता / CHECKED BY</th> <th style="width: 33%;">समीक्षाकर्ता / REVIEWED BY</th> <th style="width: 33%;">अनुमोदन कर्ता / APPROVED BY</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">  2.5.19 </td> <td style="text-align: center;">  25/1/19 </td> <td style="text-align: center;">  25/1/19 </td> </tr> </tbody> </table> <div style="font-size: small; margin-top: 10px;"> <p>किंग जानबूले कार्य का अनुमोदन आपूर्तिकर्ता संविदाकार को विनिर्देशनों के अनुसार आपूर्ति करने के उत्तरदायित्व से मुक्त नहीं करता है। This approval of the work to be done does not relieve the supplier of the responsibility of supply according to specifications.</p> </div> </div>						जॉचकर्ता / CHECKED BY	समीक्षाकर्ता / REVIEWED BY	अनुमोदन कर्ता / APPROVED BY	 2.5.19	 25/1/19	 25/1/19
जॉचकर्ता / CHECKED BY	समीक्षाकर्ता / REVIEWED BY	अनुमोदन कर्ता / APPROVED BY									
 2.5.19	 25/1/19	 25/1/19									
00	19.04.2019	2+3 = 5	 19/04/19	 (K. Singh)	 19/04/2019 (AK MAHAR)						
REV NO.	DATE	PAGES	PREPARED BY	CHECKED BY	APPROVED BY						


	CONDENSER & HEAT EXCHANGER ENGG. DIVISION BHEL BHOPAL	Document No.
		BHEL / NPCIL / 30599 / CS DISHED END/ CDE- 19-3425
TECHNICAL SPECIFICATION FOR CS DISHED END		

REVISION CONTROL SHEET

BHEL					
REV. No Date	PAGES	Description of Revision	Prepared By	Checked By	Approved By
00, 19.04.2019	2+3=5	Original submission based on the NPCIL approved document no BHEL/NPCIL/30477/CD Dished end/CDE-19-3418 for Moderator Heat exchanger.	 19/04/19 (A.K. Singh)	 19/04/19 (N. Singh)	 19/04/2019 (A.K. MAHOR)

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	Condenser & Heat Exchanger Engg. Division BHEL BHOPAL	Document No.	
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1.0 Description

Dished end shall be formed by hot/cold forming process from the single piece plate blank, duly Heat-treated, edge prepared as per the requirements indicated in the respective dished end drawings attached with enquiry/purchase order.

2.0 Shape

Torispherical /2:1 Ellipsoidal, per drg requirement.

3.0 Size

As mentioned in item drawing.

4.0 Code of Construction

As per ASME Sec. III ND-4200: latest

5.0 Material of Construction

Plates: Carbon steel plates of **SA-516 Gr70** (as specified on the dished end drawing) with ***co-related mill test certificates shall be supplied by BHEL.***

6.0 Heat Treatment

Dished ends shall be Normalized (as specified in the drawing) after forming along with the test coupon as per approved heat treatment procedure.

7.0 Tolerance


As indicated in the drawing.

8.0 Forming Process Qualification

Procedure qualification test shall be conducted on test coupons same as portion of component. Testing shall be carried out as per approved material sampling and testing plan. These coupons shall be subjected to same forming process as on actual item (maximum forming or bending, strain and heat treatment). **The applicable tests as per Clause no. ND-4200 of Section-III ND**, shall be conducted to determine the tensile and impact

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properties as per material specification. The forming procedure & material sampling and testing plan shall be submitted for NPCIL approval prior to forming / bend qualification.

9.0 **Edge Preparation**

As per details given in item drawing.

10.0 **Minimum Thickness after Forming**

Minimum thickness resulting from the forming (after forming) process shall be in compliance with the requirements indicated in the item drawing.

11.0 **Non-Destructive Examination & Testings**

11.1 **Liquid penetration Examination:** Entire outside surface of formed Dished Ends (both crown & knuckle portion) & the edge prepared ends shall be checked by dye penetration examination as per Article 6 of ASME Sec V & respective ASTM standard; latest edition.

11.2 Only NPCIL approved penetrant & developer agent shall be used.

11.3 Application of penetrant and developer using aerosol type spray cans is preferred.

11.4 The temperature of the area to be examined shall be between 16°C and 52°C.

11.5 All traces of penetrants and of developer shall be removed from the work immediately after the completion of examination.

12.0 **Cleaning & Protection**


After completing the manufacturing activities, cleanliness of both inside & outside surface of the dished ends shall be ensured by sand/shot blasting as per SIS-055900 Finish Sa 2 ½. Cleaned dished ends shall be protected by removable coating at vendor works. Final shot blasting and painting shall be done after completion of fabrication and testing of equipment as per tender specification /drawing at BHEL works.

13.0 **Identification**

Identification numbers shall be punched on each dish-end (DE no.) for

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proper identification & co-relation with test certificates. Identification numbers to be punched respectively on each dished end, are indicated in the drawing / Purchase order.

Each Dished End to have at-least following identifications duly punched on the dished end surface, at the location marked in the drawing & shall have same marking on the Test Certificates also;

- a. BHEL Purchase Order No.
- b. Drawing No. with rev. No. & Item No.
- c. Identification mark, D.E. No.
- d. Inspecting officer's Seal

14.0 **Inspection**

Vendor to submit Quality Plan for approval.

Dished ends shall be *inspected by BHEL-QC/NPCIL-QS, as per approved QA Plan.*

15.0 **Test Certificates**

Six (6) copies of following Test Certificates duly signed by inspection authority shall be furnished.

- a. Test Certificates for Testing of Test Coupons as per clause 8.0
- b. Final Dimensional Measurement Report.
- c. Heat Treatment Chart - for Stress Relieving of Dished Ends
- d. Non-Destructive Examination Reports
 - i. Liquid Penetration Examination.
- e. Dispatch Clearance from NPCIL-QS.

16.0 **Quality Plan**

Vendor to furnish in quality plan indicating manufacturing sequence, identifying the testing involved & inspection stages for the offered dished ends. Manufacturing shall be carried out as per NPCIL approved Q.A. Plan.

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