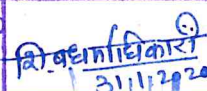
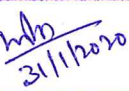
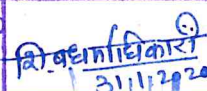
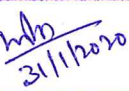
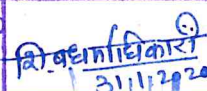
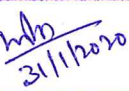
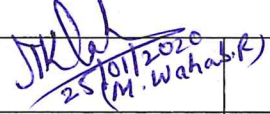
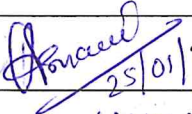
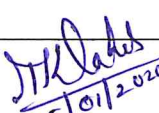


| MAIN SUPPLIER'S NAME:<br><b>BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL</b><br>(A GOVERNMENT OF INDIA UNDERTAKING)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                             |                                                                                                    |                                |                                                                                                                    |                                                                                                     |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------|------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| NAME OF SUB-VENDOR: N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                             |                                                                                                    |                                                                                                                   |                                                                                                                    |                                                                                                     |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
| NPCIL PO NO.: CMM/FTP/10-32-1-1152/e-PO/30447, DTD: 24.01.19                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                             |                                                                                                    |                                                                                                                   |                                                                                                                    |                                                                                                     |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
| QA REF. NOs.:<br>MAIN VENDOR: 2190191<br>SUB VENDOR: N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                             |                                                                                                    |                                                                                                                   |                                                                                                                    |                                                                                                     |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
| CUSTOMER:<br><b>NUCLEAR POWER CORPORATION OF INDIA LIMITED</b><br>(A GOVERNMENT OF INDIA ENTERPRISE)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                             |                                                                                                    |                                |                                                                                                                    |                                                                                                     |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
| PROJECT:<br><b>2x700MW GORAKHPUR HARYANA ANU VIDYUT PARIYOJANA</b><br>(UNIT 1&2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                             |                                                                                                    |                                                                                                                   |                                                                                                                    |                                                                                                     |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
| EQUIPMENT: MODERATOR HEAT EXCHANGER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                             |                                                                                                    |                                                                                                                   |                                                                                                                    |                                                                                                     |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
| DOCUMENT NO.: BHEL / NPCIL / 30447 / SS PIPE/ CDE-20-3453                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                             |                                                                                                    |                                                                                                                   |                                                                                                                    |                                                                                                     |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
| TITLE:<br><b>TECHNICAL PURCHASE SPECIFICATION FOR SS SPACER TUBE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                             |                                                                                                    |                                                                                                                   |                                                                                                                    |                                                                                                     |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
| <div style="border: 1px solid black; padding: 5px;">  न्यूक्लियर पावर कॉर्पोरेशन ऑफ इंडिया लिमिटेड<br/>Nuclear Power Corporation of India Limited<br/> <input checked="" type="checkbox"/> अनुमोदित / APPROVED<br/> <input type="checkbox"/> टिप्पणी के अनुसार अनुमोदित / APPROVED AS NOTED<br/> <input type="checkbox"/> संशोधन को आगे बढ़ाएं / रोके /<br/>PROCEED WITH/HOLD FABRICATION<br/> <input type="checkbox"/> अंतिम ट्रांसपेरेंसी एवं प्रिंटों भेजें /<br/>SEND FINAL TRANSPARENCIES &amp; PRINTS<br/> <input type="checkbox"/> संशोधन करें एवं अनुमोदन के लिए पुनः प्रस्तुत करें<br/>REVISE &amp; RESUBMIT FOR APPROVAL<br/> <table border="1" style="width: 100%;"> <tr> <th>जाँचकर्ता /<br/>CHECKED BY</th> <th>समीक्षकर्ता /<br/>REVIEWED BY</th> <th>अनुमोदन कर्ता /<br/>APPROVED BY</th> </tr> <tr> <td><br/>31.1.2020</td> <td><br/>वि. ब. ध. ना. अधिकारी<br/>31.1.2020</td> <td><br/>31.1.2020</td> </tr> </table> <p>किए जानेवाले कार्य का अनुमोदन आपूर्तिकर्ता संविदाकार को विनिर्देशनों के अनुसार आपूर्ति करने के उत्तरदायित्व से मुक्त नहीं करता है।<br/>This approval of the work to be done does not relieve the supplier of the responsibility of supply according to specifications.</p> </div> |                                                                                                                             |                                                                                                    |                                                                                                                   |                                                                                                                    |                                                                                                     | जाँचकर्ता /<br>CHECKED BY | समीक्षकर्ता /<br>REVIEWED BY | अनुमोदन कर्ता /<br>APPROVED BY | <br>31.1.2020 | <br>वि. ब. ध. ना. अधिकारी<br>31.1.2020 | <br>31.1.2020 |
| जाँचकर्ता /<br>CHECKED BY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | समीक्षकर्ता /<br>REVIEWED BY                                                                                                | अनुमोदन कर्ता /<br>APPROVED BY                                                                     |                                                                                                                   |                                                                                                                    |                                                                                                     |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
| <br>31.1.2020                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <br>वि. ब. ध. ना. अधिकारी<br>31.1.2020 | <br>31.1.2020 |                                                                                                                   |                                                                                                                    |                                                                                                     |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
| 01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 25.01.2020                                                                                                                  | 2+3 = 5                                                                                            | <br>25.01.2020<br>(D. K. AODH) | <br>25/01/2020<br>(M. Wahab R) | <br>25/01/2020 |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
| 00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 14.01.2020                                                                                                                  | 2+3 = 5                                                                                            | -SD-                                                                                                              | -SD-                                                                                                               | -SD- LALIT ASHMAN                                                                                   |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |
| REV NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | DATE                                                                                                                        | PAGES                                                                                              | PREPARED BY                                                                                                       | CHECKED BY                                                                                                         | APPROVED BY                                                                                         |                           |                              |                                |                                                                                                  |                                                                                                                             |                                                                                                    |

|                                                                                   |                                                                            |                                                |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------|
|  | <b>CONDENSER &amp; HEAT EXCHANGER ENGG. DIVISION</b><br><b>BHEL BHOPAL</b> | Document No.                                   |
|                                                                                   |                                                                            | BHEL / NPCIL / 30447 / SS<br>PIPE/ CDE-20-3453 |
| <b>TECHNICAL PURCHASE SPECIFICATION FOR SS SPACER TUBES</b>                       |                                                                            |                                                |

### REVISION CONTROL SHEET

| BHEL              |       |                                              |                                                                                                                |                                                                                                   |                                                                                                   |
|-------------------|-------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| REV. No<br>Date   | PAGES | Description of Revision                      | Prepared By                                                                                                    | Checked By                                                                                        | Approved By                                                                                       |
| 00,<br>14.01.2020 | 2+3=5 | Original submission.                         | -SD-                                                                                                           | -SD-                                                                                              | -SD-                                                                                              |
| 01,<br>25.01.2020 | 2+3=5 | Added Testing Matrix.<br>Revision as marked. | <br>25.01.2020<br>(D.K. Audh) | <br>25/01/2020 | <br>25/01/2020 |

|                                                                                   |                                                          |                                                |
|-----------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------|
|  | CONDENSER & HEAT EXCHANGER ENGG. DIVISION<br>BHEL BHOPAL | Document No.                                   |
|                                                                                   |                                                          | BHEL / NPCIL / 30447 / SS<br>PIPE/ CDE-20-3453 |
| TECHNICAL PURCHASE SPECIFICATION FOR SS SPACER TUBES                              |                                                          |                                                |

**1. Material specification:**

- a) Material specification shall be pipes as per SA 312 TP 304L.
- b) General requirements as per SA 999.
- c) For other requirements, refer purchase Enquiry/PO.

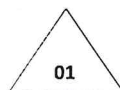
**2. Quantity/ Size:** As per enquiry / Purchase Order.



**3. Tolerance:** As per SA 312 TP 304L.

**4. Manufacture:** All Pipe shall be seamless and Cold Drawn.

**5. Marking:** Pipe shall be properly marked as per specification and must be co-related with the test certificates provided.

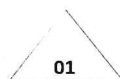
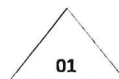
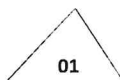


**6. Testing:** All pipes shall be hydro tested or NDE (i.e. UT,ET ) as per SA-999.

**7. Heat treatment:** All pipe shall be in solution Annealed condition as per material specification.

**8. Test certificate required:**

- a) Test certificate shall be in accordance with material specification. Material supplied to this Specification shall conform to applicable requirements of specification SA 999 of ASME Sec.II-part A (Edition 2017).
- b) Mechanical properties & chemical composition shall be as per material specification
- c) Deleted.
- d) Flattening test as per clause no. 11.3 of SA 312 TP 304L.
- e) IGC test as per A 262 Practice-E.



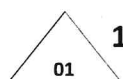
**9. Additional requirements:**

- a) Test certificate shall be provided.

|                                                                                   |                                                          |                                                |
|-----------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------|
|  | CONDENSER & HEAT EXCHANGER ENGG. DIVISION<br>BHEL BHOPAL | Document No.                                   |
|                                                                                   |                                                          | BHEL / NPCIL / 30447 / SS<br>PIPE/ CDE-20-3453 |
| TECHNICAL PURCHASE SPECIFICATION FOR SS SPACER TUBES                              |                                                          |                                                |

b) Finished pipe shall be reasonably straight with smooth ends. Surface defects like any sign of cracks, lappings, pitting etc. are not acceptable. Repair by welding is not permitted.

**10. Vendor List:** Material meeting the technical specification requirements shall be procured from BHEL Approved Vendors only.



**11. Testing Matrix:** - Vendor to carry out testing and inspection in-line with testing matrix attached as Annexure-A.

|                                                                                     |                                                                            |                                             |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------|
|  | <b>CONDENSER &amp; HEAT EXCHANGER ENGG. DIVISION</b><br><b>BHEL BHOPAL</b> | Document No.                                |
|                                                                                     |                                                                            | BHEL / NPCIL / 30447 / SS PIPE/ CDE-20-3453 |
| <b>TECHNICAL PURCHASE SPECIFICATION FOR SS SPACER TUBES</b>                         |                                                                            |                                             |



| TESTING MATRIX |                |                           |                           |                          |                              |        |                              |                                  |          |
|----------------|----------------|---------------------------|---------------------------|--------------------------|------------------------------|--------|------------------------------|----------------------------------|----------|
| PRODUCT        | MOC            | SUPPLY CONDITION          | CHEMICAL (HEAT & PRODUCT) | TENSILE                  | IGC                          | IMPACT | FLATTENING TEST              | HYDRO TEST OR NDE (i.e., ET, UT) | MT OR PT |
| PIPE           | SA 312 TP 304L | AS PER CL 6.1.2 OF SA-312 | AS PER TABLE-1 OF SA-312  | AS PER TABLE 4 OF SA-312 | AS PER ASTM A 262 PRACTICE E | NA     | AS PER CLAUSE 11.3 OF SA-312 | AS PER 22.2 of SA-999            | NA       |