

## **TECHNICAL SPECIFICATIONS**

### **1. SCOPE**

- 1.1. This specification establishes the requirements of material testing, fabrication ,Inspection, testing, packaging, guarantee and delivery of heat exchanger (H-R condenser) as per enclosed drawing and specification at BARC, Mumbai.
- 1.2. **Quantity : 4 No.s**

### **2. APPLICABLE DRAWINGS:**

- 2.1. List of applicable drawings is as indicated below and fabrication shall be strictly in accordance with these drawings and notes mentioned there in and elsewhere in the tender document.
- 2.2. **Applicable Drawing : A1-MTS/CTD/202/R0 for “HEAT EXCHANGER (H-R CONDENSER)“ Size 6"NB-20" TYPE BEM TEMA Class R.**
- 2.3. Note: All dimensions are tentative and may require minor changes, which will, not have any cost implications.

### **2.4. APPLICABLE DOCUMENTS:**

- 2.4.1. TEMA Ninth edition 2007.
- 2.4.2. ASME Boiler and Pressure Vessel code Section III, II, V, VIII Division1 and IX.
- 2.4.3. ANSI B16.5 Flanges
- 2.4.4. ASTM-B 622 : Specification for seamless Nickel and Nickel-Cobalt alloy pipe and tube
- 2.4.5. ASTM B 462: Specification for forged or rolled UNS 10276 alloy pipe flanges , forged fittings , and valves, and parts for corrosive high temperature service .
- 2.4.6. ASTM B 575: Specification for low-carbon nickel chromium-molybdenum, low-carbon nickel chromium-molybdenum-copper, low-carbon nickel-chromium-molybdenum-tantalum, and low-carbon nickel chromium molybdenum-tungsten alloy plate, sheet and strip.
- 2.4.7. ASTM B 906: Specification for General Requirements for Flat-Rolled Nickel and Nickel Alloys Plate, Sheet, and Strip
- 2.4.8. ASTM B 829 : Specification for general requirements for nickel and nickel alloys seamless pipe and tube.
- 2.4.9. ASTM A 193: Specification for alloy-steel and stainless steel bolting materials for high-temperature service
- 2.4.10. ASTM A 194: Specification for carbon and alloy steel nuts for bolts for high-pressure or high-temperature service, or both:
- 2.4.11. ASTM E 8 : Standard test methods for tension testing of metallic materials.
- 2.4.12. ASTM E 1473 : Test Methods for Chemical Analysis of Nickel, Cobalt, and High-Temperature Alloys
- 2.4.13. IS : 696- Code of practice for general engineering drawings.
- 2.4.14. IS : 3073- Assessment of Surface roughness.

### **3. MATERIAL**

#### **3.1. Material Testing and Inspection**

- 3.2. The material for parts shall be Hastelloy UNS 10276. All materials are under the scope of supplier and shall be tested for chemical composition and mechanical properties as per applicable standards stipulated above.

#### **3.3. Material Tests**

- 3.3.1. **Chemical Analysis** : Test method E1473, Nickel composition shall be determined arithmetically by difference.
- 3.3.2. **Mechanical Test**

- 3.3.2.1. Tension Test : Test method E 8. For tensile test of forged tubesheet the test specimen shall be take in the direction parallel to the axis of the vessel and as close to the hub as practical. One test specimen may represent a group of forgings provided they are from same heat of material and are forged in the same manner.
- 3.3.2.2. Flare test : Seamless pipe shall be tested for flare test also.
- 3.3.2.3. Rockwell hardness test - Test Method E18.
- 3.3.2.4. Hardness conversion - Hardness conversion table E 140.

#### 3.4. Ultrasonic testing

- 3.4.1. All the forging/plate shall be ultrasonically tested using straight beam contact method as per the requirement of ASTM A 388.
  - 3.4.2. Defect standard used for comparing the real defect indication shall be 2 mm flat bottom hole having depth not more than 10% of product nominal diameter/thickness. It shall be made of defect free samples of materials of same size, alloy and of metallurgical condition as that of the product to be tested.
  - 3.4.3. 100% volume of the material shall be covered.
  - 3.4.4. Ultrasonic testing equipment, probes and the auxiliaries shall be of standard make. However Krautkramer make instruments and probes shall be preferred.
  - 3.4.5. Speed of manual scanning shall not exceed 50m/sec with sufficient overlap between successive scanning.
  - 3.4.6. Acceptance standard: Unless otherwise agreed by our authorised representative or inspector any defect indication in the test object greater than that given by flat bottom hole (artificial defect) in defect standard or complete loss of back reflection shall be the cause of rejection.
  - 3.4.7. **Reports:** Three copies of the report describing the ultrasonic inspection procedure along with analysis of test results shall be supplied. The reports shall be signed by a responsible technical representative of the contractor.
- 3.5. The material for Pipe and tube shall be Hastelloy UNS 10276, conforming to the chemical and mechanical requirements specified in the standard ASTM B 622.
  - 3.6. All Plate material shall be Hastelloy UNS 10276 conforming to the chemical and mechanical requirements specified in the standard ASTM B575.
  - 3.7. All forged material shall be Hastelloy UNS 10276 conform to the chemical, mechanical and ultrasonic testing requirements specified in the standard ASTM B462.
  - 3.8. Welding Electrodes shall be ERNiCrMo-4 as per AWS G2.1M/G2.1:2012 .
  - 3.9. One sample from each batch of electrodes shall be subjected to testing for chemical composition and the values shall be conforming to the requirements specified for ERNiCrMo-4 as per AWS G2.1M/G2.1:2012
  - 3.10. Wherever the use of a material to an alternative specification is proposed the alternative shall be subject to prior approval by the purchaser.
  - 3.11. **Raw Material Procurement, Identification and Acceptance**
    - 3.11.1. Materials shall be procured by the contractor from genuine sources directly from reputed manufacturers as far as possible or through their authorized dealers. Purchaser's authorized representative shall witness all tests on the raw material at the place of manufacturer.
    - 3.11.2. In case of supply through authorized dealers, the original mill test certificates and shipping documents from the place of manufacturer shall be provided for verification.

- 3.11.3. In case of original documents and mill certificates are not available or are in doubt, each length of materials shall be tested for its conformance to this specification at laboratories / agencies approved by the purchaser.
- 3.11.4. **Material Identification:** Materials immediately after procurement and testing shall be offered to the purchaser for identification and stamping.
- 3.11.5. Each cut length of material shall be identified with the original mill heat markings.
- 3.11.6. Purchaser's approval of the material in the beginning shall not in any case relieve the responsibility of the supplier in supplying the materials as per this specification. Whenever correlation with the original test reports is in doubt, purchaser shall be at their liberty to insist for retesting of the material at intermediate stage or on the finished component at supplier's cost. In such retesting if the material found unacceptable, the purchaser shall reject any or all lots with no liability to their account.
- 3.11.7. No manufacturing activity shall commence without the explicit approval of the raw material in writing by the purchaser's authorized engineer.

#### 4. **FABRICATION AND WELDING:**

- 4.1. **Critical requirement :** The fabrication firm preferably should be ASME authorized manufactures (U certified ).
- 4.2. The welding procedure and performance qualifications shall be in accordance with ASME Code section IX.
- 4.3. Heat Exchanger fabrication tolerance As per F-1 , F-2 of section 2 of TEMA Ninth edition 2007.
- 4.4. The procedure qualification and performance qualification of the welders shall be carried out after approval of the WPS by the purchaser.
- 4.5. All joints on the main equipment shall be full penetration joints. Inside surfaces of the mating parts shall be matched and merged smoothly wherever possible.
- 4.6. After welding, Wherever possible, ID of vessels shall be machined and ground to N6 finish and then the radiography shall be carried out
- 4.7. Cleaning and joint preparations required for high nickel alloy may be detailed.
- 4.8. Prior to welding, 50mm on each side of the weld shall be specifically cleaned using acetone or Alcohol. All surfaces 150mm on each side of the joint shall be free from scale, rust, slag, paint, surface oxide etc. These shall be removed by wire brushing, abrasive blasting or grinding.
- 4.9. Weld edge preparation shall be machined smooth by machining or to a limited extent by grinding.
- 4.10. All weldings are to be performed by a qualified welder by TIG welding. The weld is to be protected by purging with Argon gas during the welding. The Argon gas used for shielding and purging shall be of high purity. The gas flow shall be continued for a period sufficient to prevent oxidation of the weldment after arc is extinguished.
- 4.11. Repair of weld defects: All defects such as cracks, blow holes, lack of penetration inclusions etc shall be removed by mechanical means or gauging process after which the joint shall be re-welded or re-inspected.
- 4.12. All Flange-sealing surfaces shall be perpendicular to the axis of the shell or the nozzle to achieve perfect leak tightness.
- 4.13. All welds shall be finished smoothly and merge with the parent metal without ridges or undercutting. Any gauging marks scratches etc. which occur during fabrication, testing and shipment shall be repaired to the satisfaction of the purchaser.
- 4.14. All scale oxides, weld spatter, oil machining chips and other foreign materials shall be completely removed and buffed on both the inside and the outside of the equipment. All surfaces that will not permit cleaning after complete fabrications shall be cleaned of all foreign material prior to assembly. All traces of water shall be removed by using warm air or other acceptable means.
- 4.15. **Inspection of welds**
  - 4.15.1. **Liquid Penetrant Examination**

- 4.15.1.1. After the root pass Liquid Penetrant Examination shall be done on all welds. All the completed welds shall also be examined by Liquid Penetrant Examination.
- 4.15.1.2. The procedure for Liquid Penetrant Examination shall be as per section V of ASME boiler and pressure vessel code.
- 4.15.1.3. Acceptable standards shall be as per Appendix 8, Methods for Liquid Penetrant Examination (PT) of ASME Section VIII Div 1.

#### **4.16. Radiographic Examination of Welds**

- 4.16.1. 100% radiography shall be carried out for all butt joints circumferential/longitudinal welding. RT sensitivity 2 2T for ASTM plate type IQI.
- 4.16.2. Procedure for radiography shall be got approved from the purchaser.

#### **5. Tube to Tube Sheet Joint procedure and qualification**

- 5.1. Tube expanding procedure and qualification shall be as per non mandatory appendix HH of ASME Sec VIII div. 1 2017. Manufacturer is required to use the Forms as mentioned in appendix HH for Tube Expanding procedure specification (TEPS), Tube Expanding Procedure Qualification Record For Test Qualification (TEPQR). The criteria for acceptance is that 100% of expanded length shall be in intimate continuous contact. In the groove the tubes must make intimate contact with the bottom of the groove.
- 5.2. The Manufacturer shall prepare written procedures for welded and expanded joints to examine joint strength. The Manufacturer shall establish the variables that affect joint repeatability in these procedures. The procedures shall provide detailed descriptions or sketches of enhancements, such as grooves, serrations, threads, and coarse machining profiles. The Manufacturer shall make these written procedures available to the Authorized Inspector.
- 5.3. Shear Load Test of the Tube to tube sheet joint shall be performed by the manufacturer as per non mandatory appendix A (Clause A-3 ) of ASME sec-VIII Div-1 .
- 5.4. The shear load test subjects a full-size specimen of the tube joint under examination to a measured load sufficient to cause failure. In general, the testing equipment and methods are given in the Methods of Tension Testing of Metallic Materials (ASTM E 8). Additional fixtures for shear load testing of tube-to-tube sheet joints are shown in Fig. A-3 of appendix A of ASME code 2017.
- 5.5. Flaws in the specimen may affect results. If any test specimen develops flaws, the retest provisions of ("k" of appendix A26 ASME-2017) shall govern.
- 5.6. The test block simulating the tube sheet may be circular, square or rectangular in shape, essentially in general conformity with the tube pitch (Square pitch 31.75mm) geometry. The test assembly shall consist of an array of tubes such that the tube to be tested is in the geometric center of the array and completely surrounded by at least one row of adjacent tubes. The test block shall extend a distance of at least one tubesheet ligament beyond the edge of the peripheral tubes in the assembly.
- 5.7. If any test specimen fails because of mechanical reasons, such as failure of testing equipment or improper specimen preparation, it may be discarded and another specimen is taken from the same heat.
- 5.8. All tubes in the test block array shall be from the same heat and shall be installed using identical procedures.
- 5.9. The finished thickness of the test block may be less but not greater than the tubesheet it represents. For expanded joints, made with welding, the expanded area of the tubes in the test block may be less but not greater than that for the production joint to be qualified.
- 5.10. The length of the tube used for testing the tube joint need only be sufficient to suit the test apparatus. The length of the tubes adjacent to the tube joint to be tested shall not be less than the thickness of the test block to be qualified.
- 5.11. The procedure used to prepare the tube-to-tubesheet joints in the test specimens shall be the same as used for production.

5.12. The tube-to-tubesheet joint specimens shall be loaded until mechanical failure of the joint or tube occurs. The essential requirement is that the load be transmitted axially.

5.13. Any convenient speed of testing may be used provided load readings can be determined accurately.

5.14. The reading from the testing device shall be such that pounds of applied load required to produce mechanical failure of the tube-to-tubesheet joint can be determined.

5.14.1. The value of  $f_r$  as determined by test shall be conveyed to purchaser for record of tube-to-tube sheet joints.

## 6. **Heat Exchanger Expansion Joint fabrication and examination**

### 6.1. **Fabrication**

6.1.1. All Longitudinal welds seams shall be butt type full penetration welds

6.1.2. circumferential welds attaching the bellows to the shell or weld end elements shall be full penetration groove weld or full fillet types. Refer mandatory appendix A26 (fig. 26-13) ASME sec-VIII Div. 1 2017 for typical expansion bellows to Weld Ends detail.

6.1.3. Other than the attachment welds, no circumferential welds are permitted in the fabrication of bellows convolutions.

### 6.2. **Examination**

6.2.1. All expansion joint flexible elements shall be visually examined for and shall be free of injurious defects, such as notches, crevices, material buildup or upsetting, weld spatter, etc., which may serve as points of local stress concentrations. Suspect surface areas shall be further examined by liquid penetrant.

6.2.2. All bellows butt-type welds shall be examined 100% on the inside and outside surfaces by the liquid penetrant method before forming. This examination shall be repeated after forming to the maximum extent possible considering the physical and visual access to the weld surfaces after forming. The butt weld shall be full penetration.

6.2.3. The circumferential attachment welds between the bellows and the weld ends shall be examined 100% by liquid penetrant.

6.2.4. Liquid penetrant examination shall be per Appendix 8 of ASME Sec-VIII Div-1. However, any linear indication found by examination shall be considered relevant if the dimension exceeds  $t_m/4$ , but not less than 0.010 in. (0.25 mm), where  $t_m$  is the minimum bellows wall thickness before forming.

### 6.3. **Pressure Test Requirement**

6.3.1. The completed expansion joint shall be subjected to a pressure test in accordance with UG-99 or UG-100 Of ASME Sec-VIII Div-1

6.3.2. The pressure testing of an expansion joint may be performed as a part of the vessel pressure test, provided the joint is accessible for inspection during pressure testing.

6.3.3. In addition to inspecting the expansion joint for leaks and general structural integrity during the pressure test, an expansion joint shall be inspected before, during, and after the pressure test to confirm that the requirements of clause 26-6.4 or 26-7.4 of appendix 26 of ASME code are satisfied.

6.4. **Marking and report** The expansion joint Manufacturer, whether the vessel Manufacturer or a parts Manufacturer, shall have a valid ASME Code U Certificate of Authorization and shall complete the appropriate Data Report in accordance with UG-120.

6.4.1. The Manufacturer responsible for the expansion joint design shall include the following additional data and statements on the appropriate Data Report:

6.4.1.1. spring rate

6.4.1.2. axial movement (+ and -), associated design life in cycles, and associated loading condition, if applicable

- 6.4.1.3. That the expansion joint has been constructed to the rules of Appendix-26.
- 6.4.2. A parts Manufacturer shall identify the vessel for which the expansion joint is intended on the Partial Data Report.
- 6.4.3. Markings shall not be stamped on the flexible elements of the expansion joint.
7. **Hydrostatic Testing** : The exchanger shall be hydrostatically tested with water as mentioned in the drawing. The test pressure shall be held for at least 30Mins. The shell side and tube side are to be tested separately in such a manner that leaks at the joints can be detected from at least one side. Welded joints are to be sufficiently cleaned prior to testing the exchanger to permit proper inspection during the test.
8. **Leak Detection for tube assembly with header** : Pressure test at 0.5 bar (Tube side pressurized ) with helium traces and sniffing of gas at header flange and inside the shell assembly. Leak shall be less than  $10^{-4}$  mbar Lit/sec. Applicable standard: IS 9902 :2004 recommended practice for leak testing.
9. **General Description and Requirements of the Item**
- 9.1. All parts shall be manufactured strictly conforming to the applicable drawings as stipulated above.
- 9.2. Dimensional / Geometrical tolerances wherever not specified, general tolerances as per IS 2102 Part 2 (medium) shall apply.
- 9.3. Geometric tolerances, surface finish, concentricity etc., must conform to those mentioned in the drawing.
- 9.4. All sharp corners shall be burr free and rounded to R0.2.
- 9.5. General surface finish of N7 ( $R_a$  value of 1.6  $\mu\text{m}$ ) or better must be achieved all over unless otherwise specified.
- 9.6. The Surfaces marked N6 shall have a roughness value  $R_a$  of 0.8 $\mu\text{m}$  or better. Machining lays on surface with N6 finish shall be concentric circles. These surfaces shall be free from scratches, tool marks, dents, material defects etc. Such surfaces shall be protected properly during subsequent operations if any, inspection, storage and transportation with extra care.
- 9.7. Form tolerances applicable, shall be 50 % of the dimensional tolerances unless specifically indicated.
- 9.8. All dimensions and other details shown in the drawing shall conform to the standard temperature of 20°C. Hence care shall be taken to incorporate appropriate corrections for thermal expansion or contraction during manufacturing and inspection depending on the room temperature.
10. **Fabrication Procedure and Workmanship**
- 10.1. **Fabrication Procedure**
- 10.1.1. The manufacturing procedure shall in no way impair the chemical composition and properties of the materials either by deterioration or by pick up of impurities.
- 10.1.2. The manufacturing procedure shall be such as to achieve the requirements of the drawing with consistency.
- 10.2. **Workmanship**
- 10.2.1. Workmanship shall be of high standard of engineering and shall be good enough to achieve necessary quality of the items, surface finish etc., as required by the drawing.
- 10.2.2. The supplier shall have necessary qualified operators, supervisors and inspectors to achieve the quality of the item. They should have a thorough knowledge to the fabrication, quality planning, gauge designing, and packing
11. **Quality Assurance Plan , Tests and Reports**
- 11.1. **Quality Assurance Plan**
- 11.1.1. A detailed Quality Assurance Plan in line with annexure-1 shall be submitted and the same shall be got approved by the purchaser before commencing the manufacturing activities.
- 11.1.2. fabrication drawings may also be got approved by the purchaser before commencing the fabrication activities.

## 11.2. Tests

11.2.1. The manufacturer shall carry out all the testing and inspection called for in this specification conforming to the established practice.

11.2.2. The inspection and testing shall be conducted in a manner satisfactory to, and shall be subject to approval by the purchaser. Inspection by the purchaser or his authorized representative shall not in any way relieve the manufacturer of the inspection duties called for herein.

## 11.3. Reports

11.3.1. The manufacturer shall prepare reports of all inspection and tests carried out.

11.3.2. The correspondence of the items and their reports must be traceable.

11.3.3. One copy of these reports shall be submitted to the purchaser or his authorized representative.

11.4. The supplier shall inform for purchaser's inspection after his inspection report is ready. The purchaser's representative shall cross check the inspection reports for their dimensional conformance to the drawing and correspondence to the components. In case of satisfactory results, he shall issue necessary inspection memo authorizing the supplier to dispatch the parts.

11.5. Purchaser or his authorized representative shall be permitted free access to the supplier's or his sub-contractor's premises at all reasonable times for the purpose of inspection at all stages of manufacture of the parts.

11.6. Purchaser or his authorized representative shall be given full assistance in the form of tools, gauges, instruments, skilled manpower etc., to facilitate inspection.

11.7. Purchaser shall be at their liberty to specify additional inspection procedures if felt necessary or change the one being used, to ascertain the conformance of the parts with this specification and drawings.

## 11.8. Material testing and documents to be supplied

11.8.1. Following original documents duly approved by the purchaser shall be supplied along with the components.

11.8.1.1. Chemical and mechanical test certificates showing the conformance with the applicable standard.

11.8.1.2. Welding procedure specification (WPS) and PQR.

11.8.1.3. Welder qualification records.

11.8.1.4. Radiography test certificates.

11.8.1.5. Report of DP testing.

11.8.1.6. Dimensional and surface finish report.

11.8.1.7. Documents of mock/shear test for qualifying Tube to tube sheet joint .

11.8.1.8. Additional data of expansion joint as per clause 6.4 report and marking

## 12. Certification and documentation

12.1. The manufacturer shall certify in writing to the purchaser that equipment complies with all fabrication, test requirements specified therein.

12.2. As- built drawings for each equipment shall be prepared showing actual dimensions achieved. Specified dimensions shall be shown in brackets near the actual dimensions.

12.3. The manufacturer shall provide the purchaser three sets of as built drawings along with other documents and reports.

13. **Warranty :-**The supplier shall warrantee the parts for materials, workmanship and geometry for a period of 12 months from the date of final acceptance. The supplier shall make free replacements for any rejections during this period due to reasons indicated above.

## 14. Evaluation.

14.1. Subject to meeting the terms and conditions of the tender, the technical bids will be evaluated on a 100 point scale based on weightage points assigned to different evaluation parameters as described in the table given below.

Sl. No.	Evaluation Parameters	Weightage Points		Remarks
		Own	Sub-contract	
<b>1</b>	<b>Facilities</b>	<b>40</b>	<b>20</b>	Fabrication of heat exchanger and pressure vessel shall only be considered
<b>1.1</b>	<b>"U" Stamp Certificate</b>	<b>10</b>	<b>5</b>	
<b>1.2</b>	<b>Fabrication facilities</b>	<b>8</b>	<b>4</b>	
1.2.1	Relevant facility to supply 80-100% Qty within the delivery period	8	4	
1.2.2	Relevant facility to supply 60-80% Qty within the delivery period	6	3	
1.2.3	Relevant facility to supply 40-60% Qty within the delivery period	4	2	
1.2.4	Not having relevant facility	0	0	
<b>1.3</b>	<b>Facilities for Bellow manufacturing</b>	<b>8</b>	<b>4</b>	The bidder shall provide access to verifiable details of skilled and qualified manpower being deployed; correlating the facilities & machineries and considering prevailing shift schedules.
1.3.1	Relevant facility to manufacture bellow	8	4	
<b>1.4</b>	<b>Manpower</b>	<b>8</b>	<b>4</b>	
1.4.1	Skilled & qualified manpower available to operate relevant facilities for 80-100% production	8	4	
1.4.2	Skilled & qualified manpower available to operate relevant facilities for 60-80% production	6	3	
1.4.3	Skilled & qualified manpower available to operate relevant facilities for 40-60% production	4	2	
1.4.4	Skilled & qualified manpower available to operate relevant facilities for less than 40% production	0	0	
<b>1.5</b>	<b>Inspection facilities</b>	<b>6</b>	<b>3</b>	The bidder shall provide verifiable details of inspection facilities available with them and establish its adequacy by correlating to the job requirement and
1.5.1	Inspection facilities for all parameters available to support 80-100% production	6	3	
1.5.2	Inspection facilities for all parameters available to support 60-80% production	4	2	



Sl. No.	Evaluation Parameters	Weightage Points		Remarks
		Own	Sub-contract	
1.5.3	Inspection facilities for all parameters available to support 40-60% production	2	1	machinery deployment.
1.5.4	Inspection facilities for all parameters available to support less than 20% production	0	0	
<b>2</b>	<b>Previous experience</b>	<b>20</b>	<b>0</b>	The bidder shall provide access to verifiable records of orders executed, history dockets, inspection records and dispatch documents to ascertain their past performance in comparable jobs. (Please <b>do not</b> attach purchase order copies containing price information in the technical bid)
2.1	Same job or its versions for DAE	20	0	
2.2	Jobs of comparable features for DAE	15	0	
2.3	Jobs of comparable features for other clients	10	0	
2.4	Other jobs.	0	0	
<b>3</b>	<b>Delivery commitment, if facilities match</b>	<b>15</b>	<b>0</b>	The bidder shall establish their delivery capability by comparing estimates of production cycle time required and facility/machinery hours available, considering preproduction and post production activities.
3.1	Can meet 80-100% supplies within stipulated delivery period	15	0	
3.2	Can meet 60-80% supplies within stipulated delivery period	12	0	
3.3	Can meet 40-60% supplies within stipulated delivery period	8	0	
3.5	Can meet less than 20% supplies within stipulated delivery period	0	0	
<b>4</b>	<b>Past Performance in similar/comparable jobs carried out in last 3 years</b>	<b>10</b>	<b>0</b>	The bidder shall provide access to verifiable records of orders executed, history dockets, inspection records and dispatch documents to ascertain their past performance in comparable jobs(Please <b>do not</b> attach purchase order copies containing
4.1	Completed satisfactorily within delivery period	10	0	
4.2	Completed satisfactorily within extension of delivery period up to 50% of original schedule	6	0	
4.3	Completed satisfactorily within extension of delivery	2	0	

Sl. No.	Evaluation Parameters	Weightage Points		Remarks
		Own	Sub-contract	
	period more than 50% of original schedule			price information in the technical bid)
4.4	Comparable jobs not executed/partly executed	0	0	
<b>5</b>	<b>Financial capabilities</b>	<b>15</b>	<b>0</b>	The bidder shall provide details of audited balance sheets for last three assessment years, details of bank, credit facility etc., for assessment of their financial capability.
<b>5.1</b>	Average turnover /Credit/solvency > 80% of estimated cost	<b>15</b>	<b>0</b>	
5.2	Average turnover /Credit/solvency > 60% of estimated cost	12	0	
5.3	Average turnover /Credit/solvency > 40% of estimated cost	8	0	
5.3	Average turnover /Credit/solvency > 20% of estimated cost	5	0	
5.4	Average turnover /Credit/solvency < 20% of estimated cost	0	0	
	<b>Total</b>	<b>100</b>		

Note:-

1. Fabrication facilities, skilled man power and inspection facilities in full working condition having requisite profiles and features required for manufacturing the item only shall be considered relevant.
2. Permanent manpower employed by the bidder shall be given full weightage and temporary employed shall be given 50% weightage as per the table depending on the band of assessment.
3. The figures of weightage points shown in the table are maximum applicable for respective bands. The evaluation authority of the purchaser reserves the right to assign a lower weightage in the band based on its assessment.

#### 4. Qualifying levels

Bids scoring following points or more shall only be considered technically qualified

Overall:60 points ;Facilities:30 (Min.) points; Delivery commitment:12 points and Financial capability:12 points.

Purchaser however reserves the right to modify the qualifying levels depending upon the response in the tender to ensure fair competition and hassle free supply of parts.

#### 15. Acceptance criteria :

- 15.1. Conformity of material as per specification.
- 15.2. Conformity of dimensions and tolerances and surface finish as per drawing.
- 15.3. Defect free weld joints.
- 15.4. Defect free expansion bellow and its weld end fitting.
- 15.5. Pressure test qualified expansion joint.
- 15.6. Mock/Shear load test qualified tube to tube sheet joint.

15.7. Hydrostatic test qualification of whole heat exchanger.

15.8. MSLD test qualification.

**16. RIGHTS AND PRIVILEGES**

16.1. Purchaser reserves the right to inspect any machinery, material, equipment or tool used by the manufacturer for the manufacture of equipment.

16.2. Purchaser or his representative shall be permitted free access to party's premises at all reasonable times for the purpose of inspection work at all stages of manufacture of equipment.

16.3. Even though the inspection may be carried out by the purchaser or his representative, such inspection, shall not, however relieve part of the responsibility for furnishing equipment conforming to the requirements of this specification nor prejudice any claim, right or privilege which the purchaser may have because of the use of defective and unsatisfactory equipment.

**17. Preservation, Packing and Delivery:**

**17.1. Preservation:**

17.1.1. All the components shall be suitably protected for the entire period of storage and dispatch against damage due to atmospheric factors, rough handling and transportation.

17.1.2. Special care shall be taken to protect N6 surfaces, thin sections etc.

**17.2. Packing :**

17.2.1. Internal and external surfaces are to be free from loose scale and other foreign material that is readily removable by hand or power brushing.

17.2.2. Water, Oil or other liquids used for cleaning or hydrostatic testing are to be drained from all units before shipment.

17.2.3. All exposed machined contact surfaces shall be coated with a removable rust preventive and protected from mechanical damage by suitable covers.

17.2.4. The exchanger and any spare parts are to be suitably protected to prevent damage during shipment.

17.2.5. The external thin walled expansion bellows shall be equipped with a protective cover which does not restrain movement.

17.2.6. All packages at the final stage (Outer Boxes) shall be clearly marked on with a) destination, b) purchase order No. and date, c) dimensions, d) gross weight, e) handling instructions if any, in block letters with water proof paint.

17.2.7. A copy of the inspection report must be sent along with the consignment.

**18. Delivery :**

**18.1. Supply of parts in sets.**

18.2. The parts shall be delivered in batches of full set of components only.

18.3. **Delivery Schedule:** The supply of parts shall be completed within **6 Months** from the date of issue of the Purchase Order by the supplier.

18.4. The following delivery schedule shall have to be followed.

18.4.1. Procurement of first batch of raw material for all parts, testing and obtaining approval by the purchaser within 2 months from the date of receipt of Purchase Order.

18.4.2. Complete supply within 4 months of approval of material.

18.4.3. The supplier shall state in their quotation the delivery schedule that they would be able to adhere to realistically.

**19. Confidentiality, Restricted Information, Prohibition against use of BARC's name clause :**

19.1. **Confidentiality:** No party shall disclose any information to any third party concerning the matters under this contract generally. In particular, any information identified as "proprietary" in nature by the disclosing party shall be kept strictly confidential by the receiving party and shall not be disclosed to any third party without the prior written consent of the original disclosing party.

- 19.2. This clause shall apply to the sub-contractors, consultants, advisers or the employees engaged by the party with equal force.
- 19.3. **“Restricted information” categories under section 18 of the Atomic Energy Act, 1962 and “Official secrets” under section 5 of the Official Secrets Act, 1923**
- 19.4. Any contravention of the above mentioned provisions by any contractor, sub-contractors, consultants, advisers or the employees of a contractor will invite penal consequences under the aforesaid legislation.
- 19.5. **Prohibition against use of BARC’s name without permission for publicity purpose**
- 19.6. The contractor, sub-contractors, consultants, advisers or the employees engaged by the contractor shall not use BARC’s name for any publicity purpose through any public media like press, radio, TV or internet without the prior written approval of BARC.
20. **Post supply inspection**  
Post supply inspection in respect of supplies made is not permitted. Any offer containing the condition of post supply inspection will be out-rightly rejected. It is therefore mandatory for the bidders while quoting, to indicate in clear terms the requirement of post supply inspection by outside agency.