Ref: IF3/01/2020/ 103249

October 20, 2020

Tender No.: BARC / IF3 / 01 / 2020 / 103249
Due Date: 13/11/2020

Sub: "Fabrication, testing, supply, guarantee and installation of Inconel 600 muffle and SS316L door for Resistance Heating Furnace as per the following technical specifications and drawings."

Sealed quotations are invited for and on behalf of the President of India for "Fabrication, testing, supply, guarantee and installation of Inconel 600 muffle and SS316L door for Resistance Heating Furnace as per the following technical specifications and drawings."

The following should be superscribed on the top of envelope containing quotation.

- Tender due date
- Tender No.,
- Party's Name & address and "Kind Attention to: D K Verma, Technical Officer, IF3, BARC, Mumbai-85"

Sealed offers should reach at the following address by SPEED POST (INDIA POST) only on or before DUE DATE: November 13, 2020, TIME: 16:00 Hrs.

Address: To,

Head, IF3
South Site, BARC
Trombay, Mumbai-085
Contact no.: 022 2559 4473/4596

PPL/IF3
The scope of work, completion schedule, quantity and technical specifications are as given below:

- Sub: Fabrication, testing, supply, guarantee and installation of Inconel 600 muffle and SS316L door for Resistance Heating Furnace as per the following technical specifications and drawings.

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(PART A)
Technical Specifications

- **Scope of the work:** The following is the gross scope of the work

<table>
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<tr>
<th>A. Fabrication of Inconel 600 muffle with SS316L cooling water jacket and Inconel 600 Exhaust Pipe.</th>
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<tr>
<td><strong>Quantity:</strong> 02 Nos.</td>
</tr>
<tr>
<td>1. Size of Muffle: 450 mm x 500 mm x 1000 mm L</td>
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<tr>
<td>2. MOC of the muffle: Inconel 600</td>
</tr>
<tr>
<td>3. Size of the Cooling water jacket: as per the attached dwg and following tech. spec.</td>
</tr>
<tr>
<td>4. MOC of the cooling water jacket: SS316L</td>
</tr>
<tr>
<td>5. Size of the Exhaust pipe: 50NB, 3000 mm L with a U bend and flanged end.</td>
</tr>
<tr>
<td>6. MOC of the exhaust pipe: Inconel 600</td>
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<tr>
<td>7. SS304L flanged ball valve in the exhaust pipe</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. SS316L Hinged door with Inconel 600 Heat Shield</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantity:</strong> 02 Nos.</td>
</tr>
<tr>
<td>1. Size of the door: 660 mm x 740 mm x 16 mm thick</td>
</tr>
<tr>
<td>2. MOC of the door: SS316L</td>
</tr>
<tr>
<td>3. Size of the Heat Shield: as per the attached dwg.</td>
</tr>
<tr>
<td>4. MOC of the Heat Shield with backing plate: Inconel 600</td>
</tr>
<tr>
<td>5. Suitable arrangement for door cooling</td>
</tr>
</tbody>
</table>

A. Inconel 600 muffle with SS316L cooling water jacket and Inconel 600 Exhaust Pipe.  
**Quantity:** 02 Nos.
1. The muffle should be fabricated out of 5 mm thick Inconel 600 plate as per the dimensions provided in the drawing.
2. The welding should be done in argon arc protective atmosphere by TIG welding using parent metal to ensure highest strength and ripple free welding construction.
3. The muffle should have an extended front face with cooling water jacket and a SS316L flange (16 mm thick) with silicon gasket (12 mm thick) against which the furnace door closes tightly to ensure leak tightness. The cooling water jacket on the front is required for gasket cooling. The cooling water jacket shall be fabricated out of SS 316L. It should have
15 NB cooling water inlet-outlets with ball valve and hose nipple. Cooling water will be recirculated for cooling of gasket.

4. The extended front face with water jacket and flange will be in SS316L. The flange should be provided with SS 304 M12 X 75 mm swing bolt and SS304 wing nut.

5. The muffle should have 15 NB steam entry and distribution pipe inside the furnace. A pipe line (50NB) about 3 m high with a ball valve outside the furnace should be provided for steam exit. The material of construction of all the pipe lines and valve should be Inconel 600.

6. The backside of the muffle shall be closed and is to be provided with steam entry pipe (15 NB) and exhaust pipe (50 NB).

7. Muffle exhaust: Furnace exhaust should be provided on the backside of the muffle. A SS304L flanged type isolation ball valve should be provided in exhaust line.
   - MOC of exhaust pipe: Inconel 600
   - MOC of flange: SS304L
   - Size: 50 NB
   - Overall length: 3 meters with a 90° bend and ball valve.

8. The muffles are to be installed in the furnaces (02 nos.) at purchaser’s site.

B. SS316L Hinged door with Inconel 600 Heat Shield:
   Quantity: 02 Nos.
   1. The door should be fabricated out of 16mm thick SS316L plate as per the dimensions provided in the drawing.
   2. The door should be hinged type with handles. The hinged and handles are to be fabricated out of SS316L.
   3. The door should have a suitable flange (16 mm thick) to match with the flange of extended phase of the muffle.
   4. The door flange should have necessary holes fitted with screw type tightening wheels (SS304) for locking the door against the muffle.
   5. The door should provide leak tight atmosphere inside the muffle.
   6. A Inconel 600 back plate of size 625 mm (L) x 575 mm (W) x 5 mm (Thick) is to cut from the Inconel 600 plate and the same is to be weld on the inside of furnace door. The inside of the furnace door is to be prepared for welding of the back plate.
   7. A box type heat shield of the overall dimensions 450 mm (L) x 500 (W) x 250 mm (Depth) is to be fabricated out of Inconel 600 plate. The box type heat shield is to be welded on the back plate. The heat shield should slightly taper as shown in the drawing.
   8. Suitable provision is to be made on the door for its cooling to maintain its temperature below 50°C.
   9. Welding should be done in argon arc protective atmosphere by TIG welding using parent metal to ensure highest strength and ripple free welding construction.
   10. The doors are to be installed on the furnaces (02 nos.) at purchaser’s site.

(A) Procurement of raw materials:
   1. All raw materials viz. SS 316L/304L and Inconel 600 required for the above work should be purchased from reputed and approved dealers only.
   2. Visual inspection should be done to identify defects like dimensional irregularity, surface irregularity, corrosion, physical deformation dents.

(PART B)
Terms & conditions
3. The materials shall be offered for material inspection and identification. After receipt and stamping the materials only, it will be sent for testing at govt. approved testing labs. The sample will be drawn, identified, sealed in front of I/O or his authorized representative.
4. The chemical composition of the material should be done in site for all relevant elements.
5. D.P. tests for surface cracks.
6. After testing and final approval only this material will be used for further fabrication.
7. Raw material and weld material shall meet the requirements of ASME Sec. II or ASTM standards. Tensile test of Inconel 600 at 500 °C should be done for information.

B. Transportation:
1. The materials should be packed so that no damage during transit occurs.
2. Safe delivery of the equipment to the user's site at BARC, Trombay, Mumbai – 85.

C. Welding procedures and qualifications tests
1. Welding procedure for inconel 600 / SS316L welds should be GTAW (TIG Welding) process for all passes. All joints should be full penetration welds. The root passes for weld joints, accessible from only outside should be continuously back purged with Argon during welding.
2. The argon gas used should be of 99.95% purity.
3. Qualification of the welding, procedure and performance test for welders should be carried out in accordance with the requirements of ASME B & PV Code Section IX & compatible filler wires for the TIG welding should be used.
4. The welders / operators proposed to be employed on the job should also pass the performance qualification test prescribed by the above code.
5. Surface to be welded should be made free from paint, oil, grease, dust or any other contamination. Cleaning of surfaces / weld edge preparations/ completed weldments should be done by use of approved solvents.
6. Wire brushes used should be of SS to avoid contamination of weld surfaces.
7. Tack welds should be examined for cracks before continuing with further welding and any defects observed should be done by qualified and approved welders.

D. Quality Control And Inspection
Quality assurance plan details with all aspects of quality so as to ensure conformity of the product to tender specifications, should be made and submitted to BARC for approval. Inspection facility should be offered to the representative appointed by BARC to enable him to carry out inspection
Following inspection and testing should be carried out.
1. Visual inspection
2. D.P. test of Butt welded joints (Root & final pass only)
3. Hydro testing after fabrication as per the specification
4. Radiography of 100 % of the Butt welded joints and piping will be carried out by using Gamma Radiography
5. NDE personnel should be qualified as level II or level III. The vendor should submit the list containing weld no., welder identification, weld date and NDE (DP or RT test) for the information and record. Radiography test reports should be submitted to indenter or his representative for verification and qualification.
E. Design and drawing: Drawings of the following individual equipments are to be submitted with the offer and the same needs to be approved by us before starting up the actual fabrication work in case of work order.
   1. Detailed drawing of the Inconnel 600 muffle with SS316L cooling water jacket and Inconnel 600 exhaust Pipe.
   2. Detailed drawing of SS316L Hinged door with Inconnel 600 Heat Shield.
   3. The minor changes made in drawings should not be subjected to any cost variation.

F. Welding plan: The vendor should submit the welding plan of (i) Inconnel 600 muffle (II) cooling water jacket and (III) Inconnel 600 heat shield. The vendor should take its prior approval by us before starting up the actual fabrication work in case of work order. The changes made in welding plan should not be subjected to any cost variation.

G. Pre – despatch Inspection.
   1. The equipment shall be inspected and cleared by BARC representative at the vendor’s site, before final dispatch.
   2. Party should maintain records for all inspection and tests done by BARC.
   3. Purchasers’ representatives may visit the works site during fabrication also.

H. Installation.
   1. After testing the assembled unit at vendor’s site and approval, the unit should be dismantled as per shipping requirement and shipped to BARC’s site.
   2. The vendor should depute their installation crew as soon as they are informed by the user department to take up the installation of the equipment.

I. Guarantee: Standard guarantee of the equipment shall be required.

J. General conditions
   1. In technical bid, vendor should address all the points as mentioned in our technical specifications. No point should be kept blank or ambiguous as it seriously affects bid evaluation.
   2. GSTIN & PAN should be clearly mentioned in the quotation, without which the offers will not be considered.
   3. Any minor modifications during the manufacture or commissioning for smooth and trouble free operation of the equipment shall be done free of charge.
   4. Supplier should also have flexible approach to accommodate any minor changes for betterment of the equipment.

K. The Supplier’s Scope: The supplier’s scope includes the following.
   1. This includes preparation of detailed fabrication drawings,
   2. All the materials required for fabrication and installation are in supplier’s scope.
   3. Fabrication and testing of the equipment
   4. Loading of the equipment for shipment to the user’s site,
   5. Safe delivery of the equipment to the user’s site at BARC, Trombay, Mumbai – 85.
   6. Installation of the equipment.
   7. Handing over with full documentation.

L. BARC’s Scope: Free water and electricity will be available at our site.
M. Confidentiality Clause:

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 other third party without the prior consent of the original disclosing party.

2. "Restricted information" categories under section 18 of the Atomic Energy Act., 1962 and "Official Secrets" under section 5 of the Official Secrets Act 1923:

3. Any contravention of the above mentioned provisions by any contractor, sub-contractor, consultant, advisor or the employees of a contractor will invite penal consequences under the aforesaid legislation.

4. Prohibition against use of BARC's name without permission for publicity Purposes: - The contractor, sub-contractor, consultant, advisor or the employees engaged by the contractor shall not use BARC's name for any publicity purpose through any media like press, radio, TV or internet without prior written approval of BARC.

N. Safety: The vendor should take all the safety precautions while working in the department and shall be solely responsible for any incident happening to his employees during the course of work in the department.

O. Price: Offered cost shall be valid for the entire scope of work (materials, fabrication, supply, Installation, taxes, packing & forwarding, transportation etc). Maximum possible break-up price should be given in the offer.

P. Validity: Offer should be firm and valid for next three months.

Q. Tax: As applicable shall be indicated clearly and separately.

R. Completion Period: 12 weeks from the date of the releasing the work order. The work completion schedule should be strictly adhered with. Any delay which is attributable to the contractor is liable for penalty @ 0.5% per week (max 5 %) on total work order value. In case extension in work completion period is required, request for it with proper and valid justification is to be sent to us positively before the expiry of work completion period.

S. Income Tax: Income Tax @1.5% will be deducted from vendor’s bill.

T. GST Concessional Certificate: The equipments to be fabricated will be put in service for R&D purpose only. Hence, GST concessional certificate will be issued by the department.

U. Payment: 100% payment including taxes will be made after safe delivery, installation of the equipment and submission of following documents:
   a. Original bill
   b. Advance stamped receipt
c. Guarantee Certificate
d. After receipt of site clearance certificate by the contractor issued from the BSMO (BARC Swatch Monitoring Officer).
e. Contractor shall fill up the option for payment through ECS/RTGS with pre-stamped receipt at the time of payment.

V. GSTIN Invoice: Invoice raised by a registered supplier of taxable goods/services along with other details specifically indicates:

a) GSTIN  
b) PAN  
c) Location of supply  
d) Tax component to be separately indicated in the invoice.  
e) An undertaking shall be submitted that the GST has been promptly deposited with the authorities.

(D K Verma)  
Technical Officer-D, IF3  
Email: dkverma@barc.gov.in

(Santanu Das)  
Superintendent, PPL, IF3
ELEVATION

HINGED DOOR WITH HEAT SHIELD

MOC OF DOOR: SS 316L, 16 mm THK.
MOC OF HEAT SHIELD WITH BACKING PLATE: INCONEL 600

EXHAUST PIPE: INCONEL 600, 50 NB, 3000 mm L

DWG. NO. 2
Details at Y - WELDING PLAIN FOR COOLING WATER JACKET

7 SS - 316L

1/2 in.

Weld Joint

on SS plate

on 5 mm. thick

5 mm. (Inconel 600 material)