

Scope of work

1. GENERAL REQUIREMENTS

1. The vendor shall possess a **valid ASME Section VIII Division 1 "U" Certificate of Authorization (U Stamp)** for fabrication of pressure vessels. The certificate shall be valid throughout the period of execution of the order.
2. Fabrication of Gasifier Tank sub-assemblies shall be carried out strictly in accordance with:
 - ASME Boiler & Pressure Vessel Code **Section VIII Division 1**.
 - ASME Section IX for welding qualifications.
 - BHEL-approved drawings.
 - BHEL-approved Quality Plans / Inspection & Test Plans.
 - Approved WPS/PQR/WPQ.
3. The vendor shall be responsible for complete fabrication, inspection, NDE, PWHT wherever applicable, dimensional control, documentation, preservation and dispatch of individual Gasifier Tank sub-assemblies.
4. The vendor shall arrange all required fabrication facilities, machinery, tooling, fixtures, rollers, positioners, welding equipment, lifting and handling equipment, measuring instruments, consumables and manpower required for execution of the work.
5. All welding shall be carried out by qualified welders/welding operators using qualified WPS/PQR in accordance with ASME Section IX.

2. RAW MATERIAL COLLECTION & TRACEABILITY

1. The vendor shall **collect all raw materials** from **BHEL Trichy Stores against Material Issue Voucher (MIV)** using the vendor's own vehicle/transport arrangement.
2. Raw materials may include:
 - Shell plates.
 - Formed dished ends.
 - Nozzle plates/forgings/pipes.
 - Raw material plates for Reinforcement pads.
 - Plates for Attachments.
 - Support materials.
 - Other materials specified in the approved drawings.
3. **Dished ends shall be supplied by BHEL as formed raw material.** The vendor shall collect the same from BHEL Stores and carry out edge preparation, fit-up, welding, inspection and NDE as applicable.

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4. The vendor shall verify the material identification, specification, heat number, dimensions and relevant material certificates before commencement of fabrication.
5. Complete material traceability shall be maintained throughout fabrication. Traceability shall be transferred to cut pieces and components as required by the Quality Plan.
6. PMI shall be carried out wherever specified in the approved Quality Plan.

3. FABRICATION OF SHELL COURSES

3.1 Edge Preparation

1. Carry out edge preparation of shell plates as per approved drawings and applicable WPS.
2. Edge preparation shall include cutting, beveling, grinding, cleaning and dimensional verification.
3. Edge preparation of **BHEL-supplied formed dished ends** shall be in the vendor's scope.
4. The prepared edges shall be inspected and cleared before fit-up.

3.2 Shell Rolling

5. Roll shell plates to the required diameter/profile as per approved drawings.
6. Ensure proper roundness, diameter, straightness and profile after rolling.
7. Any correction required shall be carried out by approved mechanical methods without damaging the material.

3.3 Longitudinal Seam Welding

8. Carry out fit-up of shell longitudinal joints.
9. Ensure correct root gap, alignment, mismatch and joint geometry as per approved WPS/CQP.
10. Carry out longitudinal seam welding using approved welding procedures.
11. Carry out visual and dimensional inspection after welding.
12. Perform specified NDE of longitudinal seams as per CQP.

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13. Any repair welding shall be carried out as per approved procedure followed by applicable re-NDE.

4. SHELL-TO-SHELL / DISHED END CIRCUMFERENTIAL WELDING

1. Carry out fit-up of individual shell courses.
2. Carry out shell-to-shell circumferential seam welding as per approved WPS.
3. Carry out fit-up and welding of shell-to-dished end joints.
4. Ensure proper alignment, mismatch, roundness and dimensional requirements.
5. Conduct applicable NDE of all circumferential welds.
6. Obtain NDE clearance before proceeding with subsequent fabrication activities.

5. NOZZLE FABRICATION & INSTALLATION

5.1 Plate-Formed Nozzles

1. Wherever nozzles are specified as **plate-formed nozzles**, the same shall be completely prefabricated before installation on the main shell.
2. Prefabrication shall include:
 - Plate edge preparation.
 - Rolling/forming.
 - Longitudinal seam fit-up.
 - Welding.
 - NDE of longitudinal weld.
 - PWHT/stress relieving.
 - Dimensional inspection.
 - Final NDE clearance as per CQP.
3. Only after completion of the above activities and obtaining clearance shall the prefabricated nozzle be welded to the shell.

5.2 Nozzle Opening

4. Mark nozzle locations on the shell as per approved drawings.
5. Carry out nozzle hole opening by approved cutting methods.
6. Carry out edge preparation and machining of nozzle openings wherever specified.

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7. Verify nozzle location, orientation, elevation, projection and dimensions before welding.

5.3 Nozzle Welding

8. Carry out nozzle fit-up and alignment.
9. Weld nozzles to the shell as per approved WPS.
10. Carry out visual, dimensional and applicable NDE examination of nozzle welds as per CQP (Quality Plan).
11. Repair and re-examine defective areas until final acceptance.

6. REINFORCEMENT PAD FABRICATION & WELDING

1. Fabricate reinforcement pads as per approved drawings.
2. Carry out rolling/forming of reinforcement pads wherever required.
3. Fit the reinforcement pads around nozzle weldments.
4. Carry out welding as per approved WPS.
5. Provide vent holes wherever specified.
6. Carry out applicable NDE of reinforcement pad welds.
7. Obtain clearance before proceeding to subsequent operations.

7. ATTACHMENTS & SUPPORTS

1. All components and attachments shown in the approved drawings shall be fabricated/prefabricated by the vendor.
2. The scope shall include fabrication of, but not be limited to:
 - Supports / Lifting Lugs / Support pads & other structural support attachments.
3. All formed/fabricated attachments shall be completed, inspected and dimensionally cleared before installation on the main shell wherever applicable.
4. Fit-up and welding of attachments shall be carried out as per approved drawings and WPS.

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5. Applicable NDE shall be carried out on attachment welds.

8. PWHT / STRESS RELIEVING

1. PWHT/stress relieving shall be carried out as per Quality Plan and applicable code requirements.
2. PWHT shall be carried out in an approved and calibrated furnace or by an approved local PWHT method.
3. The vendor shall maintain complete temperature-time charts and PWHT records.
4. Applicable hardness testing shall be carried out after PWHT wherever specified.
5. Required NDE after PWHT shall be completed and cleared before final acceptance.

9. NDE & INSPECTION

1. Stage-wise inspection shall be carried out throughout fabrication.
2. NDE shall be performed in accordance with the approved Quality Plan and ASME Section VIII Div 1.
3. All weld joints shall be completely cleared before proceeding to subsequent stages wherever specified.
4. Any repair welding shall be carried out only after approval and shall be followed by applicable NDE.
5. Final dimensional inspection shall ensure compliance with the approved drawings.

10. FINAL CLEANING & FINISHING

1. Remove weld spatter, slag, sharp edges and temporary attachments.
2. Carry out grinding and blending wherever specified.
3. Carry out internal and external cleaning of the sub-assemblies.
4. Protect machined surfaces and exposed areas against corrosion/damage during storage and transportation.
5. Provide identification markings, component numbers, orientation markings and other details as specified by BHEL.

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11. DOCUMENTATION

The vendor shall prepare and submit complete manufacturing and inspection documentation along with each individual sub-assembly, including, as applicable:

1. Material Test Certificates.
2. Material traceability records.
3. PMI reports.
4. Cutting Plan.
5. Joint Plan.
6. WPS/PQR/WPQ records.
7. Fit-up inspection reports.
8. Welding records.
9. NDE reports.
10. Dimensional inspection reports.
11. PWHT charts and reports.
12. Hardness test reports.
13. Repair/rework records.
14. Final inspection reports.
15. Job History Card.
16. Other documents specified in the approved Quality Plan.

12. DISPATCH TO BHEL TRICHY

1. Each individual Gasifier Tank sub-assembly shall be **completed and cleared in all respects as per the respective approved drawing** before dispatch.
2. The vendor shall arrange transportation for dispatch of individual sub-assemblies from the vendor's works to **BHEL Trichy Shops**.
3. Loading, packing, securing, transportation and unloading shall be carried out by the vendor without causing any damage, deformation or loss of traceability.
4. The individual sub-assemblies shall be dispatched along with their respective complete inspection and quality documentation.
5. The vendor shall ensure that all components, attachments, non-standard fasteners and other items forming part of a particular sub-assembly are dispatched along with the respective sub-assembly unless otherwise instructed by BHEL.

Important clarification

All components shown in the respective BHEL drawings shall be considered part of the fabrication scope unless specifically excluded. Wherever a component is required to be prefabricated separately, the vendor shall complete its forming/fabrication, welding, NDE, PWHT/stress relieving wherever applicable, dimensional inspection and obtain clearance before integrating it with the main shell/sub-assembly.