

## **2026OSB072 [SECTION I D] SCOPE OF WORK**

### **A. GENERAL REQUIREMENTS & VENDOR FACILITIES**

1. The vendor shall possess a valid ASME Section VIII Division 1 "U" Certificate of Authorization (U Stamp), wherever applicable to the scope. The certificate shall remain valid throughout the period of execution of the order.
2. The vendor shall be responsible for **complete fabrication and delivery of Cyclone Assy and Loop Seal Assy as finished products**, strictly in accordance with:
  - BHEL-approved drawings.
  - BHEL-approved Quality Plans / Inspection & Test Plans.
  - Approved WPS/PQR/WPQ.
  - ASME Section VIII Division 1, wherever applicable.
  - ASME Section IX for welding qualifications.
  - Applicable statutory and project-specific requirements.

The vendor's scope shall cover all manufacturing activities necessary to complete the **Cyclone Assy and Loop Seal Assy**, starting from collection of BHEL-supplied raw materials up to final inspection, packing and dispatch to the Site : **Bharat Coal Gasification and Chemicals Limited, Lakhanpur, Jharsuguda, Odisha.**

3. The vendor shall arrange all required manufacturing and inspection facilities, including but not limited to:
  - Plate cutting and edge preparation facilities.
  - Plate rolling machines.
  - Suitable facilities for **conical rolling/forming**.
  - Welding machines and accessories.
  - Fixtures, jigs, positioners and tools.
  - PWHT facilities.
  - Lifting and material handling equipment.
  - Hydro-test pump and associated equipment.
  - Measuring and inspection instruments.
  - Qualified welders/welding operators and other required manpower.
  - Welding and other consumables.
4. All welding shall be carried out by qualified welders/welding operators using approved WPS/PQR in accordance with applicable requirements of ASME Section IX.

### **B. RAW MATERIAL COLLECTION, INSPECTION & TRACEABILITY**

1. The vendor shall collect all BHEL-supplied raw materials from BHEL Trichy Stores against Material Issue Voucher (MIV) using the vendor's own vehicle/transport arrangement.
2. Raw materials may include, but shall not be limited to:
  - Plates for cylindrical portions.
  - Plates for conical portions.
  - Formed dished ends, wherever applicable.
  - Nozzle plates/forgings/pipes.
  - Plates for reinforcement pads.
  - Plates for supports and attachments & Internals.

- Tubes
  - Other materials specified in the approved drawings.
- 3. The vendor shall verify material specification, grade, heat number, dimensions, identification and relevant Material Test Certificates before commencement of fabrication.
- 4. Complete material traceability shall be maintained throughout fabrication. Heat numbers and material identification shall be transferred to cut pieces, formed parts and other components as required by the approved Quality Plan.
- 5. PMI shall be carried out wherever specified.
- 6. Any discrepancy in material specification, identification, dimensions or condition shall be brought to BHEL's notice before commencement of fabrication.

## **C. PLATE CUTTING, EDGE PREPARATION & ROLLING / FORMING**

### **C.1 Plate Cutting & Edge Preparation**

1. Carry out plate cutting as per approved drawings and cutting plans using suitable approved methods.
2. Carry out edge preparation as per approved drawings and applicable WPS.
3. Edge preparation shall include cutting, beveling, grinding, machining, cleaning and dimensional verification, wherever applicable.
4. Prepared edges shall be inspected and cleared before fit-up.
5. Any thermal-cutting affected zone requiring removal shall be suitably ground or machined as specified.

### **C.2 Cylindrical Rolling**

6. Roll plates to the required cylindrical diameter/profile as specified in the approved drawings.
7. The vendor shall ensure the required diameter, roundness, straightness, circumference, profile and longitudinal edge alignment.
8. Any correction required after rolling shall be carried out by approved mechanical methods without adversely affecting the material.

### **C.3 Conical Rolling / Forming**

9. The vendor shall carry out **rolling/forming of conical segments** from BHEL-supplied plates as per the approved drawings.
10. The scope shall include plate preparation, development/cutting, rolling/forming, correction and dimensional inspection.

11. Suitable rolling/forming equipment, tooling and fixtures shall be provided by the vendor to achieve the specified conical geometry.
12. The vendor shall ensure the specified:
  - Large-end diameter.
  - Small-end diameter.
  - Cone angle.
  - Height/length.
  - Circumference.
  - Roundness.
  - Straightness.
  - Profile and dimensional tolerances.
13. Where conical portions are formed from multiple plates, the plates shall be properly matched and aligned before welding.
14. Reinforcement pads and other formed parts shall also be rolled/formed wherever required by the approved drawings.
15. All rolled/formed parts shall be dimensionally inspected before proceeding to subsequent fabrication activities.

#### **D. FIT-UP, WELDING & FABRICATION**

1. Carry out fit-up and assembly of cylindrical and conical portions in accordance with the approved drawings.
2. Ensure proper alignment, orientation, diameter, roundness, mismatch, root gap, cone angle and joint geometry as specified.
3. Carry out longitudinal and circumferential seam welding using approved WPS and qualified welders/welding operators.
4. Fabricate and install nozzles as shown in the approved drawings.
5. Where plate-formed nozzles are specified, their fabrication shall include plate cutting, edge preparation, rolling/forming, longitudinal seam welding, NDE, PWHT wherever applicable and dimensional inspection before installation.
6. Carry out nozzle openings, edge preparation and machining wherever specified.
7. Fabricate and weld reinforcement pads, including rolling/forming wherever required. Provide vent holes wherever specified.
8. Fabricate and install all supports, lifting lugs, support pads and other attachments shown in the approved drawings.
9. All attachments shall be properly fitted, aligned and welded using approved WPS.
10. Carry out visual and dimensional inspection at appropriate stages.

11. Any repair welding shall be carried out only with approval and in accordance with an approved procedure, followed by applicable re-NDE.
12. Required inspection/NDE clearance shall be obtained before proceeding to subsequent manufacturing stages wherever specified.

#### **E. PWHT, NDE & INSPECTION**

1. PWHT/stress relieving shall be carried out wherever specified in the approved Quality Plan/drawings and applicable code requirements.
2. PWHT shall be carried out using an approved and calibrated furnace or approved local PWHT method.
3. Complete temperature-time charts and PWHT records shall be maintained.
4. Hardness testing shall be carried out after PWHT wherever specified.
5. NDE shall be carried out in accordance with the approved Quality Plan and applicable code requirements.
6. NDE may include, as applicable:
  - Visual Examination (VT).
  - Radiographic Testing (RT).
  - Ultrasonic Testing (UT).
  - Magnetic Particle Testing (MT/MPI).
  - Liquid Penetrant Testing (PT).
  - PMI.
  - Hardness testing.
7. All specified weld joints shall be cleared before proceeding to subsequent stages.
8. NDE after PWHT and after any repair shall be carried out as specified.
9. Final dimensional inspection shall ensure compliance with the approved drawings.

#### **F. HYDROSTATIC TESTING & TEMPORARY BLANK ARRANGEMENTS**

1. Wherever hydrostatic testing is specified in the approved drawings/Quality Plan, the completed **Cyclone Assy and Loop Seal Assy** shall be hydrostatically tested at the **vendor's shop floor**.
2. Hydrostatic testing shall be carried out after completion of applicable fabrication, welding, PWHT and NDE and after obtaining the required inspection clearances.
3. Hydro-test pressure, test temperature, holding time and acceptance criteria shall be as specified in the approved drawings, Quality Plan, applicable code and approved hydro-test procedure.
4. The vendor shall arrange all facilities required for hydrostatic testing, including:
  - Hydro-test pump.
  - Calibrated pressure gauges.

- Test manifold and piping/hoses.
  - Test water.
  - Filling, venting and draining arrangements.
  - Pressure recording facilities.
  - Temporary blanks/closures.
  - Required lifting and handling facilities.
5. Wherever required, the vendor shall **fabricate, fit and weld temporary hydro-test blanks/closures** to facilitate hydrostatic testing.
  6. Temporary blank welding shall be carried out by qualified welders using approved WPS/PQR.
  7. Applicable visual inspection and NDE of temporary blank welds shall be completed before hydrostatic testing.
  8. The respective product shall be completely filled with clean test water and adequately vented to remove entrapped air.
  9. Pressure shall be raised in a controlled manner and maintained for the specified holding period.
  10. The complete pressure-retaining boundary shall be inspected during the test for leakage, sweating, abnormal deformation or other unacceptable conditions.
  11. Hydrostatic testing shall be witnessed by BHEL / authorized inspection agency wherever specified.
  12. Hydrostatic test pressure and relevant observations shall be recorded and included in the final documentation.
  13. In case of leakage or failure, the vendor shall safely depressurize and drain the product, carry out approved rectification/repair, complete applicable NDE and repeat the hydrostatic test.
  14. After successful completion of the hydrostatic test, the product shall be completely drained and dried.

#### **G. POST-HYDRO BLANK REMOVAL, MACHINING**

1. After successful completion and acceptance of the hydrostatic test, all temporary hydro-test blanks, closures and associated temporary attachments shall be removed by the vendor.
2. Temporary blank removal shall be carried out without causing damage, distortion or reduction in the required thickness of the permanent product.
3. Temporary weld areas shall be ground flush and blended wherever applicable.
4. Wherever required, the areas affected by temporary blank welding shall be **machined after hydrostatic testing** and restored to the final dimensions/profile specified in the approved drawings.
5. Post-hydro machining shall include, wherever applicable:

- Face machining.
  - Bore machining.
  - Bevel machining.
  - Diameter restoration.
  - Profile restoration.
  - Surface finishing.
6. Any nozzle, opening, flange or machined surface affected by temporary blank welding shall be restored to the final drawing dimensions.
  7. Dimensional inspection shall be carried out after machining/restoration.
  8. Applicable NDE shall be carried out on restored areas wherever specified.
  9. Any defect identified during blank removal, grinding or machining shall be brought to BHEL's notice and rectified as per approved procedure.

#### **H. FINAL INSPECTION, SURFACE PREPARATION, PAINTING & DOCUMENTATION**

1. The completed **Cyclone Assy and Loop Seal Assy** shall be offered for final inspection only after completion of all applicable fabrication, welding, NDE, PWHT, hydrostatic testing, temporary blank removal, post-hydro machining/restoration and dimensional inspection.
2. Final inspection shall include verification of:
  - Overall dimensions.
  - Diameter and roundness.
  - Conical profile.
  - Nozzle location and orientation.
  - Attachment location.
  - Weld condition.
  - Machined dimensions.
  - Other requirements specified in the approved drawings and Quality Plan.
3. Remove weld spatter, slag, sharp edges, temporary attachments and other unwanted projections.
4. Carry out grinding, blending and finishing wherever specified.
5. Carry out complete internal and external cleaning of the finished products.
6. Remove all hydro-test water, moisture, oil, grease, dust and foreign material from surfaces to be painted.
7. **Surface preparation and painting of the Cyclone Assy and Loop Seal Assy shall be carried out strictly in accordance with the BHEL-approved painting scheme/specification.**
8. The painting scope shall include, as applicable:
  - Surface preparation by the specified method.
  - Cleaning and removal of rust, mill scale, oil, grease, dust and other contaminants.
  - Application of primer coat(s).
  - Application of intermediate coat(s).

- Application of finish/top coat(s).
  - Required drying/curing between coats.
  - Measurement and verification of surface profile, coating thickness and other parameters specified in the approved painting scheme.
  - Touch-up painting of damaged or defective areas.
  - Final visual inspection of the coating system.
9. All paints, thinners, consumables, application equipment, surface preparation equipment and manpower required for painting shall be arranged by the vendor unless specifically excluded in the purchase order.
  10. The vendor shall maintain the required painting records, including batch details of paints, surface preparation records, environmental conditions, coat-wise application records and dry film thickness (DFT) measurements, wherever specified in the painting scheme.
  11. Machined surfaces, flange faces, nozzle openings, threaded portions, identification markings and other areas not intended for painting shall be suitably protected during surface preparation and painting.
  12. Any coating damage caused during subsequent handling, inspection or transportation shall be suitably repaired by the vendor in accordance with the approved painting scheme.
  13. Provide identification markings, product numbers, orientation markings and other details specified by BHEL.
  14. The vendor shall prepare and submit complete manufacturing, inspection and painting documentation for each finished product, including, as applicable:
    - Material Test Certificates.
    - Material traceability records.
    - PMI reports.
    - Cutting Plan.
    - Joint Plan.
    - WPS/PQR/WPQ records.
    - Fit-up inspection reports.
    - Welding records.
    - NDE reports.
    - Dimensional inspection reports.
    - PWHT charts and reports.
    - Hardness test reports.
    - Hydrostatic test procedure and reports.
    - Hydro-test pressure records/charts.
    - Calibration certificates of test equipment.
    - Temporary blank welding records.
    - Blank removal and post-hydro machining records.
    - Repair/rework records.
    - **Surface preparation and painting records.**
    - **Coating/DFT inspection reports.**
    - Final inspection reports.
    - Job History Card.
    - Preservation/packing records.
    - Other documents specified in the approved Quality Plan and painting scheme.

## **I. PACKING, PRESERVATION & DISPATCH TO SITE**

1. Each **Cyclone Assy and Loop Seal Assy** shall be completed and cleared in all respects as per the respective approved drawings before dispatch.
2. The vendor shall arrange transportation of the completed and accepted finished products from the vendor's works to the designated project site.
3. The vendor shall arrange suitable vehicles/trailers, loading equipment, securing arrangements and other transportation facilities required for safe delivery
4. The finished products shall be suitably protected after painting to prevent damage, scratching, chipping, contamination or deterioration of the coating system during handling, loading, transportation and unloading. Any damage to the painted surface occurring during vendor-controlled activities shall be repaired by the vendor in accordance with the approved painting scheme.
5. Suitable protection shall be provided for:
  - Machined surfaces.
  - Flange faces.
  - Nozzle openings.
  - Threaded portions.
  - Welded attachments.
  - Other exposed surfaces.
6. The finished products shall be properly supported and secured during transportation to prevent deformation or damage.
7. All loose items, attachments, non-standard fasteners and other items forming part of the respective finished product shall be dispatched along with the respective product unless otherwise instructed by BHEL.
8. The vendor shall coordinate with BHEL regarding dispatch schedule, site delivery requirements and special transportation instructions.
9. The vendor shall ensure delivery of the finished **Cyclone Assy and Loop Seal Assy** to the designated project site within the stipulated delivery schedule.  
Site : **Bharat Coal Gasification and Chemicals Limited, Lakhanpur, Jharsuguda, Odisha.**