|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A picture containing icon  Description automatically generated | | Owner:  HINDALCO INDUSTRIES LIMITED  Ahura Centre, 1st Floor, B Wing, Mahakali Caves Road, Andheri (East), Mumbai - 400 093, India | | | | | |
|  | | EPCM Contractor:  W. L. GORE & ASSOCIATES (Pacific) Pte, Ltd. India Branch  703, A-Wing, 215 Atrium, Andheri Kurla Road, Mumbai 400059, India | | | | | |
|  | | Nominated Subcontractor - Engineering, Quality Control, Supervision:  SMARTLuth Solution and Service Pvt. Ltd.  Unit No: 503, 5th Floor, ECO Centre,. EM-4 Sector-V, Salt Lake City, Kolkata - 700091, India | | | | | |
| **Hindalco Renusagar U5 1 x 80 MW PF Captive Power Plant**  **Flue Gas Desulfurization Project (FGD) with GORETM SO2 Control System**  **`**  **FGD- Flue Gas Duct Expansion Joints – Technical Specification**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **ISSUED FOR** | APPROVAL | INFORMATION | MANUFACTURING | CONSTRUCTION | AS-BUILT | | | | | | | | |
|  |  |  |  |  |  |  | |
|  |  |  |  |  |  |  | |
|  |  |  |  |  |  |  | |
| 00 | 24-02-2022 | First Submission | IR | IR |  | BCB | |
| Rev. | Date | Description of revision | Prepared | Checked | | Approved | |
| Hindalco Renusagar U5 1 x 80 MW PF Captive Power Plant | | | Drg. / Doc. No*.*: S21001-TS01-05HTA-227203 | | | | |
| Flue Gas Desulfurization Project (FGD) with GORETM SO2 Control System | | | Gore Doc. No.: RPDU5.PG.031 | | | |  |
| **FGD- Flue Gas Duct Expansion Joints – Technical Specification** | | | GORE Job No.: RPDU5 | | | | Rev. : 0 |
|  | | | File: 1.SPC\_Expansion Joints-R0- | | | | |
| This document is a property of W.L. GORE & ASSOCIATES (Pacific) Pte, Ltd. and it may contain trade secrets or privileged, undisclosed or otherwise confidential information.  If you have received this document in error, you are hereby notified that any review, copying or distribution of it is strictly prohibited*.* | | | | | | | |

`

CONTENTS – SECTION-1

**CLAUSE. NO. DESCRIPTION PAGE NO.**

A. GENERAL 3

A-a CODES AND STANDARDS 3

A-b SYSTEM DESCRIPTION 3

A-c SCOPE OF SUPPLY 4

A-d SCOPE OF SERVICES 5

A-e EXCLUSIONS 5

A-f TERMINAL POINT 5

B. DESIGN & CONSTRUCTION REQUIREMENT 5

C. NOT USED 7

D. NOT USED 7

E. DRAWINGS / DOCUMENTS TO BE SUBMITTED 7

**ANNEXURES**

ANNEXURE-I : TECHNICAL DATA SHEET

ANNEXURE-II : QUALITY CONTROL PLAN

ANNEXURE-III : COMMERCIAL TERMS-CONDITIONS

1. **General**  
   1) Hindalco Industries Limited (HIL)-Renusagar intends to install Flue Gas Desulphurisation Project (FGD) in their Unit-5 ,1 x 80 MW captive power Plant using **GORE TM** technology. The flue gas from the existing ID Fan outlet shall be taken to new Booster Fan suction and the discharge of the fan shall be taken to Mist Cooling Unit where water shall be sprayed in atomised form to cool the hot flue gas and also saturate the same. The cold and moisture saturated flue gas shall be further taken for desulpharisation into the Flue Gas Treatment Reactor (FGTR). This FGTR unit shall have Modules through which Flue gas shall pass and SOx will be trapped and dilute 10% H2SO4 acid solution shall be generated.The Flue gas after passing through the Demister shall exit through the Wet Stack at top of the FGTR unit.

**Non-metallic Expansion Joints (NMEJ)** shall be used in flue gas ducts at various locations for the purpose accommodating the thermal expansion/movements and erection misalignment.

.

2) This specification covers the design, engineering, manufacture, assembly, testing at manufacturer's works, supply and delivery to project site properly packed for transportation, including shop painting, freight, transit insurance, all taxes, duties, octroi, other charges/levies as applicable, supervision of erection, testing and commissioning at site of all materials and equipment inclusive of accessories as specified and as required for **Non-metallic Expansion Joints, Inlet and Outlet counterflanges withnuts, bolts, gaskets and accessories** complete with all materials and accessories for safe and trouble-free operation of same.

1. **Codes and Standards** : The design, manufacture, inspection and testing of the equipment covered under this specification shall conform, in general, to the standards and codes (latest editions) mentioned below:
2. International Organisation for Standardisation (ISO);ISO3585/3586/3587/4704
3. Bureau of Indian Standards (BIS)
4. British Standards (BS); BS EN 1595
5. American National Standards (ANSI).
6. ASTM. Standards for materials
7. NFPA 85
8. ASTM F 1123
9. In case of any contradiction between the above standards and data specification sheets, the stipulations in the data sheets shall prevail and shall be binding on the Supplier/ Bidder.
10. **System Description** : The flue gas shall be taken from the discharge duct of existing ID Fans and transferred to the inlet of new Booster Fan. The discharge of booster fan shall be sent to the inlet of Mist Cooling unit for moisture saturation and reduction in temperature. In the Mist cooling Unit water shall be sprayed in mist form for evaporative heat exchange and thereby reducing flue gas temperature and achieving saturated condition. After the mist cooling unit, the flue gas shall be sent to the FGTR Reactor Tower to trap SOx. As SOx is trapped in the tower,10% dilute H2SO4 solution shall be generated. The flue gas after treatment shall exit through the Wet Stack at the top of the tower.

The FGTR unit shall have a Wet Stack at the top of it through which the treated flue gas shall exit to atmosphere.

The existing system of each unit has two ID fans handling the flue gas and discharging through chimney. From the individual discharge duct of the ID fans, new ducts will be put with Expansion joints. Then expansion joints will be put at various straight runs, vertical ducts, Mist cooling unit and at the inlet of Wet stack. The expansion joints shall be Non-metallic Expansion joints for the purpose of accommodating various axial , lateral thermal movements and also erection misalignment of the ducts..

1. **Scope of supply , and supervision of erection and commissioning :**

The scope for Non-metallic Expansion Joints & accessories shall consist of :

1. Non-metallic Expansion joints and accessories.

2) All inlet and outlet counterflanges with nuts, bolts and gaskets.

3) Sets of fixing bolts, fixing frame, support plate, grounding pad, lifting lugs, eye bolts, for each expansion joint sets.

4) Set of special tools and tackles.

5) Mandatory spares if specified. Price of same shall be evaluated.

6) Erection and commissioning spares.

7) List of recommended spares with Unit Rate for three (3) years of trouble-free operation. The Price of Recommended spares shall not be evaluated.

**c-1.** The extent of supply is also enumerated below :

|  |  |  |  |
| --- | --- | --- | --- |
| Item | Description | Included (Y) / Excluded ( N) | Remarks |
| 1 | Expansion joint fabric. | Y |  |
| 2 | Internal Insulation Bolster. | Y |  |
| 3 | Counter Flange | Y |  |
| 4 | Fastener | Y |  |
| 5 | Protection covers as required. | Y |  |
| 6 | Expansion joint frames. | Y |  |
| 7 | Clamping bars, including corrosion protection. | Y |  |
| 8 | Protection liner | Y |  |
| 9 | All gasket materials & slims where required. | Y |  |
| 10 | Drawing showing equipment details including end joints | Y |  |
| 11 | Any additional items required to meet requirements | Y |  |

1. **Scope of services** :

The following services shall be provided by the bidder for all equipment and accessories listed above:

1)Complete design and engineering required for Expansion joints selection,

2)Detail engineering for all related items, supports etc & submission of all necessary documentation, drawings, and operation and maintenance manuals.

3) Inspection and testing of all equipment at manufacturer's shop.

4) Packing for road transportation as applicable.

5) Transportation of all equipment including transit insurance up to site.

6) Supervision of Erection and commissioning of items supplied.

7) Witnessing of Performance test of equipment at site and fulfilment

of Guaranteed Data /Parameters.

1. **Exclusions :**

Following items are out of scope of Bidder:

1. Erection at site.
2. All ducts, support structures.
3. **Terminal Point :**

The terminal point shall be as follows.

1. Expansion Joints inlet & outlet counter-flanges.
2. **Design and construction requirements and important considerations**

**1)**For selection and sizing of equipment the technical data sheet (Annexure-1) may be referred.

**2)** Material of construction – The material of construction shall be minimum as indicated in the technical datasheet. However the bidder may select higher grade based on requirement of the specific function as deemed suitable.

**3)** Adequate margin shall be considered for selection and sizing of equipment.

**4)** Expansion Joints shall generally be of robust multi-layer reinforced cloth construction with outside **protective SS wire mesh,** complete with additional internal insulation and/or, insulation bolster, as required, to accommodate the movements, temperature and pressure conditions of flue gas & 10% H2SO4 solution saturated flue gas are mentioned in data sheets. Protection liner to be provided inside the duct for flue gas line expansion joints to protect the fabric.

Particular care is to be exercised to ensure that if during operation, start up etc. duct pressure is negative, the compensator does not become trapped such that it cannot recover the outward convex profile, and overheats as a result.

**5)** Joints with frames - The expansion joints shall be supplied with frames and the fabric joints shall be completed in the works and shipped as complete gagged units where this is practical.

**6)** Component Identification - All expansion joints shall be provided with labels, nameplates and identification numbers. The position and numbering of expansion joints are to be taken from the data sheets.

The permanent nameplate shall be of stainless steel retained under or on the clamp bar.

Joints shall have the direction of flow clearly and permanently indicated.

All markings and equipment nomenclature shall be in the English language.

**7)** All materials including fabric reinforcement shall be compatible with the anticipated operating conditions and the Supplier shall give adequate justification for their selection. The supplier is to state the expected life of the fabric elements, under the conditions given on the Data Sheets. The use of noxious substances such as ‘Refractory Ceramic Fiber’ shall not be permissible, but where unavoidable shall be fully justified, along with the required Health and Safety information.

**8)** The design of the expansion joints shall take into account all operating parameters as defined in the Data Sheets. The expansion joints shall be designed to avoid the deposition or collection of dust and minimize erosion from dust. The expansion joints shall be so designed that a movement of +/- 15 mm axially & +/- 15 mm laterally is possible to take care of erection mis-alignments.

**9)** Joint ‘Flutter’ and Vibration - It is possible for joints to be subject to oscillations in internal pressure. The Suppliers are to provide details of any necessary joint reinforcement to guard against joint 'flutter'.

**10)** Corrosion Protection – Where the flue gas is saturated with 10% H2SO4 solution as indicated in the data sheet, the fabric and body parts shall be suitably selected to resist corrosion. For other normal flue gas application Expansion Joint frames and clamp bars shall be painted with two coats of red oxide zinc chromate primer

**11)** **PG Test and Performance Guarantee** – The contractor is required to demonstrate where possible that the expansion joints will operate to the required proficiency.

Expansion Joints are to be fully guaranteed as specified.

Supplier shall demonstrate PG test for stipulated time as agreed with Purchaser and following shall be the minimum items :

a) Movements as specified in data sheet – As per Technical datasheet annexed.

1. **Not used**
2. **Not used**
3. **Documents/Drawings to be submitted along with the bid as “Must Items” for a responsive bid.**

**E-1 Along with Bid**

1. Scope of supply without any ambiguity.
2. Datasheet, Technical Particulars of offered item(s).
3. Not used.
4. MOC of all items.
5. GA & Layout drawings for Expansion Joints.
6. QAP.
7. Guaranteed Performance Data.
8. Price Schedule.
9. Delivery Schedule.
10. Details of Commissioning manpower.
11. Document submission schedule as per Deliverable List (post order) in Annexure.
12. Terms of Payment.
13. **Deviation List if any. Without any deviation list, bid shall be construed exactly as per requirement of Scope Document / Technical Data Sheet.**
14. Catalogue of all equipment.
15. List of commissioning and maintenance spares.
16. Recommended Spare parts list for Three (3) year’ operation.

**E-2 Post Order**

1. Design Calculation, Operation & Control Philosophy,Technical Datasheet, Technical Particulars of offered item(s) along with its constructional features and Performance detail.
2. Dimensional General arrangement Drawings.
3. Cross sectional Drawings with partlist and MOC.
4. Operation & Maintenance Manual.
5. QAP showing the Customer / Third Party Inspector (TPI) Hold Points.
6. Weight data for erection & loading data (static & dynamic) for civil design by other.
7. Material Test certificates shall be furnished.