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**Annexure-V**

**QUALITY CONTROL PLAN**

1. **Quality Control / Inspection and Test Plan (ITP)**

The Supplier shall be responsible for assuring that his and his sub-suppliers quality control program meets the specified requirements.

The Supplier shall develop a recommended Purchaser inspection point program. This program shall include the design, manufacturing, inspection and testing operations that the Supplier believes may be of interest to Purchaser in demonstrating product quality, whether performed in his own or his sub-suppliers' facilities.

Relevant preliminary ITPs are attached with this specification as per the list provided in Annexure A. Supplier shall modify these ITPs as per requirement of their manufacturing process and shall submit to the Purchaser along with the enquiry. ITPs shall be submitted again to purchaser for review and approval within four weeks of Letter of Intent being issued.

Purchaser and/or his designated representative shall have full access to the Supplier's and sub-Supplier’s facilities and work area for reviewing conformance to the approved ITPs and records and for witnessing of inspections and tests. Purchaser/Purchaser's Engineer shall be notified ten (10) working days if inspection is in India and twenty-one (21) working days if inspection to be carried outside India prior to the start of the tests and inspection points as specified by Purchaser.

Supplier shall have methods in place to assure that items and services including subcontracted items and services, comply with this Specification. Supplier shall describe these methods in his proposal.

All manufacturing, processing, testing and inspection operations affecting the equipment or material may be subject to surveillance by Purchaser or Purchaser's Engineer.

Prior to production, Supplier shall submit to Purchaser a fabrication sequence describing inspection and/or tests to be performed, for use in determining inspection points that Purchaser may desire to witness. The Purchaser shall advise the Supplier, prior to production, of those fabrication steps and shop inspection points that the Purchaser desires to witness, and shall identify which of these points require work to be stopped pending written authorization to proceed from Purchaser/Purchaser's Engineer.

In the event of non-conformance of materials or equipment, the Supplier is to prepare a `Non-conformance Report'. This will be signed jointly by the Supplier and the Purchaser's Engineer. Each Non-conformance Report shall be dealt with on a `VERY URGENT' basis. All deviations from this Specification must be documented and referred to Purchaser for written disposition.

The Supplier shall indicate the name of the manufacturer and place of test and inspection for each equipment supplied by him in the offer.

1. **Inspection and Testing**

Given below a Standard Inspection and Testing requirement. The relevant test for the specified equipment shall be applicable as per this document and all the requirement shall be incorporated in the Inspection and Test Plan (ITP).

1) The Supplier shall conduct all tests and inspections required to ensure that the equipment furnished shall conform to the requirements of this specification and in compliance with requirements of applicable Codes and Standards. The particulars of the proposed tests and the procedures for the tests as required by the ITP, shall be submitted to the Purchaser for approval before conducting the tests. The Purchaser's representative shall be given full access to all tests.

2) The Supplier shall submit to the Purchaser, at the initiation of the contract, the detailed schedule showing the manufacturing programme and indicating the period where Purchaser or his authorised inspecting agency is required at the shop.

3) **Shop Tests**

3-1)Material Test

i) All materials used for construction shall be of tested quality. Physical and Chemical tests of materials shall be conducted as per the relevant standards and test certificates shall be made available to the Purchaser. If demanded by Purchaser’s inspector, proof of use of only tested quality material shall be furnished.

ii) Where stage inspection is to be witnessed by Purchaser, all material test certificates shall be correlated and verified with the actual material used for construction by Purchaser’s inspector. In case mill test certificates for the materials are not available, the Supplier shall carry out physical and chemical tests at his own cost from a testing agency, approved by the Purchaser, as per the requirement of specified material standard. The samples for physical and chemical testing shall be drawn up in presence of Purchaser’s inspector who shall also witness the testing.

iii) All castings shall be sound, clean and free from porosity, blow holes, hard spots and other harmful defects.

iv) The equipment system components shall be subjected to non-destructive testing (NDT) like Radiography, Ultrasonic test, Magnetic particle test, Liquid penetration test etc. as required by ITP & ITP must be approved by the Purchaser before all tests. The accepted limit shall be as stipulated therein. All components subjected to NDT shall be identified by Purchaser’s inspector on successful completion of testing.

1. Control panel sequence tests to be done.
2. During assembly all clearances and alignments shall also be checked and recorded.
3. All major components shall be tested for chemical composition and mechanical strength.

3-2) Hydraulic Test

If required by ITP, relevant parts shall be hydraulically tested at shop as per relevant code and at not less than 150% of design pressure where not specified, prior to painting and lining. The pressure parts shall be kept pressurised for at least one (1) hour at this test pressure, unless contradicted by the relevant test code Hydraulic test procedure shall be submitted by the vendor in case hydraulic test is required by ITP.

3-3) Dynamic Balancing Test

All rotating components and the assembly of the shall be subjected to dynamic balancing

test, as applicable.

3-4) Test for capacity, pressure drop and efficiency of equipment shall be made as per manufacturer’s standard.

3-5) Performance Test at shop

Type test/routine test for the system / equipment shall be done for satisfactory performance in accordance with the relevant IS/BS/ASME or equivalent standard.

Tests shall be conducted with actual driver being furnished.

Reports and test certificates of the above tests shall be submitted to the Purchaser.

3-6) All drive motors shall be tested as per Electrical standards and codes.

1. **Quality Control at Site**

Relevant preliminary ITPs for inspection at site during erection and commissioning are attached with this specification as per the list provided in Annexure A. Supplier shall modify these ITPs as per requirement of their manufacturing process and shall submit to the Purchaser along with the enquiry. ITPs shall be submitted again to purchaser for review and approval within four weeks of Letter of Intent being issued.

**Performance Test at Site –** Given below are the general requirement for performance test at site. Applicable items shall be considered.

After the equipment along with all accessories are installed at site, the following tests shall be conducted at site by the supplier with his own calibrated testing equipment.

Performance test procedure shall be submitted to Purchaser for review and approval.

1. To check capability of each equipment to deliver rated performance specified & guaranteed by the supplier.
2. To check proper and continuously reliable operation of the control/regulation/sequence of the equipment furnished.

c) To check proper operation, freedom from excessive temperature rise, unsatisfactory vibration noise.

d) The tests shall be carried out for a minimum period of eight (8) hours or as directed by the Engineer.

e) To check the loaded and unloaded shaft horse power (BHP)

f) To check power (KW) drawn by the equipment

h) If the performance at field is found not to meet the requirement, the bidder shall be given a reasonable time not exceeding 30 days to make good of the equipment / system to meet the guaranteed performance failing which penalty for non-fulfilment of guaranteed performance shall be imposed.

**ANNEXURE A**

**INDEX FOR INSPECTION AND TEST PLAN**

**PRELIMINARY INSPECTION AND TEST PLANS (ITP) FOR FABRICATION AND ERECTION ACTIVITIES**

**(Note 1)**

| **Pos.** | **EQUIPMENT DESCRIPTION** | **ITP** | **ITP**  **Hindalco No.** |
| --- | --- | --- | --- |
| **Gore No.** |
| 1 | Booster Fan ITP during Fabrication | RPDU5.QF.510 | S21001- IT01- 05CPP- 664010 |
| 2 | Booster Fan ITP during erection | RPDU5.QM.501 | S21001- IT01- 05CPP- 664027 |

Note 1

1. Supplier can modify the inspection and test plan in accordance to the requirement of its specific manufacturing processes.  However, Quality Control, inspections and test to be carried to keep a sufficiently high standard of reliability in order to safeguard Purchaser’s interests. This is very important.
2. In each ITP there is a column named “CODES & STANDARDS” where EN or ASME or ISO applicable codes are shown for a specific Pos. (i.e. inspection step) of the Quality Control. In case an equivalent Indian Standard exists, Supplier can decide to substitute such EN/ASME/ISO code/standard with the corresponding Indian code/standard but if there isn’t any correspondent code, the EN/ASME/ISO shall remain applicable because for certain Positions of the ITPs codes/standards must be used to carry out the relevant inspection. This must be discussed/agreed between purchaser and Supplier for each specific equipment/ material before Purchaser place the Purchase Order to Supplier.
3. In each ITP there are different columns under “QUALITY SURVEILLANCE - % OF INSPECTION”, reserved for each party. They are filled in accordance with the typical requirements for such specific equipment/material. However, these will be finalised before issue of PO to the supplier.
4. Relevant ITPs have to be approved by the purchaser before commencement of manufacturing.