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REF. NO. EME/2019-20/PQR/05

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PRE-QUALIFICATION REQUIREMENTS (TECHNICAL) FOR
HYDROGEN /WATER COOLED TERMINAL BUSHINGS

Introduction: Terminal Bushings of preferably of Resin Impregnated Paper (RIP) type for large size turbo-generators (250-800 MW) are used for current transfer between the generator & the bus duct and as such are subjected to very high current during normal as well as fault conditions. Robust bushings are of paramount importance in successful running of the generator and minimizing damage during fault conditions. Therefore, the bushings are subjected to stringent tests relating to dielectric strength, leak-proofness, bending, mechanical strength, sudden short circuit test, impulse voltage withstand test etc.

1. EXPERIENCE:

- 1.1. The vendor should have the experience of manufacturing and supplying hydrogen-cooled and water-cooled HIGH VOLTAGE TERMINAL BUSHINGS of high quality resin impregnated paper or its equivalent type of voltage rating ≥ 27.8 KV for large size Turbo-generators suitable for continuous operating temperature 120°C to reputed Turbogenerator manufacturers world-wide for the last 5 calendar years.
- 1.2. Vendor to furnish copies of any three Purchase Orders successfully executed during the last 5 calendar years.
- 1.3. Vendor to provide the copy of test certificates for the above bushings corresponding to any one purchase order executed against clause no. 1.2.
- 1.4. Also vendor to provide documentary evidence of the acceptance of material like Acceptance Certificate or letter from customer or copy of invoice, for above bushings whose test certificates is being provided against clause no. 1.3.

2. DESIGN CAPABILITY:

- 2.1. The vendor shall submit the drawings of their designed bushings for different ratings with critical dimensions conforming to respective BHEL drawings for BHEL approval.
- 2.2. The vendor shall submit details of high quality resin impregnated paper or its equivalent along with its properties including Electrical strength, Flexural Strength, Tensile strength, Glass Transition temperature.
- 2.3. The voltage withstand capability of the bushings shall be in line with that specified in VDE 0530 part 3 for the intended voltage rating of the bushing.
- 2.4. Vendor to confirm that the manufactured terminal bushings, shall comply (clause-wise) the requirements of BHEL specification TG60409 in all respects.

3. MANUFACTURING FACILITIES:

The vendor should have facilities for manufacturing high voltage bushings with high quality resin impregnated paper or its equivalent, manufacturing of copper terminal, precision machining, silver plating, stress-grading of insulation, sealing of air side and gas side etc. Vendor to furnish details of the manufacturing facilities available at their works.

4. TESTING FACILITIES:

- 4.1 The vendor should have facilities for carrying out the following tests and provide details (including make and year of manufacture) of test equipment available at their works. Alternatively, he should indicate his tie-up with reputed accredited laboratory for performing these tests or agree to carry out at reputed NABL/ILAC/APLAC lab and give details of the same:
- a) Dielectric strength at a.c. test voltage as specified in VDE 0530 part 3 in line with the rating of the bushing.
 - b) Leak testing using Helium at 10 bar test pressure.
 - c) Electrical Conductivity, chemical composition and mechanical properties testing for copper conductor.
 - d) Dimensional measurement.
 - e) Capacitance, partial discharge and tan delta.
 - f) Type testing including Bending test, Mechanical Strength test as per VDE 0530 part 3, Sudden Short Circuit test with test surge of 10 KN, Change in length of conductor and angular deviation after sudden short circuit test, Impulse Voltage Withstand test.
 - g) The testing facilities should be duly calibrated against measurement standards traceable to national or international measurement standards.
- 4.2 The vendor should have facilities for carrying out Routine and Type testing as per BHEL specification TG60409 and should provide details of the same.
- 4.3 Vendor to confirm to provide copy of the type test and routine test reports, for terminal bushings as per BHEL specification and drawing along with the supply.
5. If the vendor plans to outsource any activity/testing, particulars of the same along with details of the sub-vendor/ laboratory to be furnished to BHEL.
6. Vendor to confirm that the packing should be such that terminal bushings should not get damaged during transit with due care of machined and silver-plated surfaces.

NOTE:

1. BHEL reserves the right to verify the information submitted by vendor. in case the information is found to be false / incorrect, the offer shall be rejected.
2. All correspondence shall be in English Language.
3. If any document provided by vendor is in language other than English, it must be supported with its English translation.