

**Mandatory Pre-Qualification requirements for RTD as per BHEL specification  
TG60053 (Material code-W96413500778)**

**Description:**

The Duplex platinum resistance temperature detector is used in generators for Measurement of temperature of air, gas and oil. The RTD should be of very reliable and proven design for temperature measurement.

- 1.0 The vendor should be a regular manufacturer of such RTD with minimum following requirements –

| Si No. | Parameter                            | Value  |
|--------|--------------------------------------|--|
| (i)    | Suitable Environment                 | Tropical ,dusty and humid atmosphere   |
| (ii)   | Terminal Block                       | Ceramic terminal block fixed with the help of spring loaded screw  |
| (iii)  | Operating Temperature (Range)        | 0 C to 200 C   |
| (iv)   | Protective Sheath and Extension pipe | SS316 or equivalent  |
| (v)    | Resistance element                   | Resistance value and tolerance class-A as per IS 2848. Duplex non- inductive wire wound platinum resistance element. |
| (vi)   | IR Test                              | Should not be less than 100M ohms at room temperature  |
| (vii)  | Routine Test                         | As per IS:2848   |
| (viii) | Type Test                            | As per IS:2848   |
| (ix)   | Terminal head                        | Die cast aluminum/light metal alloy with protection class-IP65   |
| (x)    | Wires                                | Each of the two RTD elements shall consist of 2 PTFE insulated wires which shall terminate on the terminal block.    |
| (xi)   | Connection                           | Threaded connection for fitting into thermowell.   |

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- 2.0 In support of above serial number-1, vendor shall furnish technical details RTD in below mentioned format for at least one nos. (1) of the P.O. executed in past 10 years (from date of enquiry) along with P.O. copies.

| S. No. | Brief technical details | Application | Name & address of customer | Date of supply |
|--------|-------------------------|-------------|----------------------------|----------------|
| 1      | Type of RTD             |             |                            |                |

- 3.0 Vendor to furnish correlated test certificates against the P.O. submitted as per clause 2.
- 4.0 Vendor to furnish acceptance certificate from the end users of RTD against the P.O. submitted as per clause 2. (Original Certificate or through e-mail directly from the customer). Acceptance certificate should contain information like item details and its application or correlation with P.O.
- 5.0 The vendor should have in-house manufacturing facilities for manufacturing of RTD. Vendor to furnish details of the manufacturing facilities available at their works.
- 6.0 The vendor should have facilities for carrying out the following tests and provide details of test equipment available at their works.
- 1) Insulation Resistance Test
  - 2) High Voltage Test
  - 3) Resistance Accuracy Test
- 7.0 The testing facilities available at vendor's works should be duly calibrated against measurement standards traceable to national/international measurement standards. Vendor to confirm the same. Alternatively, vendor to indicate their tie-up with accredited laboratory for performing Routine/Type tests or agree to carry out at NABL/ILAC/APLAC approved lab and provide the details for the same.
- 8.0 Vendor shall confirm to meet all the technical requirements of Specification TG60053.

**Note:** BHEL reserves the right to verify information submitted by vendor. In case the information is found to be false / incorrect, the offer shall be rejected.

**Mandatory Pre-Qualification requirements for Three wire simplex-PRTD as per BHEL specification TG60468 (Material code- W96413508566)**

**Description:**

The three-wire simplex flat platinum resistance temperature detector is used in generators for Measurement of temperature of stator winding bars. The PRTD should be of very reliable and proven design for temperature measurement.

- 1.0 The vendor should be a regular manufacturer of such three-wire simplex flat platinum resistance temperature detector) with minimum following requirements –

| Si No. | Parameter                     | Value   |
|--------|-------------------------------|---|
| (i)    | Suitable Environment          | Tropical, humid and dusty atmosphere  |
| (ii)   | Minimum dimension             | 150X10X2 mm   |
| (iii)  | Operating Temperature (Range) | 0 C to 150 C  |
| (iv)   | Leads                         | Each conductor shall be twisted from 19 nos strands of bright annealed electrolytic silver plated copper wires of 0.15mm each. Silver plating thickness shall not be less than 1 micron.  |
| (v)    | Resistance element            | Resistance value and tolerance class-A as per IS 2848. The non-inductive bifilar element shall be wound on thick epoxy former and laid down in glass epoxy sheet in total strain free manner. Empty space shall be filled with alumina paste. |
| (vi)   | HV Test                       | 2.5 kV AC for 1 Min   |
| (vii)  | IR Test                       | Should not be less than 200M ohms when measured with 500VDC meggar at 20C   |
| (viii) | Routine Test                  | Resistance Accuracy and IR test   |
| (ix)   | Type Test                     | As per IS:2848  |
| (x)    | Pull Test                     | The leads shall be suitably brazed to the resistance element. Each lead shall withstand Pulling force of 2 kg when applied to each of the leads.  |
| (xi)   | Compression load              | Construction shall be such that it can bear compression load greater than 1 metric ton without any damage.  |

**Mandatory Pre-Qualification requirements for Three wire simplex-PRTD as per BHEL specification TG60468 (Material code- W96413508566)**

- 2.0 In support of above serial number-1, vendor shall furnish technical details of three-wire simplex flat platinum resistance temperature detector in below mentioned format for at least one nos. (1) of the P.O. executed in past 10 years (from date of enquiry) along with P.O. copies.

| S. No. | Brief technical details                                      | Application | Name & address of customer | Date of supply |
|--------|--|-------------|----------------------------|----------------|
| 1      | -Resistance Element<br>-Leads<br>-Routine Test<br>-Type Test |             |                            |                |

- 3.0 Vendor to furnish correlated test certificates against the P.O. submitted as per clause 2.
- 4.0 Vendor to furnish acceptance certificate from the end users of three-wire simplex flat platinum resistance temperature detector against the P.O. submitted as per clause 2. (Original Certificate or through e-mail directly from the customer). Acceptance certificate should contain information like item details and its application or correlation with P.O.
- 5.0 The vendor should have in-house manufacturing facilities for manufacturing of three-wire simplex flat platinum resistance temperature detector Vendor to furnish details of the manufacturing facilities available at their works along with photographs
- 6.0 The vendor should have facilities for carrying out the following tests and provide details of test equipment available at their works.
- 1) Insulation Resistance Test
  - 2) High Voltage Test
  - 3) Resistance Accuracy Test
  - 4) Type Test
- 7.0 The testing facilities available at vendor's works should be duly calibrated against measurement standards traceable to national/international measurement standards. Vendor to confirm the same. Alternatively, vendor to indicate their tie-up with accredited laboratory for performing Type tests or agree to carry out at NABL/ILAC/APLAC approved lab and provide the details for the same.

**Note:** BHEL reserves the right to verify information submitted by vendor. In case the information is found to be false / incorrect, the offer shall be rejected.



# STANDARD QUALITY PLAN

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## LEGENDS:

P-PERFORMED BY 1-BHEL REP.  
W-WITNESS BY 2-VENDOR  
V-VERIFIED BY 3-SUB-VENDOR

QPNO : QA/BE/QP/908 REV.NO. : 07 DESCRIPTION: (MATERIAL, CLASS, GRADE, RATING, SIZE ETC): PLATINUM RESISTANCE TEMPERATURE DETECTORS & ASSEMBLIES WITH THERMOWELL  
SPECNO: As Per PO REV.NO. : --  
DRG : As Per PO REV.NO. : --

| SL. NO. | COMPONENT/ OPERATION                      | CHARACTERISTICS   | CLASS | TYPE OF CHECK        | QUANTUM OF CHECK | REFERENCE DOCUMENT                  | ACCEPTANCE NORMS                    | FORMAT OF RECORDS                | AGENCY P W V | REMARKS       |
|---------|---|---|-------|----------------------|------------------|-------------------------------------|-------------------------------------|----------------------------------|--------------|---------------|
| 1       | 2   | 3   | 4     | 5                    | 6                | 7                                   | 8                                   | 9                                | 10 11 12     | 13            |
| 1.00    | Raw Material                              |   |       |                      |                  |                                     |                                     |                                  |              |               |
| 1.01    | Resistance Element                        | Material Grade, Type & Resistance Characteristics.                | Major | Visual / Electrical  | 1 Sample / Lot   | Ordering Specn / BHEL Appd Drawing. | Ordering Specn / BHEL Appd Drawing. | Test Report* / Internal Records* | 2 - 1        |               |
| 1.02    | Cable for RTD                             | Continuity  | Major | Electrical           | 1 Sample / Lot   | Mfg. Specn                          | Mfg. Specn                          | Internal Record                  | 2 - 1        | If Applicable |
| 1.03    | Protecting Sheath, Terminal Head & Spring | Material Type / Grade   | Major | Chemical / Physical  | 1 Sample / Lot   | Ordering Specn / BHEL Appd Drawing. | Ordering Specn / BHEL Appd Drawing. | Test Report* / Internal Records* | 2 - 1        |               |
| 1.04    | Extension Pipe & Thermowell               | Chemical Analysis & Physical Properties                           | Major | Chemical / Physical  | 1 Sample / Lot   | Ordering Specn / BHEL Appd Drawing. | Ordering Specn / BHEL Appd Drawing. | Test Report* / Internal Records* | 2 - 1        |               |
| 2.00    | Fitting & Assembly                        | Soundness of Embedment / Fitting / Connections & Terminal Marking | Major | Physical             | 100%             | Ordering Specn / BHEL Appd Drawing. | Ordering Specn / BHEL Appd Drawing. | Internal Records                 | 2 - -        |               |
| 3.00    | Type Tests                                |   |       |                      |                  |                                     |                                     |                                  |              | Note: 3       |
| 4.00    | Routine Tests                             |   |       |                      |                  |                                     |                                     |                                  |              | Note: 5       |
| 4.01    |   | Visual and Dimensions   | Major | Visual / Measurement | 100%             | Ordering Specn / BHEL Appd Drawing. | Ordering Specn / BHEL Appd Drawing. | Inspection Report*               | 2 1 -        |               |
| 4.02    |   | Resistance Accuracy   | Major | Electrical           | 100%             | Ordering Specn / BHEL Appd Drawing. | Ordering Specn / BHEL Appd Drawing. | Test Report*                     | 2 1 -        |               |
| 4.03    |   | Pull out  | Major | Physical             | 100%             | Ordering Specn / BHEL Appd Drawing. | Ordering Specn / BHEL Appd Drawing. | Test Report*                     | 2 1 -        | Note: 2       |
| 4.04    |   | Continuity  | Major | Electrical           | 100%             | Ordering Specn / BHEL Appd Drawing. | Ordering Specn / BHEL Appd Drawing. | Test Report*                     | 2 1 -        |               |
| 4.05    |   | Insulation Resistance   | Major | Electrical           | 100%             | Ordering Specn / BHEL Appd Drawing. | Ordering Specn / BHEL Appd Drawing. | Test Report*                     | 2 1 -        |               |

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| SL. NO. | COMPONENT/ OPERATION               | CHARACTERISTICS  | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT                          | ACCEPTANCE NORMS                            | FORMAT OF RECORDS  | AGENCY P W V | REMARKS                                  |
|---------|------------------------------------|--|-------|---------------|------------------|---|---|--------------------|--------------|--|
| 1       | 2                                  | 3  | 4     | 5             | 6                | 7   | 8   | 9                  | 10 11 12     | 13                                       |
| 4.06    |                                    | High Voltage   | Major | Electrical    | 100%             | Ordering Specn / BHEL Appd Drawing.         | Ordering Specn / BHEL Appd Drawing.         | Test Report*       | 2 1 -        | Note: 2                                  |
| 4.07    |                                    | Weld closure confirmity  | Major | Mechanical    | 100%             | Ordering Specn / BHEL Appd Drawing.         | Ordering Specn / BHEL Appd Drawing.         | Inspection Report* | 2 1 -        | If Applicable                            |
| 4.08    |                                    | Bore Concentricity & Dimensions of Thermowell incluncluding process connections.   | Major | Measurement   | 100%             | Ordering Specn / BHEL Appd Drawing.         | Ordering Specn / BHEL Appd Drawing.         | Inspection Report* | 2 1 -        | Note: 2 & BHEL Check Critical Dimensions |
| 4.09    |                                    | Easy Opening / Closing of Terminal Head Cover & Operating of Spring Loaded Insert ( Applicable for Terminal Head Type RTDs). | Major | Physical      | 100%             | Ordering Specn / BHEL Appd Drawing.         | Ordering Specn / BHEL Appd Drawing.         | Inspection Report* | 2 1 -        | Note: 2                                  |
| 4.10    |                                    | Hydraulic on Thermowell  | Major | Hydraulic     | 100%             | Ordering Specn / BHEL Appd Drawing.         | Ordering Specn / BHEL Appd Drawing.         | Test Report*       | 2 1 -        | Note: 2                                  |
| 4.11    |                                    | Compliance of Technical Requirements   | Major | --            | 100%             | Ordering Specn / BHEL Appd Drawing.         | Ordering Specn / BHEL Appd Drawing.         | COC*               | 2 - -        |  |
| 4.12    |                                    | Completeness of TCs, COCs, & Inspection Reports  | Major | Physical      | 100%             | Ordering Specn./ BHEL Appd Drawing / QP/ PO | Ordering Specn./ BHEL Appd Drawing / QP/ PO | Documents*         | 2 - 1        |  |
| 5.00    | Identification / Marking & Packing |  |       |               |                  |   |   |                    |              |  |
| 5.01    |                                    | Identification Marking / Firmness of Tagging of Each Instrument  | Major | Visual        | 100%             | Ordering Specn.                             | Ordering Specn.                             | Internal Records   | 2 - 1        |  |
| 5.02    |                                    | Soundness of Packing Against Transit Damage  | Major | Physical      | 100%             | Ordering Specn./ Vendor's STD               | Ordering Specn./ Vendor's STD               | Internal Records   | 2 - -        |  |

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| 1       | 2                    | 3               | 4     | 5             | 6                | 7                  | 8                | 9                 | 10 11 12     | 13      |

## NOTE:-

1. Records as marked \* shall essentially be submitted by vendor as QA documentation package.
2. If applicable as per ordering specification, BHEL approved Drawing / BHEL Appd Data Sheet.
3. Type tests clearance from BHEL Engineering to be verified by inspection engineer during inspection at vendor's works.
4. Manufacturer to maintain calibrated instruments having better accuracy than the item under the test. Inspection engineer shall check the same.
5. Witness by inspection agency to be random 10% of each material code (minimum 1 pieces per material code) from each lot. However vendor to carry out 100% tests internally and tests report shall be reviewed by inspection engineer during inspection at Vendor's works.

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