

**Mandatory Pre-Qualification requirements for PRTD as per BHEL Specification-
AA7322622 (Material code- HW7322622979)**

Description:

The duplex cylindrical platinum resistance temperature detector is used in generator for Measurement of temperature of bearing bushes. The PRTD should be of very reliable and proven design for temperature measurement.

- 1.0 The vendor should be a regular manufacturer of such duplex cylindrical platinum resistance temperature detector) with minimum following requirements –

Sl No.	Parameter	Value
(i)	Minimum dimension	Dia4 mm and length 25mm
(ii)	Operating Temperature (Range)	0 C to 200 C and above
(iii)	Resistance element	Resistance value and tolerance Class-B as per IS 2848. The elements shall be non-inductively wound on a mica strip and suitably encapsulated using epoxy resin.
(iv)	Routine Test	As per IS:2848
(v)	Type Test	As per IS:2848

- 2.0 In support of above serial number-1, vendor shall furnish technical details of duplex cylindrical 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 -Routine Test -Type Test			

- 3.0 Vendor to furnish correlated test certificates against one of the P.O. submitted as per clause 2.
- 4.0 Vendor to furnish acceptance certificate from one of the end users of duplex cylindrical platinum resistance temperature detector against any one of the P.O. submitted as per clause 2. (Original Certificate or through e-mail directly from the customer).
- 5.0 The vendor should have in-house manufacturing facilities for manufacturing of duplex cylindrical platinum resistance temperature detector Vendor to furnish details of the manufacturing facilities available at their works along with photographs.

**Mandatory Pre-Qualification requirements for PRTD as per BHEL Specification-
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- 6.0 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.

**Mandatory Pre-Qualification requirements for RTD as per BHEL specification
TG60753 (Material code-W90415302781)**

Description:

The four wire duplex platinum RTD is used in generators auxiliary systems for measurement of temperature of oil and water. PRTD should be of very reliable and proven design for temperature measurement.

- 1.0** The vendor should be a regular manufacturer of such four wire duplex PRTD with minimum following requirements –

Sl No.	Parameter	Value
(i)	Suitable Environment	Tropical, humid and dusty atmosphere
(ii)	Terminal block	Shall be of Ceramic material and fixed inside the connection head with the help of spring loaded fixing screws M4 (SS-304 or Zinc/Nickel plated mild steel).
(iii)	Operating Range, accuracy	0 to 260 °C, accuracy class-A
(iv)	Measuring insert	Shall consist of duplex non- inductive wire wound platinum resistance element.
(v)	Wires	Each of the two RTD elements shall consist of 4 PTFE insulated wires which shall terminate on the terminal block.
(vi)	Connection	Threaded connection for fitting into thermowell
(vii)	Terminal head	Shall be of die cast aluminum or light metal alloy with protection class IP65.
(viii)	IR Test	IR shall be not less than 100M ohms at 25±10 °C when measured with 10VDC and 10M ohms at 16±10 °C when measured with 10VDC.
(ix)	Routine Test	Resistance Accuracy test
(x)	Type Test	As per IS:2848/ IEC 60751

- 2.0** In support of above serial number-1, vendor shall furnish technical details of PRTD in below mentioned format for at least three nos. (3) of the P.O. executed in past 5 years (from date of enquiry) along with P.O. copies.

S. No.	Brief technical details	Application	Name & address of customer	Date of supply
1	-Measuring insert			
2	-Terminal block			
3	-Connection thread size			
	Routine Test			
	-Type Test			

**Mandatory Pre-Qualification requirements for RTD as per BHEL specification
TG60753 (Material code-W90415302781)**

- 3.0 Vendor to furnish correlated test certificates (routine & type) against any one of the P.O. submitted as per clause 2.
- 4.0 Vendor to furnish acceptance certificate from one of the end users of four wire duplex platinum RTD against any one of 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 four wire duplex platinum RTD. 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) Resistance Accuracy Test
 - 3) 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.

**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 –

Sl 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.

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

- 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 4-Wire Simplex RTD for Core as per BHEL specification TG60661 (Material code-W96413507055)

Description:

The 4-Wire Simplex RTD is used in generators for Measurement of core temperature. The 4-Wire Simplex RTD for Core should be of very reliable and proven design for temperature measurement.

- 1.0** The vendor should be a regular manufacturer of such 4-Wire Simplex RTD for Core with minimum following requirements –

Si No.	Parameter	Value
(i)	Suitable Environment	Tropical, humid and dusty atmosphere
(ii)	Material of Square plate and enclosure for RTD Element	X6CrNiMoTi17122(1.4571)/SS321
(iii)	Operating Temperature (Range)	0 C to 200 C
(iv)	Leads	The leads shall be of 19/0.16mm stranded copper with poly-tetrafluoroethylene Insulation (with min. radial thickness of 0.25mm).
(v)	Resistance element	Resistance value and tolerance class-A as per IS 2848. The elements shall be wire wound type using insulated wire and suitably encapsulated in silicon alumina paste and epoxy resin
(vi)	HV Test	1.5 kV AC for 1 Min
(vii)	IR Test	Should not be less than 100M 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 4 kg when applied to each of the leads.

Mandatory Pre-Qualification requirements for 4-Wire Simplex RTD for Core as per BHEL specification TG60661 (Material code-W96413507055)

- 2.0 In support of above serial number-1, vendor shall furnish technical details of 4-Wire Simplex RTD for Core 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 Size of RTD-5.5X5.5X30 mm Max.			

- 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 4-Wire Simplex RTD for Core 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 4-Wire Simplex RTD for Core. 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 TG60661.

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 Thermocouple (W96414200115) as per BHEL specification TG60399

1.0 Experience:

Vendor should confirm that they are Manufacturer of insulated type Triplex NiCr-Ni Thermocouple (K type thermocouple) for bearing temperature monitoring suitable for temperature range of 0-150 °C as per IS.7358, Vendor to furnish supporting documents like Catalogue/ Datasheet etc.

- 2.0 In support of above, vendor shall furnish technical details of thermocouples in below mentioned format for P.O. executed in last 7 years (from date of enquiry). Vendor shall also furnish at least one PO copy from the list.

Sl. No	PO No.	Quantity Nos.	Name & address of customer	PO Date

- 3.0 Vendor to furnish test certificates against P.O. submitted as per clause 2.
- 4.0 Vendor to furnish acceptance certificate or material receipt of Thermocouples 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 **Manufacturing Facilities:** Vendor shall confirm that they have manufacturing facilities suitable to manufacture the thermocouples as per enquiry and furnish details of the manufacturing facilities available at their works. If the vendor plans to outsource any activity particulars of the same along with details of the sub-vendor/laboratory are to be furnished to BHEL.
- 6.0 **Testing Facilities:** Details of in-house testing facilities (like dimensional measurement, Type tests and Routine tests) as per the requirement of enquiry specification to be submitted with offer. In case of outsourcing of tests, vendor to agree for testing at Government/International agency's accredited labs only.

- 7.0 Vendor shall confirm to meet all the technical requirements of Spec. TG60399.

Note:

- 1) All correspondence shall be in English Language. If any document provided by vendor is in any language other than English, it must be supported with its English translation.

Mandatory Pre-Qualification requirements for Duplex Platinum RTD
(W96414500224,W96414501557)

Description:

The Duplex platinum RTD with PT100 Sensor is used in generators/exciter for Measurement of temperature of ventilation air/gas/water. The PT 100 Sensor should be of very reliable and proven design for temperature measurement.

- 1.0 The vendor should be a regular manufacturer of such RTD with Non inductively wound platinum wire-PT100 with following requirements –

S. No.	Parameter	Value
(i)	Suitable Atmosphere	Tropical, humid and dusty atmosphere
(ii)	Material of Protective sheath for RTD Element	Special Brass(SoMs58A12)/SS316/SS321 or equivalent.
(iii)	Operating Temperature	0 °C to 150 °C (minimum)
(iv)	Terminal head	The terminal/connection head should be die cast Aluminum or light metal alloy with protection class IP65 or better.
(v)	Terminal block	Terminal block should be of ceramic material and fixed inside the terminal head with the help of spring loaded fixing screws. The measuring tip of RTD should be pressed inside thermowell in assembled condition with the help of spring loaded fixing screw.
(vi)	Resistance element	Resistance value and tolerance as per IS 2848. Or IEC:60751, Tolerance class A. The Measuring insert should be consist of two resistance elements of non inductively wound platinum wire(PT100). Each resistance element should have nominal resistance of 100 ohms at 0° C. The resistance elements should be embedded with suitable insulating powder/paste in a protective sheath; and connected to PTFE insulated wire by brazing.
(vii)	Routine Test	Resistance Accuracy and IR test
(viii)	Type Test	Thermal response test, Self heating test, Thermo-electric effect test, Drop test, Vibration test, etc.

- 2.0 In support of above, vendor shall furnish technical details of RTD with PT100 Sensor in below mentioned format for P.O. executed in last 7 years (from date of enquiry). Vendor shall also furnish at least one PO copy from the list.

Sl No	PO No.	Quantity Nos.	Size/Dimension of Sensor Element	Material of Sensor Element	Name & address of customer	Date of supply

- 3.0 Vendor to furnish test certificates against P.O. submitted as per clause 2.
- 4.0 Vendor to furnish acceptance certificate or material receipt from one of the customer of RTD with PT100 Sensor against the P.O. submitted as per clause 3. (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 **Manufacturing Facilities:** Vendor shall confirm that they have manufacturing facilities suitable to manufacture the RTD as per enquiry and furnish details of the manufacturing facilities available at their works. If the vendor plans to outsource any activity particulars of the same along with details of the sub-vendor/laboratory are to be furnished to BHEL.
- 6.0 **Testing Facilities:** Details of in-house testing facilities (like dimensional measurement, Type tests and Routine tests) as per the requirement of enquiry specification to be submitted with offer. In case of outsourcing of tests, vendor to agree for testing at Government/International agency's accredited labs only.
- 7.0 Vendor shall confirm to meet all the technical requirements of Mat. codes W96414500224 & W96414501557 per BHEL specification and drawing given in enquiry.

Note:

- 1) All correspondence shall be in English/Hindi Language.
- 2) If any document provided by vendor is in any language other than English/Hindi, it must be supported with its English translation.





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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STANDARD QUALITY PLAN

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LEGENDS:

P-PERFORMED BY 1-BHEL REP.
W-WITNESS BY 2-VENDOR
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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
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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STANDARD QUALITY PLAN

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LEGENDS:

P-PERFORMED BY 1-BHEL REP.
W-WITNESS BY 2-VENDOR
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QPNO : QA/BE/QP/908 REV.NO. : 07 DESCRIPTION: (MATERIAL, CLASS, GRADE, RATING, SIZE ETC): PLATINUM RESISTANCE TEMPERATURE DETECTORS & ASSEMBLIES WITH THERMOWELL
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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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