



HYDERABAD

**PRODUCT STANDARD
TURBINES & COMPRESSORS**

TC 5 1136

REV 00

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Remove this preface sheet before issuing to Supplier

DESIGNATION

Resistance temperature detector (RTD) & its accessories to this standard shall be designated as follows:

ON DRAWINGS

Material specification column : TC 51136
Description column : As per variant table
Material code column : As per variant table

ON INDENTS

Material specification column : TC 51136
Description column : As per variant table
Material code column : As per variant table

ON ENQUIRIES & PURCHASE ORDERS

A copy of this standard shall be enclosed **without** this preface sheet.

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RESISTANCE TEMPERATURE DETECTOR (R.T.D) AND MOUNTING ACCESSORIES

- 1.0 **SCOPE** : This standard specifies the technical requirements of flexible, heavy-duty Platinum resistance temperature detector and its mounting accessories for journal bearing metal temperature measurement of steam turbine operating at marine environment.
- 2.0 **DESIGN** : RTD 2 x Pt 100 Ω , 2-wire temperature sensor element with teflon cable as per dimensions in Figure- 1 and variant table.

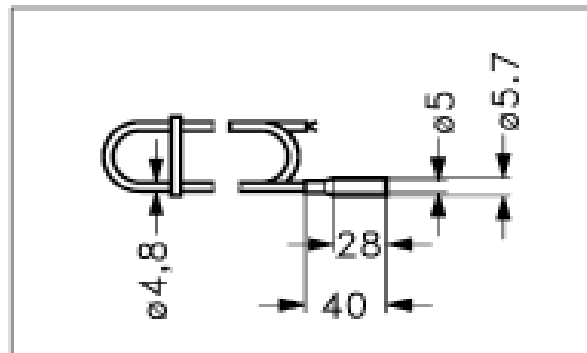


Figure- 1

3.0 **TECHINICAL REQUIREMENTS:**

- 3.1 **GENERAL** : a) The RTDs shall be suitable for operation at an ambient temperature of 0 to 60 °C and relative humidity of 10 to 95%.
b) Measuring Range: 0 to +200 °C.
c) The RTD's should be able to withstand maximum external overpressure of 0.2 bars, shortly upto 4 bars.
d) Thermal response time shall be 3 seconds.
e) **Vibration stability:**
Shock : 100 g in 6 ms
Vibrations : 4 g sine function 5-200 Hz,
measured acc.to IEC 68-2-6.
f) The enclosure shall be suitable to IP 67.

3.2 **RESISTANCE ELEMENT**

- a) Platinum 100 ohms at 0 °C conforming to IEC751 with **tolerance Class-B**.
b) Elements shall be constructed with **spiral wound platinum wire**, thin film or thick film type elements are not acceptable.
c) Duplex elements with 2-wire connection (for each element).
d) The resistance value at different temperatures shall be as per Table-I of IEC 751.
e) Tolerance on temperature and resistance shall be as per Table-II of IEC 751.
f) The resistance vs. temp linearity shall be within ± 0.50 % of top range value.
g) The cable shall be made of **teflon**.

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3.3 INSULATION : Swaged type Magnesium Oxide insulation shall be packed in the protective sheath. Electrical insulation resistance between each terminal and sheath shall be not less than 100 M ohms at a range of 10 to 100V DC at ambient conditions.

4.0 TESTS :

4.1 ROUTINE TESTS: Following routine tests shall be conducted on 100% quantity of temperature detectors by vendor as per standard IEC 751. Manufacturer's internal reports shall be verified by Inspection Agency during final inspection. Inspection Agency shall witness tests on 10% samples selected randomly.

- a) Insulation Resistance test including resistance between two elements.
- b) Calibration test at minimum three points i.e. 0° C, 100° C and top Range temp.
- c) Pull test: The connecting leads shall be securely anchored to the thermo-element probe/ sheath, so that a 10 pound pull applied on each terminating lead shall not cause an electrical disconnectivity for miniature RTDs.
- d) Thermal response time test: Thermal response time shall be 3 seconds.
- e) Dimensional check.

5.0 TEST REPORTS : The following test certificates shall be furnished.

- a) Test certificates for the tests specified at clause no 4.1.
- b) Conformance certificate for degree of protection IP-67 (Type Test).
- c) Shock & Vibration test (Type Test).

Vendor shall furnish quality plan for approval after order placement.

6.0 GUARANTEE CERTIFICATES :

A guarantee certificate for 24 months of trouble free performance from the date of shipment or 12 months from the date of commissioning whichever is earlier, shall be provided.

7.0 COMPLIANCE TO BHEL SPECIFICATIONS :

Vendor shall comply fully with BHEL specifications. If the deviations are not brought out in their offer specifically, it will be construed as vendor has confirmed total compliance to BHEL specification.

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8.0 DOCUMENTS : Descriptive catalogues / write-up giving full details of the temperature sensors and its required accessories shall be furnished with the offer. The final installation, operating and maintenance manuals shall be supplied within 4 weeks after placement of order.

9.0 MARKINGS: Name plate containing following details shall be attached such that it cannot be separated from the RTD assembly. Also manufacturer's name shall be etched on the rigid element sheath/cap of the RTD.

- a) Manufacturer's Name or Trade Mark and code no.
- b) BHEL order No
- c) BHEL 12 digit Material code
- d) Month/ Year of supply

The following details shall be marked on the packing case.

- a) Manufacturers name or trade mark
- b) BHEL Order No.
- c) BHEL Specification No.

Size & No. of items (to be marked on the individual boxes)

Identification marks on miniature RTDs: Metallic tag bearing vendor's name shall be crimped on the extension cable 100mm from the end.

10.0 PACKING : Each RTD shall be wrapped individually in a bubbled polythene sheet and packed in a carton or a case with adequate cushioning materials to withstand normal transit risks and marine environment.

Mounting accessories, screws, washers & nuts, if any, shall be sent packed along with each RTD.

An additional copy each of the Test and Guarantee Certificate, installation, operation & maintenance manuals shall be enclosed to the packing list along with the consignment.

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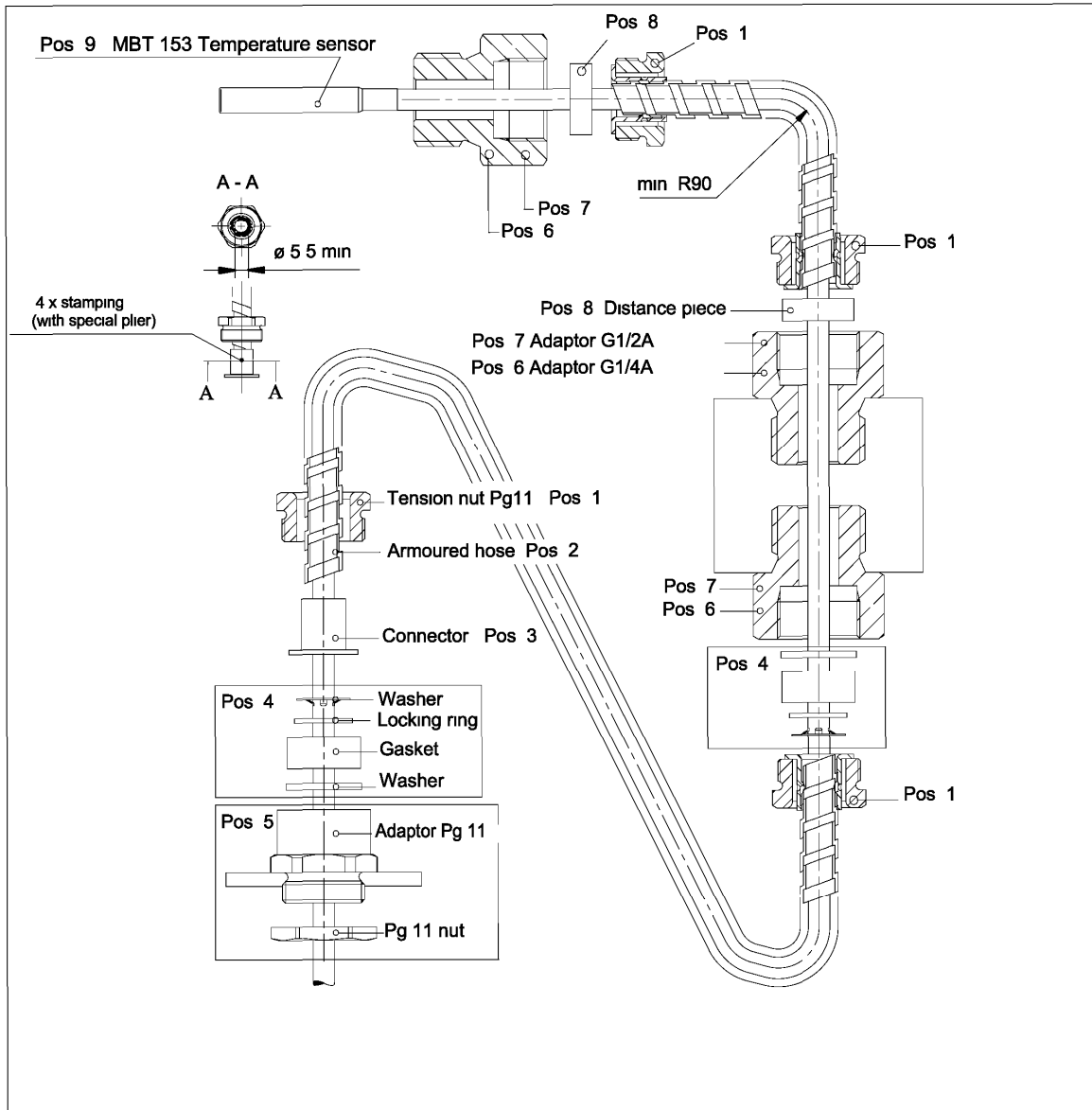
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Figure-2

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*POS	DESCRIPTION	DIMENSIONS	UNITS	DANFOSS CODE NUMBER	BHEL MATERIAL CODE	VAR
1.	TENSION NUT	PG 11	Nos	084Z4382	TC9751136016	01
2.	ARMoured HOSE, STAINLESS STEEL	-	meters	084Z4374	TC9751136024	02
3.	CONNECTOR FOR ARMoured HOSE	ø 16 x 12 / ø 8.8 internal	Nos	084Z4384	TC9751136032	03
4.	WASHER, LOCKING RING, GASKET, WASHER	-	Set	084Z4381	TC9751136040	04
5.	ADAPTOR WITH COUNTERNUT	1/2" NPT	Nos	084Z4383	TC9751136059	05
6.	ADAPTOR, BRASS, NICKEL-PLATED	G 1/4A	Nos	084Z4379	TC9751136067	06
7.	ADAPTOR, BRASS, NICKEL-PLATED	G 1/2A	Nos	084Z4378	TC9751136075	07
8.	DISTANCE PIECE	ø 16 x 5 / ø 9 internal	Nos	084Z4380	TC9751136083	08
9.	MBT153-4100-0100 SENSOR ELEMENT	2xPt100, class B, 2 wire, 1 m teflon cable	Nos	084Z5294	TC9751136091	09
	MBT153-4100-0300 SENSOR ELEMENT	2xPt100, class B, 2 wire, 3 m teflon cable	Nos	084Z5295	TC9751136105	10
	MBT153-4100-0600 SENSOR ELEMENT	2xPt100, class B, 2 wire, 6 m teflon cable	Nos	084Z5296	TC9751136113	11
	MBT153-4100-1000 SENSOR ELEMENT	2xPt100, class B, 2 wire, 10 m teflon cable	Nos	084Z5297	TC9751136121	12
10.	SPECIAL PLIER	-	Nos	084Z4427	TC9751136130	13

Variant table with code numbers and specifications

*NOTE: For POS refer Figure-2

The models indicated in this specification are of M/s Danfoss. Other Vendors may please offer equivalent models.

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