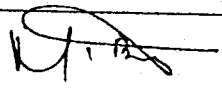


DOCUMENT TITLE : TECHNICAL SPECIFICATION FOR BOUGHT OUT ITEMS FOR
ELECTROSTATIC PRECIPITATOR

ITEM : THERMOSTAT

PROJECT : BHEL STANDARD

	NAME	DESIGNATION	SIGNATURE	DATE
PREPARED BY	M.BOOPATHY	EF		29.01.2004
REVIEWED BY	C.R.JAYACHANDRAN	SR MANAGER		29.01.2004
APPROVED BY	S.JAYAPRAKASAM	DGM		29.01.2004

ISSUED BY

EDC - AQCS

RECORDS OF REVISIONS :

REVISION NUMBER 00

INITIAL RELEASE

Dt.29.01.2004

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1.0 SCOPE:

The scope shall include design, development, manufacture, inspection, testing, packing and supply of THERMOSTATS as per Enquiry / PURCHASE Order

2.0 APPLICABLE STANDARDS : IS4165, IS13947

3.0 APPLICATION : To control the ESP Hopper wall temperature and to control the air temperature inside the Insulator Housing.

4.0 TECHNICAL PARTICULARS:

4.1 INSTALLATION LOCATION : (i) Outdoor, highly polluted with abrasive dust
(ii) The Thermostat will be subjected to constant vibration during operation.

4.2 SENSING : Liquid Expansion

4.3 SENSING BULB MATERIAL : Copper

4.4 CAPILLARY MATERIAL : Copper

4.5 CAPILLARY LENGTH : To suit the THERMOWELL

4.6 THERMOWELL MATERIAL : STAINLESS STEEL

4.7 THERMOWELL LENGTH : 280mm

4.8 MOUNTING : Direct mounting on hopper wall & Insulator housing of ESP.

4.9 PROCESS CONNECTION : ½" BSP (Male)

4.10 OPERATING RANGE : 90 deg. C-160 deg. C

4.11 MAXIMUM PROCESS TEMPERATURE : 200 Deg.C

4.12 MINIMUM AMBIENT TEMPERATURE : 6 deg.C

4.13 MAXIMUM AMBIENT TEMPERATURE : 60 deg.C

4.14 INDICATING DIAL	:	To be provided internally (over the operating range)
4.15 HOUSING	:	DIE CAST ALUMINIUM with paint shade 631 as per IS 5.
4.16 HOUSING COVER	:	DIE CAST ALUMINIUM with paint shade 631 as per IS 5.
4.17 LINK CHAIN FOR HOUSING COVER:	:	To be provided
4.18 INGRESS PROTECTION	:	IP55 as per IS13947
4.19 MICRO SWITCH	:	SPDT – 1No.
4.20 MICRO SWITCH RATING	:	230V, 5A, AC, INDUCTIVE
4.21 CONTACT ACTION	:	On increasing temperature
4.22 CONTACT RESISTANCE	:	BELOW 50 m Ω
4.23 SET POINT	:	Adjustable throughout entire operating range.
4.24 RESET	:	Auto Reset
4.25 TEMPERATURE SETTING	:	(i) Internal and (ii) Field setting
4.26 SWITCHING DIFFERENTIAL	:	7 deg.C (max.)
4.27 SCALE ACCURACY	:	Plus or Minus 2% FSR
4.28 REPEAT ACCURACY	:	Plus or Minus 1% FSR
4.29 INTERNAL WIRING	:	With 1.5 sq.mm multi stranded copper conductor with high temperature TEFLON coating
4.30 ELECTRICAL CONNECTION (EXTERNAL)	:	3C-2.5 sqmm stranded Copper, Armoured PVC Cable.
4.31 CABLE GLAND TYPE	:	Double compression, Nickel Plated Brass glands with grommet

- 4.32 CABLE GLAND MAKE : COMMET/BRACCO/SUNIL&CO
- 4.33 CABLE GLAND SIZE : CBW 01 or approved Equivalent
- 4.34 CABLE GLAND QUANTITY : 1 No.
- 4.35 CABLE LUG TYPE : Annealed Tinned Copper, Insulated Crimping type.
- 4.36 CABLE LUG MAKE : DOWELLS
- 4.37 CABLE LUG SIZE : CPI 19
- 4.38 CABLE LUG QUANTITY : 3 Nos.
- 4.39 External EARTHING PROVISION : Shall be provided (min. M6).
- 4.40 TERMINAL BLOCK : (i) 650 V grade
(ii) Shall be suitable for terminating 3C – 2.5 sq.mm copper stranded cable.
- 4.41 INSULATION RESISTANCE : > 100 MΩ at 500 V DC for 1 minute
- 4.42 HIGH VOLTAGE TEST : 1500 V AC , 50 Hz for 1 minute

5.0 DOCUMENTS TO BE SUBMITTED ALONG WITH OFFER:

- 5.1 Compliance to enquiry technical specification.
- 5.2 Technical particulars of the offered model

6.0 DOCUMENTS TO BE SUBMITTED ON PLACEMENT OF ORDER FOR APPROVAL:

- 6.1 Six copies of Technical data sheet for the offered model covering all aspects of Enquiry / Order technical specification shall be submitted within 10 days from the date of Purchase order.
- 6.2 Six copies of GA Drawing indicating various dimensions and parts of THERMOSTAT shall be submitted within 10 days from the date of Purchase order.
- 6.3 Draft manual covering Dos & Don'ts, packing, storage, mounting, calibration, commissioning, troubleshooting, operation principle, technical data sheet, GA drawing, typical routine test certificate etc. of the THERMOSTAT, shall be submitted to BHEL for approval.

6.4 Forty-five copies of printed copy of the manual prepared based on BHEL / RANIPET approved draft manual, shall be submitted to BHEL along with the THERMOSTAT supply.

6.5 In addition, one set of manual shall be supplied in CD.

7.0 PROTOTYPE APPROVAL:

Before starting bulk manufacturing, the vendor shall submit the prototype sample of the THERMOSTAT to BHEL for approval.

8.0 INSPECTION & TESTING

8.1 TYPE TESTS:

The vendor shall conduct the following TYPE TESTS in the presence of BHEL/ RANIPET engineers / BHEL authorized engineers, specifically for BHEL / RANIPET supplies, for the offered model. However, if the vendor has already conducted all the TYPE TESTS successfully, for the offered model against earlier supplies to BHEL/ RANIPET, then the vendor need not repeat the TYPE TESTS.

In any case if, the TYPE TESTS were conducted 5 years earlier, at the time of quoting / supply, then the TYPE TESTS shall be conducted without any implication to BHEL.

8.2 LIST OF TYPE TESTS:

- a) Low temperature test
- b) Moisture resistance test
- c) Resistance to Rusting
- d) Overload test
- e) Calibration, Accuracy, Differential test
- f) Degree of protection
- g) Vibration test
- h) Endurance test-Thermal & Mechanical
- i) High voltage and Insulation resistance test
- j) Hydraulic test for Thermowell.

8.3 ROUTINE TESTS:

For all THERMOSTATS, all routine tests / checks shall be carried out, as per BHEL quality check list referred in the Enquiry / Purchase order.

8.4 TEST PROCEDURE:

The THERMOSTAT shall be tested as per the TEST PROCEDURE ref:TP:122:TH:REV 00

8.5 INSPECTION:

The THERMOSTAT will be inspected by BHEL based on the following documents at vendor's works.

- a) BHEL Purchase Order
- b) BHEL Technical Specification
- c) BHEL Quality checklist
- d) Vendor data sheets & drawings approved by BHEL.

9.0 PACKING:

- 9.1 Each THERMOSTAT shall be packed in separate packing consisting of Thermocol and hard board. The packing shall be done such that, the THERMOSTAT will not get damaged during transport, storage and handling. The packing material shall withstand long storage kept inside covered area.

10.0 DESPATCH:

The Thermostats shall be dispatched from vendor's works only after obtaining written clearance from BHEL.