

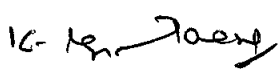
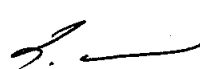
PRODUCT STANDARD
AIR QUALITY CONTROL SYSTEMS
BAP / BHEL RANIPET

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EFFECTIVE DATE: 14.08.2010

**TITLE : TECHNICAL SPECIFICATION FOR BOUGHT OUT ITEMS OF
ELECTROSTATIC PRECIPITATOR**

ITEM : HEATING ELEMENT FOR SHAFT / SUPPORT INSULATOR

CUSTOMER : M/S. NATIONAL THERMAL POWER CORPORATION (M/S. NTPC)

	NAME	DESIGNATION	SIGNATURE	DATE
PREPARED	R.VENKATARAMAN	SAE		14.08.2010
CHECKED	S.RANGARAJAN	DGM		14.08.2010
APPROVED	S.RANGARAJAN	DGM		14.08.2010

ISSUED BY

EDC / AQCS

REVISION NUMBER: 01 In Cl.No 6.1.7 material changed from Incolloy to SS **REVISION DATE 14.08.2010**

REVISION NUMBER: 00

INITIAL RELEASE 24.01.2004

1.0.0 SCOPE OF SUPPLY:

The scope of supply of Heating elements for shaft insulator and support insulator includes design, manufacture, testing, inspection, packing and delivery.

2.0.0 APPLICATION:

These HEATING ELEMENTS are used in Electrostatic precipitator, to keep the shaft and support insulator in warm condition in order to avoid any moisture condensation and dust deposit, which will result in failure of the insulator.

3.0.0 SITE CONDITIONS:

The HEATING ELEMENTS shall be designed taking care of the following site conditions.

- 3.1.1 Ambient temperature : 5 deg C to 50 deg C
- 3.1.2 Design ambient temperature : 50 deg C
- 3.1.3 Relative humidity (max) : 100% RH
- 3.1.4 Environment : Highly polluted, abrasive dust. Climate is tropical and conducive to fungus growth.
- 3.1.5 Location : The HEATING ELEMENT portion is kept inside the chamber to be heated. The terminal box is kept at ambient temp.

4.0.0 APPLICABLE STANDARD:

The HEATING ELEMENT shall be designed, manufactured and tested as per the following standards. If there is any conflict between these standards, and their amendments, if any, then the most stringent condition shall apply.

- 4.1.1 IS 302 : General & safety requirements for light electrical appliances.
- 4.1.2 IS 4159 : Specification for mineral filled sheathed heating elements.

5.0.0 TERMINAL CONDITIONS:

- 5.1.1 Input power supply : 415V, 2 Wire, 50 Hz.
- 5.1.2 Power supply variation:
 - Voltage : +/- 10%
 - Frequency : +/- 5%
 - Combined voltage and frequency : 10% (Absolute sum)

6.0.0 CONSTRUCTIONAL FEATURES:

- 6.1.1 The heating elements shall be of mineral filled sheathed type as per IS 4159 and manufactured as per the drawing indicated in the Purchase enquiry / purchase order.
- 6.1.2 The design of heating elements, shall take into account necessary safety factor.
- 6.1.3 The heaters shall have minimum design life of 25 years, and shall be able to withstand the thermal cycling as well as dynamic forces such as vibrating etc.
- 6.1.4 All ferrous parts shall be adequately rust protected.
- 6.1.5 All bolts, nuts, washers and other terminals shall be nickel plated to avoid rusting.
- 6.1.6 The external finish on metal components shall be heat and moisture resisting nature and shall not be affected adversely by variation in temperature under normal operating temperature.
- 6.1.7 The sheath material shall be heat resisting, Stainless Steel SS321.
- 6.1.8 The resistance wires forming the heating coil shall be of "KANTHAL – D". The wire shall be free from twist, bends, kinks and other flaws and shall be clean and smooth.
- 6.1.9 The resistance wire heating coil shall be of uniform hardness and shall be capable of being closely wrapped without twisting.
- 6.1.10 The mineral shall be adequately filled to withstand thermal shock and shall not deteriorate by heating and cooling in service. The filling material shall be magnesium oxide granules.
- 6.1.11 The terminal box shall house with terminal block of ceramic material. The terminal connectors shall be of brass.
- 6.1.12 The terminal block shall be suitable to receive 2 Nos 2C – 2.5 sq.mm stranded copper, PVC insulated FRLS, unarmoured cables.
- 6.1.13 The terminals of heating elements shall be connected to the terminal block using 2.5 sq .mm copper conductor having heat resistant insulation with crimping type ATC lugs. The heat resistant insulation shall withstand, the temperature inside the terminal box.
- 6.1.14 The terminal box shall be provided with 2 Nos. nickel chromium plated double compression type heavy duty BRASS cable gland as per BS6121 each suitable to receive 2C – 2.5 sq.mm copper, PVC insulated FRLS, unarmoured cable.

- 6.1.15 The terminal box shall be provided with 4 Nos. annealed tinned copper crimping type lugs to receive 2.5 sq.mm insulated copper conductor.
- 6.1.16 Two sets of M6 earthing screws with rose Courtney washer, nuts shall be provided at the outside of terminal box, to receive, 8 SWG GI earth wire.
- 6.1.17 The rating of shaft insulator heater and support insulator heater shall be 1 KW each.
- 6.1.18 At the steady state temperature, leakage current, which may flow from the live parts to the accessible parts and metal foil on external insulating material connected together shall not exceed 210 microamperes (rms) or 300 microamperes (peak) when measured as per IS 302.
- 6.1.19 At steady state and at rated voltage the power consumption shall not differ from the rated power consumption by more than 10%.
- 6.1.20 The heating elements shall be capable of withstanding 1KV AC high voltage test at 50 Hz without flashover or break down for one minute.
- 6.1.21 The Insulation resistance of the heater, immediately after conducting High voltage test, shall be more than 1 mega ohms, when measured at 500 V DC.
- 6.1.22 The Heating elements shall be capable of withstanding the following endurance and thermal shock tests. Heating elements shall be operated in air at 1.1 times the rated input for 1000 operating hours on cycles consisting of 30 minutes switching ON followed by 30 minutes switching OFF. Heat discharge shall not exceed the quoted value of manufacture after every 100 hours. Water at a temperature between 15 deg C and 40 deg C shall be poured on the element immediately, after the element has been switched OFF. At the end of the test, high voltage and insulating resistance test shall be conducted.
- 6.1.23 Asbestos should not be used. Instead an equivalent material shall be used.
- 6.1.24 The NON- ASBESTORS thermal & electrical insulating material provided in the terminal box shall be suitable for the temperature encountered.
- 6.1.25 **MAKE OF COMPONENTS:**
- i) Cable glands: COMET / SUNIL & CO / BRACCO / QUALITY PRECISION.
 - ii) Cable lugs : DOWELLS.

6.1.26 PAINTING: As per purchase order / purchase enquiry.

6.1.27 Manufacturing and packing drawings prepared in AUTO CAD shall be submitted in SOFT MEDIA in addition to hard copies for approval by BHEL, (prior to start of manufacture) within 10 days from the date of purchase order.

6.1.28 Name plate (engraved chromium plated) shall be provided on the terminal box indicating manufacture's name, KW rating, Voltage grade, serial number, name of the equipment.

7.0.0 INSPECTION AND TESTING:

The heating element shall be inspected and tested based on the following documents.

1. BHEL Purchase order.
2. BHEL Technical specification.
3. BHEL Quality CHECKLIST.
4. BHEL Approved supplier drawings.

8.0 PACKING:

8.1.1 Each Heating element shall be packed individually with cardboard packing material. Lining with plastic sheet shall be provided inside the cardboard packing to avoid water entry during transit / storage.

8.1.2 The shaft insulator heating elements shall be packed with 2 nos in each final packing.

8.1.3 The support insulator heating elements shall be packed with 4 Nos in each final packing.

8.1.4 In the event of order, manufacturing and packing drawing shall be submitted for BHEL approval within 10 days from the date of purchase order.

9.0.0 This specification meets NTPC requirements. Hence no deviation shall be taken by bidder / supplier.
