

**SPECIFICATION
FOR
TEMPERATURE SENSOR OIL CIRCUIT TRANSFORMER
FOR
WAG-9/WAP-7/WAP-5, 3-PHASE ELECTRIC
LOCOMOTIVES**

Specification No: CLW/ES/3/0033/ GH

Enclosure: Drawing No.-CLW/ES/3/SK-1/0033/H

ISSUED BY

DY.CHIEF ELECTRICAL ENGINEER/D-I
CHITTARANJAN LOCOMOTIVE WORKS
CHITTARANJAN-713331
Dist: BARDHAMAN (WEST)
WEST BENGAL (INDIA)

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ALTERATION RECORD SHEET

| Amendment Number | Date of Amendment | Alteration | Descriptions | Authority |
|------------------|-------------------|------------|--|-----------|
| 1. | 12.02.02 | A | Specification has been thoroughly revised. | Sd/- |
| 2. | 10.03.03 | B | Fire retardant/ self-extinguishing clause included as a note. | Sd/ |
| 3. | 12.04.05 | C | Correction of ABB identification number. | Sd/ |
| 4. | 18.11.05 | D | Correction of inner Dia in the drawing No: CLW/ES/3/SK-5/0033 and Scope of supply listed in the drawing no: CLW/ES/3/SK-1/0033. | Sd/ |
| 5. | 27.06.07 | E | Cable screen must be connected to the connector body & sensor housing to ground at both ends. | Sd/ |
| 6. | 16.01.10 | F | Mounting Temperature Sensor deleted from scope of supply as it is procured from supplier of Set of Metallic Pipe. | Sd/ |
| 7. | 03.05.12 | G | Thickness of Copper Washer increased from 1.5 mm to 02mm. | Sd/- |
| 8. | | H | <p>i. Specification has been thoroughly revised. Test description elaborated. Drawing no-CLW/ES/3/SK-2, SK-3, SK-4 & SK-5/0033 removed. Existing drawing no-CLW/ES/3/SK-1/0033/G replaced by new modified drawing No-CLW/ES/3/SK-1/0033/H.</p> <p>ii. Dia. of cable has been deleted in drawing No-CLW/ES/3/SK-1/0033/H.</p> <p>iii. Test schedule has been amended in clause no. 8.0.</p> <p>iv. Quantity of copper washer has been revised in drawing no.- CLW/ES/3/SK-1/0033/H.</p> <p>v. Word 'Radox' has been deleted in clause no 6.7 and electron beam irradiated has been included.</p> <p>vi. Length of cable has been specified in clause no. 6.7.</p> | |

Note: Specification has been digitized and all the alteration i.e addition, deletion, modification etc. has been incorporated in the digitized specification.

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1.0 GENERAL

TECHNICAL SPECIFICATION FOR TEMPERATURE SENSOR OIL CIRCUIT TRANSFORMER for 3-PHASE, WAG-9/WAP-7/WAP-5 ELECTRIC LOCOMOTIVES.

2.0. SCOPE

This specification covers the supply of Temperature Sensor Oil Circuit Transformer used in WAG-9, WAP-7, WAP- 5, 6000 HP, 3-phase, 50 Hz AC locomotives.

In addition to the general conditions of the supply and the requirement given below, the supplier has to comply with the dimensions and instruction given in the relevant drawing sheet. The successful tenderer can obtain any other relevant technical details/drawing for further clarification from CLW.

3.0 SERVICE CONDITIONS

| Sl. No. | Description | Remarks |
|---------|----------------------------------|---|
| 1. | Maximum atmospheric temperatures | Under Sun : +70°C. In shade : +50°C. |
| 2. | Ambient Temperature(operating) | -20°C . . . +70°C |
| 3. | Ambient Temperature (Storage) | -30°C to +80°C |
| 4. | Normal Humidity | 60%. |
| 5. | Maximum Humidity | 100% saturation during rainy season. |
| 6. | Altitude | 1776 m above mean sea level against USBRL project condition. |
| 7. | Rainfall | Very heavy in certain areas. The locomotive will be designed to permit it's running at 10 kilometer per hour in flood water level of 200 millimeter above rail level. |
| 8. | Atmosphere during hot weather | Extremely dusty and desert terrain in certain areas. |
| 9. | Coastal areas | Locomotive and equipment will be designed to work in coastal areas in humid and salt laden atmosphere. |
| 10. | Vibration. | The equipment, subsystem and their mounting arrangement will be designed to withstand vibrations and shocks encountered in service as specified in corresponding IEC: 61373 or latest publications unless otherwise prescribed. |

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4.0 CONFORMING STANDARDS

The Temperature Sensor shall conform to the requirements as per IEC 60571 & 60721-3-5 or latest updates/ equivalents.

5.0 SCOPE OF SUPPLY

Temperature Sensor consists of two items-1) Sensor Assembly and 2) Copper Washer.

| Sl.No. | Description | ABB Identification No | CLW Drawing No. |
|--------|-------------|-----------------------|-----------------------|
| 1. | SENSOR | 3EHN424142R3000 | CLW/ES/3/SK-1/0033/GH |

6.0 TECHNICAL DESCRIPTION

SENSOR

6.1 DESCRIPTION: The sensor consists of 2 Nos PT 100 platinum resistance thermometers in one body.

6.2 CONNECTION: Each Thermometer is connected to the control electronics in the two wire configuration.

6.3 THERMOMETER REQUIREMENTS

| Sl. No. | Description | Characteristics |
|---------|------------------------|--|
| 6.3.1 | Operating Temperature | -45°C to +125°C |
| 6.3.2 | Sensor tip environment | -45°C to +125°C |
| 6.3.3 | Accuracy | <0.5K in the temperature range as per IEC60571 |
| 6.3.4 | Test voltage | 1000VAC 60sec. |

6.4 INSTALLATION

To installed in pipes with an outer diameter from 76.1 to 114.3mm
The sensor tip should be approximately in the middle of the pipe.

6.5 ENVIRONMENTAL RESISTANCE

| Description | Characteristics |
|-------------------------------------|-----------------|
| Climatic Environmental Resistance | 5K2 |
| Biological Environmental Resistance | 5B1 |
| Chemical Environmental Resistance | 5C1 |
| Mechanical Active Substances | 5S1 |

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6.6 MECHANICAL CONDITIONS

Operating Environment : Insulating Oil.

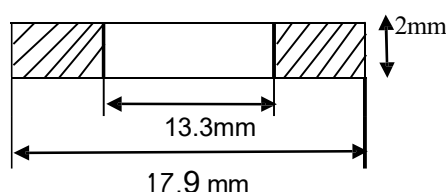
6.7 CABLE

| | |
|--------------|--|
| Cable Type | Cable Radex Electron beam irradiated cable GKW/RW/EMV 2x2x0.5mm |
| Construction | Cores 0.5mm ² |
| Conductor | Stranded tin plated copper |
| Insulation | GKW/RW |
| Length | 03 meters |

6.8 SENSOR COVER

Material : Stainless Steel

6.9 COPPER WASHER: The copper sealing washer belongs to the delivery.



6.10 CONNECTOR:- Connectors must be 5 Pin Circular type of ITT CANNON make or CLW/BLW/RDSO approved Source.

6.11 Cable screen must be connected to the connector body & sensor housing to ground at both ends.

7.0 APPROVAL OF SAMPLE

7.1 The offers from the OEM or its authorized agent for identical type of Temperature Sensor shall be verified based on the original test certificates from the OEM, the invoice particulars, which shall contain the Batch No./ SL. No, etc. and approval shall be given according to this data.

7.2 For offers other than the Original type, the supplier shall make available at least two prototypes of the Temperature Sensor proposed to be supplied for inspection and tests at his works and request CLW/BLW when such sample is ready.

7.3 The prototype testing facilities must be arranged by the supplier at his own cost. Tests shall be carried out as per relevant IEC standard mentioned above.

7.4 After the prototype tests as mentioned above, if it is considered necessary by CLW/BLW's representative to carry out any further tests or trials of the prototype at CLW/BLW, The supplier shall arrange for the same by the quickest means at his own cost.

7.5 Series supply shall commence only after the prototypes are approved and cleared.

7.6 Routine tests on 100% of the items shall be carried out by the authorized representative of CLW/BLW according to the relevant IEC standard mentioned above. Necessary facilities for carrying out the routine tests shall be arranged by the supplier free of cost.

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8.0 TESTS

FOLLOWING TESTS SHOULD BE CARRIED OUT ON TEMPERATURE SENSOR

| Sl. No. | Test Description | Specified value / standard | Test | | | Remarks |
|---------|--|----------------------------|------------------|--------------------------|-------------------------|--|
| | | | Routine* 100% | Acceptance (bulk) 10% | Type (Proto) 100% | |
| | | | | Inspection by as per PO. | | After complete assembled Temp. Sensor. |
| 8.1 | Physical verification, Quality of workmanship and Dimensional measurement. | As per relevant Drg. | Yes | Yes | Yes | |
| 8.2 | Di Electric test at 1000V AC. | Withstand | Yes | Yes | Yes | |
| 8.3 | Insulation Resistance Measurement by 500V DC Meggar (PT100 RTD Element) . | 100M ohm | Yes | Yes | Yes | |
| 8.4 | Earth Checking. | Less than 1 ohm | Yes | Yes | Yes | |
| 8.5 | Measurement of Resistance at Ambient Temperature | | Yes | Yes | Yes | |
| 8.6 | Measurement of Resistance at -45°C and +125°C (PT100 RTD Element) | As per IEC:60751 | No | No | Yes | |
| 8.7 | Measurement of resistance in oil at 50°C, 100°C (PT100 RTD Element) | As per IEC 60751 | Yes | 10% at all temp. | Yes | |
| 8.8 | Damp Heat Test | As per IEC:60571 | No | No | Yes | |
| 8.9 | Dry Heat Test | As per IEC:60571 | No | No | Yes | |
| 8.10 | Ingress Protection Test (Level- IP-64). | As per IEC:60529 | No | No | Yes | |
| 8.11 | Shock and Vibration Test | As per IEC:61373 | No | No | Yes | |
| 8.12 | Drop test | As per IS: 2848'86 | 5% | 5% | Yes | |
| 8.13 | Verification of OEM documents as per approved Bill of Material. | As per relevant document. | Yes | Yes | Yes | |
| 8.14 | Marking and Lebeling as per specification clause no-10.0 | ---- | Yes | Yes | Yes | |

* Routine test to be carried treated as firm's internal inspection which is is to be submitted by firm during acceptance test (bulk/ regular inspection) as well as type test (prortotype).

All Type test & Routine test will be carried out according to the International Standard (IEC-60571) and shall be finalized jointly with the firm.

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9.0 HARDWARE

Standard hardware and fasteners of CLW/BLW approved source only to be used.

10.0 LABELING/MARKING: -

Products should be marked with the following: -

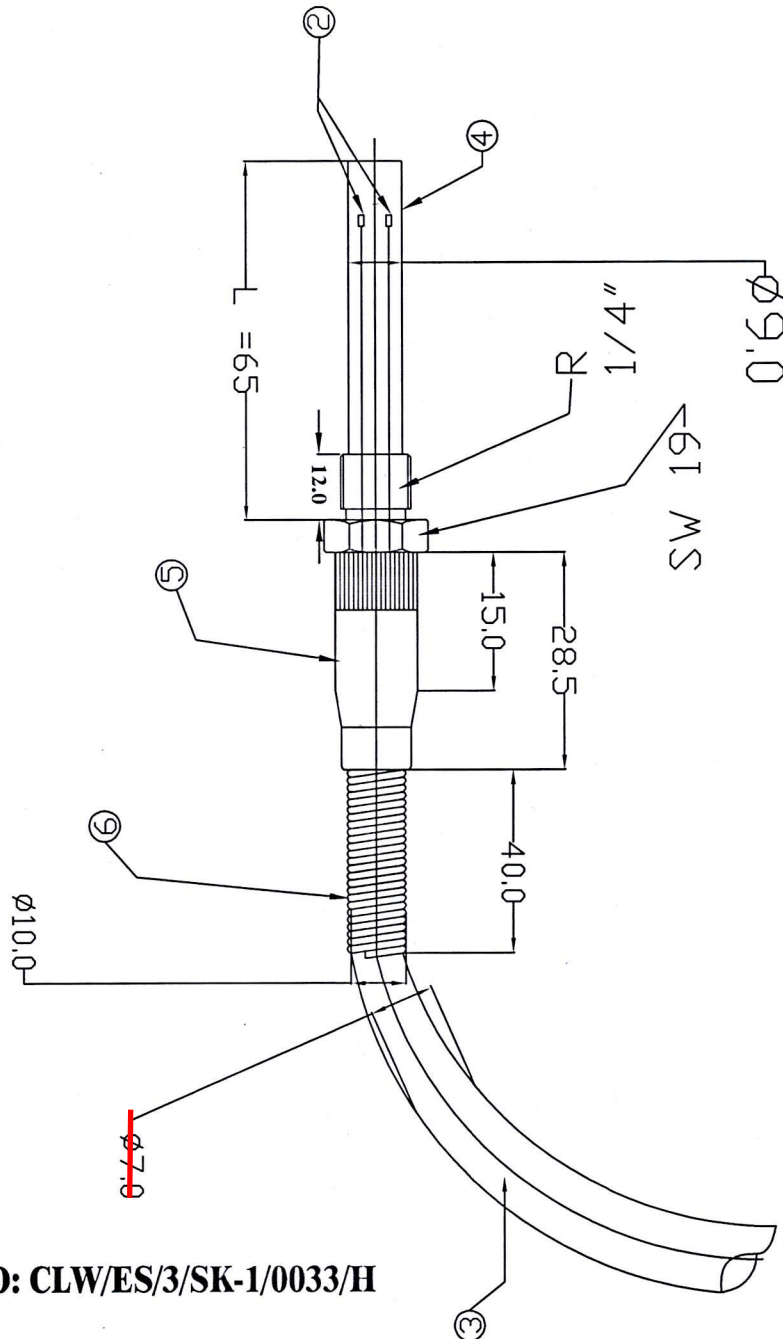
- i) Type no. of each product should be provided for identification.
- ii) Month/Year of manufacture.
- iii) Name of manufacturer with trademark, code no. & batch no.

11.0 QUANTITY/LOCO

| SI.No. | Description | ABB Identification No | CLW Drawing No. | QTY/LOCO |
|--------|--------------------|-----------------------|-------------------------------|----------|
| 01 | TEMPERATURE SENSOR | 3EHN424142R3000 | CLW/ES/3/SK-1/0033/G H | 02 |

12.0 NOTE: The non metallic part of sensor should be fire retardant and self extinguishing type as per IEC 11731 or any other relevant DIN/IEC standard.

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Specification No. CLW/ES/3/0033/H**TEMPERATURE SENSOR OIL CIRCUIT TRANSFORMER****DRG. NO: CLW/ES/3/SK-1/0033/H****NOTES:****1. ALL DIMENSION ARE IN MM & TOLERANCE AS PER IS**

| SL.NO. | DESCRIPTION | ITEM DETAILS |
|--------|---------------------------------|--|
| 1. | 5 PIN CONNECTOR (Circular type) | As per clause no-6.10 |
| 2. | PT-100 ELEMENT | 2 nos PT100 PLATINUM RESISTANCE TRERMOMETER IN ONE BODY |
| 3. | CABLE 4 CORE(PTFE) | CABLE RADOX GKW RW/EMV 2X2X0.5mm ELECTRON BEAM IRRADIATED |
| 4. | SS HOUSING | SS 304 |
| 5. | SS PROTECTION COVER | SS 304 |
| 6. | SS PROTECTION SPRING | SS 304 |
| 7. | COPPER WASHER (2 Nos.) | AS PER DRAWING AT PAGE 5 TO BE LOOSE SUPPLY |

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