

KS

KOREAN INDUSTRIAL STANDARD

Metal Sheathed Resistance Thermometer Sensors

KS C 1616 : 1992

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Metal Sheathed Resistance Thermometer Sensors

1. Scope

This Korean Industrial Standard specifies the sheathed platinum resistance thermometer sensors to be used for temperature measurements, hereinafter referred to as the "sheathed resistance thermometer sensors", whose resistance value at 0°C is 100Ω.

Remark Normative references to this standard shall be as follows.

- KS A 0006 Standard Atmospheric Conditions for Testing
- KS A 0511 Temperature Measurements—General requirements Corresponding International Standard :
- KS B 5202 Micrometer Callipers for External Measurement
- KS C 1302 Insulation Resistance Testers(Battery Operated)
- KS C 1606 Electrical Methods of Temperature Measurements

2. Definitions

For the purposes of this Standard, the following definitions apply :

(1) sheathed resistance thermometer sensor

A platinum thermometer sensor integrating the metal sheath and the internal connecting wires and sensing resistor by placing the powdery inorganic substance between them.

(2) sensing resistor

A sensing element composed of an element resistance wire and a supporting structure.

(3) internal connecting wires

Wires connecting the sensing resistor and the terminals of sheathed resistance thermometer sensor.

(4) inorganic insulating substance

An excellent powdery substance which electrically insulates the internal connecting wires and the sensing resistor from the metal sheath.

(5) metal sheath

A metal tube which encases the sensing resistor, internal connecting wires and inorganic insulating substance together and protects the sensing resistor and internal connecting wires from direct contact with the measuring object, atmosphere or the like.

(6) terminals

Metal fittings or ends of internal connecting wires attached for the purpose of effecting a resistance variation due to change of temperature in the sensing resistor of the sheathed resistance thermometer sensor.

(7) element resistance wire

A platinum wire composing the sensing part of the sheathed resistance thermometer sensor.

(8) reference sensing resistor

An imaginary sensing resistor of which resistance value varies according to temperature as given in the reference table of resistance values.

(9) specified current

A current value to be passed continuously through the sensing resistor for the purpose of measuring resistance values.

3. Classification

The sheathed resistance thermometer sensors shall be classified as given in the following, according to R_{100}/R_0 values of reference sensing resistor, classes, specified current, divisions by service temperature range and connecting wire configurations.

(1) R_{100}/R_0 Value of Reference Sensing Resistor

The R_{100}/R_0 value of the reference sensing resistor shall be as specified in Table 1.

Table 1

Symbol	R_{100}/R_0 Value	Table of reference resistance value
Pt 100	1.3850	Attached Table 1
(KPt 100)	(1.3916)	(Attached Table 2)

Remarks 1. R_{100} is the resistance value of the sensing resistor at 100°C.
2. R_0 is the resistance value of the sensing resistor at 0°C.

Reference Items given in () are scheduled to be abolished in future.

(2) Classes

The classes shall be class A and class B according to the tolerances for the temperatures given in Table 3.

(3) Specified Currents

The specified current shall be one of the following. However, 5mA shall not be applied to class A.

1mA, 2mA and 5mA

(4) Division by Service Temperature Ranges

The division by service temperature ranges shall be as specified in Table 2.

Table 2

Unit : °C

Symbol	Division	Service temperature range
L	For low temperature	-200 to +100
M	For medium temperature	0 to 350
H	For high temperature	0 to 500

(5) Connecting Wire Configuration

The connecting wire configuration shall be one of the following :

3-connecting wire system and 4-connecting wire system

4. Resistance Values of Reference Sensing Resistor

The resistance values of the reference sensing resistors shall conform to Attached Table 1 or Attached Table 2.

5. Characteristics**5.1 Temperature Characteristics****5.1.1 Tolerances on Temperatures**

When the sheathed resistor thermometer sensors are tested in accordance with 9.2.3, the temperature tolerances should be such that the errors are within the ranges of Table 3 in the service temperature range.

Further, an example of tolerance on measured temperatures is given in Table 4.

Remark The error of a sensing resistor at a measured temperature means the value obtained by subtracting the measured temperature from the temperature of the resistance value given by the sensing resistor as converted in accordance with Attached Table 1 or Attached Table 2.

Table 3

Unit : °C

Class	Tolerances
Class A	$\pm(0.15+0.002 t)$
Class B	$\pm(0.3+0.005 t)$

Remar $|t|$ is the measured temperature unrelated to the signs of + and - and indicated by temperature(°C).

Table 4 Tolerances on Temperatures

Unit : °C

Measuring temperature	Tolerances	
	Class A	Class B
-200	±0.55	±1.3
-100	±0.35	±0.8
0	±0.15	±0.3
100	±0.35	±0.8
200	±0.55	±1.3
300	±0.75	±1.8
400	±0.95	±2.3
500	±1.15	±2.8

5.1.2 Stability

The stability, when tested in accordance with 9.2.4, shall be $\pm 0.15^{\circ}\text{C}$ for class A and $\pm 0.3^{\circ}\text{C}$ for class B.

5.2 Electrical Characteristics

5.2.1 Insulation Resistance

The insulation resistance shall, when test in accordance with 9.2.5, be not less than the value in Table 5.

Table 5

Outside diameter of metal sheath mm	Test temperature	Insulation resistance MΩ	Test voltage V
3.0, 3.2	Ordinary temperature	5	250
4.5, 4.8, 6.0, 6.4, 8.0		5	500

5.2.2 Withstand Voltage

The sheathed resistance thermometer sensor shall, when tested in accordance with 9.2.6, withstand the test voltage.

5.3 Mechanical Properties

When the mechanical properties are tested in accordance with 9.2.7, there shall be no breakage of wire or short circuit, and the results shall conform to 5.2.1, 5.2.2 and 8.

6. Dimensions

The dimensions of the sheathed resistance thermometer sensor shall generally be as specified in Table 6 and Fig. 1. However, the length of the metal sheath shall be as