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Sheathed base metal thermocouple cables

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Foreword

This document is drafted in accordance with the provisions of GB/T 1.1—2020 Directives for standardization — Part 1: Structure and drafting rules of standardization documents.

This document replaces JB/T 8205—1999 Sheathed Base Metal Thermocouple Cables.

Compared with JB/T 8205—1999, besides structural adjustments and editorial modifications, the main technical changes are as follows:

- a) The structure and dimensions of the cables have been modified (see 5.1; 5.1 of the 1999 edition);
- b) The requirements for insulation resistance have been modified (see 5.4; 5.5 of the 1999 edition);
- c) Requirements and test methods for electrical strength have been added (see 5.5 and 6.5);
- d) Technical requirements and test methods for ductility of thermocouple wires have been added (see 5.7 and 6.7);
- e) Requirements and test methods for electrical continuity have been added (see 5.9 and 6.9);
- f) Chemical composition of insulation materials has been added (see Annex A).

Attention is drawn to the possibility that some contents of this document may involve patents.

The issuing body of this document shall not be responsible for the identification of such patents.

This document is proposed by China Machinery Industry Federation.

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History of previous editions of the standard replaced by this document:

— JB/T 8205.1—1995, JB/T 8205.2—1995;

— JB/T 8205—1999.

Sheathed base metal thermocouple cables

1 Scope

This document specifies the product classification and technical requirements for sheathed base metal thermocouple cables, describes the corresponding test methods, and stipulates the supply method, packaging and quality certification documents.

This document applies to the manufacture of sheathed thermocouple cables whose thermocouple wires are Chromel-Alumel, Nicrosil-Nisil, Chromel-Constantan, Iron-Constantan and Copper-Constantan.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through normative reference herein. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including all amendments) applies.

GB/T 2614 Chromel-Alumel thermocouple wires

GB/T 2903 Copper-Constantan thermocouple wires

GB/T 4993 Chromel-Constantan thermocouple wires

GB/T 4994 Iron-Constantan thermocouple wires

GB/T 16839.1 Thermocouples — Part 1: EMF specifications and tolerances

GB/T 17615 Nicrosil-Nisil thermocouple wires

JB/T 6819.2 Terms for instrument materials — Temperature measuring materials

3 Terms and Definitions

The terms and definitions defined in JB/T 6819.2 as well as the following apply to this document.

3.1 sheathed base metal thermocouple cables

A flexible and solid assembly made by insulating one or more pairs of Chromel-Alumel, Nicrosil-Nisil, Chromel-Constantan, Iron-Constantan or Copper-Constantan thermocouple wires with mineral insulating materials, placing them inside a metal sheath and compacting the assembly.

3.2 metal sheath material

A metal tube used to protect the thermocouple wires from direct contact with the measured medium or surrounding atmosphere.

3.3 insulation material

Powdery inorganic material that provides electrical insulation between the metal sheath and thermocouple wires, and between individual thermocouple wires.

3.4 thermocouple wire

Metal or alloy wire forming the two thermal electrodes of a thermocouple.

3.5 tolerance

Maximum permissible deviation of electromotive force (EMF).

3.6 simplex thermocouple cables

Thermocouple cables made of one pair of thermocouple wires with the same thermocouple type.

3.7 duplex thermocouple cables

Thermocouple cables made of two pairs of thermocouple wires with the same thermocouple type.

3.8 triplex thermocouple cables

Thermocouple cables made of three pairs of thermocouple wires with the same thermocouple type.

4 Product Classification

4.1 Product name, type and thermocouple index

The product name, type and thermocouple index are given in Table 1.

Table 1 Product Name, Type and Thermocouple Type Letter

Product Name	Type	Thermocouple Type Letter
Sheathed Chromel- Alumel thermocouple cable	KK	K
Sheathed Nicrosil- Nisil thermocouple cable	KN	N
Sheathed Chromel- Constantan thermocouple cable	KE	E
Sheathed Iron- Constantan thermocouple cable	KJ	J
Sheathed Copper- Constantan thermocouple cable	KT	T

4.2 Number of Cores

For sheathed base metal thermocouple cables (hereinafter referred to as “cables”):

- Cables with an outer diameter less than 1.5 mm may be manufactured as 2-core cables using one pair of thermocouple wires;
- Cables with an outer diameter from 1.5 mm to 3.0 mm may be manufactured as 2-core cables using one pair of thermocouple wires or 4-core cables using two pairs of thermocouple wires;
- Cables with an outer diameter greater than 3.0 mm may be manufactured as 2-core cables using one pair of thermocouple wires, 4-core cables using two pairs of thermocouple wires, or 6-core cables using three pairs of thermocouple wires.

4.3 Materials

4.3.1 Sheath

Qualified stainless steel, high-temperature alloy, or other metals agreed between the user and the supplier shall be used as the sheath material.

Recommended sheath materials are given in Table 2.

4.3.2 Thermocouple Wires

Thermocouple wires shall comply with the specifications for Type K, N, E, J or T thermocouple wires given in GB/T 2614, GB/T 17615, GB/T 4993, GB/T 4994 and GB/T 2903.

4.3.3 Insulation Material

Magnesium oxide (MgO) or aluminium oxide (Al₂O₃) with a purity of not less than 96 % shall be used as insulation

material.

The chemical composition is given in Annex A.

4.4 Recommended Maximum Operating Temperature

The recommended maximum operating temperature, according to cable type, sheath material and outer diameter, is given in Table 2.

The supplier and purchaser may negotiate and select the sheath material according to different service conditions.