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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 16839.1-2018

Replacing GB/T 16839.2-1997; GB/T 16839.1-1997

Thermocouples -- Part 1: EMF specifications and tolerances

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Foreword

GB/T 16839 "Thermocouple" plans to release the following parts.

--- Part 1. Electromotive force specifications and tolerances;

--- Part 2. Extension and compensation of wire tolerance and marking system.

This part is the first part of GB/T 16839.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This part replaces GB/T 16839.1-1997 "Thermocouple Part 1. Index Table" and GB/T 16839.2-1997 "Thermocouple"

Part 2. Tolerance, the main technical changes compared with GB/T 16839.1-1997 and GB/T 16839.2-1997 are as follows.

--- Combine GB/T 16839.1-1997 and GB/T 16839.2-1997;

--- Added Type A and Type C thermocouples and related contents (see Table 10, A.10, Table A.9, Table B.9 and Table 11, A.11, Table)

A.10, Table B.10);

--- Clarify the primary and secondary relations of the indexing polynomial and the index table, and adjust the position of the two in the standard. The former is included in the text, and multiple

The index table derived by the formula is given in Appendix A (see Chapter 4, Appendix A of GB/T 16839.1-1997; see Appendix A,

Chapter 4 of GB/T 16839.1-1997;

--- Removed the inverse indexing table (the thermocouple inverse function table of each type in Chapter 4 of GB/T 16839.1-1997);

---Modified the maximum temperature of the K-type thermocouple electromotive force polynomial, 1300 °C (see Table 8, Table A.7, Table B.7,

GB/T 16839.1-1997 Chapter 4 K-type index table, K-type inverse function table and A.7, B.7);

--- Increased the thermoelectric data of the ITS-90 fixed point (electromotive force and Seebeck coefficient, the latter value is separated by 10 ° C) (see section

Chapter 6);

--- Added Appendix C, gives the use of various types of thermocouples and the use of different environmental conditions (see attached

Record C).

This section uses the translation method equivalent to IEC 60584-1.2013 "Thermocouple Part 1. Electromotive Force Specifications and Tolerances".

This section has made the following editorial changes.

--- Corrected an error in IEC 60584-1.2013. Revised the definition of 2.1. The original definition is closer to the Peltier effect, not the

"Seebeck effect", the latter should occur in a closed loop of two different electrically conductive materials, rather than in a conductor;

--- Note to the inverse function formula of Appendix B, the symbol "T" is corrected to "t90";

--- Table C.2 "RP, SP, RN, SN, BP, BN" column, the third line and the fourth line are repeated, delete one of the lines.

This part was proposed by the China Machinery Industry Federation.

This part is under the jurisdiction of the National Industrial Process Measurement Control and Automation Standardization Technical Committee (SAC/TC124).

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Introduction

This section gives the relationship between the electromotive force (EMF) produced by the letter-marked thermocouple and the.1990 International Temperature Scale (ITS-90) temperature.

relationship.

The indexing polynomials of the R, S, B, J, T, E, K and N type thermocouples are identical to IEC 60584-1.1995, originally developed by the US NIST

It was published and published in the.1993 NIST Special Report No. 175.

The main revision made in this section is the standardization of two tungsten-rhodium thermocouples with the indexing numbers C and A. These two types of thermoelectric

I have been used in industry for a long time. This section is used in ASTM E230/E230-M12 and GOSTR8.585-2001 respectively.

The temperature-electromotive force relationship of Type C and Type A.

Thermocouples Part 1. Electromotive force specifications and tolerances

1 Scope

This part of GB/T 16839 specifies the indexing function and permission of letter-marked thermocouples (R, S, B, J, T, E, K, N, C and A).

difference. The temperature (symbol t90) is expressed in degrees Celsius according to the.1990 international temperature scale ITS-90, and the electromotive force (symbol E) is expressed in microvolts.

The indexing function is in the form of a polynomial, and the electromotive force (E, in μV) at the reference junction of the thermocouple is 0°C (t90, unit)

Expressed as a function of °C). Appendix A gives the electromotive force values corresponding to the interval of 1 °C in the form of a list.

To facilitate the calculation of temperature, Appendix B gives the inverse function, which is expressed as a function of the electromotive force within the set tolerances.

This section specifies the tolerances for thermocouples manufactured in accordance with the requirements of this standard. These tolerance values apply to the nominal diameter of the wire is 0.13mm~

The state of the 3.2mm thermocouple delivered to the user does not apply to the drift calibration of the product in use.

Appendix C gives guidelines for the selection of thermocouples based on temperature range and environmental conditions.

2 Terms and definitions

The following terms and definitions apply to this document.

2.1

Thermoelectric effect

Seebeck effect

In a closed loop composed of two different conductors, an electromotive force (EMF) phenomenon occurs due to the difference in temperature of the two contacts.

2.2

Thermocouple's Seebeck coefficient of Seebeckcoefficientofathermocouple

The thermocouple electromotive force change caused by the change in temperature per unit, that is, the first derivative of the electromotive force-temperature function.

Note. The Seebeck coefficient dE/dt90 unit is μV/°C.

2.3

Thermocouple thermocouple

A temperature detector consisting of a pair of conductors of different materials, one end of which is connected to each other, and a thermoelectric effect is used to measure the temperature.

2.4