SLOVENSKI STANDARD
SIST EN 60751:1998

01-november-1998

Industrial platinum resistance thermometer sensors (IEC 60751:1983 + A1:1986)

Industrial platinum resistance thermometer sensors

Industrielle Platin-Widerstandsthermometer und Platin-Meßwiderstände

Capteurs industriels à résistance thermométrique de platine

Ta slovenski standard je istoveten z: **EN 60751:1995**

ICS:

17.200.20	Instrumenti za merjenje temperature	Temperature-measuring instruments

SIST EN 60751:1998 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 60751

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English version

Industrial platinum resistance thermometer sensors
(IEC 751:1983 + A1:1986)

Capteurs industriels à résistance thermométrique de platine
(CEI 751:1983 + A1:1986)

Industrielle Platin-Widerstandsthermometer und Platin-Meßwiderstände
(IEC 751:1983 + A1:1986)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC
European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 751:1983 and its amendment 1:1986 , prepared by SC 65B, Devices, of IEC TC 65, Industrial-process measurement and control, was approved by CENELEC as HD 459 S2 on 1988-12-06.

This Harmonization Document was submitted to the formal vote for conversion into a European Standard and was approved by CENELEC as EN 60751 on 1995-07-04.

The following date was fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1996-07-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA is normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 751:1983 and its amendment 1:1986 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 258	1968	Direct acting recording electrical measuring instruments and their accessories	HD 368 S1[1)]	1978

1) HD 368 S1 includes A1:1976 to IEC 258.

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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IEC STANDARD

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Capteurs industriels à résistance thermométrique de platine

Industrial platinum resistance thermometer sensors

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3, rue de Varembé

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Price Fr.s. 51.—

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This standard has been prepared by Sub-Committee 65B: Elements of Systems, of IEC Technical Committee No. 65: Industrial-process Measurement and Control.

Drafts were discussed at the meetings held in Budapest in 1976 and in Florence in 1978. As a result of the latter meeting, a draft, Document 65B(Central Office)24, was submitted to the National Committees for approval under the Six Months' Rule in April 1980.

The National Committees of the following countries voted explicitly in favour of publication:

Australia	Germany
Austria	Israel
Belgium	Italy
Brazil	Japan
Bulgaria	Poland
Canada	Romania
Czechoslovakia	South Africa (Republic of)
Denmark	Turkey
Egypt	Union of Soviet Socialist Republics
Finland	United Kingdom
France	

Other IEC publication quoted in this standard:

Publication No. 258: Direct Acting Recording Electrical Measuring Instruments and their Accessories.

INDUSTRIAL PLATINUM RESISTANCE THERMOMETER SENSORS

1. Scope

This standard specifies requirements for industrial platinum resistance thermometer sensors whose electrical resistance is a defined function of temperature. The standard covers thermometers suitable for all or part of the temperature range −200 °C to +850 °C with two tolerance classes. It is primarily concerned with sheathed elements suitable for immersion in the medium whose temperature is to be measured.

Methods of test to prove compliance with this standard and suitable apparatus for some of the tests are also described.

2. Definitions

2.1 *Platinum resistance thermometer sensor*

A temperature-responsive device consisting of a sensing resistor within a protective sheath, internal connecting wires and external terminals to permit connection of electrical measurement devices. Mounting means or connection heads may be included. Typical constructions are shown in Figure 1.

Notes 1. — This resistance thermometer sensor is referred to as a thermometer in subsequent clauses of this standard.

2. — This definition excludes any separable pocket or well provided with the thermometer.

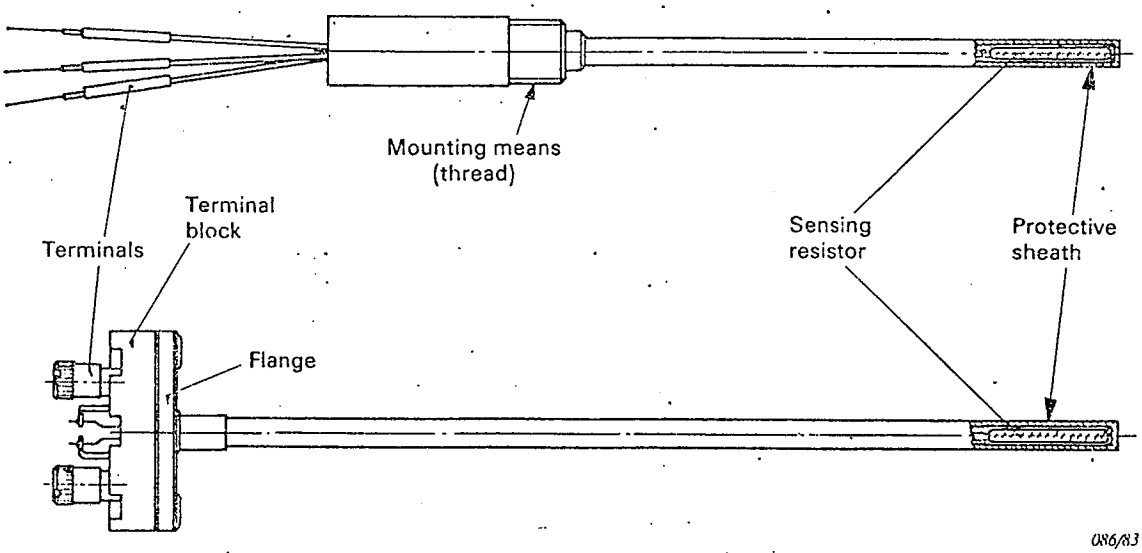

FIG. 1. — Typical construction of resistance thermometer sensor.

2.2 *Tolerance*

For the purpose of this standard the tolerance of a resistance thermometer is the maximum allowable deviation expressed in degrees Celsius from the nominal resistance temperature relationship such as given in Table I.

3. Characteristics

3.1 *Temperature/resistance relationships*

The temperature/resistance relationships used in this standard are as follows:

– for the range −200 °C to 0 °C:

$$R_t = R_0 \left[1 + At + Bt^2 + C\,(t - 100\ °C)\,t^3\right]$$

– for the range of 0 to 850 °C:

$$R_t = R_0 \left(1 + At + Bt^2\right)$$

For the quality of platinum commonly used for industrial resistance thermometers the values of the constants in these equations are:

$$A = 3.908\,02 \times 10^{-3}\ °C^{-1}$$
$$B = -5.802 \times 10^{-7}\ °C^{-2}$$
$$C = -4.273\,50 \times 10^{-12}\ °C^{-4}$$

For resistance thermometers satisfying the above relationships the temperature coefficient:

$$\alpha = 0.003\,850\ \Omega \cdot \Omega^{-1} \cdot °C^{-1}$$

alpha is defined as follows:

$$\alpha = \frac{R_{100} - R_0}{100 \times R_0}\ \Omega \cdot \Omega^{-1} \cdot °C^{-1}$$

where R_{100} = resistance at 100 °C and R_0 resistance at 0 °C.

These equations are listed as the basis for the temperature/resistance tables of this standard and are not intended to be used for the calibration of individual thermometers.

Values of temperature in this standard are in the International Practical Temperature Scale of 1968 (IPTS-68).

Notes. — Unless specified by the manufacturer the resistance values defined by the above equations do not include resistance of the leads between the sensing resistor and the terminations.

3.2 *Resistance values*

Most thermometers are constructed to have a nominal resistance at 0 °C of 100 Ω or 10 Ω. The preferred value is 100 Ω. The 10 Ω type is built with heavier wire for more reliable service above 600 °C.

Values of resistance using the equations of Sub-clause 3.1 are given in Table I.

3.3 *Tolerances*

The tolerance values of resistance thermometers are classified as follows:

Tolerance class	Tolerance (°C)
A	$0.15 + 0.002\ \|t\|$*
B	$0.3 + 0.005\ \|t\|$

* $|t|$ = modulus of temperature in degrees Celsius without regard to sign.

3.3.1 Thermometers of 100 Ω nominal resistance value shall be classified according to degree of conformity with the values of Table I. The tolerances are given in Table II. Class A tolerances shall not be applied to 100 Ω resistance thermometers at temperatures above 650 °C. Thermometers with only two internal connecting wires (see Sub-clause 3.5) which are intended for use with only two external connecting wires shall not be specified as being in Tolerance Class A.