

Industrial platinum resistance thermometers and platinum temperature sensors

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 60751:2008 sisaldab Euroopa standardi EN 60751:2008 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 20.10.2008 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 19.09.2008.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 60751:2008 consists of the English text of the European standard EN 60751:2008.

This standard is ratified with the order of Estonian Centre for Standardisation dated 20.10.2008 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 19.09.2008.

The standard is available from Estonian standardisation organisation.

ICS 17.200.20

Võtmesõnad:

Standardite reprodutseerimis- ja levitamisoigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

English version

**Industrial platinum resistance thermometers
and platinum temperature sensors
(IEC 60751:2008)**

Thermomètres à résistance
de platine industriels
et capteurs thermométriques en platine
(CEI 60751:2008)

Industrielle
Platin-Widerstandsthermometer
und Platin-Sensoren
(IEC 60751:2008)

This European Standard was approved by CENELEC on 2008-08-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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 document 65B/664/FDIS, future edition 2 of IEC 60751, prepared by SC 65B, Devices & process analysis, of IEC TC 65, Industrial-process measurement, control and automation, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60751 on 2008-08-01.

This European Standard supersedes EN 60751:1995 + A2:1995.

The significant technical changes with respect to EN 60751:1995 are as follows:

While the temperature/resistance relationship in 4.2 remains unchanged, there are several changes in the other chapters. Most important are:

- tolerance classes follow a new scheme;
- tolerance acceptance test is included;
- hysteresis test is included;
- several changes in the individual tests;
- appendices are deleted.

The following dates were 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) 2009-05-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2011-08-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60751:2008 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61152 (mod)	- ¹⁾	Dimensions of metal-sheathed thermometer elements	EN 61152	1994 ²⁾
IEC 61298-1	- ¹⁾	Process measurement and control devices - General methods and procedures for evaluating performance - Part 1: General considerations	EN 61298-1	1995 ²⁾

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
4 Characteristics	8
4.1 Temperature/resistance relationships	8
4.2 Resistance values	9
5 General requirements.....	12
5.1 Tolerance classes	12
5.1.1 Temperature range of validity	12
5.1.2 Resistors	12
5.1.3 Thermometers	12
5.1.4 Special tolerance classes and special temperature ranges of validity	12
5.2 Measuring current	13
5.3 Electrical supply	13
5.4 Connecting wire configuration	13
6 Tests.....	14
6.1 General.....	14
6.1.1 Routine production tests.....	14
6.1.2 Type tests	14
6.1.3 Additional type tests	14
6.2 Routine production tests for resistors	14
6.2.1 Tolerance acceptance test.....	14
6.3 Routine production tests for thermometers	15
6.3.1 Insulation resistance at ambient temperature.....	15
6.3.2 Sheath integrity test	15
6.3.3 Dimensional test.....	16
6.3.4 Tolerance acceptance test.....	16
6.4 Type tests for resistors.....	16
6.4.1 Tolerances	16
6.4.2 Stability at upper temperature limit	16
6.4.3 Self-heating	16
6.5 Type tests for thermometers.....	16
6.5.1 Insulation resistance at elevated temperatures	16
6.5.2 Thermal response time	18
6.5.3 Stability at upper temperature limit	18
6.5.4 Thermoelectric effect.....	18
6.5.5 Effect of temperature cycling	18
6.5.6 Effect of hysteresis	18
6.5.7 Self-heating	18
6.5.8 Minimum immersion depth.....	19
6.6 Additional type tests for special applications of thermometers	19
6.6.1 Capacitance	19
6.6.2 Inductance.....	19
6.6.3 Dielectric strength	19
6.6.4 Vibration test	19

6.6.5	Drop test	19
6.7	Summary of tests	19
7	Information to be made available by the manufacturer	20
7.1	For resistors only	20
7.2	For resistors and/or thermometers	20
8	Thermometer identification and marking	20
Figure 1 – Connecting configurations		13
Figure 2 – Examples of test results for selecting or rejecting resistors..		15
Table 1 – Temperature/resistance relationship, $R_0 = 100.00 \, \Omega$		10
Table 2 – Tolerance classes for resistors		12
Table 3 – Tolerance classes for thermometers		12
Table 4 – Minimum insulation resistance of thermometers at maximum temperature		16
Table 5 – Table of tests described in this standard		20

INDUSTRIAL PLATINUM RESISTANCE THERMOMETERS AND PLATINUM TEMPERATURE SENSORS

1 Scope

This standard specifies the requirements and temperature/resistance relationship for industrial platinum resistance temperature sensors later referred to as "platinum resistors" or "resistors" and industrial platinum resistance thermometers later referred to as "thermometers" whose electrical resistance is a defined function of temperature.

The International Standard applies to platinum resistors whose temperature coefficient α , defined as

$$\alpha = \frac{R_{100} - R_0}{R_0 \cdot 100^\circ\text{C}}$$

is conventionally written as $\alpha = 3.851 \times 10^{-3} \text{ }^\circ\text{C}^{-1}$, where R_{100} is the resistance at $t = 100 \text{ }^\circ\text{C}$ and R_0 is the resistance at $t = 0 \text{ }^\circ\text{C}$.

Values of temperature in this standard are in terms of the International Temperature Scale of 1990, ITS-90. Temperatures in degrees Celsius are denoted by the symbol t , except in Table 1 where the full nomenclature $t_{90}/^\circ\text{C}$ is used.

The standard covers resistors or thermometers for all or part of the temperature range $-200 \text{ }^\circ\text{C}$ to $+850 \text{ }^\circ\text{C}$ with different tolerance classes, which may cover restricted temperature ranges.

For temperature/resistance relationships with uncertainties $< 0,1 \text{ }^\circ\text{C}$, which are possible only for resistors or thermometers with exceptionally high stability and individual calibration, a more complex interpolation equation than is presented in this standard may be necessary. The specification of such equations is outside the scope of this standard.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies:.

IEC 61152, *Dimensions of metal-sheathed thermometer elements*

IEC 61298-1, *Process Measurement and Control devices – General Methods and Procedures for Evaluating Performance – Part 1: General considerations*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 dielectric strength

maximum voltage between all parts of the electric circuit and the sheath of the thermometer or, in the case of a thermometer with two or more sensing circuits, between two individual