

---

# International Standard



# 653

---

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

---

## Long solid-stem thermometers for precision use

*Thermomètres de précision, sur tige, type long*

**First edition — 1980-10-01**

---

**UDC 536.512 : 542.2**

**Ref. No. ISO 653-1980 (E)**

**Descriptors :** glassware, laboratory glassware, temperature measuring instruments, thermometers, dimensions, graduation, designation, specifications, precision, marking.

Price based on 7 pages

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 653 was developed by Technical Committee ISO/TC 48, *Laboratory glassware and related apparatus*, and was circulated to the member bodies in September 1979.

It has been approved by the member bodies of the following countries:

Australia	Hungary	Romania
Brazil	India	South Africa Rep. of
Canada	Italy	Spain
Czechoslovakia	Korea, Rep. of	United Kingdom
France	Libyan Arab Jamahiriya	USSR
Germany, F.R.	Netherlands	

The member body of the following country expressed disapproval of the document on technical grounds:

USA

This International Standard cancels and replaces ISO Recommendation R 653-1968, of which it constitutes a technical revision.

# Long solid-stem thermometers for precision use

## 0 Introduction

This International Standard is based on ISO 386, *Liquid-in-glass laboratory thermometers — Principles of design, construction and use*. It is one of four International Standards specifying requirements for basic series of long and short solid-stem and enclosed-scale thermometers, intended for general use in precision work.

For ease of reference, each thermometer of the series has been allocated a combination of letters and figures indicating the type of thermometer, the value of the smallest scale interval and the upper and lower limits of the nominal scale range. The letter abbreviations given below have been selected, after taking into account the descriptions in various languages usually given to these types of thermometers :

STL ..... Long solid-stem thermometers;

STC ..... Short solid-stem thermometers;

EL ..... Long enclosed-scale thermometers;

EC ..... Short enclosed-scale thermometers.

The method for determining the change in the zero indication is given in the annex.

## 1 Scope and field of application

This International Standard specifies requirements for a basic series of liquid-in-glass solid-stem thermometers, not exceeding 375 mm in length, for general use in precision work.

NOTE — There are in existence many different specifications for thermometers of the general types covered by this series. It is intended that this series should replace all such specifications, except those for which there is a well-established justification.

## 2 Temperature scale

The thermometers shall be graduated in accordance with the Celsius scale as defined in the current definition of the International Practical Temperature Scale (IPTS) adopted by the Conférence générale des poids et mesures, and in accordance with the International System of Units (SI).

## 3 Immersion

**3.1** The thermometers shall be adjusted for use at total immersion (i.e. the reading shall be correct when the thermometer is immersed so that the top of the liquid column is in the same plane as, or no more than two scale divisions above, the surface of the medium the temperature of which is required to be measured).

**3.2** Thermometers having a smallest scale division of 0,1 °C or 0,2 °C may alternatively be adjusted for complete immersion (i.e. the reading shall be correct when the entire thermometer is immersed in the medium) and if so shall be identified by marking [see 10 b)].

## 4 Glass

The thermometer shall be made of suitable thermometric glass<sup>1)</sup> selected and processed so that the finished thermometer shows the following characteristics.

**4.1** Stress in the glass of the bulb and capillary stem shall be reduced to a level sufficient to minimize the possibility of fracture due to thermal or mechanical shock.

**4.2** The bulb glass shall be stabilized by suitable heat treatment to ensure that the accuracy requirements of 9.1 and 9.3 can be met.

**4.3** The legibility of the reading shall not be impaired by devitrification or clouding.

**4.4** The image of the meniscus shall be distorted as little as possible by defects or impurities in the glass.

## 5 Liquid filling

Mercury shall be used as liquid filling, except for thermometers with a scale extending below – 38 °C for which the eutectic alloy of mercury and thallium (8,5 % thallium by mass) shall be used. The liquid filling shall be free from any contamination likely to interfere with the proper functioning of the thermometer.

1) An International Standard (ISO 4795) dealing with glasses for thermometer bulbs is in preparation.