भारतीय मानक

Indian Standard

IS 1672 : 2024

फ्लोटिंग डेयरी थर्मामीटर — विशिष्टि

(दूसरा पुनरीक्षण)

Floating Dairy Thermometers — Specification

(Second Revision)

ICS 17.200.20

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Glass, Glassware & Laboratoryware Sectional Committee, CHD 10

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Glass, Glassware and Laboratoryware Sectional Committee had been approved by the Chemical Division Council.

This standard was first published in 1960 and was revised in 1967, in order to align it with other Indian Standards on thermometer by specifying testing of individual thermometer for all requirements and modifying the ranges.

In this revision, the requirement for accuracy, glass, and thermometric liquid has been modified and a new requirement for stability has been added. A sampling plan for lot testing has also been prescribed and several editorial changes such as inclusion of the reference clause, Hindi title, ICS no., BIS Certification Marking clause, etc have also been incorporated.

The composition of the Committee responsible for development of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

FLOATING DAIRY THERMOMETERS — SPECIFICATION

(Second Revision)

1 SCOPE

This standard specifies the material, dimensional requirements and methods of sampling and tests for floating dairy thermometers.

2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provisions of and necessary adjuncts to this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards:

IS No.	*Title*
IS 321 : 1964	Specification for absolute alcohol (*first revision*)
IS 1382 : 1981	Glossary of terms relating to glass and glassware (*first revision*)
IS 2303 (Part 1/ Sec 1) : 2021/ ISO 719 : 2020	Grading glass for alkalinity: Part 1 Hydrolytic resistance of glass grains, Section 1 Determination and classification of hydrolytic resistance at 98 °C (*third revision*)
IS 2627 : 1979	Glossary of terms relating to liquid-in-glass thermometers (*first revision*)
IS 4905 : 2015/ ISO 24153 : 2009	Random sampling and randomization procedures (*first revision*)
IS 6274 : 1971	Method of calibrating liquid-in-glass thermometers

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 1382 and IS 2627 shall apply.

4 TYPE

4.1 The floating dairy thermometers shall be of the mercury-in-glass, enclosed scale type, graduated to read at total immersion.

4.2 There shall be two ranges of thermometers as follows:

a) - 5 °C to + 50 °C, designated as FLOAT 50; and

b) 0 °C to + l00 °C, designated as FLOAT 100.

5 REQUIREMENTS

5.1 Pattern

The thermometers shall be as shown in Fig. 1.

5.2 Material

5.2.1 *Glass*

The glass of the thermometer shall be such that after finishing the thermometer, the sheath, stem and the bulb show no appreciable signs of fissures or half cracks, dust or moisture, clouding or elastic bending, distortion of liquid meniscus anywhere, knots and stones, double bore, appreciable non-uniformity of scale, loss of transparency or any sign of bad workmanship. The type of glass used for the constriction tube, capillary tube and sheath tube shall correspond to HGB 3 or better grade when tested for hydrolytic resistance in accordance with the IS 2303 (Part 1/Sec 1).

5.2.2 *Thermometric Liquid*

5.2.2.1 The thermometric liquid shall be entirely free from contamination particularly of solid particles or of any liquid which produces a variation of volume with time.

5.2.2.2 Recommended thermometric liquids and the approximate temperature ranges covered by them are given in Table 1.

Table 1 Temperature Ranges for Various Thermometric Liquids

(*Clause* 5.2.2.2)

Sl No.	Thermometric Liquid	Approximate Temperature Range, °C
(1)	(2)	(3)
i)	Mercury	- 38 to + 600
ii)	Mercury-thallium alloy [8.5 percent (*m/m*) of thallium]	- 55 to + 600
iii)	Alcohol	- 80 to + 50
iv)	Toluene (IS 537 : 2011)	- 90 to + 50
v)	Technical pentane	- 200 to + 30
vi)	Kerosene oil	- 20 to + 150

5.2.2.3 The organic liquid used as the liquid filling shall, wherever possible, be coloured by means of light-fast dye which does not stain the glass. Alcohol shall comply in all respects with the provisions of special grade of IS 321 subject to the following modifications:

a) *Aldehydes and ketones* — Alcohol shall not contain more than 0.02 percent (*m/m*) of aldehydes and ketones, calculated as acetaldehyde (CH_3CHO); and

b) *Amines* — Alcohol shall give no indication of the presence of amines when tested by adding to 10 ml of alcohol, 10 ml of distilled water followed by 2 drops of a saturated solution of *p*-nitrophenol in water. Not more than 0.05 ml (1 drop) of 0.1 N sulphuric acid shall be required to discharge any yellow colour produced.

5.2.3 *Scale Strip*

The scale strip shall be made of a suitable opal glass, metal sheet, plastic or tough glared paper which permits fine clear graduation marks to be drawn on it and does not appreciably deteriorate.

5.2.4 *Loading Material*

The loading material shall be either rust-free iron filings or lead.

5.3 Construction

5.3.1 *Bulb*

5.3.1.1 The bulb shall be cylindrical and in alignment with the stem.

5.3.1.2 The bulb as well as the joint with the stem shall be free from visible irregularities, and shall be smooth throughout.

5.3.2 *Stem*

5.3.2.1 The capillary shall have a lens front section, so designed, that when the thermometer is being read, the liquid column appears to be at least 1 mm wide.

NOTE — This may be tested by a finely graduated (0.5 mm) scale against the thermometer at right angles to it while taking the temperature reading.

5.3.2.2 The capillary and the sheath shall be fused with the bulb without any constriction.

5.3.2.3 The capillary shall lie flat over the middle line of the scale so as to give maximum optical magnification. It shall extend beyond the top most graduation mark as shown in Fig. 1.

5.3.2.4 The top of the capillary shall end in a safety chamber as shown in Fig. 1 and shall be provided with a nip at the back.

5.3.2.5 The safety chamber shall start at least 10 mm from the nearest graduation line.

5.3.2.6 The safety chamber shall be elongated or pear shaped, provided with a hemispherical top and a conical bottom as shown in Fig. 1A and Fig. 1B. It shall be in line with the bore.

5.3.2.7 The safety chamber shall be adequate for at least 50 degree temperature rise above the maximum nominal temperature of the thermometer.

5.3.2.8 The capillary shall be securely supported inside the sheath near the top and by a ring of rubber or cork not exceeding 10 mm in width, fitted inside the sheath and around the capillary above the safety chamber.

5.3.2.9 The scale strip shall snugly fit diametrically into the sheath and the capillary shall be attached to it at least near the top.

5.3.2.10 The sheath of the thermometer shall be thoroughly dried before sealing so that no visible condensation takes place inside it during use.

5.3.2.11 The sheath shall be provided with a button at the top as shown in Fig. 1.

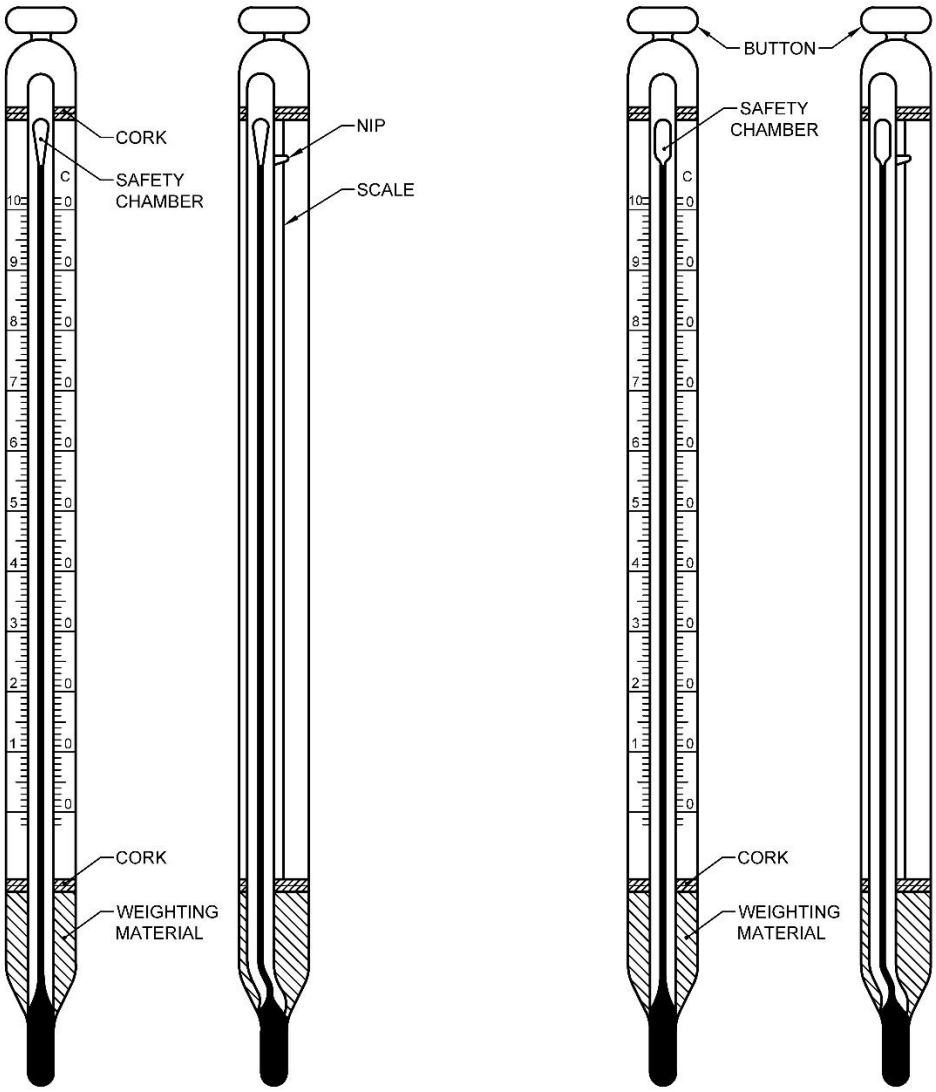
5.3.2.12 The thermometer shall be so designed that the whole of the thermometric liquid does not recede into the bulb under conditions of use and storage.

5.3.3 *Floatation*

5.3.3.1 The loading material shall be secured in place so that it does not move into the rest of the sheath during transportation and use; say by adding suitable binders or by a diaphragm of cork etc as shown in Fig. 1. The diaphragm shall be at least 5 cm below the lowest graduation on the scale strip.

5.3.3.2 The loading material shall occupy the space inside the sheath above the bulb as shown in Fig. 1.

5.3.3.3 The mass of the loading material and the overall design of the thermometers shall be such that it floats vertically, projecting its top at least 70 mm above the level of a liquid of density 1.03 g/ml.



1A PEAR SHAPED SAFETY CHAMBER

1B ELONGATED SAFETY CHAMBER

FIG. 1 FLOATING DAIRY THERMOMETERS

5.4 Graduations and Figuring

5.4.1 The scale shall extend at least five small dimensions beyond the maximum and minimum nominal temperatures.

5.4.2 No graduation line shall be within 10 mm of the start of the safety chamber and 20 mm of the top of the bulb.

5.4.3 All graduation lines and lettering shall be in black.

5.4.4 The graduation lines shall be of the same thickness but not less than 0.15 mm and not more than 0.25 mm.

5.4.5 All graduation lines shall extend almost equally on both sides of the capillary.

5.4.6 The graduation lines shall be at right angles to the axis of the thermometer.

5.4.7 The graduation lines shall be of three different lengths. Every tenth graduation line shall be a long line extending to the edge of the scale strip; there shall be a medium line midway between the two consecutive long lines; there shall be four short lines between consecutive medium and long lines.

5.4.7.1 Each short line shall extend 2 mm on each side of the capillary.

5.4.7.2 Each medium line shah extend 1.5 mm beyond the short lines.

5.4.8 The extremities of all short and medium lines respectively shall lie along an imaginary straight line parallel to the capillary.

5.4.9 The graduations at every long line shall be figured.

5.4.10 The figures shall be bold, upright and easily legible when the thermometer is held vertically for reading.

5.4.11 The figures shall be immediately above the graduation mark to which they relate, and the top of the figures shall be well below the medium line above the numbered mark.

5.4.12 The figures shall neither touch any graduation line nor encroach upon the space occupied by the short lines.

5.4.13 The digits of units position of all figures indicating temperatures shall be as far as possible between two lines parallel to the capillary.

5.4.14 The digits of tens and hundreds of the figures shall be written on the one side of the capillary (*see* Fig. 1).

5.4.15 The height of the figures shall be about 2 to 3 small divisions of the scale.

5.4.16 Two datum lines, each at least 10 mm long, shall be etched on the sheath to correspond with the zero and 50 degree graduation mark respectively on the scale.

5.5 Dimensions

The dimensional and scale requirements of thermometers shall be as given in Table 2.

Table 2 Details of Dimensions and Scale of Floating Dairy Thermometers

(*Clause* 5.5)

Sl No.	Details	Requirements for	
		Float 50	Float 100
(1)	(2)	(3)	(4)
i)	Nominal range	- 5 °C to 50 °C	0 °C to 100 °C
ii)	Smallest division, *deg*	1	1
iii)	Overall length, mm	200 to 220	280 to 320
iv)	Length of scale, mm, *Min*	100	100
v)	Length of bulb, mm	15 to 25	10 to 25
vi)	External diameter of the bulb, mm, *Max*	8	8
vii)	External diameter of the sheath, mm	15 to 20	15 to 20

5.6 Accuracy

The maximum value of calibration correction shall not exceed one smallest division of the scale of the thermometer when tested and determined in accordance with **7.1** of IS 6274.

5.7 Stability

The thermometers shall pass the stability test when tested in accordance with **7.2** of IS 6274.

6 PACKING AND MARKING

6.1 Packing

The thermometers shall be securely packed as agreed to between the purchaser and the supplier.

6.2 Marking

6.2.1 Each thermometer shall be marked legibly with:

a) The letter 'C' at the top of the scale strip;

b) Maker's name or recognized trade-mark at the back of the scale strip;

c) Serial number of the thermometer at the back of the scale strip; and

d) The designation 'FLOAT 50' or 'FLOAT 100', as the case may be, at the back of the scale strip.

6.2.2 *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

7 SAMPLING

7.1 Lot

7.1.1 All thermometers of the same type in a single consignment and produced under similar conditions of manufacture shall constitute a lot.

7.1.2 Thermometers constituting the sample shall be drawn from each lot separately for deciding the conformity of the lot to the requirements of the specification.

7.2 Scale of Sampling

Number of thermometers to be selected at random from the lot shall depend on the lot size and shall be in accordance with co1 (3) of Table 3. In order to ensure randomness of selection, procedures given in IS 4905 may be followed.

7.3 Criteria for Conformity

7.3.1 For deciding the conformity of the lot to the requirements of this specification, the test results of each characteristic shall meet the corresponding requirements specified in the relevant clauses.

7.3.2 The lot shall be declared as conforming to the requirements of the specification, if the number of defectives is equal or less than the number given in col (4) of Table 3.

Table 3 Scale of Sampling

(*Clause* 7.2, 7.3.2)

Sl No.	No. of Thermometers in the Lot	Sample Size	Acceptance Number
(1)	(2)	(3)	(4)
i)	Less than 150	20	1
ii)	151 to 280	32	2
iii)	281 to 500	50	3
iv)	501 to 1 200	80	5
v)	1 201 and above	125	7

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Glass, Glassware and Laboratoryware Sectional Committee, CHD 10

Organization	*Representative(s)*
CSIR - Central Glass and Ceramic Research Institute, Kolkata	DR SUMAN KUMARI MISHRA (***Chairperson***)
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