Designation: E 2251 – 03a

# Standard Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids[1]

This standard is issued under the fixed designation E 2251; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 The purpose of this standard is to specify liquid-in-glass ASTM thermometers using low hazard thermometric liquids defined in this standard.

1.2 This standard specifies liquid-in-glass thermometers graduated in degrees Celsius or degrees Fahrenheit that are frequently identified and used in methods under the jurisdiction of the various technical committees within ASTM. The current approved thermometers are listed in Table 1.

1.3 The technical requirements for the thermometric liquids used in the thermometers in Table 1 are specified in Annex A1. Tests for conformity to the technical requirements are also found in Annex A1.

NOTE 1—It has been found by experience that ASTM Thermometers, although developed in general for specific tests, may also be found suitable for other applications, thus precluding the need for new thermometer specifications differing in only minor features. However, it is suggested that technical committees contact E20.05 before choosing a currently designated thermometer for a new method to be sure the thermometer will be suitable for the intended application.

1.4 For full rationale, see Appendix X1.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.*

## 2. Referenced Documents

2.1 *ASTM Standards:*

E 1 Specification for ASTM Thermometers

E 77 Test Method for Inspection and Verification of Thermometers

E 344 Terminology Relating to Thermometry and Hydrometry

E 563 Practice for Preparation and Use of an Ice-Point Bath as a Reference Temperature

## 3. Terminology

3.1 *Definitions*—The definitions given in Terminology E 344 apply.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *bulb length*, *n*—the distance from the bottom of the bulb to the junction of the bulb and the stem tubing.

3.2.2 *contraction chamber*, *n*—an enlargement of the capillary, located below the main scale or between the main scale and the auxiliary scale, that serves to reduce the scale length or to prevent contraction of all the liquid column into the bulb.

3.2.3 *diameter*, *n*—the largest outside dimension of the glass tubing as measured with a ring gage.

3.2.4 *expansion chamber*, *n*—an enlargement at the top of the capillary to provide protection against breakage caused by excessive gas pressure.

3.2.5 *faden thermometer*, *n*—a thermometer with a long, thin bulb used to determine emergent stem temperatures.

3.2.6 *interval error*, *n*—the deviation of the nominal value of a temperature interval from its true value; either for the total range (total interval) or for a part of the range (partial interval).

3.2.7 *low-hazard liquid*, *n*—a liquid that is biodegradable, non-hazardous and considered non-toxic in thermometer quantities.

NOTE 2—It is the responsibility of the manufacturer to determine the suitability of a liquid for this standard. In marking the thermometer with the ASTM designation the manufacturer is confirming that the liquid in the thermometer is non-hazardous as defined by current OSHA (Occupational Safety and Health Administration) standards and non-toxic in thermometer quantities per current definitions of the United States Environmental Protection Agency.

3.2.8 *thermometric liquid*, *n*—the liquid in a liquid-in-glass thermometer that indicates the value of temperature.

3.2.9 *top of the thermometer*, *n*—the top of the finished instrument.

3.2.10 *total length*, *n*—the distance from the bottom of the bulb to the top of the finished thermometer, including any special finish at the top.

[1] This specification is under the jurisdiction of ASTM Committee E20 on Temperature Measurement and is the direct responsibility of Subcommittee E20.05 on Liquid-in-Glass Thermometers and Hydrometers.

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