



Standard Test Method for Inspection, Calibration, and Verification of ASTM Hydrometers¹

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This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This test method describes the principles, apparatus, and procedures for the inspection, calibration, and verification of ASTM glass hydrometers. This test method is applicable to ASTM hydrometers and may be used for other general hydrometers of the constant-mass, variable-displacement type.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard. The metric equivalents of inch-pound units may be approximate.

1.3 *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 limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

D1265 Practice for Sampling Liquefied Petroleum (LP) Gases, Manual Method

D1298 Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

D1657 Test Method for Density or Relative Density of Light Hydrocarbons by Pressure Hydrometer

E1 Specification for ASTM Liquid-in-Glass Thermometers

E77 Test Method for Inspection and Verification of Thermometers

E100 Specification for ASTM Hydrometers

E344 Terminology Relating to Thermometry and Hydrometry

E2251 Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids

3. Terminology

3.1 *Definitions*—The definitions given in Terminology E344 apply.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *API gravity, n*—a relative index of density for petroleum products developed by the American Petroleum Institute. API gravity is defined as:

API Gravity, deg = $[141.5/(\text{rel. density } 60/60^\circ\text{F})] - 131.5$ (1)
Values of API gravity are typically expressed in degrees API, that is, 39.60 °API.

3.2.2 *comparator, n*—in this test method, a glass or other transparent cylinder to contain a liquid in which hydrometers may be compared. Examples of suitable comparators are given in Appendix X1.

3.2.3 *density, n*—mass of a unit volume of material.

3.2.3.1 *Discussion*—Units of density in hydrometers include kg/l (kilograms per liter), kg/m³ (kilograms per cubic meter), and g/l (grams per liter); each typically expressed as mass per volume at a specified temperature, that is, kg/m³ at 15 °C. As of this writing, only the kg/m³ at 15 °C scale is offered in ASTM hydrometers (see Specification E100).

3.2.4 *relative density (formerly specific gravity), n*—ratio of the mass of a given volume of material at a stated temperature to the mass of an equal volume of gas-free distilled water at the same or different temperature. Both reference temperatures shall be explicitly stated.

3.2.4.1 *Discussion*—Common reference temperatures include 60 °F/60 °F, 20 °C/20 °C, 20 °C/4 °C. The historic term, specific gravity, may still be found.

3.2.5 *specific gravity, n*—historic term, replaced by *relative density*.

3.2.6 *thermo-hydrometer, n*—glass hydrometer having a thermometer combined with a hydrometer in one instrument.

¹ This test method 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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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.