



Designation: E2995 – 14

# Standard Specification for ASTM Thermohydrometers with Integral Low-Hazard Thermometers<sup>1</sup>

This standard is issued under the fixed designation E2995; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers glass thermohydrometers of various scale graduation systems, intended for use in a variety of ASTM Test Methods.

1.2 The thermohydrometers presented in this standard are not exact replacements for the thermohydrometers in Specification E100; the thermometers have larger maximum permissible scale errors than do their Hg-filled counterparts. The user should decide if these thermohydrometers are appropriate for use in his or her application.

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:<sup>2</sup>

D287 Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)

D1250 Guide for Use of the Petroleum Measurement Tables

D3290 Specification for Bond and Ledger Papers for Permanent Records (Withdrawn 2010)<sup>3</sup>

E77 Test Method for Inspection and Verification of Thermometers

E100 Specification for ASTM Hydrometers

E126 Test Method for Inspection, Calibration, and Verification of ASTM Hydrometers

E344 Terminology Relating to Thermometry and Hydrometry

## 3. Terminology

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

### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *ledger paper, n*—a paper characterized by strength, high tearing resistance, eraseability, water resistance, ink receptivity, uniformity of surface, and smoothness.

3.2.1.1 *Discussion*—Originally, ledger paper was used especially for pen and ink records. Most ledger papers are surface sized, frequently subjected to appreciable wear, and must have a high degree of permanence and durability.

3.2.2 *length of the scale, n*—length of the nominal range in the stem, not including graduations extending above and below the nominal limits.

3.2.3 *thermohydrometer, n*—glass hydrometer having an integral thermometer.

3.2.4 *top of the thermohydrometer, n*—top of the finished instrument.

3.2.5 *total length, n*—overall length of the finished thermohydrometer.

## 4. Specifications

4.1 Thermohydrometers shall conform to the detailed specifications in Table 1 and to the general requirements specified in Sections 5 – 15.

4.2 Thermohydrometers shall conform to the inspection criteria found in Section 16 and the calibration and verification criteria found in Section 14.

4.3 Thermohydrometers manufactured to previous revisions of this specification shall retain the same ASTM status as those meeting current specifications.

4.4 At time of purchase, scale errors shall not exceed the maximum permissible scale error found in Table 1.

NOTE 1—**Caution**—Users should be aware that both temperature and density indications of thermohydrometers may change with rough handling, shock, exposure to aggressive liquids, and thermal cycling, among other factors. Consequently, test results and performance obtained at the time of manufacture may not necessarily apply throughout an extended period of use. Periodic calibration or verification of these instruments, in accordance with procedures set forth in Standard Test Method E126, is recommended

<sup>1</sup> 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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<sup>2</sup> 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.

<sup>3</sup> The last approved version of this historical standard is referenced on www.astm.org.

**TABLE 1 Specifications for ASTM Thermohydrometers**

API Gravity Thermohydrometers for Petroleum Products and Other Liquids of Similar Surface Tensions (33 dynes/cm or less)		
Thermometer Scale in Body		
ASTM Thermohydrometer No.		Nominal API Gravity Range, deg
S550HL-14		-6 to +6
S551HL-14		-1 to 11
S552HL-14		9 to 21
S553HL-14		19 to 31
S554HL-14		29 to 41
S555HL-14		39 to 51
S556HL-14		49 to 61
S557HL-14		59 to 71
S558HL-14		69 to 81
S559HL-14		79 to 91
S560HL-14		89 to 101
S561HL-14		37 to 49
S562HL-14		64 to 76
Thermohydrometer Dimensions		
Total length, mm		374 to 387
Body diameter, mm		18 to 25
Stem diameter, min, mm		4.0
Hydrometer Scale		
Standard temperature, °F		60
Subdivisions, °API		0.1
Intermediate lines at, °API		0.5
Main (numbered) lines at, °API		1.0
Scale error at any point not to exceed, °API		0.1
Length of nominal scale, mm		125 to 145
Thermometer Scale		
Range, °F		0 to 150
Immersion		total
Subdivisions, °F		2
Intermediate lines at, °F		10
Main (numbered) lines at, °F		20
Scale error at any point not to exceed, °F		2
Scale length, mm		80 to 110
Density Thermohydrometers for Petroleum Products and Other Liquids of Similar Surface Tensions (33 dynes/cm or less)		
Thermometer Scale in Body		
ASTM Thermohydrometer No.		Nominal Range, kg/m <sup>3</sup> at 15°C
S500HL-14		600 to 650
S501HL-14		650 to 700
S502HL-14		700 to 750
S503HL-14		750 to 800
S504HL-14		800 to 850
S505HL-14		850 to 900
S506HL-14		900 to 950
S507HL-14		950 to 1000
S508HL-14		1000 to 1050
S509HL-14		1050 to 1100
S510HL-14		775 to 825
Thermohydrometer Dimensions		
Total length, mm		374 to 387
Body diameter, mm		18 to 25
Stem diameter, min, mm		4.0
Hydrometer Scale		
Standardization temperature, °C		15
Subdivisions, kg/m <sup>3</sup> at 15°C		0.5
Intermediate lines, kg/m <sup>3</sup> at 15°C		1.0
Number lines, kg/m <sup>3</sup> at 15°C		5
Main (numbered) lines, kg/m <sup>3</sup> at 15°C		10
Scale error at any point not to exceed, kg/m <sup>3</sup> at 15°C		0.5
Length of nominal scale, mm		125 to 145
Thermometer Scale		
Range, °C		-20 to 65
Immersion		total
Subdivisions, °C		1
Intermediate lines at, °C		5
Main (numbered) lines at, °C		10
Scale error at any point not to exceed, °C		1
Scale length, mm		80 to 110