



Designation: D 1544 – 98

Standard Test Method for Color of Transparent Liquids (Gardner Color Scale)¹

This standard is issued under the fixed designation D 1544; 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 approval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

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

1. Scope

1.1 This test method covers the measurement of the color of transparent liquids by means of comparison with arbitrarily numbered glass standards.

1.2 *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:

D 1545 Test Method for Viscosity of Transparent Liquids by Bubble Time Method²

E 308 Practice for Computing the Colors of Objects by Using the CIE System³

3. Significance and Use

3.1 This test method applies to drying oils, varnishes, fatty acids, polymerized fatty acids, and resin solutions. Its application to other materials has not been tested.

4. Apparatus

4.1 *Glass Standards*, 18, numbered separately, and having the color characteristics given in Table 1. The color shall be produced by the glass components only. Some glass standards in use today do not conform to the values reported in Table 1. The calibration of glass standards should be verified prior to use, a suitable procedure for their calibration is contained in Appendix X1.

4.2 *Glass Tubes*, clear, 10.65 mm in inside diameter and about 114 mm in outside length. (Viscosity tubes, as described in Test Method D 1545, are satisfactory.)

¹ This method is under the jurisdiction of Committee D-1 on Paint and Related Coatings, Materials and Applications, and is the direct responsibility of Subcommittee D01.26 on Optical Properties.

Current edition approved Jan. 10, 1998. Published September 1998. Originally published as D 1544–58T. Last previous edition D 1544–80 (1989) ^{ϵ 1}.

² *Annual Book of ASTM Standards*, Vol 06.03.

³ *Annual Book of ASTM Standards*, Vol 06.01.

TABLE 1 Color Specifications of Reference Standards

Gardner Color Standard Number	Chromaticity Coordinates ^A		Luminous Transmittance Y, %	Transmittance Tolerance, \pm
	x	y		
1	0.3177	0.3303	80	7
2	0.3233	0.3352	79	7
3	0.3329	0.3452	76	6
4	0.3437	0.3644	75	5
5	0.3558	0.3840	74	4
6	0.3767	0.4061	71	4
7	0.4044	0.4352	67	4
8	0.4207	0.4498	64	4
9	0.4343	0.4640	61	4
10	0.4503	0.4760	57	4
11	0.4842	0.4818	45	4
12	0.5077	0.4638	36	5
13	0.5392	0.4458	30	6
14	0.5646	0.4270	22	6
15	0.5857	0.4089	16	2
16	0.6047	0.3921	11	1
17	0.6290	0.3701	6	1
18	0.6477	0.3521	4	1

^AA duplicate standard shall have chromaticity coordinates that differ from the reference standard by no more than one third of the difference in x or y between adjacent reference standards. In any one set, no two standards shall be closer together than two thirds of the difference in x or y between corresponding reference standards.

4.3 Suitable apparatus for comparing sample and standard. The apparatus may be of any design, but should have the following characteristics:

4.3.1 *Illumination*—CIE Illuminant C.

4.3.2 *Surrounding Field*—The field should not differ significantly in brightness from the samples and standards and should be essentially achromatic.

4.3.3 *Field of View*—The specimen and one or more standards should subtend a visual angle of about 2° and be in the field of view simultaneously.

4.3.4 *Separation of Standard and Specimen*—There should be a perceptible separation between specimen and standard, but this should be as small as is mechanically possible.

5. Procedure

5.1 Fill a glass tube with the material under test. If the material is perceptibly cloudy, first filter it.