



Designation: D8515 – 23

Standard Test Method for Color of Rosin in Solution (Instrumental Determination of Gardner Color)¹

This standard is issued under the fixed designation D8515; 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 This test method covers the quantitative determination of the color of clear, yellow/brown, liquid materials using color measuring instruments. The results may be invalid if other materials are used. The test uses the Gardner color scale described in Test Method **D1544**. This test method applies to pine chemical products including tall oil rosin, gum rosin, wood rosin and related products.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D1544 Test Method for Color of Transparent Liquids (Gardner Color Scale)

E308 Practice for Computing the Colors of Objects by Using the CIE System

¹ This test method is under the jurisdiction of ASTM Committee **D01** on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee **D01.34** on Pine Chemicals and Hydrocarbon Resins.

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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.

3. Summary of Test Method

3.1 The color of a liquid sample is measured using an instrument capable of measuring transmitted color and reporting in Gardner colors or in a color system that can be converted to Gardner colors.

4. Significance and Use

4.1 This test method provides a more precise way of measuring Gardner color than described in Test Method **D1544**. It is applicable to rosin products having colors from Gardner 1 to Gardner 18. The Gardner scale is not applicable to materials with colors lighter than 1 or darker than 18.

5. Apparatus

5.1 An instrument capable of measuring transmitted color and reporting the results in the Gardner color scale described in Test Method **D1544**. If such an instrument is not available, one may be used which is capable of measuring transmitted color and reporting in tristimulus values or chromaticity coordinates using standard illuminant C and the 2° observer, described in Practice **E308**.

5.2 *Glass Cuvets*, 10 mm path length, unless a different path length is specified by the manufacturer, or

5.3 *Glass Tubes*, clear. Standard Gardner tubes, as described in Test Method **D1544**, or other glass tubes designed for a specific instrument may be used. Gardner tubes may provide less accuracy than glass cuvetts and should be used only when a decrease in accuracy is acceptable. Glass cuvetts should be used for referee situations.

6. Calibration and Standardization

6.1 Calibrate the instrument following the manufacturer's recommendations.

6.2 Test sample preparation for rosin and rosin derivatives.

6.3 As most rosins and rosin derivatives are solids, it is necessary to introduce a liquid sample into the tube or cuvet.

6.4 If the sample is available in molten form follow the procedure steps in Section 7.

6.5 If the sample is in solid form follow the procedure steps in Section 7.

7. Procedure

7.1 For a solid rosin sample: open the sample container and crack the solid rosin into large pieces. Discard the top one inch of the container contents including the dust or finely divided particles.

7.2 For a molten rosin sample: please proceed as described below with sample preparation.

7.3 Each sample measurement shall be made in duplicate. Duplicate means to weigh two individual samples and make color determinations.

7.4 Weigh a small sample of rosin to the nearest 1.0 g.

7.5 Prepare a 50:50 (w/w) solution of rosin in Toluene (reagent grade or better) in a clean beaker, flask or other glassware.

7.6 Dissolve the rosin sample by gentle stirring or swirling until the sample is completely dissolved and the solution is homogeneous. **Warning**—DO NOT HEAT the flask or beaker to dissolve the sample.

7.7 Taking care not to touch the measurement area of the sample cell, fill a clean tube or cuvet with the material to be tested. If the material is cloudy, first filter it.

7.8 Insert the glass tube or cuvet in the instrument and measure the color to the nearest 0.1 of a color grade, following the manufacturer’s recommended procedure.

7.9 Record the Gardner color and report.

8. Report

8.1 Report the color in Gardner color units to a tenth of a Gardner unit as given by the instrument or as calculated by the method in **Appendix X1**. Note if the material was filtered.

9. Precision and Bias

9.1 The precision and bias of this test method will be available within five years of the approval and publication of this standard. An interlaboratory study is being conducted.

10. Keywords

10.1 gum rosin; instrumental Gardner color; rosin; tall oil rosin; wood rosin

APPENDIX

(Nonmandatory Information)

X1. CALCULATING GARDNER COLOR FROM CHROMATICITY COORDINATES

X1.1 For instruments reporting in tristimulus values or chromaticity coordinates, measure the tristimulus values or chromaticity coordinates using 10 mm cuvetts or standard Gardner tubes. Sample cells with larger or smaller path lengths will produce tristimulus values and chromaticity coordinates that will not convert, using **Table X1.1**, to the true Gardner color of the test material.

X1.2 Record the tristimulus values X, Y, Z, or the chroma-

ticity coordinates x, y, Y for the test material.

X1.3 If the instrument reports tristimulus values, convert them to chromaticity coordinates using the procedure in **Practice E308**.

X1.4 The Gardner value of the test material is determined as follows:

$$G_{TM} = G_I + G_F \tag{X1.1}$$

where:

- G_{TM} = the Gardner color of the test material,
- G_I = the integer portion of the test material’s Gardner color value, and
- G_F = the fractional portion of the Gardner color value.

X1.5 By comparing the x-chromaticity coordinate of the test material with the x-chromaticity coordinate in **Table 1** of **Test Method D1544**, determine the integer portion of the test material’s Gardner color using the relationship as follows:

TABLE X1.1 Chromaticity Coordinates of Gardner Colors^A

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

^A See Test Method **D1544**.