



Standard Practice for Determining the Color Stability of Hydrocarbon Resins After Heating¹

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1. Scope

1.1 This practice covers the determination of the color stability of a hydrocarbon resin by exposure to a specific temperature for a defined time period in a forced draft oven.

1.2 Color stability is measured by the change in color of the test resin, measured via the yellowness index color scale, in accordance with Practice E 313, or the procedure for Gardner Color, Test Method D 6166.

1.3 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

1.4 *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 6166 Test Method for Color of Naval Stores and Related Products, (Instrumental Determination of Gardner Color)²
- E 313 Practice for Calculating Yellowness and Whiteness Indices from Instrumentally Measured Color Coordinates.³

3. Summary of Practice

3.1 Samples of the hydrocarbon resin to be tested are placed in 250-mL (8-oz) glass jars and placed in a heating block that is in a ventilated oven set at 175°C. The samples are kept in the oven for a given period of 5 h. At the end of this time, the samples are removed and allowed to cool. After cooling, the samples are dissolved in toluene. The color of each aged sample solution is measured and compared to an initial sample solution. This color change is a measure of the stability of the resin.

4. Significance and Use

4.1 This practice is useful for both quality control and research.

¹ This practice is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.38 on Hydrocarbon Resins.

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

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

5. Apparatus and Materials

5.1 *Forced Draft Oven*, with the ventilation set at maximum capacity.

5.2 *Aluminum Block*, equipped with a control thermocouple (see Fig. 1).

5.3 *Temperature Indicator*.

5.4 *Glass Jars*, 250 mL (8 oz), with suitably lined screw cap.

NOTE 1—Tetrafluoroethylene (TFE) lined caps work well.

5.5 *Balance*, readable to at least 0.1g.

5.6 *Shaker*: used to facilitate the dissolution of the heat-aged resin.

5.7 *Spectrophotometer* or *Tristimulus Colorimeter*.

6. Reagents

6.1 *Reagent Grade Toluene*, or other solvent, for dissolving resins.

7. Sample Preparation

7.1 Weigh 10.0 ± 0.1 g of resin into the sample jar.

7.2 Tap each jar gently to flatten the resin layer.

NOTE 2—Avoid having resin stick to the wall of the jar, since this tends to bias the results high.

8. Procedure

8.1 Install the aluminum block (see Fig. 1) in the center of an electronically regulated oven with the ventilation set at maximum.

8.2 Set the oven controls so that the control thermocouple reads $175.0^\circ\text{C} \pm 0.5^\circ\text{C}$.

8.3 **Warning**—An increase or decrease in the oven temperature from the specified temperature may alter the results.

NOTE 3—It generally takes about 4 h to stabilize the aluminum block at 175°C, when starting from room temperature.

8.4 Place the uncapped jar(s) containing the resin to be tested in the holes in the 175°C aluminum block in the oven and allow it to remain for the chosen time.

8.5 **Warning**—Sample contamination may cause unexpected results.

8.6 Remove after 5 h, seal and allow the sample to cool for approximately 30 min. After cooling, add 10 g of toluene to each jar and close the jars tightly. To another jar, add 10 ± 0.1

Aluminum Block

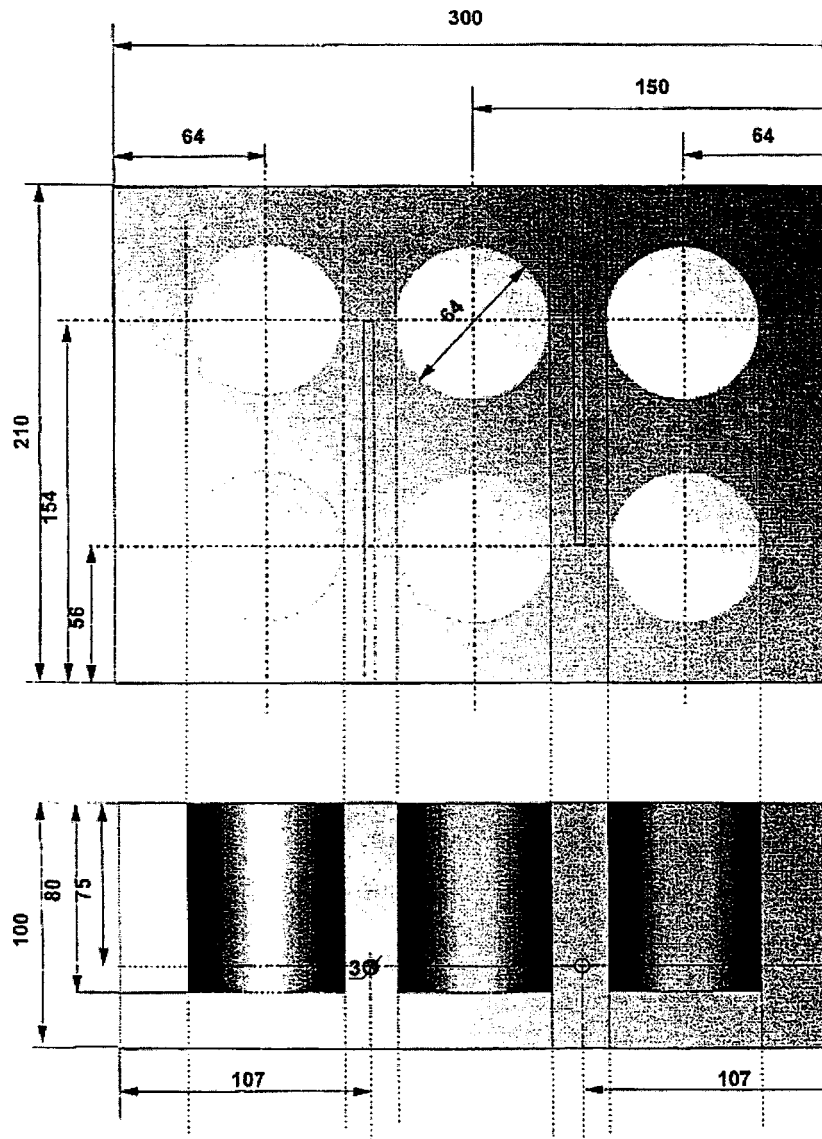


FIG. 1 Measurements in Millimetres

g of the original test sample, 10 g of toluene, and seal tightly.

8.7 Shake the jars until the resin dissolves.

8.8 Measure tristimulus values for CIE standard observer 1931 and Illuminant C. Calculate the yellowness index (YI) in accordance with Practice E 313. Calculate the Gardner color in accordance with Test Method D 6166.

NOTE 4—For 16-h color stability, the procedure is the same except that samples are allowed to remain in the oven for 16 h.

9. Report

9.1 Report the following information:

9.1.1 Complete identification and description of the material tested,

9.1.2 Description of the instrument used for the color measurement,

9.1.3 The color of the sample before and after the test, and

9.1.4 State the test duration, and the solvent used, if different from toluene.

10. Keywords

10.1 color stability; Gardner color; hydrocarbon resins; yellowness index, (YI)

 **D 6605**

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