



Standard Test Method for WARPAGE OF SHEET PLASTICS¹

This Standard is issued under the fixed designation D 1181; 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.

This method has been approved for use by agencies of the Department of Defense to replace method 6054 of Federal Test Method Standard 406 and for listing in the DoD Index of Specifications and Standards.

1. Scope

1.1 This method covers the determination of the dimensional distortion of sheet plastic specimens resulting from exposure to service conditions. In particular, the method is suitable for measuring warpage such as that developed in accordance with the conditions described in ASTM Methods D 756, Test for Resistance of Plastics to Accelerated Service Conditions.²

NOTE 1—The values stated in SI units are to be regarded as the standard.

2. Significance

2.1 This procedure is intended only as a convenient method for determination of dimensional distortion in sheet plastics, either when subjected to conditions of test such as are outlined in Procedure E of Methods D 756, or “as received” from a supplier. It is not applicable to specimens less than 1.3 mm (0.050 in.) in thickness, or where the span to be measured exceeds 21.5 cm (8.5 in.).

3. Apparatus

3.1 *Dial Indicator*—A 0-50-0 dial indicator³ (Fig. 1) equipped with spindle extension (brass or aluminum) 3.2 mm (0.125 in.) in diameter, mounted in a small stainless steel block which shall be machined to slide laterally on a stainless steel bar. This bar shall be equipped with two supports, one stationary and the other movable. Machining shall be of such precision that movement of the indicator, while the jig is on the test plate surface, will not produce deviations in excess of ± 0.013 mm (± 0.0005 in.).

3.2 *Test Plate*—Stainless steel test plate, 18 by 18 by 1.3 cm (7 by 7 by 0.5 in.) with

one 18 by 18-cm (7 by 7-in.) testing surface ground flat to ± 0.013 mm (± 0.0005 in.).

4. Test Specimens

4.1 The test specimens shall be not less than 10 cm (4 in.) nor more than 15 cm (6 in.) square, and shall be of uniform thickness. In practice, specimens 10 by 10 cm (4 by 4 in.) by the full thickness of the material are recommended, although the measuring device is capable of measuring a 15 by 15-cm (6 by 6-in.) specimen.

5. Conditioning

5.1 *Conditioning*—Condition the test specimens at 23 ± 2 C (73.4 ± 3.6 F) and 50 ± 5 percent relative humidity for not less than 40 h prior to test in accordance with Procedure A of ASTM Methods D 618, Conditioning Plastics and Electrical Insulating Materials for Testing,² for those tests where conditioning is required. In cases of disagreement, the tolerances shall be ± 1 C (± 1.8 F) and ± 2 percent relative humidity.

5.2 *Test Conditions*—Conduct tests in the Standard Laboratory Atmosphere of 23 ± 2 C (73.4 ± 3.6 F) and 50 ± 5 percent relative humidity, unless otherwise specified in the test methods or in this specification. In cases of disagreements, the tolerances shall be ± 1 C (± 1.8 F) and ± 2 percent relative

¹ This method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D-20.50 on Permanence Properties.

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² *Annual Book of ASTM Standards*, Part 35.

³ Starrett No. 81C Dial Indicator (or equivalent), 0-50-0 by 0.001 in., center lug with top lift, jewel bearings. Tension springs removed to make the indicator the dead-weight type. Spindle thrust not to exceed 10 g.