Designation: D 3762 – 98

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

Standard Test Method for Adhesive-Bonded Surface Durability of Aluminum (Wedge Test)[1]

This standard is issued under the fixed designation D 3762; 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[2,3] simulates in a qualitative manner the forces and effects on an adhesive bond joint at metal-adhesive/primer interface. It has proven to be highly reliable in determining and predicting the environmental durability of adherend surface preparations. The method has proven to be correlatable with service performance in a manner that is much more reliable than conventional lap shear or peel tests (Note 2).

NOTE 1—While this test method is intended for use in aluminum-to-aluminum applications it may be used for determining surface durability of other metals and plastics provided consideration is given to thickness and rigidity of the adherends.

NOTE 2—This test method is not a quantitative fracture strength test method. To measure fracture strength see Test Method D 3433.

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

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:*

D 907 Terminology of Adhesives[4]

D 3433 Test Method for Fracture Strength in Cleavage of Adhesives in Bonded Metal Joints[4]

3. Terminology

3.1 *Definitions*—Many of the terms used in this test method are defined in Terminology D 907.

4. Summary of Test Method

4.1 A wedge is forced into the bondline of a flat-bonded aluminum specimen, thereby creating a tensile stress in the region of the resulting crack tip. The stressed specimen is exposed to an aqueous environment, usually at an elevated temperature, or to an appropriate environment relative to the use of the bonded structure. The resulting crack growth with time and failure modes are then evaluated. Variations in adherend surface quality are easily observable when the specimens are forcibly, if necessary, opened at the test conclusion.

5. Significance and Use

5.1 The test is primarily qualitative, but is very discriminating in determining variations in adherend surface preparation parameters and adhesive environmental durability. The test has found application in controlling surface preparation operations and in screening surface preparations, primer and adhesive systems for durability. In addition to determining crack growth rate and assigning a value to it, the adhesive–joint failure is evaluated and reported. For example, adhesion failure; cohesion failure; or adherend failure are noted after opening up the specimen at the conclusion of the test period.

6. Apparatus

6.1 *Magnifier* (preferably stereo binocular), 5 to 30-power.

6.2 *Marking Stylus*, sharp-pointed, or triangular file.

6.3 *Wedges*, aluminum or stainless steel.

NOTE 3—Wedges are preferably of the same composition as the adherends of the specimen being tested to reduce the possibility of electrolytic corrosion. Stainless steel wedges have been found to work well with many adherends and are very durable and reuseable.

6.4 *Scale*, small, graduated in millimetres or hundredths of an inch.

7. Test Specimen

7.1 Use a minimum of five 25.4 by 203-mm (1 by 8-in.) specimens from a single assembly for each test (Fig. 1).

7.2 It is desirable to prevent plastic deformation (yielding) of the test specimen adherends when inserting the wedge into the bondline. However, some plastic deformation is permissible providing it is not excessive. (Fig. 2 illustrates data in which some plastic deformation of high-strength aluminum

[1] This test method is under the jurisdiction of ASTM Committee D-14 on Adhesives and is the direct responsibility of Subcommittee D14.80 on Metal Bonding Adhesives.

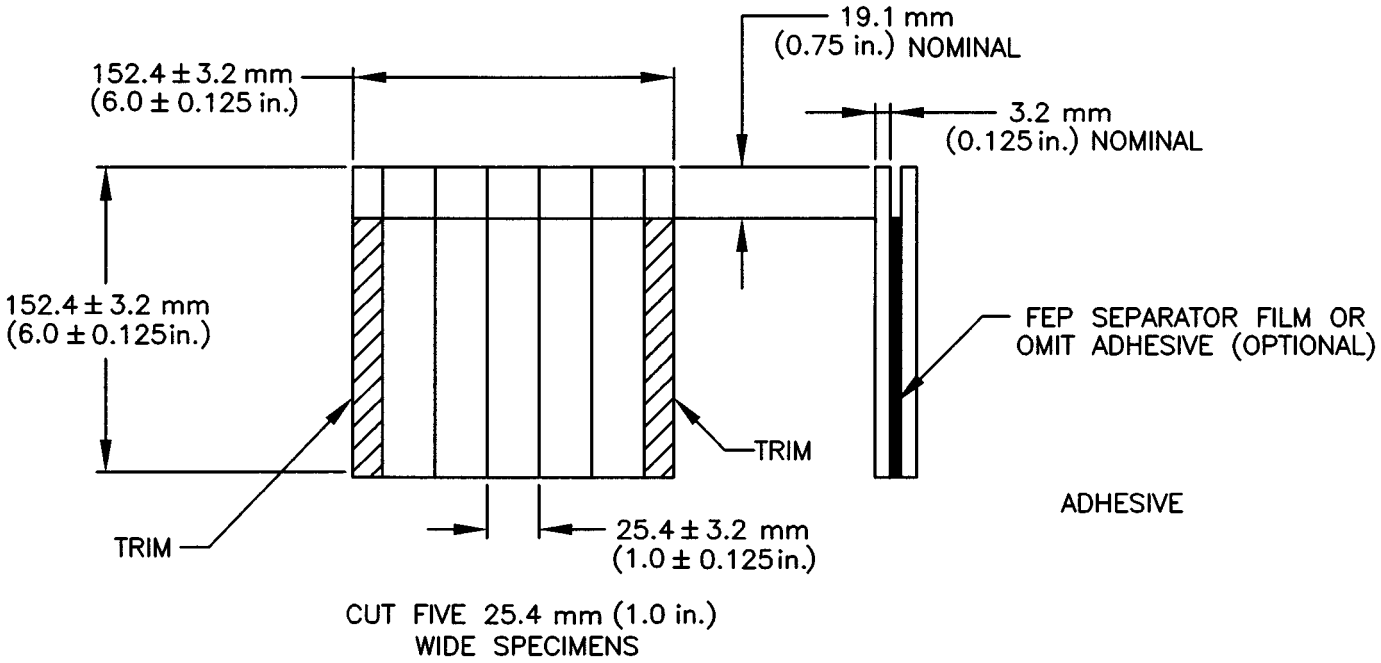
Current edition approved May 10, 1998. Published March 1999. Originally published as D 3762–79. Last previous edition D 3762–79 (1993)$^{\epsilon 1}$.

[2] Marceau, J. A., Moji, Y., and McMillan, J. C., "A Wedge Test for Evaluating Adhesive Bonded Surface Durability," *21st SAMPE Symposium*, Vol 21, April 6–8, 1976.

[3] Scardino, W. M., Marceau J. A., "Comparative Stressed Durability of Adhesive Bonded Aluminum Alloy Joints" *Symposium on Durability of Adhesive Bonded Structures*, U. S. Army Armament Research and Development Command, Dover, N. J. Oct, 27–29, 1976.

[4] *Annual Book of ASTM Standards*, Vol 15.06.

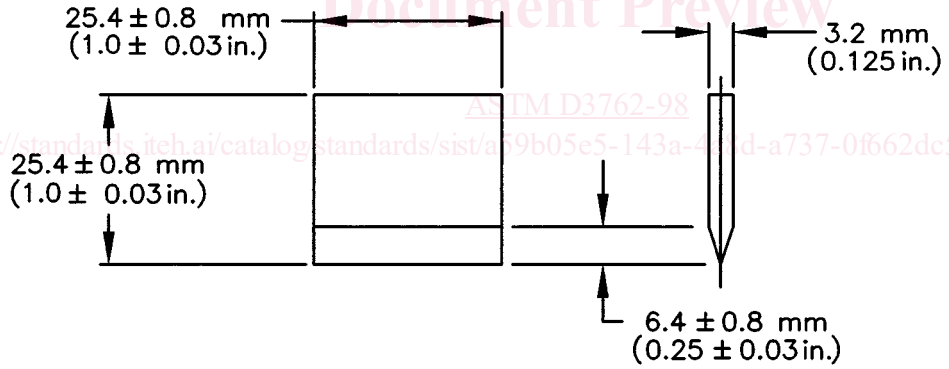
WEDGE TEST SPECIMEN ASSEMBLY



CUT FIVE 25.4 mm (1.0 in.)
WIDE SPECIMENS

WEDGE TEST SPECIMEN CONFIGURATION

ALUMINUM OR STAINLESS STEEL WEDGE



WEDGED CRACK EXTENSION SPECIMEN

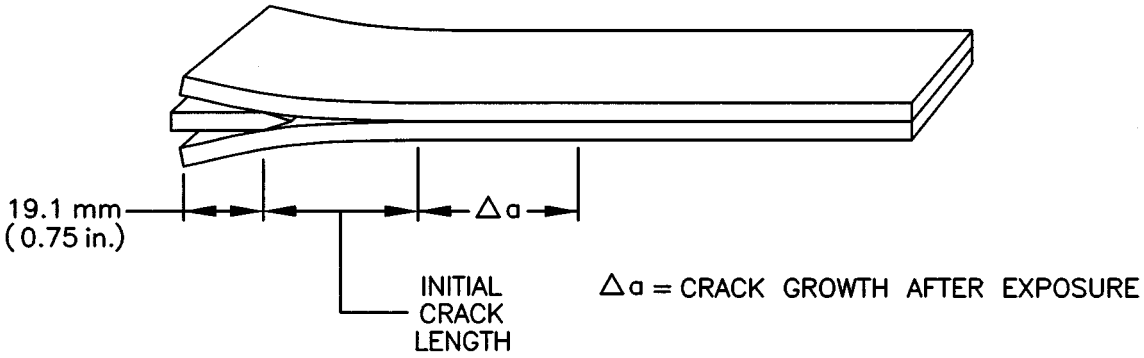


FIG. 1 Crack Extension Specimen Configuration