Designation: D 2295 – 96

Standard Test Method for Strength Properties of Adhesives in Shear by Tension Loading at Elevated Temperatures (Metal-to-Metal)[1]

This standard is issued under the fixed designation D 2295; 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 determination of the comparative shear strengths of adhesives for bonding metals when tested on a standard specimen and under specified conditions of preparation and testing at elevated temperatures.

1.2 This test method is applicable to the temperature range from 315 to 850°C (600 to 1500°F).

1.3 The values stated in SI units are to be regarded as the 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 consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

A 167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip[2]

D 638 Test Method for Tensile Properties of Plastics[3]

D 907 Terminology of Adhesives[4]

D 1002 Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal)[4]

3. Terminology

3.1 Many terms in this test method are defined in Terminology D 907.

4. Significance and Use

4.1 Comparative strength of adhesive bonds at elevated temperatures allows for better selection of adhesives that must perform at temperatures above normal. This test method is useful in supplying such information.

5. Apparatus

5.1 *Testing Machine*, conforming to the requirements of Test Method D 638. Use pin-type grips as shown in Fig. 1 to hold the test specimen.

5.2 *Heating Equipment*, consisting of a radiant heat source, backed by a high-efficiency reflector for the purpose of obtaining the desired heat flux. A suitable lamp arrangement for heating a specimen is shown in Fig. 2.[5]

6. Test Specimens

6.1 Cut test specimens from panels shown in Fig. 3(*a*). These test specimens' form and dimensions are shown in Fig. 3(*b*). The specimens are similar to the tension lap shear specimen described in Fig. 1 of Test Method D 1002, except that pin-type grips are used.

6.2 Base the selection of materials on the test temperature range. The following grades of steel are recommended, although use of other types of heat-resistant steel is permitted:

Metal	Designation
Steel, corrosion-resistant (18-8) plate, sheet, and strip	A 167, Type 302
Steel plate, sheet, and strip 17-7PH, TH 1050, corrosion-resistant, precipitation hardened	MIL-S-25043

The nominal thickness for the sheet 1.270 mm (0.050 in.).

7. Preparation of Test Specimens

7.1 Cut test specimens as shown in Fig. 3(*b*) to dimensions from the test panel. Measure the width of the specimen and the length of the overlap to the nearest 0.25 mm (0.01 in.).

7.2 Prepare test specimens by bonding individual strips as shown in Fig. 3(*b*). Machine unbonded individual strips to size and free from burrs or other irregularities.

7.3 Uniformly coat both sides of the dummy and test specimens with carbon black as shown in Fig. 3(*b*).

8. Procedure

8.1 Place the specimens in the pin-type grips of the testing machine so that the long axis of the test specimen coincides with the direction of applied pull through the center line of the grip assembly.

8.2 Heat the specimen uniformly in the bond area using a

[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.

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[2] *Annual Book of ASTM Standards*, Vol 01.03.

[3] *Annual Book of ASTM Standards*, Vol 08.01.

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

[5] The General Electric 100 T3/CL tubular quartz lamp has been found suitable for this purpose. A lamp-reflector combination suitable for this purpose may be obtained from Research, Inc., Northfield, MN.