

FOREWORD

This standard sets forth a standard test method to define the procedure and apparatus for testing fasteners in single shear.

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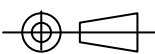
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THE INITIAL RELEASE OF THIS DOCUMENT SUPERSEDES MIL-STD-1312-20.
DESIGNATION FOR THIS TEST METHOD REMAINS MIL-STD-1312-20

THIRD ANGLE PROJECTION		CUSTODIAN NATIONAL AEROSPACE STANDARDS COMMITTEE	REVISION 1
PROCUREMENT SPECIFICATION NONE		TITLE FASTENER TEST METHODS METHOD 20 SINGLE SHEAR	CLASSIFICATION PART STANDARD NAS 1312-20



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1. SCOPE

- 1.1 Applicability. This test method outlines the procedure and apparatus for testing fasteners in single shear.
- 1.2 While this method primarily is for testing fasteners that cannot be tested in double shear, if used for those fixture types and lengths amenable to double shear testing, the double shear test is considered the referee method.

2. REFERENCED DOCUMENTS

- 2.1 Publications. The following documents form a part of this specification to the extent specified herein. The issue of the documents which are indicated as DOD adopted shall be the issue in the current DoDISS and the supplement thereto, if applicable.

ASTM International

ASTM E4 Force Verification of Testing Machines

Copies can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959 USA www.astm.org

NCSL International

NCSL Z540.1 Calibration Systems Requirements

Copies can be obtained from NCSL International, 2995 Wilderness Place, Suite 107, Boulder, CO 80301.
www.ncsli.org

3. DEFINITIONS

Not applicable.

4. GENERAL REQUIREMENTS

- 4.1 Test apparatus
- 4.1.1 Testing machine. The testing machine shall be capable of applying a compressive load at a controllable rate. The machine shall conform to the requirements of NCSL Z540.1. Its accuracy shall be verified every six months by a method complying with ASTM E4, using a calibration device which shall have been calibrated by the National Bureau of Standards not more than two years prior to its use. The loads of the fasteners tested shall be within the loading range of the testing machine as defined in ASTM E4.

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4.1.2 Test fixtures

4.1.2.1 Test plate. The test plates shall be as shown in Figures 1, 2, 3 or equivalent. Plates must maintain the following essential properties:

- The hole diameter for installation formed fasteners, shall be as specified in the product specification or ($\text{"ØD"} + .001$) + .002 – .000, where "ØD" is the maximum fastener shank diameter for cylindrical body fasteners.
- The hole shall be perpendicular to the test plate within fifteen minutes of arc.
- The hole shall be radiused at one end to provide clearance between fastener head and shank fillet.
- The hole shall be chamfered or broken .005/.010 in the shear plane.
- Unless specified otherwise the width of the shear blade at the fastener contact area shall be $1/2 \times \text{"ØD"} + .010 - .000$.

4.1.2.2 Holding fixture. The holding fixture shall be equivalent to Figures 1, 2 or 3. Fixtures shall be capable of providing shear loading while preventing rotation of the fastener. Shear loading shall remain perpendicular to the longitudinal axis of the fastener throughout the complete test.

5. DETAIL REQUIREMENTS

5.1 Test procedures. The ultimate single shear strength shall be obtained as follows:

- Fasteners shall be installed in the test plates in accordance with the recommendations of the manufacturer, using approved installation equipment. Unless specified otherwise, no preload shall be used, except where such preload is a necessary consequence of fastener installation.
- The specimen shall be installed in the jig and placed between the compression heads of the testing machine. When hydraulic testing machines are used, care shall be exercised to locate the jig at the center of the piston. Caution should be exercised to prevent excessive preload. It is recommended that the preload nuts be torqued to 2 in.-lbs. maximum.
- The test load is then applied at a uniform load rate as specified in Table I. The ultimate strength is determined by increased deformation of the specimen without increased load. Load rates for oversized fasteners (including blind bolts) shall be the same as for normal size fasteners of the corresponding nominal size. Load rates for larger or smaller size fasteners shall be calculated as 100,000 pounds per minute per square inch of nominal shear area. A tolerance of ± 10 percent shall apply on the load rate. Nominal shear area is equal to the nominal shank area for load rate calculation only.

TABLE I – SINGLE SHEAR LOAD RATES

Nominal fastener diameter	Load Rate lb/min	Nominal fastener diameter	Load Rate lb/min
.125	1,240	.563	24,800
.156	1,920	.625	39,600
.164	2,100	.750	44,000
.190	2,800	.875	60,000
.250	5,000	1.000	78,000
.313	7,700	1.125	100,000
.375	11,000	1.250	122,000
.438	15,000	1.375	148,000
.500	19,600	1.500	176,000

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