

FOREWORD

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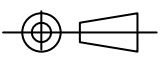
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This standard sets forth a standard test method to determine the tensile strength of externally and internally threaded fasteners.

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PROCUREMENT SPECIFICATION NONE		TITLE FASTENER TEST METHODS, METHOD 8, TENSILE STRENGTH	CLASSIFICATION STANDARD PRACTICE NAS1312-8

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1. SCOPE

- 1.1 Applicability. This method covers a procedure for testing all types of structural fasteners in axial tension at room temperature. This procedure is intended to define the test required to determine the tensile strength of the fastener itself, not the strength of the fastener in any combination of sheet materials, sheet heat treat levels, or sheet thicknesses.

2. REFERENCED DOCUMENTS

- 2.1 Government documents.

- 2.1.1 Specifications, standards and handbooks. Unless otherwise specified, the following specifications, standards and handbooks of the issue listed in the current Department of Defense Index of Specifications and Standards (DoDISS) and the supplement thereto (if applicable), form a part of this standard to the extent specified herein.

MILITARY STANDARDS

~~MIL-STD-45662~~ Calibration System Requirements

(Copies of specifications, standards, handbooks, drawings and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

- 2.2 Other publications. The following document(s) forms a part of this specification to the extent specified herein. The issues 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 Standard Methods of Force Verification of Testing Machines
ASTM E83 Tentative Method of Verification and Classification of Extensometers Systems

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

AEROSPACE INDUSTRIES ASSOCIATION (AIA)

NAS1069 Tension Fatigue Test Procedure for Aeronautical Fasteners

(Copies can be obtained from the Aerospace Industries Association, 1000 Wilson Blvd., Suite 1700, Arlington, VA 22209 www.aia-aerospace.org)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 10012 Measurement Management Systems - Requirements for Measurement Processes and Measuring Equipment

(Copies can be obtained from the American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036-8002 USA www.ansi.org)

NCSL International (National Conference of Standards Laboratories)

NCSL Z540.3 Calibration Laboratories and Measuring and Test Equipment

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

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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 tensile load at a controllable rate. The calibration system for the machine shall conform to the requirements of MIL-STD-45662/ISO 10012 or NCSL Z540.3. Its accuracy shall be verified every 12 months by a method complying with ASTM E4, using a calibration device that shall have been calibrated by the National Institute of Standards and Technology not more than 2 years prior to its use. The yield loads, ultimate loads, and structural failure loads of the fasteners tested (5.4 and 5.5) shall be within the loading range of the testing machine as defined in ASTM E4.

4.1.2 Extension measuring device. The extension measuring device shall be an averaging, differential-transformer extensometer, or equivalent, preferably of the separable type. It shall conform to the requirements of ASTM E83, Class B-1 when used in conjunction with an autographic recorder. The extensometer shall be capable of installation so as to measure either the relative movement between the movable and stationary crossheads of the testing machine or the extension of the fastener only, preferably the latter. Load and extension ranges shall be used to give the initial portion of the load-extension curve a slope between 45 and 60 degrees.

4.1.3 Test fixtures. Test fixtures specified in 4.1.3.1 and 4.1.3.2 are permissible. Other types of fixtures may be used provided all of the following requirements are met:

- a. Hole size for any fastener shall be the maximum shank diameter of the fastener to be tested plus 0.001 inch with a tolerance of +0.004, -0.000 inch. Alternatively, the hole shall conform to the diameter and limits specified by the fastener manufacturer or by the applicable procurement specification.
- b. The hole shall be perpendicular to the fixture surfaces within ± 1 degree.
- c. Where applicable, the hole shall be chamfered to provide clearance for the head-to-shank fillet radius of the fastener. The diameter of the chamfer shall not exceed the maximum diameter of the shank of the fastener being tested, plus two times the maximum fillet radius of the fastener being tested, plus .010 inch. When a chamfer at the entrance of the hole is used, the diameter of the chamfer shall be recorded in the Test Report. See 6.1.
- d. The fixture shall be capable of applying an axial tensile load through the center line of the fastener by means of suitable supporting fixtures.

4.1.3.1 NAS1069 fixture. This recommended test fixture is either the cup or insert type as defined in NAS1069, figures 8-13. Hole size for any unspecified fastener shall be the maximum shank diameter of the fastener to be tested plus 0.001 inch with a +0.004, -0.000 inch tolerance. In any case, the hole in the fixture shall not reduce the bearing area of the fastener head by more than 10 percent. The bearing area shall be considered as the area between the minimum bearing face outer diameter and the maximum diameter at the point of tangency of the head-to-shank fillet radius. The fixture design shall provide clearance for the head to shank fillet radius.

4.1.3.2 Tension plate fixture. The tension plate type fixture may be used for short grip length fasteners. The fixture configuration shall be as shown in Figures 1 and 2 or Figures 3 and 4. The upper and lower plates shall be parallel within 0.25 degree.

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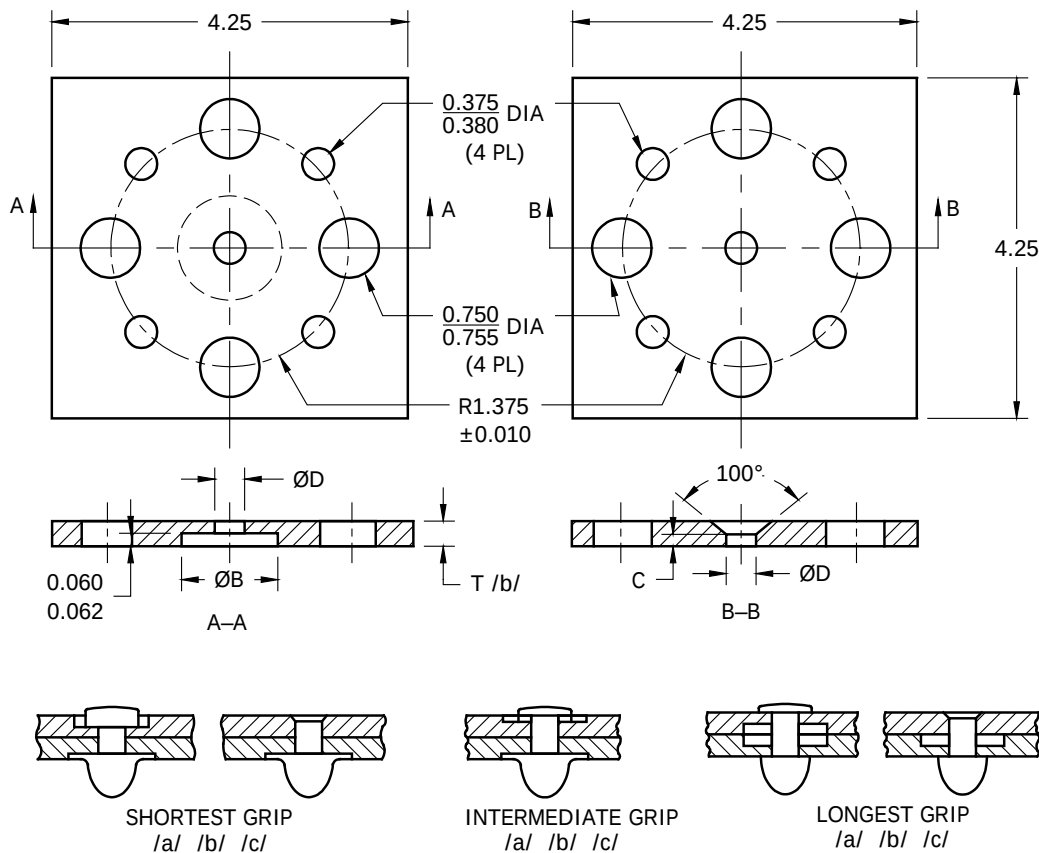
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4.1.3.3 Angularity evaluation. When tests are intended to evaluate the effect of angularity under the head or nut (collar) end of the fastener, the angularity shall be applied by the use of tapered spacers with the required angularity. The spacers shall be made of material harder than that of the fastener and shall have flat ground surfaces. The area of the spacer shall be greater than the bearing area of the fastener head or the nut being tested. The hole shall be the maximum shank diameter plus 0.005 inch with a tolerance of +0.003, -0.000 inch. Alternatively, the hole size shall conform to the diameter and limits specified by the fastener manufacturer or applicable specification.

4.2 Test specimens.



- /a/ ~~Omit counterbore and use 2024 T3 or 2024 T4 aluminum sheet when testing DEUTSCH blind rivets, unless otherwise specified.~~
- /b/ Counterbore optional, if short and intermediate grips are not required.
- /c/ Surface Roughness 32 to 63 microinches Ra per ASME B46.1.
- (d) Material: ~~4140 Alloy steel heat treated to 200/220 KSI 200,000 psi, or equal 1/.~~
- (e) Tolerances unless otherwise specified: decimals ±0.010, angels ±1 degree.
- (f) Chamfer all hole edges to provide head fillet clearance.
- (g) Dimensions in inches.

FIGURE 1 – TENSION FIXTURES FOR SHORT GRIP FASTENERS

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