#### STD-AIA/NAS NASM1312-14-ENGL 1997 🖿 0318743 0505404 025 🎞

NASM1312-14 29 August 1997

#### ADOPTION NOTICE

NASM1312-14, "Fastener Test Methods Method 14 Stress Durability" was adopted on 29 August 1997 for use by the Department of Defense (DoD). Proposed changes by DoD activities must be submitted to the DoD Adopting Activity: Commander, Naval Air Warfare Center Aircraft Division, Code 414100B120-3 Highway 547, Lakehurst, NJ 08733-5100. DoD activities may obtain copies of this standard from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094. The private sector and other Government agencies may purchase copies from the Aerospace Industries Association, 1250 Eye Street NW, Washington, DC 20005.

NASM1312-14 Should be used instead of MIL-STD-1312-14, which was cancelled on 29 August 1997.

Custodians: Army - AV Navy - AS Air Force - 11

Review Activities: Army - AV, AR Navy - AS, SH Air Force - 11 DLA - IS Preparing activity: Navy - AS (Project No. 53GP-0285-14)

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> INASM1312-14 STANDARD PRACTICE

#### FASTENER TEST METHODS

#### METHOD 14

#### STRESS DURABILITY

#### INTERNALLY THREADED FASTENERS



THE INITIAL RELEASE OF THIS DOCUMENT SUPERSEDES MIL-STD-1312-14 DESIGNATION FOR THIS TEST METHOD REMAINS MIL-STD-1312-14

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#### FOREWORD

This standard sets forth standard test procedures for determining the stress durability of internally threaded fasteners which may be subject to embrittlement.

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1. SCOPE

1.1 <u>Applicability</u>. This test method outlines a standard procedure for testing the stress durability of internally threaded fasteners. This test method applies to all types of internally threaded fasteners which may be subject to embrittlement and is not limited by configuration or size.

#### 2. REFERENCED DOCUMENTS

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2.1 Government documents.

2.1.1 <u>Specifications, standards and handbooks</u>. 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.

#### **STANDARDS**

FEDERAL

GGG-W-686 Wrench, Torque

(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 <u>Other publications</u>. 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.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B46.1

Surface Texture (Surface Roughness, Waviness, and Lay)

1.14

(Applications for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

3. DEFINITIONS Not applicable.

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1.1

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## 4. GENERAL REQUIREMENTS

4.1 Test apparatus.

4.1.1 <u>Torque method of loading</u>. Torque wrenches calibrated for accuracy within the limits specified by GGG-W-686, as well as the necessary adapters to fit the configuration of the fastener under test shall be required. Unless otherwise specified, steel fixtures as shown on figure 1, heat treated to a minimum hardness of Rockwell 45HRC, are also required along with an externally threaded member (bolt) with sufficient strength to develop a minimum of 110 percent of the minimum rated tensile strength of the internally threaded fastener being tested.

4.1.2 <u>Extension method of loading</u>. Equipment as specified in 4.1.1 shall be used, except that the torque wrenches may be replaced by any other suitable wrenching device and a precision measuring instrument to measure elongation of the bolt.

4.2 <u>Test specimen</u>. The number of fasteners to be tested from each lot shall be as specified in the procurement document or product specification. The test specimen shall not be altered in any manner beyond the product specification prior to testing the specimen.

5. DETAIL REQUIREMENTS

5.1 <u>Test procedures</u>. Unless otherwise specified, stress durability tests shall be performed in accordance with one of the following methods, depending upon the test criteria specified for loading. When installation torques are specified, the torque method shall be used. When installation loads, stresses or elongations are specified, any of the methods of MIL-STD-1312-5 (Stress durability) may be used, but the extension method of 5.1.2 below shall be used as the referee method.

5.1.1 <u>Torque method</u>. The test fastener shall be assembled using the fixtures of figure I and an externally threaded member (bolt). No supplementary lubrication shall be used unless specifically required by the product specification. The assembly shall be torqued to the specified value by holding the fixture and externally threaded member and rotating the internally threaded fastener. When seated, a minimum of two threads shall extend above the top of the fastener and a minimum of two full form threads shall be unengaged below the bearing surface of the fastener. The assembly shall be left in a torqued condition at room temperature for a period of time as specified by the procurement document. The externally threaded fastener shall be of sufficient strength to develop full strength of the nut.

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NOTE:

1. Chamfer to clear head fillet of bolt.

- 2. Material: Steel
- 3. Heat Treat: 45HRC minimum
- 4. Surface Texture: 32 microinches per ANSI B46.1

C = 2D minimum, 3D (typical) maximum

 $D' = Bolt Basic Dia. +0.010 \pm 0.002$ 

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X = Length as required, use of multiple parts permitted providing surface requirements are met

#### FIGURE 1. Fixture.

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5.1.2 Extension method. The ends of the externally threaded member (bolt) shall be prepared so that accurate, repeatable length measurements may be obtained. The bolt ends shall be ground parallel to each other and perpendicular to the bolt axis and marked to ensure proper orientation so that all measurements are made at the same point; or the bolt ends shall be spot drilled on centers at each end to provide an accurate contact with precision steel balls. The overall reproducibility of length measurements shall be maintained to within 0.0002-inch per inch of fixture length. The test fastener shall be assembled using the fixture of figure 1 and the bolt. No supplementary lubrication shall be used unless specifically required by the product specification. The bolt shall be measured to the nearest 0.0001-inch. With the bolt and fixture held, the internally threaded fastener shall be rotated to load the assembly to the desired elongation  $\pm 0.0001$  inch per inch of fixture length, being careful to prevent overloading. When seated, a minimum of two thread pitch lengths shall extend above the top of the fastener and internally threaded fastener threads shall not encroach on the thread runout. The assembly shall be left in a torqued condition at room temperature for a period of time as specified by the procurement document.

5.1.2.1 <u>Extension formula</u>. When the extension method is used and the load or stress specified, the following formula shall be used to determine the extension:

$$e = \frac{F}{E} \left[ X + 0.75Z + \frac{YR^2}{S^2} - Y \right]$$

where

e = desired extension (inches)

i

y jing

E = modulus of elasticity of bolt material at room temperature

X = fixture length (inches)

Y = bolt nominal grip length (inches)

Z = internally threaded fastener thread length (inches)

S = bolt maximum grip diameter (inches)

 $F = desired stress at bolt root area (psi)^*$ 

#### SHEET 7

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R = bolt basic thread minor diameter (inches)\*

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\* If stress is specified at area other than thread minor diameter, use value for R relative to diameter at that area. If load is specified, divide load by thread minor diameter area of bolt to determine F.

5.2 <u>Specimen examination</u>. The test fastener shall be disassembled and examined for presence of cracks using a 10X magnification, magnetic particle or fluorescent penetrant inspection. Parts which are suspected of having cracks shall be sectioned and microscopically examined for the presence of cracks using 100X magnification.

5.3 <u>Test results</u>. The development of cracks or the failure of the test fastener by fracture constitutes failure. Fracture of the externally threaded member (bolt) shall not constitute a failure of the test fastener; and the test shall be rerun with a new part.

6. NOTES

6.1 <u>Test report</u>. The test report shall contain the following data:

a. Fastener description.

b. Part number.

c. Manufacturer.

d. Material and finish.

e. Installation torque, elongation or load.

f. T,est method used.

g. Test time.

h. Externally threaded member (bolt) used.

i. Calculations, if applicable.

j. Test results.

k. Test temperature.

#### SHEET 8

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