NASM1312-23
29 August 1997

ADOPTION NOTICE

NASM1312-23, "Fastener Test Methods Method 23 Tensile Strength Of Panel Fastners" 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.

NASM1312-23 Should be used instead of MIL-STD-1312-23, 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-0285-23)

NATIONAL AEROSPACE STANDARD

NASM1312-23
STANDARD PRACTICE

FASTENER TEST METHODS

METHOD 23

TENSILE STRENGTH

OF PANEL FASTENERS

Aerospace Industries Association

THE INITIAL RELEASE OF THIS DOCUMENT SUPERSEDES MIL-STD-1312-23

DESIGNATION FOR THIS TEST METHOD REMAINS MIL-STD-1312-23

LIST OF CURRENT SHEETS									
NO.	1	2	3	4	5	6	7	8	9
REV.	NEW	NEW	NEW	NEW	NEW	NEW	NEW	NEW	NEW
NO.	10								
REV.	NEW								

FSC 53GP

APPROVAL DATE AUGUST 1997

NATIONAL AEROSPACE STANDARD

FOREWORD

This standard sets forth a standard test procedure for determining the tensile strength for all types of quick operating panel fasteners at room temperature.

APPROVAL DATE AUGUST 1997

NATIONAL AEROSPACE STANDARD

NASM1312-23

TABLE OF CONTENTS

FIGURES

APPROVAL DATE AUGUST 1997

NATIONAL AEROSPACE STANDARD

1. SCOPE

1.1 Applicability. This method covers a procedure for testing all types of Quick Operating Panel Fasteners in 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 sheet combination.

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.

STANDARDS

MILITARY

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) form 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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E4 Load Verification of Testing Machines

ASTM E83 Verification and Classification of Extensometers

(Applications for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

3. DEFINITIONS Not applicable.

APPROVAL DATE AUGUST 1997

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. Its accuracy shall be verified every 12 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 2 years prior to its use. The yield loads, ultimate loads and structural failure loads of the fasteners tested 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 class B-1 in ASTM E83 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 which give the initial portion of the load-extension curve a slope between 45 and 60 degrees.

4.1.3 Test fixtures. Typical fixtures are shown in figures 1 and 2. Other types of fixtures may be used provided all of the following specifications are met:

a. Hole size for any fastener shall be the maximum body diameter of the fastener to be tested plus 0.001 inch, with a +0.003 - 0.000 tolerance. Alternately, the hole shall be to the diameter and limits specified by the fastener manufacturer.

b. The hole shall be perpendicular to the fixture surface within ± 1/2 degree.

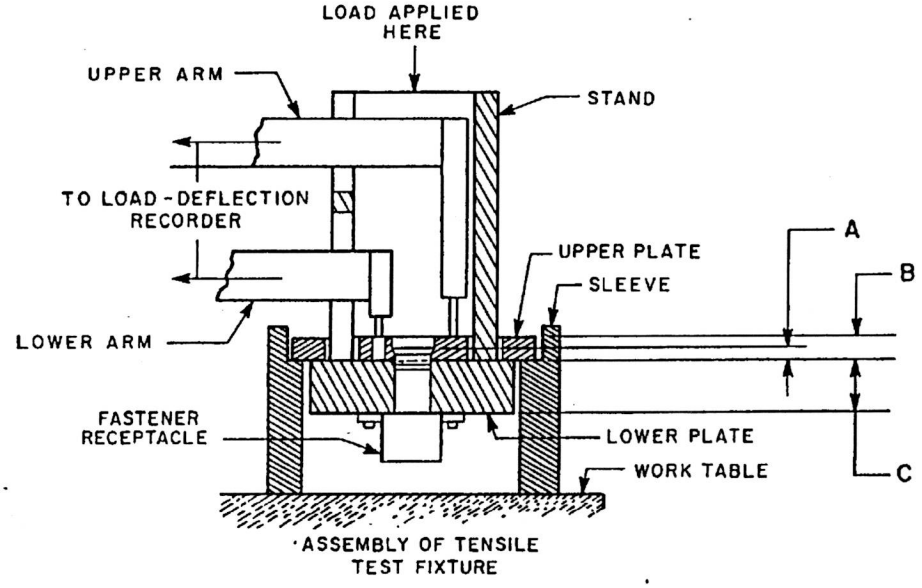
c. Where applicable, the hole shall be chamfered to provide clearance for the head-to-shank fillet of the fastener.

d. The fixture shall be capable of applying an axial tensile load through the centerline of the fastener by means of suitable supporting fixtures.

4.2 Test specimen. The number of specimens to be tested shall be as specified in the procurement document or product specification. The test specimen shall not be altered in any manner other than that described in the product design specification. Fastener grips and plate thicknesses shall be such that the fastener is tested at the maximum grip.

NATIONAL AEROSPACE STANDARD

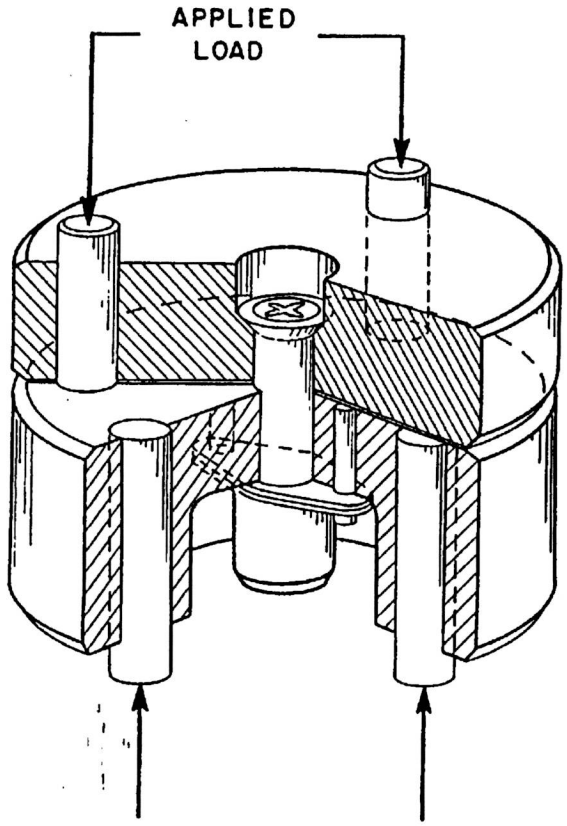
Fastener size dia	Test plate thickness dimension		
	A	B	C
1/4"	0.125	0.250	0.250
5/16"	0.188	0.312	0.375
3/8"	0.250	0.375	0.500



Test plate and fixture material shall be steel plate or bar (MIL-S-18728, MIL-S-5000, or MIL-S-6050) heat treated to 160,000 - 180,000 psi.

FIGURE 1 Typical tension fixture.

NATIONAL AEROSPACE STANDARD



SEE FIGURE 1 FOR
MATERIAL & TEST PLATE
THICKNESS DIMENSIONS

FIGURE 2. Typical tension load.

NATIONAL AEROSPACE STANDARD

5. DETAIL REQUIREMENTS

5.1 Test procedures. The fastener assembly shall be installed in the applicable test fixture and tightened to not more than the maximum locking torque specified for the fasteners being tested. The rated tensile load, as specified in the product design specification, shall be applied thru the fixture in an axial direction tending to pull the fastener apart. This test load shall be applied and released five consecutive times. The fastener shall then be subjected to the locking and unlocking torque tests specified. These torque readings shall be recorded and the fasteners examined for any evidence of failure or permanent deformation.

The fastener shall then be loaded to failure and the ultimate load and description of failure recorded. A load deflection curve shall be constructed.

5.1.1 Load deflection curves. Load deflection curves shall be made by autographic recording. The movement sensing element shall be so installed as to either measure the relative movement between the movable crosshead and the stationary crosshead or to measure the deflection of the fastener only, preferably the latter. The fixture will have the capability of being non-yielding at ultimate load.

5.1.2 Failing load determination. When a structural failure occurs before the ultimate or fracture load, it may be detected on the load-deflection curve as a peak load followed by severe permanent deformation without increase in load or with a decrease in load. A sample load-deflection curve illustrating a "structural failure" is shown on figure 1. The first peak load shall be designated as the "structural failure load" and the highest peak shall be the "ultimate" load.

6. NOTES

6.1 Test reports. The test report shall include the following data:

a. Fastener description.

b. Part number.

c. Lot identification.

d. Manufacturer.

e. Measured body diameters.

f. Grip length.

g. Loading rate or strain rate.

h. Ultimate loads.

i. Structural failure loads.

j. Mode of failure.

k. Fixture used.

l. Load deflection curves

m. Strain magnification factor.

n. Method of deflection measurement.

NATIONAL AEROSPACE STANDARD

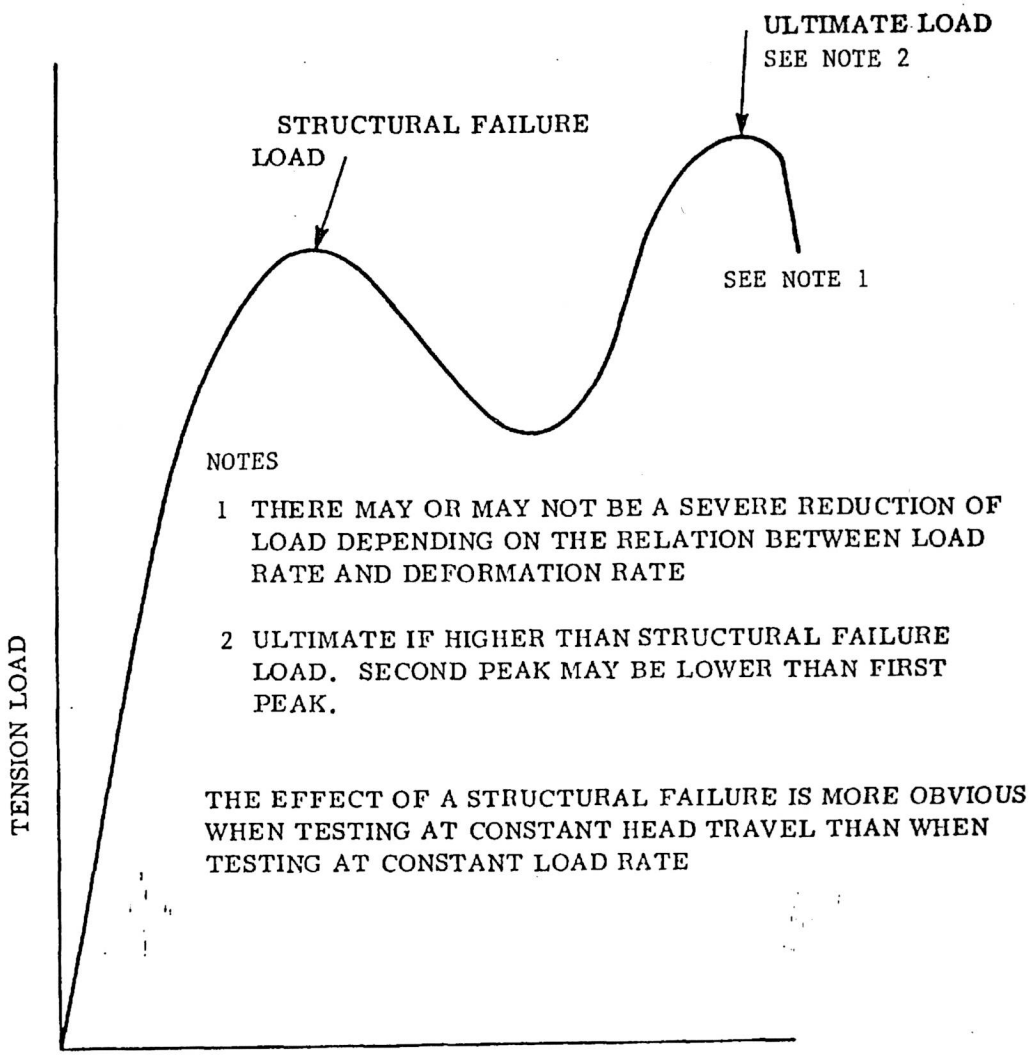


FIGURE 3. Sample load deflection curve.