NATIONAL AEROSPACE STANDARD

NASM1312-7
STANDARD PRACTICE

FASTENER TEST METHODS

METHOD 7

VIBRATION

Aerospace Industries Association

THE INITIAL RELEASE OF THIS DOCUMENT SUPERSEDES MIL-STD-1312-7A

DESIGNATION FOR THIS TEST METHOD REMAINS MIL-STD-1312-7

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

53GP

APPROVAL DATE AUGUST 1997

FOREWORD

This standard sets forth a standard test method for determining the capability of externally threaded fasteners to withstand the accelerated vibration conditions on any fastener system capable of providing a clamp-up load.

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TABLE OF CONTENTS

FIGURE

1. SCOPE

1.1. Applicability. This method establishes a standard procedure for conducting accelerated vibration tests on any fastener system capable of providing a clamp-up load. This method is intended to define the test required to determine the life and compare fasteners under vibratory conditions.

2. REFERENCED DOCUMENTS

Not applicable.

3. DEFINITIONS

Not applicable.

4. GENERAL REQUIREMENTS

4.1. Test apparatus.

4.1.1. Testing machine. The testing machine shall be capable of vibrating the fixture, as shown on figure 1, with an essentially sinusoidal waveform at a frequency of 1,750 to 1,800 cycles per minute with an amplitude of 0.450 ±0.015 inches (peak to peak). The machine shall be provided with a means to verify the proper amplitude is present, such as an optical wedge gage.

4.1.2. Test fixture. Unless otherwise specified, the test fixture shall conform to figure 1. The fixture is intended for the testing of threaded fasteners and is satisfactory for testing supplementary locking means such as cotter pins.

4.1.2.1. Other fixtures. Other fixtures may be used, provided the following criteria are met (see figure 1 for B, C and D):

a. The cross-section area of the cylinder shall be at least 1.5 times the areas of the cylinder ID.

$$\frac{\pi}{4}(D^2 - C^2) \geq \frac{1.5\pi C^2}{4}$$

$$D^2 \geq 2.5C^2$$

b. The slot clearance shall be equal to 0.745 inch

$$B\text{-}D = 0.745 \text{ inch}$$

c. Sufficient clearance shall be provided between the cylinder and fixture so that the cylinder moves freely in the slot.

d. The mass of the cylinder assembly with test parts in place shall be distributed so that the cylinder axis stays substantially perpendicular to the applied vibratory forces during the test. This is normally accomplished by adding washers.

4.2. Test specimen (sample size). 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.

5. DETAIL REQUIREMENTS

5.1. Test procedures. Unless otherwise specified, the following procedure shall be followed:

a. Assemble all components on the test cylinder, using washers as required. Threaded parts shall be preloaded, as required, using the appropriate seating torque as specified in the acquisition document.

b. When parts require baking as a step in the processing before testing, install a separate spacer of length and material comparable to the bolt, and seat the nut against the spacer. Bake as specified.

c. Disassemble and assemble with test cylinder to provide the reuse as specified. The last assembly shall be with the cylinder in the fixture.

d. If rotation is a measure of failure, scribe or otherwise, mark parts to determine relative movement.

e. Lightly lubricate the sliding surfaces of the test fixture under the cylinder flanges and washers with SAE 20 oil so that the cylinder assembly will freely traverse the slots of the fixture.

f. Vibrate the fixture for the required time and inspect the components for failure.

g. Failure shall be indicated by the product design specification, normally as a minimum amount of rotation or the presence of cracking within a required time.

6. NOTES

6.1. Test Report. The test report shall contain the following:

a. Fastener system description.

1. Part number.
2. Lot identification.
3. Material.
4. Heat treatment.
5. Measured fastener diameter.

b. Test Machine.

1. Model and serial number.
2. Calibration date.

c. Installation procedure.

d. Installation data such as seating torque, bake time and temperature, and reuses.

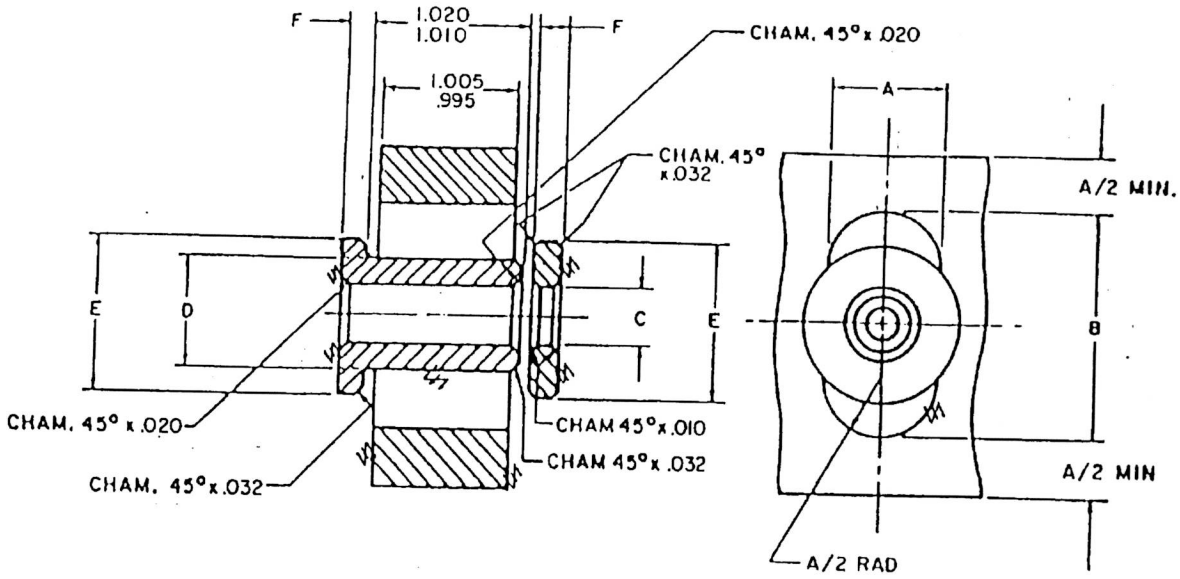
e. Test duration.

f. Vibration frequency.

g. Cause and duration of any interruptions during test.

h. Results of all inspections.

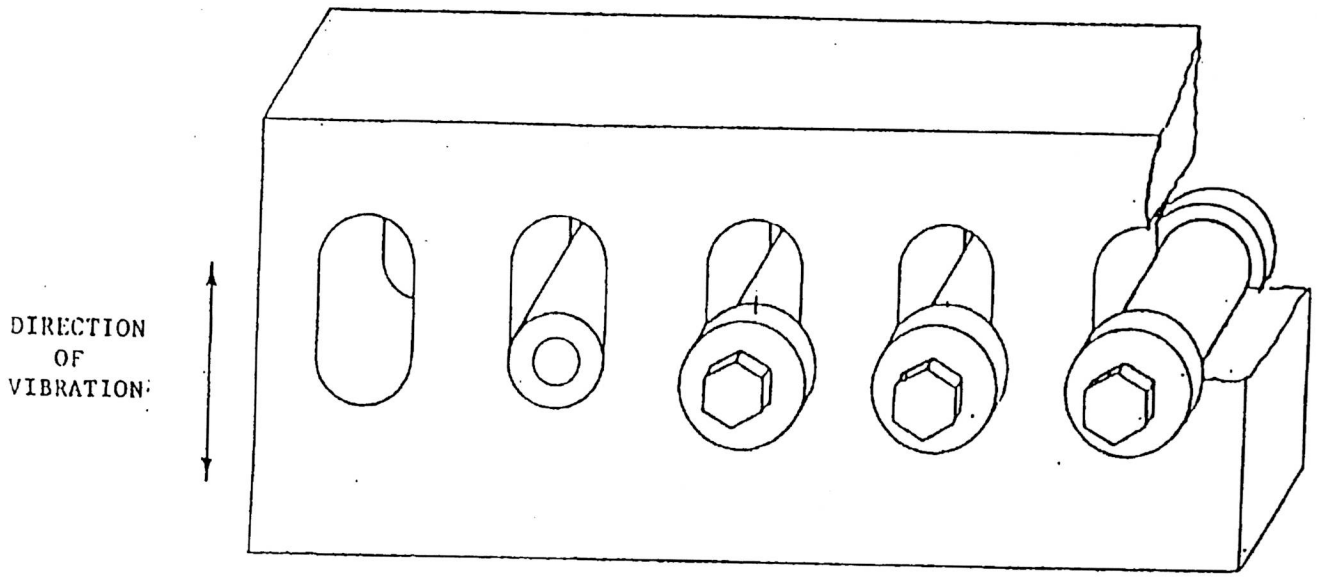
i. Test results.



Nominal fastener size	Slot width A +0.005 -0.002 (in.)	Slot height B ±0.002 (in.)	Washer & cylinder ID C +0.002 (in.)	Cylinder OD D ±0.002 (in.)	Washer OD E ±0.005 (in.)	Washer face thickness F ±0.002 (in.)
0.190	0.328	1.067	0.200	0.322	0.550	0.123
0.250	0.500	1.240	0.265	0.495	0.750	0.163
0.313	0.625	1.365	0.328	0.620	0.875	0.163
0.375	0.750	1.490	0.390	0.745	1.000	0.163
0.438	0.875	1.615	0.452	0.870	1.200	0.188
0.500	1.000	1.735	0.515	0.990	1.375	0.188
0.563	1.125	1.865	0.578	1.115	1.550	0.213
0.625	1.250	1.985	0.640	1.240	1.700	0.213

NOTES:
1. Material: Steel.
2. Hardness: HRC 40-45
3. Surface roughness: On surfaces coded $\sqrt{}$, the finish shall be 32 microinches R_a max.

FIGURE 1. Vibration fixture.



TYPICAL ASSEMBLY

FIGURE 1. Vibration fixture (continued).