AEROSPACE STANDARD

AS1974™	REV. A

Issued 2003-04
Reaffirmed 2013-01
Stabilized 2024-02

Superseding AS1974

Clamps, Support, Comparative Fatigue Strengths, Test Method

RATIONALE

This technical report is being stabilized because it covers technology, products, or processes which are mature and not likely to change in the foreseeable future.

STABILIZED NOTICE

This document has been declared “STABILIZED” by SAE G-3, Aerospace Couplings, Fittings, Hose, Tubing Assemblies Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

TO PLACE A DOCUMENT ORDER:
Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

For more information on this standard, visit
https://www.sae.org/standards/content/AS1974A/

1. SCOPE:

This SAE Aerospace Standard (AS) establishes vibration and transmissibility test procedures which compare the relative strengths of various loop and saddle type support clamps.

This procedure is intended for conducting fatigue testing which is standard throughout the aerospace industry thereby establishing a clamp strength comparison that can be used in an evaluation process.

The testing required by this document ensures that clamps will meet adequate fatigue requirements only. It does not infer qualification of the clamp installation techniques or its ability to meet in-service environments or operating conditions. Separate qualification testing should be performed to ensure satisfactory service of the installed clamp.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 ASTM Publications: Available from ASTM, 100 Barr Harbor, West Conshohocken, PA 19428-2959.

ASTM A 686 Standard Specification for Tool Steel, Carbon

3. TECHNICAL REQUIREMENTS:

3.1 Fatigue Test Device:

The test device should be capable of testing a wide variety of loop and saddle support clamps both cushioned and non-cushioned, metallic and non-metallic. The fatigue cycling shall be induced by means of sinusoidal vibration applied by a shaker in a test setup similar to those shown in Figure 1. The test device shall be capable of testing clamps up to a maximum of 5 inches in diameter. Multiple setups are permissible if the shaker has the required force range and the test fixture has the stiffness required to achieve the specified vibration spectrum for all of the clamps tested.

The vibration device shall be capable of automatic control of the sinusoidal vibration input at a constant acceleration amplitude of 2 g peak ± 10% through a frequency range of 20-500 Hz. The input vibration shall be controlled through an accelerometer mounted on top of the vibration fixture coupled directly to the shaker armature, while acceleration output generated on the clamps shall be measured at a point adjacent to the clamp (see Figure 1). A recording method is required to plot acceleration (g) vs frequency (Hz).

3.2 Vibration Test Specimens:

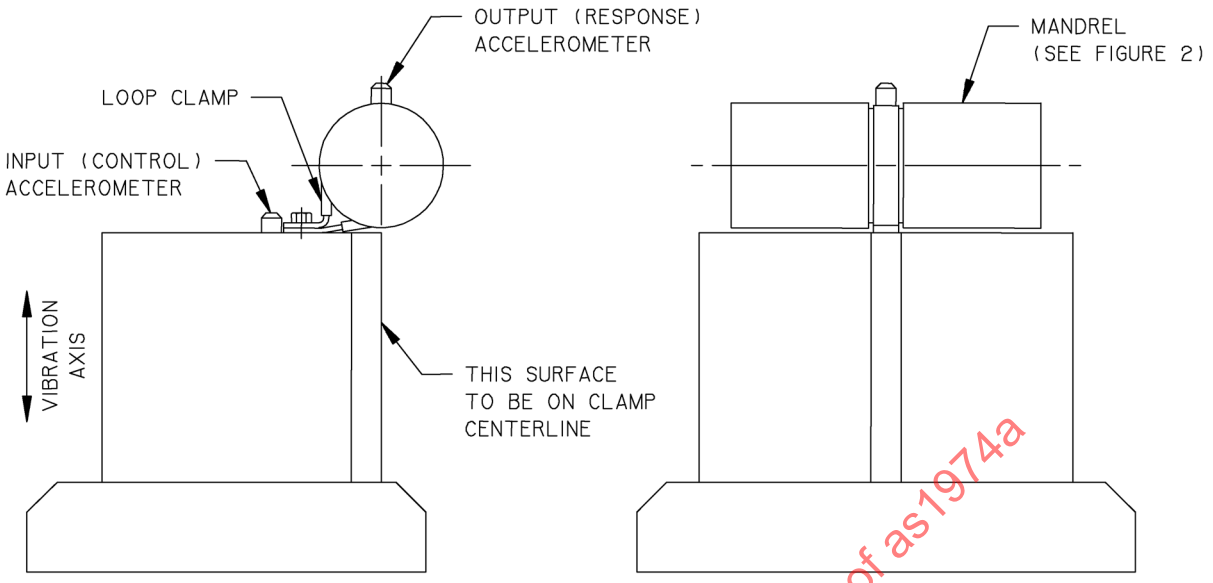
The specimen to be tested using this procedure is classified as any type of loop or saddle support clamp that has the strength capability to ensure a reasonable probability of successfully completing the vibration tests. Clamps representative of those to be tested are shown in Figure 3.

3.3 Test Mandrels and Test Weights:

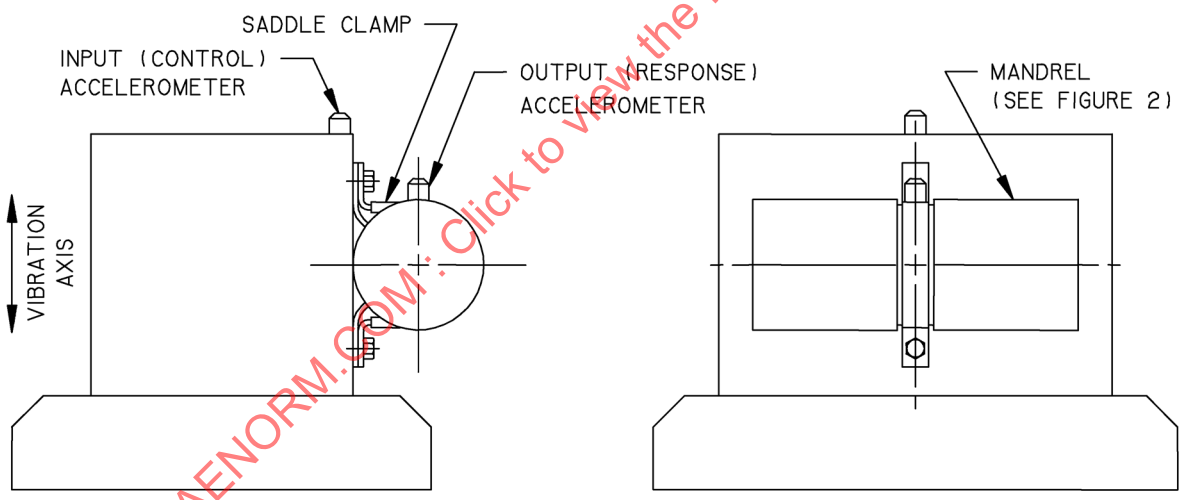
Test mandrels shall be tool steel drill rod in accordance with ASTM A 686 or equivalent in density and shall be as shown in Figure 2. All dimensions shall be as shown in Table 1 with surface finishes of 125 µin Ra maximum unless otherwise specified.

3.4 Vibration Test Fixture:

The vibration test fixture shall be similar to that shown in Figure 1 with mandrels and weights as specified in Table 1 and Figure 2.



CASE I – Loop Type Clamp, Single Bolt



CASE II – Saddle Type Clamp, Two Bolt

FIGURE 1 - Loading Schematic for Fatigue Testing Tube Clamps Single Clamp Method

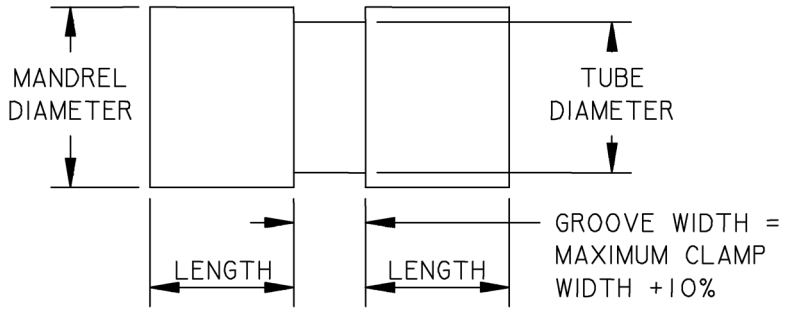


FIGURE 2 - Mandrel Configurations

TABLE 1 - Mandrel Dimensions (in)

NOMINAL CLAMP SIZE (.062 INCREMENTS) DASH NUMBERS	TUBE DIAMETER	MANDREL DIAMETER +.005 -.000	LENGTH +.010 -.000	APPROX WT EACH END LBS (REF)
04	.250 ± .003	.400	1.50	.05
06	.375 ± .003	.525	1.00	.06
08	.500 ± .003	.650	1.25	.12
10	.625 ± .004	.825	1.50	.23
12	.750 ± .004	.950	1.75	.34
16	1.000 ± .004	1.200	2.00	.64
20	1.250 ± .005	1.450	2.50	1.17
24	1.500 ± .005	1.750	2.50	1.70
28	1.750 ± .005	2.000	1.25	1.11
32	2.000 ± .005	2.250	1.50	1.68
36	2.250 ± .005	2.500	1.50	2.08
40	2.500 ± .005	2.750	1.50	2.52
44	2.750 ± .005	3.000	1.50	3.00
48	3.000 ± .006	3.250	1.75	4.10
52	3.250 ± .006	3.650	1.75	5.20
56	3.500 ± .006	3.850	1.75	5.76
64	4.000 ± .006	4.350	1.75	7.36
72	4.500 ± .006	4.850	2.00	10.50
80	5.000 ± .006	5.350	2.00	12.72

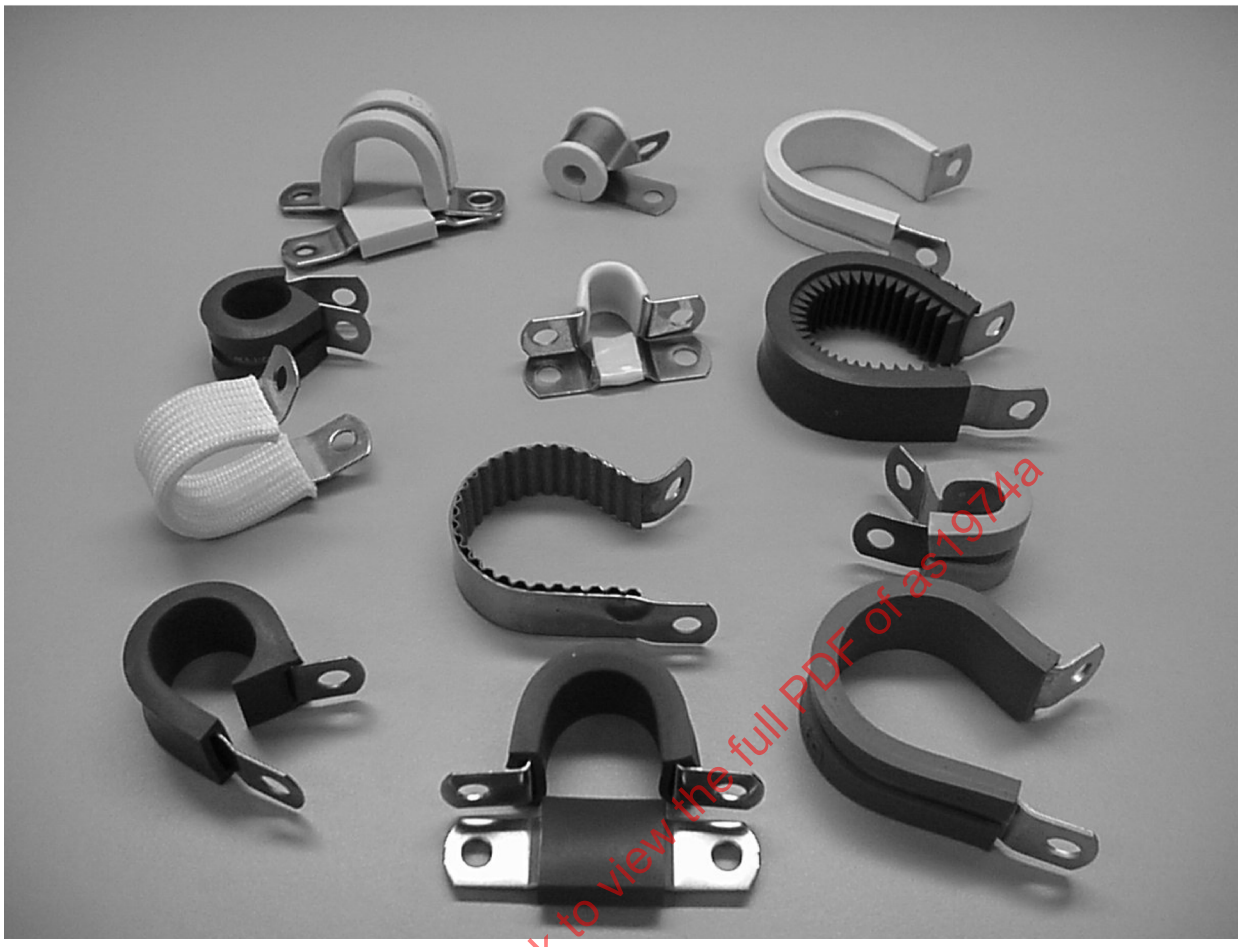


FIGURE 3 - Representative Clamps

4. PROCEDURE:

4.1 Preparation for Test:

4.1.1 Instrumentation, Accelerometers: A control accelerometer (input) shall be mounted to the top of the vibration fixture as close to a clamp mounting bolt of the fixture as possible. A monitoring accelerometer (output) shall be mounted as shown in Figure 1. The output accelerometer shall be monitored and recorded as frequency vs acceleration.