METRIC AEROSPACE STANDARD

MA3399™	REV. A

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Superseding MA3399

Clamp - Tube Support, Spring Clips and PTFE Cushion
Procurement Specification for

FSC 5340

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.

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1. SCOPE:

1.1 Type:

This procurement specification covers the requirements for metal tube support clamps comprising of two spring clips made of corrosion and heat resistant steel and the associated PTFE single split cushion that supports the tube. See Figure 1.

1.2 Application:

Primarily for use in aerospace propulsion systems to support metal tubes, and are suitable for use at temperatures up to 260°C, which is the limitation of the PTFE cushion. For the same set of metric spring clips, PTFE cushions are available for metric and inch OD tubing.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other documents shall be the issue in effect on the date of the purchase order.

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

2.1.1.1 Aerospace Material Specifications:

AMS-2645	Fluorescent Penetrant Inspection
AMS-2759/3	Heat Treatment of Precipitation Hardening Corrosion Resistant and Maraging Steel Parts
AMS-3659	Polytetrafluoroethylene Extrusions, Premium Strength, Stress-Relieved
AMS-3660	Polytetrafluoroethylene Moldings, General Purpose Grade A As Sintered
AMS-5525	Steel Sheet, Strip, and Plate, Corrosion and Heat Resistant, 15Cr - 25.5Ni - 1.2Mo - 2.1Ti - 0.006B - 0.30V, 1800°F (980°C) Solution Heat Treated

2.1.1.2 Aerospace Standards:

MA1806	Spring Clips and Cushion Selection for Metal Tube Support, Metric
MA3294	Clip - Spring Tension, Outer, 5.5 mm Bolt Hole, AMS-5525, Metric
MA3295	Clip - Spring Tension, Inner, 5.5 mm Bolt Hole, AMS-5525, Metric
MA3296	Cushion - Tube Clamp Support, PTFE, Metric
AS3298	Cushion - Tube Clamp Support, PTFE, Inch
MA3393	Clip - Spring Tension, Outer, 6.7 mm Bolt Hole, AMS-5525, Metric
MA3394	Clip - Spring Tension, Inner, 6.7 mm Bolt Hole, AMS-5525, Metric

2.2 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

2.2.1 Federal Specification:

QQ-P-35	Passivation Treatments for Corrosion Resisting Steel

2.2.2 Military Standards:

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-1312	Fastener Test Methods
MIL-STD-2073-1	DOD Materiel, Procedures for Development and Application of Packaging Requirements

3. TECHNICAL REQUIREMENTS:

3.1 Materials:

3.1.1 Clip Material: Shall be AMS-5525 strip, unless otherwise specified on the part drawing.

3.1.2 Cushion Material: Shall be AMS-3659 for tube sizes up to 12 mm OD and AMS-3660 for tube sizes larger than 12 mm OD.

3.2 Design:

The typical design of the clamp assembly is as shown in Figure 1.

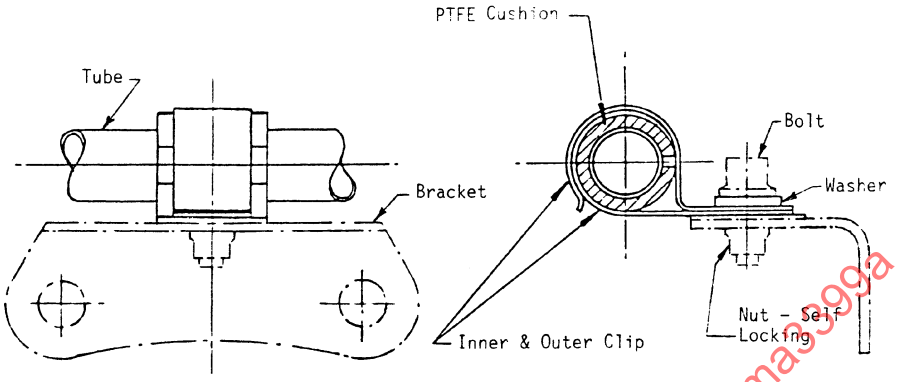

FIGURE 1 - Typical Design of Clamp Assembly

3.2.1 Dimensions: The dimensions of finished parts, after all processing, shall conform to the part drawing (see standards listed under 2.1.2).

3.3 Fabrication:

3.3.1 Cushion: May be produced by molding or machining from rod. Sharp edges, burrs, and slivers shall be removed to 0.3 mm maximum, unless otherwise specified on the part drawing.

3.3.2 Clips: Stamped and formed from strip stock as in 3.1.1. The inside edge of the clip that contacts the cushion shall be rolled or radiused to eliminate sharp edges.

3.3.2.1 Heat Treatment: After forming, clips shall be degreased, and then, precipitation heat treated in accordance with AMS-2759/3 (for UNS S66286) in a vacuum or argon (or equivalent) atmosphere to produce the specified hardness in 3.5.

3.3.2.2 Cleaning: After heat treatment as in 3.3.2.1, clips shall be cleaned and passivated in accordance with QQ-P-35.

3.4 Hardness, Clips:

Unless otherwise specified on the part drawing, hardness of clips shall be uniform and within the range 45 to 55 HR30N or 260 to 345 HV, as determined by MIL-STD-1312-6.

3.5 Fluorescent Penetrant Inspection, Clips:

Clips shall be fluorescent penetrant inspected. Parts subjected to fluorescent penetrant inspection shall show no evidence of cracks, seams, laminations, or laps.

3.6 Product Marking:

Each clip and cushion shall be identification marked as specified on the part drawing.

3.7 Clip Spring Tension:

Inner and outer clips shall be capable of undergoing the assembly and removal test cycles specified in Section 4 without any evidence of cracking when viewed under low magnification, and without taking a permanent set in excess of not retaining spring tension onto the assembled tube cushion.

3.8 Workmanship:

Parts shall be uniform in quality and condition, clean, sound, smooth, and free from burrs, foreign materials, and imperfections detrimental to their performance.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of parts shall supply all parts for vendor tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the parts conform to the requirements of this specification.

4.2 Classification of Tests:

Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and shall be performed on each production inspection lot (see 8.2.1). The acceptance tests are summarized in Table 1.

4.3 Acceptance Test Sampling:

4.3.1 Nondestructive Tests - Visual and Dimensional: A random sample shall be selected from each production inspection lot, the size of the sample to be as specified in Table 3. The classification of defects shall be as specified in Table 2. Defects not classified in Table 2 shall be classified as Minor A defects. All dimensional characteristics are considered defective when out of tolerance.

4.3.2 Destructive Tests: A random sample shall be selected from each production inspection lot, the size of the sample shall be as specified in Table 4, Column B. The sample parts may be selected from those that have been subjected to and passed the nondestructive tests.

TABLE 1 - Summary of Acceptance Tests

Characteristic	Req. Para.	Sample Size	Test Method
Destructive Tests			
Material	3.1	Table 4, Col B	Inspection per material specification
Hardness	3.4	Table 4, Col B	MIL-STD-1312-6
Non-Destructive Tests			
Dimensions	3.2.1	Tables 2 & 3	Conventional measuring methods
Product Marking	3.6	Table 4, Col A	Visual examination
Workmanship	3.8	Table 4, Col A	Visual examination
Fluorescent Penetrant Inspection	3.5	Tables 2 & 3	Inspection per AMS-2645
Clip Spring Tension	3.7	Table 4, Col A	4.4.2
Packaging & Identification	5.1 & 5.2	None	Visual

NOTE: The same test sample may be used for more than one test provided that none of the characteristics of the samples are altered during the test procedure.

TABLE 2 - Classification of Defects

Category No.	A.Q.L.	Characteristic
Major A		
101	0.15 %	Surface discontinuities revealed by fluorescent penetrant inspection.
Major B		
201	1.0 %	Cushion material thickness (min).
202		Cushion inside width.
203		Clip band material thickness (min).
204		Clip band material width (min).
205		Clip spring tension test.
Minor A		
301	4.0 %	Bolt hole diameter.
302		Cushion inside diameter.
303		Location of bolt hole.
304		Product Identification.
305		Workmanship

TABLE 3 - Sampling Data

Visual & Dimensional Characteristics
Sample Size (n), Acceptance Number & Limiting Quality (LQ)
In percent Defective For AQL 0.15, 1.0, & 4.0%

Production Inspection Lot	Sample Size (n)	0.15% AQL		1.0% AQL		4.0% AQL	
		(AC)	(LQ)%	(AC)	(LQ)%	(AC)	(LQ)%
51 to 90	13	0	2.8	0	16	1	27
91 to 150	20	0	2.8	0	16	2	25
151 to 280	32	0	2.8	1	7.6	3	20
281 to 500	50	0	2.8	1	7.6	5	18
501 to 1200	80	0	2.8	2	6.5	7	14
1201 to 3200	125	1	1.2	3	5.4	10	12
3201 to 10000	200	1	1.2	5	4.6	14	10
10001 to 35000	315	1	1.2	7	3.7	21	9
35001 to 150000	500	2	1.1	10	3.1	21	9

Sampling sizes listed above are based on single sampling plans for normal inspection in MIL-STD-105. It is permissible to use other sampling plans per MIL-STD-105 which provide the same quality protection. When sample size equals or exceeds lot size, 100% inspection is required.

TABLE 4 - Sampling Data

Mechanical and metallurgical Characteristics
Sample Size (n) and Acceptance Number (AC)

Lot Size	Sample Size (n)		Acceptance Number (AC)
	Nondestructive	Destructive	
	A	B	
Up to 500	8	3	0
501 to 3200	13	5	0
3201 to 35000	20	5	0
35001 and over	32	8	0