



Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE STANDARD

AS 1553

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Revised

PERFORMANCE STANDARD FOR TUBE SUPPORT LOOP-CUSHIONED CLAMP

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- 1.0 **PURPOSE:** To establish the performance requirements for loop clamps with a woven steel wire cushion.
- 2.0 **SCOPE:** This standard covers heat and corrosion resistant steel loop clamps with a woven steel wire cushion that is attached to the clamp by spot welding and is intended for use in applications up to 1200°F (649°C).
- 3.0 **APPLICABLE DOCUMENTS:** The following publications form a part of this standard to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) and Aerospace Standards (AS) shall apply. The applicable issue of other documents shall be the issue in effect on date of invitation for bids.
 - 3.1 **SAE Publications:** Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pennsylvania, 15096
 - 3.1.1 **Aerospace Material Specifications:**
 - AMS 5510 Sheet, Strip, and Plate-18 Cr, 10Ni, 0.40Ti
 - AMS 5697 Wire-19Cr, 9Ni Braiding
 - 3.1.2 **Aerospace Standards:**
 - AS3268 Sleeve Half-Reinforcing, Tube
 - AS3269 Sleeve Half-Reinforcing, Tube
 - 3.2 **Government Publications:** Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania, 191120.
 - 3.2.1 **Military Specifications:**
 - MIL-H-5606 Hydraulic Fluid, Petroleum Base, Aircraft, Missile and Ordnance
 - MIL-T-6845 Tubing, Steel, Corrosion-Resisting (304), Aerospace Vehicle Hydraulic System, 1/8 Hard Condition
 - 3.2.2 **Military Standards:**
 - MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes
 - MIL-STD-810 Environmental Test Methods

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4.0 GENERAL REQUIREMENTS4.1 Materials

4.1.1 Clamp material: Bands for clamps shall be formed from corrosion and heat resistant steel conforming to AMS 5510.

4.1.2 Cushion material: Cushions shall be braided or woven from .005-.010 wire conforming to AMS 5697 to form a liner meeting the dimensions specified on the drawing.

4.2 Design and construction:

4.2.1 Sizes and dimensions: The sizes and dimensions shall be as specified on the applicable drawing. Clamps shall be formed through a minimum of 270 degrees of the mandrel circumference. Normal spring back of the clamp from this formed condition will be acceptable.

4.2.2 Construction: Woven cushion shall be permanently attached to clamp by spot welding.

4.3 Finish: All surfaces shall have a smooth finish, free from burrs and sharp edges. The insides of the clamp band shall be rolled or provided with a radius to eliminate sharp edges which would cut the cushion or mark tubing.

4.4 Identification of products: Each clamp shall be marked in accordance with the requirements of the drawing.

4.5 Performance: The clamps shall meet the performance requirements specified in section 5.

5.0 QUALITY ASSURANCE PROVISIONS:

5.1 Classification of tests: The inspection and testing of clamp assemblies shall be classified as follows:

- (a) Quality Conformance Tests
- (b) Qualification Tests

5.2 Quality conformance tests: Quality conformance tests shall be conducted in conformance with MIL-STD-105 and shall consist of:

- (a) Acceptance Tests
- (b) Periodic Control Tests

5.2.1 Acceptance tests: The following acceptance test shall be performed on clamp assemblies selected at random from each inspection lot. An inspection lot shall consist of all clamps of a particular size made under essentially the same conditions and presented for inspection at the same time. Unless otherwise noted, inspection sample size shall be in accordance with MIL-STD-105, Inspection Level II of Table titled "Sample Size Code Letters" for ordinary inspection. The acceptance quality level (AQL) shall be as specified in Table I.

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- (a) Examination of product; see para 5.4.1.
- (b) Closure test; see para 5.4.2.
- (c) Weld test; see para 5.4.3. Weld inspection plan shall be based on a sample level of one-half of one percent (0.005) per inspection lot.

TABLE 1. Classification of defects, sampling plan

INSPECTION	AQL (percent defective)	
	Major	Minor
Examination of product	1.0	4.0
(a) Dimensions		
(1) Loop diameter (max.)	X	
(2) Width (min.)	X	
(3) Thickness (min.)	X	
(4) Centerline of loop to centerline of screw hole (min.)	X	
(5) All other dimensions		X
(b) Workmanship and marking		X
(c) Materials	X	
(d) Closure test	X	

5.2.2 Periodic control test: Periodic control test shall consist of vibration test as defined in paragraph 5.4.4, except testing shall be performed at room temperature only. Testing shall be performed on sizes and intervals as agreed upon between vendor and purchaser. If failure occurs in this test, the qualification test must be repeated for the size clamp that failed.

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5.3 Qualification tests: The qualification of clamp assemblies shall consist of the following performance tests. Successful completion of testing on one particular size may when agreed upon between vendor and purchaser provide acceptance for other sizes based on similarity of construction and manufacture.

- (a) Examination of product; see para. 5.4.1.
- (b) Closure test; see para. 5.4.2.
- (c) Vibration test; see para. 5.4.4.

5.4 Test methods and Acceptance Criteria:

5.4.1 Examination of product:

5.4.1.1 General: Clamp assemblies shall be examined to determine conformance to the requirements of this specification with respect to dimensions, material and workmanship.

- 5.4.1.1.1 Weld electrode pickup not permitted.
- 5.4.1.1.2 Cushion may not separate from clip by more than .025 (0.64mm) at any point between welds.
- 5.4.1.1.3 External indentations shall not exceed 15% of clamp thickness.
- 5.4.1.1.4 Pits and voids are not permitted.
- 5.4.1.1.5 Cushion delamination shall not exceed .035 (0.89mm) width.
- 5.4.1.1.6 Cushion edge bulge is permitted within the limits on the drawing.
- 5.4.1.1.7 Cushion shall be spotwelded to clamp.

5.4.2 Closure test: Clamps shall be installed on a bar having a diameter equal to the nominal tube outside diameter within $\pm .001$ (± 0.02 mm) inch. The gap "D" dimension between the clamp legs at the attachment screw holes shall meet within specified limits; the holes shall be in alignment within .01 (0.25mm) inch and the clamps shall be flat within .01 (0.25mm) inch through the clamp width.

5.4.3 Weld test: The weld of cushion to clamp shall be destructive tested by pulling the cushion from the clamp. In every case the failure must be that the cushion wires have parted. Failure of the weld to remain on the clamp surface is cause for rejection.