



AEROSPACE STANDARD	AS4751™	REV. A
	Issued 2005-04 Reaffirmed 2013-01 Stabilized 2025-10 Superseding AS4751	
Coupling Assembly, V-Band Sheet Metal Wide Flange, Pneumatic Tube		

RATIONALE

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Documents

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1. SCOPE:

This SAE Aerospace Standard (AS) establishes the requirements for a grooved clamp coupling and flanges suitable for joining intermediate pressure and temperature ducting in aircraft pneumatic systems. The rigid coupling joint assembly, hereafter referred to as “the joint”, shall operate within the temperature range of -65 °F external ambient to +800 °F internal fluid.

2. 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 SAE Publications:

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

AS4108	T-Bolt and Eyebolt, A-286 CRES, 1000°F Fatigue Rated
AS8879	Screw Threads - UNJ Profile, Inch, Controlled Radius Root with Increased Minor Diameter
AIR869	V-Couplings, Application of
AS478	Identification Marking Methods

2.1 (Continued):

AMS 5510	Steel, Corrosion and Heat-Resistant, Sheet, Strip and Plate 18Cr - 10.5Ni - 0.40Ti (SAE 30321) Solution Heat Treated
AMS 5513	Steel, Corrosion-Resistant, Sheet, Strip, and Plate 19Cr - 9.2Ni (SAE 30304) Solution Heat Treated
AMS 5516	Steel, Corrosion Resistant, Sheet, Strip, and Plate 18Cr - 9.0Ni (SAE 30302) Solution Heat Treated
AMS 5518	Steel, Corrosion Resistant, Sheet and Strip 18Cr - 8Ni (SAE 30301) Cold Rolled, 150 ksi (1034 MPa) Tensile Strength
AMS 5525	Steel, Corrosion and Heat Resistant, Sheet, Strip, and Plate 15Cr - 25.5Ni - 1.2Mo - 2.1Ti - 0.006B - 0.30V 1800 °F (982 °C) Solution Heat Treated
AMS 5732	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing, and Rings 15Cr - 25.5Ni - 1.2Mo - 2.1Ti - 0.006B - 0.30V Consumable Electrode Melted 1800 °F (982 °C) Solution and Precipitation Heat Treated
AMS 5737	Steel, Corrosion and Heat-Resistant, Bars, Wire, Forgings, and Tubing 15Cr - 25.5Ni - 1.2Mo - 2.1Ti - 0.006B - 0.30V Consumable Electrode Melted 1650 °F (899 °C) Solution and Precipitation Heat Treated
AMS 5901	Steel, Corrosion Resistant, Sheet, Strip, and Plate 18Cr - 8Ni (SAE 30301) Solution Heat Treated
AMS-W-6858	Welding, Resistance: Spot and Seam

2.2 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-810	Environmental Engineering Considerations and Laboratory Tests
MIL-HDBK-831	Preparation of Test Reports

2.3 NAS Standards:

Available from Aerospace Industries Association, 1250 Eye Street NW, Washington, DC 20005.

NASM25027 Nut, Self Locking

NASM7873 Nut, Self Locking

2.4 ASME Standards:

Available from The American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.

ASME Y14.100 Engineering Drawing Practices

2.5 AWS Standards:

Available from The American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

AWS D17.1 Specification for Fusion Welding for Aerospace Applications

3. TECHNICAL REQUIREMENTS:

3.1 Qualification:

The joint furnished under this specification shall be representative of products which have been subjected to and which have successfully passed the tests specified in this standard.

3.2 Materials:

The joint component materials shall be uniform in quality, free from defects, suitable for service, consistent with good manufacturing practices, and in conformance with the applicable specifications and requirements stated herein. Specific materials used in the joint components shall be specified on the applicable AS standard drawing.

3.2.1 Duct Material: Duct materials shall be stainless steel. The coupling shall meet the requirements herein when assembled on stainless steel flanges.

3.2.2 Equipment Flanges: Equipment Flange materials shall be stainless steel for stainless steel tubing. The flange may be sheet metal formed, solid, machined, forged, or cast shape.

3.3 Design and Construction:

The joint consisting of coupling and flanges listed in Table 1 shall fulfill all design and performance requirements of this specification.

3.3.1 Coupling: The material of the coupling shall be corrosion resistant steel as specified on the applicable AS drawing noted in Table 1.

3.3.1.1 Coupling Retainer Strength: The coupling shall maintain joint integrity at operating pressure in the event of coupling retainer failure. The coupling shall be so designed that 0.75 of the coupling retainer circumference shall be sufficient to hold the joint and leakage shall not exceed 0.03 SCFM per inch of diameter at operating pressure of Table 2 at 800 °F.

3.3.2 Flanges: The material of the flanges shall be corrosion resistant steel as specified on the applicable AS drawing shown in Table 1.

TABLE 1 - Joint Component Control Numbers

Description	AS Number
V-Band Coupling Standard latch	AS 4751/1
Sheet Metal Flange Solid Flange End	AS 4751/2
Design Standard	AS 4751/3

3.3.3 Welding: Resistance welding shall be in accordance with AMS-W-6858. Fusion welding shall be in accordance with AWS D17.1.

3.3.4 Bolt: Bolt material shall be as specified on the applicable AS drawing, with a tensile strength of 160 ksi minimum.

3.3.4.1 Bolt Threads: Bolt threads shall conform to AS8879, and may be lubricated using an anti-seize or dry film high temperature lubrication.

NOTE: Addition of lubrication will reduce the necessary torque values by approximately five lb-in and should be verified by the user.

3.3.5 Nut: The nut shall be a long beam, self locking type with a running torque of 3.5 to 30 lb-in. The material shall be as specified on the applicable coupling drawing. The nut shall have a minimum life of five complete full on-off cycles when installed within a speed of 60 to 120 rpm on the bolt, or 15 complete full on-off cycles when installed within a speed not to exceed 25 rpm.

TABLE 2 - Minimum Rated Limit Load Capability

"N" lb-in (limit)			Pressure psig (with no bending moment applied)					
			Normal Operating		Proof		Burst	
			70 °F & -65 °F Fluid Temp.	800 °F Fluid Temp.	70 °F & -65 °F Fluid Temp.	800 °F Fluid Temp.	70 °F & -65 °F Fluid Temp.	800 °F Fluid Temp.
Tube O.D.	Ambient Temp. & -65 °F	800 °F						
1.00	935	745	460	365	920	735	1380	1100
1.25	855	685	420	335	840	670	1260	1005
1.50	795	635	380	300	760	605	1140	910
1.75	745	595	340	270	680	540	1020	815
2.00	705	560	305	240	610	485	915	730
2.25	670	535	275	220	550	440	825	660
2.50	640	510	255	200	510	405	765	610
2.75	615	495	235	185	470	375	705	560
3.00	595	475	220	175	440	350	660	525
3.50	560	450	195	155	390	310	585	465
4.00	535	425	175	140	350	280	525	420
4.50	515	410	160	125	320	255	480	380
5.00	495	395	150	120	300	240	450	360
5.50	480	380	135	105	270	215	405	320
6.00	465	370	130	100	260	205	390	310
6.50	455	365	125	100	250	200	375	300
7.00	445	355	120	95	240	190	360	285
7.50	435	350	110	85	220	175	330	260
8.00	430	345	100	80	200	160	300	240
8.50	425	340	85	65	170	135	255	200
9.00	420	335	75	60	150	120	225	180
10.00	405	320	70	55	140	110	210	165

3.3.6 Duct Installation: The joint shall be so designed as to permit removal of a single duct section without moving mating ducting axially. Each joint must be manually aligned during assembly. The manually aligned joint shall meet the requirements herein with a total of 0.060 inch transverse mismatch.

3.4 Temperature:

The joints shall meet the requirements of this specification under any combination of ambient/fluid temperature exposure within the range of -65 °F external ambient to 800 °F internal fluid.

3.5 Performance:

The values specified herein shall define the requirements for satisfactory performance and shall apply to performance under the conditions as specified in 3.4.

3.5.1 Static Leakage: The joint, consisting of the coupling and flanges noted in 3.3 shall show no evidence of leakage in excess of 0.01 SCFM (0.000765 lb dry air per minute) per inch of tube diameter when subjected to the requirements specified herein.

3.5.2 Rated Limit and Ultimate Load: The joint shall be capable of carrying the total limit load "N" as a minimum, see Figure 1, specified in Table 2 without deformation or exceeding the leakage requirement of 3.5.1 with respect to the following relationship:

$$N = N_p + N_b + N_a \quad (\text{Eq. 1})$$

where:

N_p = Load, Pounds per inch of circumference due to pressure

N_b = Load, Pounds per inch of circumference due to bending load

N_a = Load, Pounds per inch of circumference due to axial loading

3.5.2.1 Pressure: The rated load per inch of circumference due to pressure shall be determined from the following relationship:

$$N_p = \frac{PD}{4} \quad (\text{Eq. 2})$$

where:

N_p = Load, Pounds per inch of circumference due to pressure

P = Pressure in psi

D = Flange maximum diameter in inches

- 3.5.2.2 Bending: The rated load per inch of circumference due to bending shall be determined from the following relationship:

$$N_b = \frac{4M}{\pi D^2} \quad (\text{Eq. 3})$$

where:

N_b = Load, Pounds per inch of circumference due to bending (limit)

M = Bending moment in lb-in

D = Flange outside diameter in inches

- 3.5.2.3 Axial Load: The rated load per inch of circumference due to axial loading shall be determined from the following relationship:

$$N_a = \frac{E}{\pi D} \quad (\text{Eq. 4})$$

where:

N_a = Load, Pounds per inch of circumference due to axial load

E = Axial tension load in pounds

D = Flange outside diameter in inches

- 3.5.2.4 Rated Load: Limit (proof) = Two times operating load

Ultimate = Three times operating load (burst load), 3.5.1 may be exceeded.
Deformation may occur but the joint shall remain intact.

- 3.5.3 Proof Pressure: The joint shall show no evidence of deformation or leakage in excess of 3.5.1, when subjected to the proof pressure of Table 2.

- 3.5.4 Burst Pressure: The joint shall not rupture and shall remain intact when subjected to the burst pressure of Table 2, for 2 minutes. Deformation shall be allowed.