



AEROSPACE INFORMATION REPORT

AIR869**REV. B**

Issued 1967-04
Revised 2008-09
Reaffirmed 2014-10

Superseding AIR869A

(R) V-Couplings, Including V-Band and V-Retainer Coupling Assemblies,
Flange and Seal Design, Application of

RATIONALE

AIR869B has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

This SAE Aerospace Information Report (AIR) is intended to inform users of the proper use, application, and installation of V-Couplings, which will perform satisfactorily only if they are properly installed. This document informs the user of the correct manner of applying and installing V-Couplings and also cautions against improper use.

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 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS-W-6858 Welding, Resistance: Spot and Seam

ARP699 High Temperature Pneumatic Duct Systems for Aircraft

AS1701 Lubricant, Solid Film

AS1895 Coupling Assembly, V-Retainer, High Pressure, High Temperature, Pneumatic Tube

AS1960 Coupling Assembly, V-Band, Sheet Metal Flange, Pneumatic Tube

AS4108 T-Bolt and Eye Bolt, A-286 Cres, 1000 °F Fatigue Rated

AS4751 Coupling Assembly, V-Band, Sheet Metal Wide Flange, Pneumatic Tube

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<http://www.sae.org/technical/standards/AIR869B>

Documents

Document Sharing Hub

AS5355 Couplings, Clamped, Grooved, V-Band

AS24563 Coupling Flanges, V-Band, Profile Dimensions for

2.1.2 AIA/NAS Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NASM7873 NUT, SELF-LOCKING, 1200 DEG F

NASM25027 NUT, SELF-LOCKING, 250 DEG F, 450 DEG F, AND 800 DEG F

2.2 Definitions

CLAMP: The general category of special fasteners which includes, V-Couplings, band clamps, and strap assemblies.

V-BAND COUPLING: A sheet metal band clamp with sheet metal or machined retainer sections welded or riveted to the band or band loops (i.e., AS1960, AS4751). Also called V-Band Clamps.

V-RETAINER COUPLINGS: Coupling with the V-retainer as an integral part of the coupling segment. V-Retainer Couplings have no band or straps. The latch components are attached to lugs on the retainer segments (i.e., AS1895).

V-COUPLING: The family of V-Band Couplings and V-Retainer Couplings.

V-COUPLING JOINT: The connection composed of a V-Coupling, mating flanges, and a seal when used.

2.3 Symbols

A_g = Seal load, in psi

B = Bolt nominal diameter, in inches

D_f = Flange outside diameter, in inches

D_n = Coupling nominal diameter, in inches

D_{pl} = Pitch line diameter, in inches (flange to retainer contact point, see Figure 1)

D_s = Diameter at seal line or seal, in inches

H = Hoop or circumferential band load, in pounds

K_b = Number of bolts at each latch location

G_a = Radial apex gap, in inches

E = Axial load, in pounds

H_s = Seal height, in inches

L_s = Axial load to preload seal, in pounds

M = Bending moment, in pounds-inches

N_a = Axial tension load, in pounds per inch of circumference

N_b = Axial force as a result of bending moments, in pounds per inch of circumference

N_p = Axial force due to internal pressure, in pounds per inch of circumference

N = Design load, in pounds per inch of circumference

N_s = Seal seating load, in pounds per inch of circumference

P = Internal pressure, psig

T = Approximate design nut torque, in pounds-inches

Φ = V-Retainer angle, in degrees (commonly 40 degrees)

2.3.1 Subscripts

c = coupling

f = flange

g = gasket

b = bending moment

pl = pitch line

n = nominal

p = pressure

s = seal line or seal

3. V-COUPLING DESIGN FEATURES AND FACTORS

V-Couplings are used to join two flanges together forming a V-Coupling Joint. The V-Coupling is tightened by applying torque to a nut which tightens a circumferential band or band loops or an integral retainer and lugs exerting an inward radial force onto V-shaped retainer segments. These retainer segments then exert an axial clamping force onto the flanges, joining or pressing them together. V-couplings consist of V-band couplings (Figures 2 and 3) and V-retainer couplings (Figure 4). V-Band Coupling design features are shown in Figures 2, 3, and 5. V-Retainer Coupling design features are shown in Figures 4 and 6.

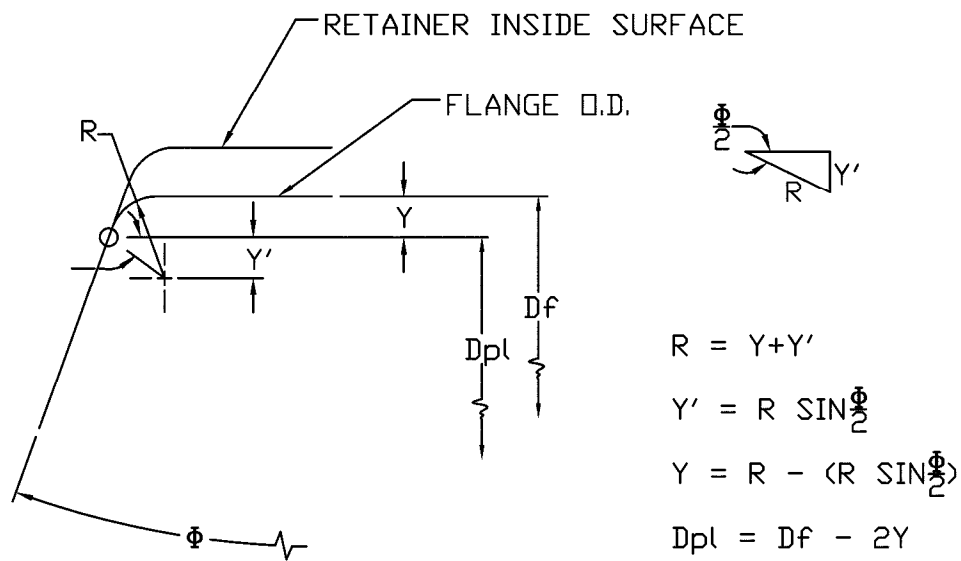
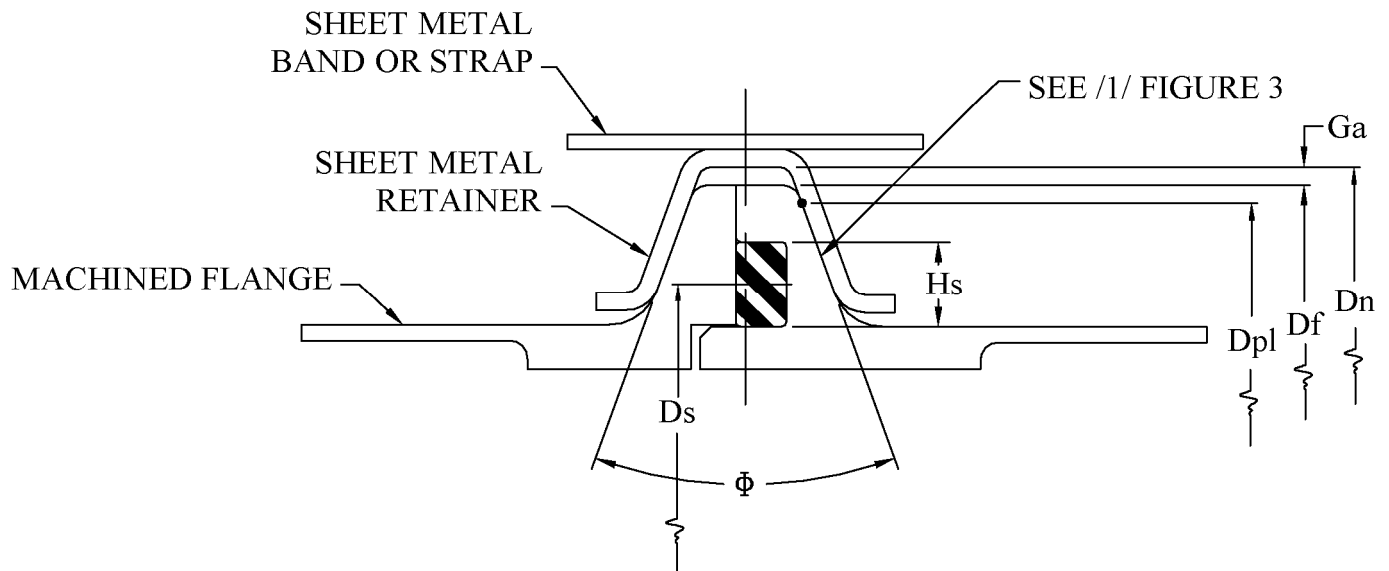
FIGURE 1 - LOCATION OF FLANGE TO RETAINER CONTACT POINT (D_{pl})

FIGURE 2 - V-BAND COUPLING JOINT AND MACHINED FLANGES