



AEROSPACE STANDARD

AS4157™**REV. B**

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Superseding AS4157A

Coupling Assemblies, Hydraulic,
Self-Sealing, Quick Disconnect
8000 Pounds Per Square Inch, Gage

RATIONALE

Removed all references to 5000 psig pressure class.

1. SCOPE

This specification covers the requirements for aircraft hydraulic, self-sealing, quick disconnect couplings for use in 8000 lbf/in² (gage) lightweight hydraulic systems.

1.1 Classification

Hydraulic self-sealing, quick disconnect couplings shall be of the following class and type:

a. Class 8000 - 8000 lbf/in² (gage) Operating Pressure

NOTE: See AS1709 for other pressure classes.

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, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

ARP24 Determination of Hydraulic Pressure Drop

ARP868 Method-Pressure Drop Tests for Fuel System Components

AIR1047 A Guide for the Selection of Quick-Disconnect Couplings for Aerospace Fluid Systems

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Documents
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AS603	Impulse Testing of Hydraulic Hose, Tubing, and Fitting Assemblies
AS1709	Coupling Assembly, Hydraulic Self Sealing, Quick Disconnect
AS8775	Hydraulic System Components, Aircraft and Missiles, General Specification For
AS85720	Fittings, Tube, Fluid Systems, Separable, High Pressure Dynamic Beam Seal, 5000/8000 psi, General Specification For

2.1.2 U.S. Military Specifications and Standards

Copies of these documents are available online at <http://quicksearch.dla.mil>.

MIL-PRF-83282 Hydraulic Fluid, Fire Resistant Synthetic Hydrocarbon Base, Aircraft

MIL-H-85800 Hose Assemblies, Polytetrafluoroethylene, Fiber Reinforced, 5000 and 8000 lbf/in², General Specification For

MIL-STD-129 Marking for Shipment and Storage

MIL-STD-130 Identification Markings of US Military Property

MIL-STD-810 Environmental Test Methods

3. REQUIREMENTS

3.1 Qualification

The couplings furnished under this document shall be products which have been tested, and have passed the qualification tests specified herein, and have been approved by the procuring agency or prime contractor.

3.2 General Specification

The document established by the procuring agency shall be in addition to the requirements specified herein.

3.3 Materials

The couplings shall be constructed of materials that shall not change the composition of or be adversely affected by hydraulic fluid conforming to MIL-H-83282. Other materials and fluids can be utilized for similar applications based on procuring agency requirements.

3.4 Design and Construction

The configuration, dimensions, and other details of design of the couplings shall conform to applicable specification control drawing, Table 5, or as specified by the procuring agency. The design objective shall be to obtain the smallest size and lightest weight commensurate with meeting performance requirements herein. When coupled, the coupling shall be such that it shall permit fluid flow in either direction in accordance with the rated flow and pressure drop as specified in Table 1. Flow shall not be blocked under surge conditions.

Quick disconnect shall have both a visual and touch indication that they are connected and open to flow. The overall dimensions shall not exceed that shown in Table 5. Unless otherwise specified by the procuring agency, the end fitting size configuration shall be per MIL-F-85720.

Table 1 - Rated flow and pressure drop class 8000

Dash No. Class 8000	Equivalent Tube Size in Inches Class 8000	Rated Flow gal/min	Maximum Pressure Drop lbf/in ² Rated Flow	Surge Flow gal/min
-03	3/16	2.5	25	12.5
-05	5/16	5.7	25	28.5
-07	7/16	10.0	25	50.0
-09	9/16	16.3	25	81.5
-11	11/16	26.0	25	130.0
-15	15/16	47.0	25	234.0

If a secondary sealing function for the disconnected half is required, a pressure cap or plug shall be provided as an optional design feature. The requirement shall be specified by the procuring agency.

3.4.1 Temperature Range

Couplings shall be designed to operate throughout the temperature range listed in 4.6.3.

3.4.2 Sealing and Fluid Loss

The couplings shall, when uncoupled, seal the ends of the disconnected lines at the point of disconnection and shall not permit external leakage during any phase of coupling or uncoupling. Fluid loss (spillage) as specified in Table 2 is not considered to be external leakage. Both halves of the coupling shall seal fluid under both low and high pressures (see 4.6.4).

Table 2 - Air Inclusion and Fluid Loss

Dash No. Class 8000	Equivalent OD Tube Size in Inches Class 8000	Air Inclusion Standard Cubic Centimeters Maximum	Average Fluid Loss (Spillage)/Operating Cycle, Cubic Centimeter Maximum
-03	3/16	0.10	0.05
-05	5/16	0.20	0.10
-07	7/16	0.40	0.20
-09	9/16	0.60	0.30
-11	11/16	1.00	0.50
-15	15/16	1.75	1.00

3.4.3 Seals

The selection of packing and retainer materials shall be compatible with MIL-H-83282 fluid. For other fluids, packing and retainer material shall be specified by the procuring agency, and the material compatibility tests shall be conducted by the supplier to demonstrate the satisfactory performance of the coupling.

3.4.3.1 Glands

Glands shall be per MIL-G-5514, except that the radial clearance shall be reduced as required to prevent extrusion.

3.4.4 Functional Operation

The coupling design shall be such that, even when wearing an arctic glove, the coupling's connect and disconnect operation can be performed with one hand. A static pressure shall be applied to both halves and each one-half of the coupling respectively (that is, when one-half of the coupling is pressurized and the other half is unpressurized) (see 4.6.10.1). The static pressure applied shall be per Table 3 to permit one-hand operation (see 4.6.10).

Table 3 - Coupling forces with the indicated static pressure applied to both halves

Dash No. Class 8000	Static Pressure lbf/in ² (gage)	Push-Pull Axial lb	Torque Rotation in lb
-03	100	50	15
-05	100	50	20
-07	100	50	25
-09	100	50	30
-11	100	50	40
-15	100	50	50

3.5 Interchangeability

It shall be impossible to interconnect different tube sizes and couplings of different pressure classes shall not be capable of cross-coupling. Coupling halves of the same part number shall be interchangeable and cross-couple all referenced mating halves.

3.6 Performance

The self-sealing couplings furnished under this document shall perform satisfactorily when conforming to the following performance requirements:

3.6.1 Envelope, Weight, Materials

Each coupling half must conform to the applicable purchaser and supplier envelope dimensions, weight control, materials, and finishes.

3.6.2 Proof Pressure

The connected coupling and each coupling half must meet operational and leakage requirements after being subjected to proof pressure of 150% of operating pressure (see 4.6.2).

3.6.3 Extreme Temperature Functioning

The connected coupling and each coupling half shall show no malfunction during or after being subjected to extreme temperature testing using the values stated in 4.6.3.

3.6.4 Leakage

Coupling halves shall meet specified leakage requirements of 4.6.4 at 30 inches static head of hydraulic fluid and at the operating pressure specified in 1.1.

3.6.5 Vacuum

The connected and disconnected coupling shall meet inward leakage requirements with no evidence of malfunction or degradation, with equivalent of 10 inches Hg applied and lines closed for 5 minutes (see 4.6.5).

3.6.6 Surge Flow

The connected and disconnected coupling shall meet leakage, operational, and pressure drop requirements after being subjected to the surge flow tests, as defined in Table 1.

3.6.7 Vibration

Unless otherwise specified, the connected and disconnected coupling must be capable of withstanding the vibration environment specified herein without experiencing any malfunction or degradation. Couplings shall be pressurized with 15 lbf/in² (gage) pressure (see 4.6.7). The test setup shall be as shown in Figure 1.

3.6.8 Impulse

The connected coupling and disconnected coupling halves with pressure cap and plug, if required, shall be capable of withstanding the impulse testing specified per ARP603 without any indication of malfunction. Pressures, rate of rise, and impulse form shall be per Table 6 and Figure 3 (see 4.6.8).

3.6.9 Endurance

Each coupling half shall be capable of withstanding 1000 endurance cycles of coupling/uncoupling without any evidence of malfunction or degradation, with the pressures specified in Table 3 applied to both halves (see 4.6.9).

3.6.10 Manual Operation

The coupling shall be capable of being tested in accordance with specified requirements of 4.6.10 with no evidence of coupling forces, leakage, or spillage beyond the specified limits.

The coupling force/torque and applied pressures shall be per Table 3 (see 4.6.10).

NOTE: Both coupling halves shall be installed in systems capable of accommodating some fluid displacement without pressure rise.

3.6.11 Air Inclusion

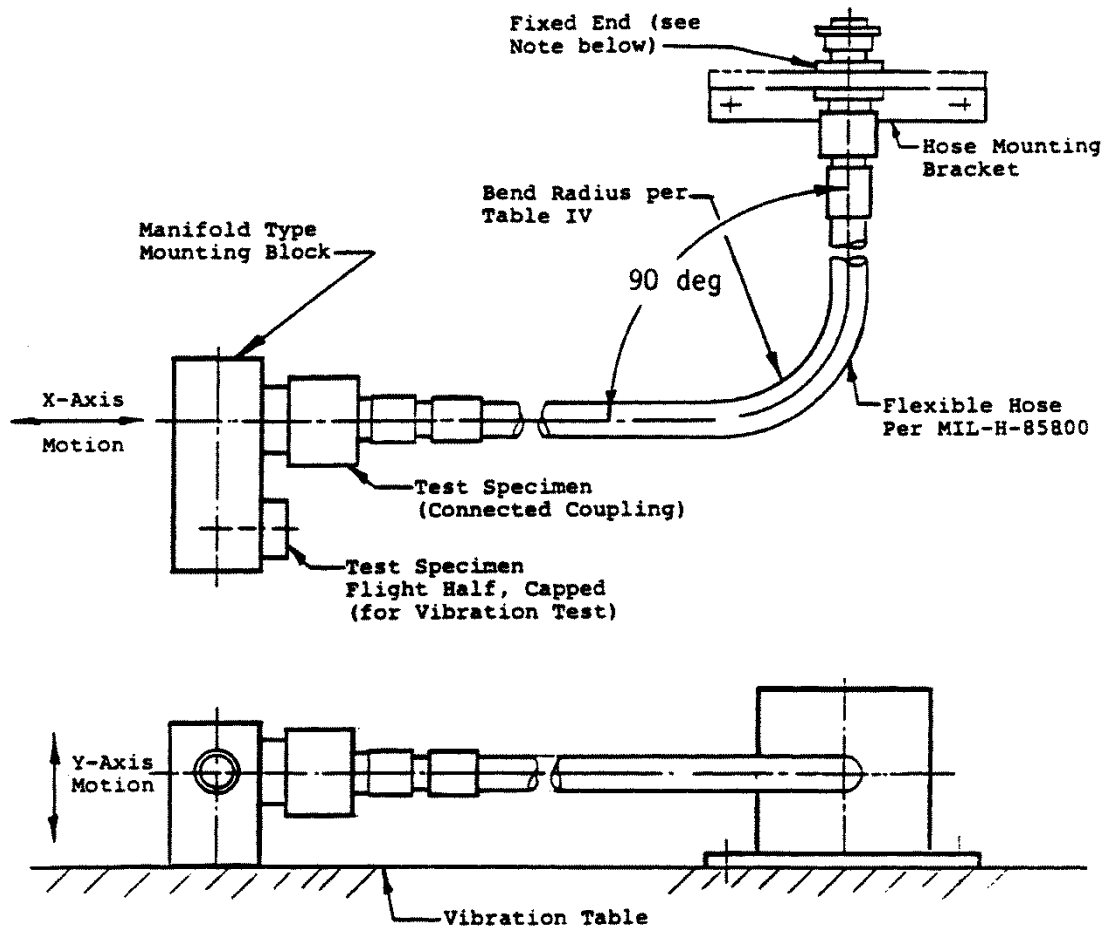
The air inclusion for all couplings shall be within specified limits per Table 2 and at 30 inches of fluid pressure (see 4.6.11).

3.6.12 Impact

Unless otherwise specified by the Procuring Agency, connected couplings and coupling halves (disconnected coupling halves with caps and plugs, if required) shall withstand a 20 g impact test without evidence of disconnection. Evidence of leakage or malfunction after the test is not permitted (see 4.6.12).

3.6.13 Pressure Drop

Each coupling shall indicate a pressure drop within the limits specified in Table 1. The fluid temperature shall be $100\text{ }^{\circ}\text{F} \pm 10\text{ }^{\circ}\text{F}$ and test setup shall be as shown in Figure 4 (see 4.6.13).



NOTE: The end shall be fixed to allow equivalent length and bend radius shown on Table 4 by clamping either the end fitting or the hose as required.

Figure 1 - Setup for impulse and vibration test