



AEROSPACE STANDARD

AS1709™**REV. B**

Issued 1989-09
Reaffirmed 2014-11
Revised 2020-01

Superseding AS1709A

(R) Coupling Assembly, Hydraulic Self Sealing,
Quick Disconnect

RATIONALE

General corrections, clarification updates, added AS1241 Type V and specified AS1241 Type IV high temperature to +250 °F, Table 5 updated max rise rate, updated Figure 2 and added notes 1 and 2, 4.3.1 clarified sequence to include immersion and repeat proof, updated 4.6.5 vacuum, clarified 4.6.12 impact, 4.7 ATP clarified 4.7.2, updated 4.7.3, and removed 4.7.4.2.

1. SCOPE

1.1 This specification covers the requirements for aircraft, hydraulic, self-sealing, quick disconnect couplings, for use in Type II hydraulic systems (-65 to +275 °F temperature range) as defined by AS5440.

1.2 Classification

Hydraulic self-sealing, quick disconnect couplings shall be of the following classes and types:

Class 1000: 1000 psig

Class 3000: 3000 psig

Class 4000: 4000 psig

Class 5000: 5000 psig

Type I Quick Disconnects shall have a visual indication that they are completely connected and open to flow.

Type II Quick Disconnects shall have both a visual and touch indication that they are completely connected and open to flow.

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 precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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2.1 Military Specifications

MIL-DTL-25579	Hose Assembly, Tetrafluoroethylene, High Temperature, Medium Pressure, General Requirements for
MIL-PRF-5606	Hydraulic Fluid, Petroleum Base, Aircraft and Ordnance
MIL-PRF-83282	Hydraulic Fluid, Fire Resistant Synthetic Hydrocarbon Base, Aircraft
MIL-PRF-87257	Hydraulic Fluid, Fire Resistant, Low Temperature, Synthetic Hydrocarbon Base, Aircraft and Missile

2.2 Military Standards

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Markings of U.S. Military Property
MIL-STD-810	Environmental Test Methods

2.3 SAE Publications

Available from SAE International, 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.

AIR1047	A Guide for the Selection of Quick-Disconnect Couplings for Aerospace Fluid Systems
ARP24	Determination of Hydraulic Pressure Drop
AS603	Impulse Testing of Hydraulic Hose, Tubing, and Fitting Assemblies
AS614	Hose Assembly, Polytetrafluoroethylene, Metallic Reinforced, 4000 psi, 400 °F, Heavy Duty, Hydraulic and Pneumatic
AS1241	Fire Resistant Phosphate Ester Hydraulic Fluid for Aircraft
AS1339	Hose Assembly, Polytetrafluoroethylene, Metallic Reinforced, 3000 psi, 400 °F, Lightweight, Hydraulic and Pneumatic
AS5440	Hydraulic Systems, Military Aircraft, Design and Installation, Requirements For
AS8775	Hydraulic System Components, Aircraft and Missile, General Specification for
AS8791	Hydraulic and Pneumatic Retainers (Back-Up Rings), Polytetrafluoroethylene (PTFE) Resin

3. REQUIREMENTS

3.1 Qualification

The couplings furnished under this specification shall be a product that has been tested, has passed the qualification tests specified herein, and has been approved by the procuring agency or prime contractor.

3.2 General Specification

The requirements of AS8775 apply to this specification except as specified herein.

3.3 Materials

The coupling shall be constructed of materials that will not change the composition of, or be adversely affected by hydraulic fluid conforming to MIL-PRF-5606, MIL-PRF-83282, MIL-PRF-87257, or AS1241 Type IV or Type V. Materials, processes, and parts shall meet the design requirements and intent of AS8775. 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 design details of the couplings shall conform to applicable specification control drawings. 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 will 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.

3.4.1 Temperature Range

Couplings shall be designed to operate throughout the temperature range of -65 to +275 °F for all hydraulic fluids listed in 3.3 except AS1241 Type IV, which has a high temperature limitation of +250 °F (see 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).

3.4.3 Seals

The packing and retainer materials shall be compatible with the applicable fluid specified on the procurement specification; MIL-PRF-5606, MIL-PRF-83282, MIL-PRF-87257, or AS1241 Type IV or Type V. Packing and retainer material for other fluid shall be specified by the procuring agency. However, the supplier shall demonstrate that the performance of the coupling is satisfactory with the packing retainer material used.

Table 1 - Rated flow and pressure drop

Dash No.	Equivalent Tube Size (in)	Rated Flow (gal/min)	Surge Flow (gal/min)	Differential Pressure Drop (psid)
-04	1/4	1.2	6	8
-06	3/8	3.5	17.5	8
-08	1/2	6.0	30	8
-10	5/8	10.5	52.5	8
-12	3/4	16.0	80	8
-16	1	29.0	87	8
-20	1 1/4	45.0	90	4
-24	1 1/2	60.0	120	4

Table 2 - Air inclusion and fluid loss

Dash No.	Equivalent Tube Size (in)	Air Inclusion Standard Cubic Centimeters (max)	Average Fluid Loss (Spillage) per Operating Cycle Cubic Centimeter (max)
-04	1/4	0.10	0.05
-06	3/8	0.20	0.10
-08	1/2	0.40	0.20
-10	5/8	0.60	0.30
-12	3/4	1.00	0.50
-16	1	1.75	1.00
-20	1 1/4	2.00	1.20
-24	1 1/2	2.50	1.50

3.4.4 Operation

The coupling shall be so designed that it can be coupled and uncoupled with a one handed, simple motion and without special tools while one-half is held in a fixed mounting. It shall be possible to couple and uncouple with a static pressure (as shown in Table 3) applied to both halves and each one-half of the coupling, respectively. The force, or torque, shall not exceed the values shown in Table 3.

The Type I coupling shall have a clear and unmistakable visual indication that it is fully connected and open when viewed at a 90 degree angle to the axis from any side.

The Type II coupling shall have a visual and touch feature that indicates the completely connected condition. The touch feature shall be clear and unmistakable.

The coupling shall not inadvertently uncouple under a 20 g maximum load.

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

Dash No.	Static Pressure (psig)	Push-Pull Axial (lb)	Torque Rotation (in-lb)
-04	60	30	15
-06	60	35	20
-08	60	40	25
-10	60	45	30
-12	50	50	40
-16	30	60	50
-20	20	60	60
-24	15	60	70

3.5 Interchangeability

Couplings shall be interchangeable as a connected assembly (not individual coupling halves). It shall be impossible to interconnect different body sizes; however, it shall be permissible to jump tube sizes by changing the end fitting configuration. Couplings of different pressure classes shall not be capable of cross-coupling.

3.6 Performance

The self-sealing couplings furnished under this specification 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 dimension, weight control, materials, and finishes.

3.6.2 Proof Pressure

Each coupling half must meet operational and leakage requirements after being subjected to proof pressure of 150% of operating pressure for a period of 1 minute (4.6.2).

3.6.3 Extreme Temperature Functioning

Each coupling half shall show no malfunction during or after being subjected to extreme temperature testing from -65 to +275 °F (4.6.3).

3.6.4 Leakage

Coupling halves shall meet specified leakage requirements at 30-inch static head of hydraulic fluid and at operating pressure (4.6.4).

3.6.5 Vacuum

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

3.6.6 Surge Flow

Coupling halves shall meet leakage, operational, and pressure drop requirements after being subjected to five times (three times for -16, two times for -20 and -24) the rated flow in each direction (4.6.6).

3.6.7 Vibration

The connected and disconnected coupling halves with pressure cap and plug if required, shall be capable of withstanding the vibration environment specified herein without experiencing any malfunction or degradation. Couplings shall be pressurized with 15 psig pressure (4.6.7). The test set-up 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 in AS603 without any indication of malfunction. The test setup shall be as shown in Figure 1. Pressure, rate of rise, and impulse form shall be per Table 4 and Figure 2 (4.6.8).

3.6.9 Endurance

Each coupling half shall be capable of withstanding 200 endurance cycles without any evidence of malfunction or serious degradation, with 15 psig pressure applied to each half (4.6.9).

3.6.10 Manual Operation

Coupling halves shall be capable of being tested in accordance with specified requirements with no evidence of coupling forces, leakage, or spillage beyond the specified limits per Table 2.

NOTE: Both coupling halves shall be installed in systems capable of accommodating some fluid displacement without pressure rise. The connecting force/torque and applied pressures shall be per Table 3 (4.6.10).