



SURFACE VEHICLE RECOMMENDED PRACTICE

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Quick Connect Fluid Coupling Specification for Coolant System Interconnect

RATIONALE

This document is intended to provide a recommended practice for the construction details for the male and female coolant quick connects. It also provides performance and dimensional specifications for quick connect devices designed specifically for coolant systems interconnect. These types of connections have increasing usage worldwide without the benefit of common performance and dimensional standard definition to guide their use.

1. SCOPE

This SAE Recommended Practice defines the minimum performance and dimensional requirements for quick connect couplings between flexible tubing or hose and rigid tubing or tubular fittings used in coolant systems. This document applies to automotive and light duty truck applications under the following conditions:

- Gasoline, diesel, hybrid, and electrical propulsion cooling systems.
- Operating pressure up to 206 kPa (30 psi).
- Operating temperatures from -40 °C (-40 °F) to 125 °C (260 °F).

Quick connect couplings function by joining the connector to a mating end form, typically without the use of tools. The requirements stated in this document apply to new connectors in assembly operations unless otherwise indicated.

For modern powertrain applications, the interconnection of the following devices is typically the design responsibility of the cooling group: coolant control valve, water-to-air charge air cooler (CAC), radiator (high and low temperature variants), and remote transmission oil heat exchanger (used for both warming and cooling functions).

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2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

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 +1 724-776-4970 (outside USA), www.sae.org.

SAE J2044 Quick Connect Coupling Specification for Liquid Fuel and Vapor/Emissions Systems

SAE J1610 Test Method for Evaluating the Sealing Capability of Hose Connections with a PVT Test Facility

2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM A254 Standard Specification for Copper Brazed Steel Tubing

ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus

ASTM D380 Standard Test Methods for Rubber Hose

3. DEFINITIONS

The following are brief descriptions of the components of a quick connect coupling.

3.1 Body

See Figure 1. The quick connect fitting body is constructed as follows:

- a. Inside diameter (i.d.) dimensioned to receive and support the mating component or male fitting.
- b. Internal groove dimensioned to receive and retain the internal O-ring or seal.
- c. Retainer groove geometry designed to receive and retain the snap-ring retainer.
- d. External diameter and geometry designed to allow for the coolant hose to seal and be retained, typically by a hose clamp.

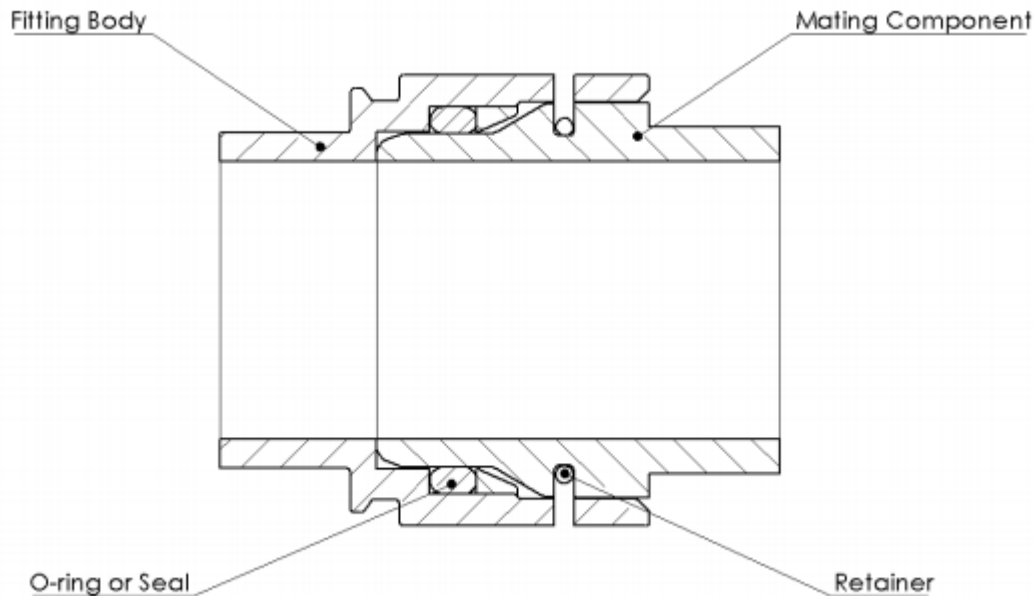


Figure 1 - Typical fitting joint

3.2 O-Ring

The O-ring promotes sealing between the body and the male fitting. It is retained within the body by the geometry of an internal groove. The designed dimensional characteristics of the O-ring, the internal groove, and the male fitting provide for an interference fit between these components and the O-ring. This interference fit, or “crush,” is critical to the sealing performance of the quick connect. The typical crush is 10 to 20%, depending on O-ring material, ergonomic requirements, and operating conditions.

3.2.1 Snap-Ring Retainer

The snap-ring retainer provides the mechanical retention of the male fitting to the body. Its design is such that, as the male fitting is inserted into the body, the snap-ring retainer first expands, then subsequently retracts into a groove in the male fitting. It is the design of the retainer, the grooves in the body, and the groove in the male fitting that provide the quick connect retention characteristics.

3.3 External Diameter and Geometry

When coupled with elastomeric hose, the connector external diameter and geometry provide for an interference fit between the inside diameter (i.d.) of the mating hose and the connector. It is essential that the maximum hose i.d. is less than the minimum coupling external diameter for sealing purposes. It is also important that a minimum hose i.d. coupled with a maximum coupling external diameter not result in hose insertion efforts that are beyond ergonomic specifications. The coupling will also have a bead geometry that prohibits hose blow-off under pressure once a suitable hose clamp is installed. There must be suitable distance behind the bead geometry to allow for the hose clamp to completely seat and seal for good leak performance.

4. TYPICAL APPLICATIONS AND GEOMETRIES

4.1 Small Diameters

Connectors for small hose diameters are typically used for applications like radiator to surge tank or exhaust gas recirculation (EGR) cooler vents. These are low-flow applications with a hose i.d. as small as 3 mm. The coolant temperature will be as high as 125 °C (260 °F). Pressures will be as high as 210 kPa (30 psi).