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An American National Standard

Standard Specification for Quick Disconnect Couplings (6 in. NPS and Smaller)[1]

This standard is issued under the fixed designation F1122; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers the manufacturing data required to produce a variety of styles and sizes of quick disconnect couplings up to and including NPS 6 for marine use that ensure interchangeability and safety of operation.

1.2 In general, quick disconnect couplings are hose and pipe end fittings that permit quick mechanical attachment by means other than bolted or threaded fittings. The method of attachment is a male coupling half ~~(adapter)~~ (adapter, tank unit) that fits into a female coupling half ~~(coupler)~~ (coupler, hose unit) of the same size. ~~By closing attached cam handles, the coupling halves seal, permitting fluids to be transported under pressure through the quick disconnect coupling.~~

1.2.1 By closing attached cam handles on cam and groove couplings, the coupling halves seal, permitting fluids to be transported under pressure through the quick disconnect coupling.

1.2.2 By aligning the rollers on the hose unit coupler with the notches on the tank unit adapter on the dry disconnect coupling (DDC), push the coupler onto the adapter and rotate past 100°. This will lock the couplings together, create a seal and open the internal valves for full flow with low pressure drop. The dual poppet design shut-off mechanism seals liquids and gases behind the valve, eliminating fugitive emissions and the danger of a spill upon disconnection.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 The following safety hazards caveat pertains only to the test method described in this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *MSS Standards:*[2]

MSS-SP-6 Standard Finish for Contact Faces of Pipe Flanges and Connecting End Flanges of Valves and Fittings

MSS-SP-25 Standard Marking System for Valves, Fittings, Flanges, and Unions

MSS-SP-55 Quality Standard for Steel Castings for Valves, Flanges, and Fittings and Other Piping Components (Visual Method)

[1] This specification is under the jurisdiction of ASTM Committee F25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.11 on Machinery and Piping Systems.

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[2] Available from Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 127 Park St., NE, Vienna, VA 22180-4602, http://www.mss-hq.org.

2.2 *ASME Standards:*[3]
ASME Boiler and Pressure Vessel Code Section VIII, Division 1
ASME Boiler and Pressure Vessel Code Section IX
ASME/ANSI B2.1 Pipe Threads (Except Dryseal)
B16.5 Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard
B16.24 Cast Copper Alloy Pipe Flanges, Flanged Fittings, and Valves: Classes 150, 300, 600, 900, 1500, and 2500
B16.42 Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300
B31.1 Power Piping
2.3 *Other Standards:*
STANAG 3756 Facilities and Equipment for Receipt and Delivery of Aviation Kerosene and Diesel Fuels[4]
ISO 3601 Fluid power systems — O-rings[5]
ISO 2230 Rubber products — Guidelines for storage[5]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *adapter, n*—one half of a quick disconnect coupling that fits into the coupler and seals against an elastomer gasket ~~positioned inside the coupler.~~or seal.

3.1.2 *cam handles, n*—handles that are assembled to the coupler half which by closing engages the adapter sealing the coupling.

3.1.3 *coupler, n*—one half of a quick disconnect coupling that receives the ~~adapter. This~~adapter; this half contains the sealing gasket and cam handles on the cam and groove type coupling (see Fig. 1).

3.1.3.1 *Discussion*—
See Fig. 2 for a description of typical coupler pipe ~~fittings.~~ fittings—cam and groove type.

3.1.4 *units:*
3.1.4.1 *tank unit, n*—the male half of the coupling (DDC). It contains a valve that closes before the hose unit is disconnected. Attachment of this tank unit may be by a flanged or threaded connection.

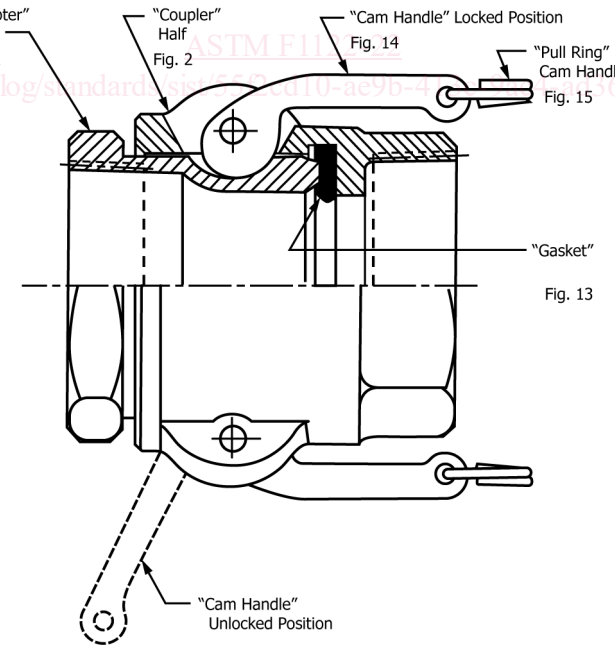


FIG. 1 Typical Coupler Assembly

[3] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, http://www.asme.org.
[4] Available from SAI Global, 205 West Wacker Dr., Suite 1800, Chicago, IL 60606, https://infostore.saiglobal.com.
[5] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

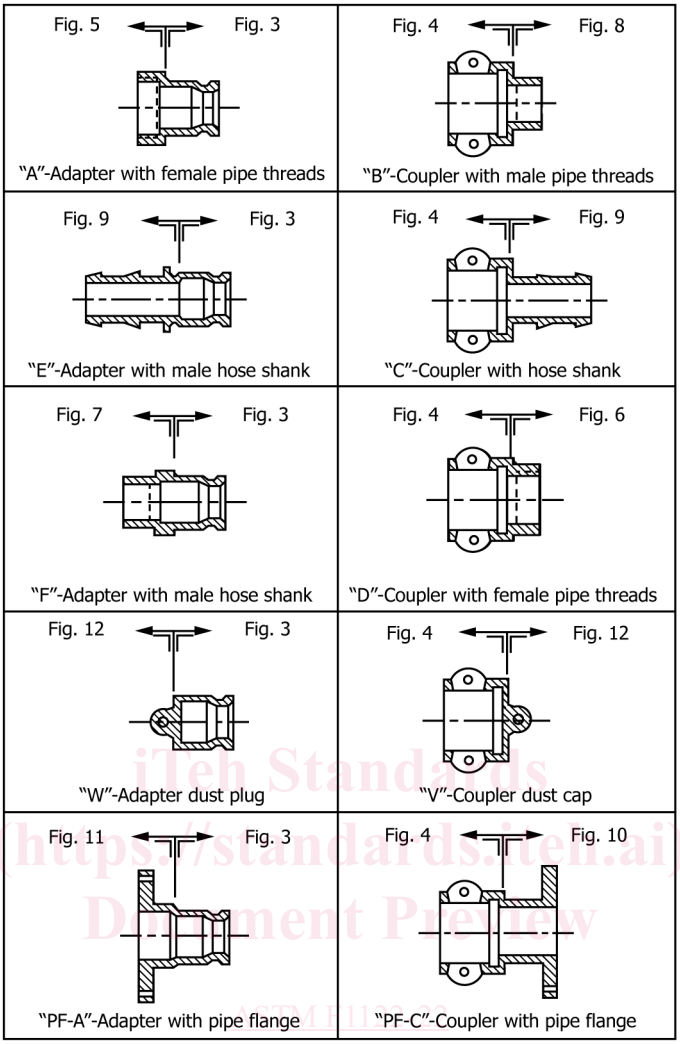


FIG. 2 Adapter/Coupler Types (End Dimensional Data Located in Tables Indicated by Arrows)

3.1.4.2 *hose unit, n*—the hose unit (DDC) is designed to couple with the adapter of the tank unit in any of the three lug positions and shall be interlocked in such a way that product cannot flow until a seal is achieved. The interlock must also ensure that flow will cease before the seal between the adapter and hose is broken. Attachment of the hose unit may be by a threaded or flanged connection.

3.1.4.3 *Discussion*—
The design of the interface between the hose unit and tank unit shall ensure that the residue on disconnection is minimized and all cases will be less than that specified below. Based on average loss over 10 couplings and uncoupling at 1 bar to the maximum working pressure. See Fig. 3.

$$\text{The permitted loss} = \frac{\text{Coupling size (mm)}}{20}\ \text{(mL)}$$

4. Classification

4.1 Quick disconnect couplings shall consist of the following types:

4.1.1 *Standard Class*—This type is to be designed for a 4:1 burst factor of safety.

4.1.2 *Class I*—This type is to be designed for a 5:1 burst factor of safety.

FIG. 3 Typical Tank Unit and Hose Unit for Bayonet-type DDC

4.2 Both Standard Class and Class I will be called quick disconnect couplings in the body of this specification unless otherwise specified.

5. Ordering Information

5.1 Purchase orders for quick disconnect couplings under this specification shall include the following applicable information:

5.1.1 Class.

5.1.2 Size and type of each coupling half-end connection. (Example: 2- by 1½-in. NPT.)

5.1.3 ASTM material designation and date including alloy specifications for the following:

5.1.3.1 Adapter and coupler halves, tank units and hose units,

5.1.3.2 Cam handle, if applicable, and

5.1.3.3 Cam handle pivot ~~pin.~~pin, if applicable.

5.1.4 Product or fluid in applicable system.

5.1.5 Shipping instructions.

5.1.6 Any special requirements, such as testing, coatings, and threads.

6. Materials and Manufacture

6.1 *Materials:*

6.1.1 Pressure-retaining parts shall be manufactured from material specifications and grades listed in Section VIII, Division 1, of the ASME Boiler and Pressure Vessel Code or ASME B31.1.

6.1.2 All other materials of construction shall be of the type specified by the user and shall conform to ASTM, ASME, or Metal Power Industry Federation material specifications. Materials not identified by the ordering data shall be of the manufacturer's standard and of the same quality used for the intended purpose in commercial practice.

6.1.3 All material incorporated in the work covered by this specification shall be new. The use of rebuilt or used products are not allowed under this specification.

6.1.4 Gaskets and seals are to be produced from a compressible elastomeric material and shall be compatible with the fluid to be transferred (see 5.1.4).

6.1.5 Materials used shall be compatible with the liquid for which the coupling is to be used and the supplier must state, upon request, the full specification of the materials of construction.

6.1.6 Attention shall be given to the selection of materials to avoid corrosion due to the use of dissimilar metals in contact giving rise to electrolytic action.

6.1.7 The possibility of seizure between sliding surfaces of similar metals shall be taken into consideration.

6.1.8 Materials selected shall be consistent with those used for a marine environment.

6.2 *Manufacture:*

6.2.1 Adapters and ~~couplers~~ couplers, tank units and hose units are to be produced as castings or ~~forgings.~~ forgings or from solid bar material. Cam handles may be produced by casting, forging, or sintered metal processes. Established commercial processing methods are to be used to produce these parts, provided chemical and physical properties are consistent with those cataloged for the specified materials.

6.2.2 Pipe threads on the service end of couplers or adapters, tank units and hose units, when specified, shall meet ASME/ANSI B2.1.

6.2.3 Flanges on the service end of couplers or adapters, tank units and hose units, when specified, shall meet ASME B16.5, B16.24, or B16.42.

6.2.4 Flanges shall be finish machined to specifications shown in MSS-SP-6.

6.2.5 Cam handles may be produced by casting, forging, or sintered metal processes. Cam handles assembled to the coupler are to have a safety locking device to ensure against the handles being opened unintentionally or vibrating open. This locking device must require a separate, deliberate effort in the opening operation over the standard handle operation.

6.2.6 Cam handles shall be manufactured to contain the adapter within the coupler under rated pressure with no leakage occurring. The cam action shall not distort the couplers rendering the coupler unusable. The force required to close the cam handles shall be adequate to prevent leakage, but shall be easily attainable through hand operation by an average strength person. Handles should not need to be hammered closed.

6.2.7 Welding procedure qualifications, welder performance qualifications, and welding materials shall be in accordance with ASME B31.1 and Section IX of the ASME Code. Brazing or soldering shall not be used. Where radiography is required (see 12.1), all welds shall be butt welds.

7. Other Requirements

7.1 All couplings shall have a maximum allowable working pressure of not less than 150 psi (1034 kPa) up to 4 in. nominal size. For 5 in. and 6 in. cam and groove couplings, the MAWP shall not be less than 75 psi (517 kPa).

7.2 Maximum allowable working pressure (MAWP) for a Standard Class coupling shall be 25 % of its burst pressure.

7.3 Maximum allowable working pressure for a Class I coupling shall be 20 % of its burst pressure.

7.4 Burst pressure shall be determined in accordance with Section VIII, Division 1, of the ASME Code.

7.5 The electrical resistance across a coupling, measured from thread to thread (or flange) with the coupling dry, shall be less than 10 Ω.

7.6 The hydrostatic test pressure for couplings shall be 1.5 times MAWP (see 11.2).

7.7 The design of DDC couplings should permit coupling and uncoupling when pressurized to 60 psi (4 bar) without excessive spillage or force.

7.8 *Pressure Drop for DDC*—The coupling shall be tested as specified over its full flow range and the pressure drop presented in graphical form.

7.9 The test fluid may be either water or kerosene. This should be clearly stated along with the density and viscosity of the fluid

7.10 The maximum flowrate shall be calculated to give a maximum velocity of 17.25 f/s (5.25 m/s) through the minimum bore of the coupling. Higher flow rates may be achieved at an increased pressure loss.

7.11 The pressure drop at 17.25 f/s (5.25 m/s) for the coupling tested with kerosene shall be less than 7.5 psi (0.5 bar).

8. Dimensions

8.1 The dimensions and tolerances required to ensure interchangeability of adapter and coupler ~~halves,~~ halves (cam and groove type), of common sizes, shall be as given in Figs. ~~3-4-15~~16.

8.2 Sizes as listed in the tables correspond to NPS for piping systems.

8.3 The dimensions and tolerances required to ensure interchangeability of tank units and hose units (DDC type), of common sizes, shall be as given in Fig. 17 and Fig. 18. Only the dimensions of the tank unit face are stated.

8.3.1 The methods of connecting the tank unit to the tank, and the hose unit to the hose are not covered by this standard.

8.3.2 The size of the coupling shall be defined by the nominal bore size of the adapter to the nearest half inch or metric equivalent of this size.

9. Workmanship, Finish, and Appearance

9.1 Couplings are to be produced with quality workmanship. Casting surface quality is to be in accordance with MSS-SP-55. Machined surfaces are to be finish machined to a 125-µin. (3175-µmm) (AA) finish or better with no porosity showing.

9.1.1 Couplings are to be free of burrs or sharp edges. Machined surfaces are to be free of nicks or scratches that may affect the sealing capabilities of the couplings.

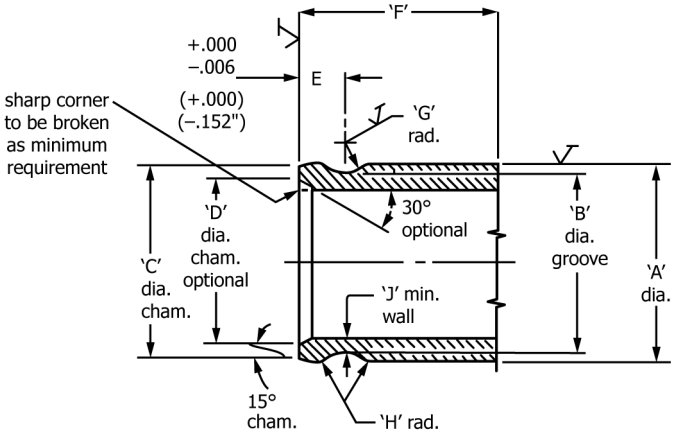
9.1.2 Surfaces are to be sound with good appearance and true pattern. Internal surfaces, if not machined, shall be smooth, as expected from good quality casting, and free from any flaw that would render the part unsafe for its intended use.

9.2 Cam handles are to be smooth, having no burrs or sharp edges. Cam closing surface is to be continuous, providing an increasing axial pull on mating adapter until proper seating against the gasket occurs.

9.3 Defective parts are not to be repaired by welding, brazing, or any other method, to fill porosity or other flaws in the casting.

9.4 Gaskets are to be produced having parallel sealing faces. Faces are not to contain any imperfections that will allow leakage to occur at working pressure.

9.5 Seals are to conform to standards appropriate to general class and usage of O-rings ISO 3601, ISO 2230 compliant.



NOTE 1—Unidentified tolerances; fractional = ±1/64 (±0.4), decimal = +0.000/–0.005 (+0.000/–0.127), angular = ±2° (±0.035 rad)

Size	Dimensions, in. (mm)								
	A	B	C	D	E	F	G	H	J
½	1.264 (32.1)	1.035 (26.3)	1 7/32 (31)	27/32 (21)	0.471 (12)	1 (25.4)	0.378 (9.6)	1/16 (1.6)	3/32 (2.4)
¾	1.264 (32.1)	1.035 (26.3)	1 7/32 (31)	31/32 (24.6)	0.471 (12)	1 (25.4)	0.378 (9.6)	1/16 (1.6)	3/32 (2.4)
1	1.446 (36.7)	1.144 (29)	1 3/8 (34.9)	1 3/32 (27.8)	0.565 (14.3)	1 5/16 (33.3)	0.378 (9.6)	3/32 (2.4)	3/32 (2.4)
1¼	1.792 (45.5)	1.388 (35.2)	1 23/32 (43.6)	1¼ (31.7)	0.690 (17.5)	1 9/16 (39.7)	0.441 (11.2)	1/8 (3)	1/8 (3)
1½	2.105 (53.4)	1.690 (42.9)	2 1/32 (51.6)	1 9/16 (39.7)	0.690 (17.5)	1 5/8 (41.3)	0.441 (11.2)	1/8 (3)	1/8 (3)
2	2.484 (63.1)	2.065 (52.4)	2 13/32 (61.1)	1 15/16 (49.2)	0.848 (21.5)	1 7/8 (47.6)	0.441 (11.2)	1/8 (3)	1/8 (3)
2½	2.985 (75.8)	2.545 (64.6)	2 7/8 (73)	2 7/16 (61.9)	0.848 (21.5)	1 15/16 (49.2)	0.441 (11.2)	1/8 (3)	5/32 (4)
3	3.604 (91.5)	3.202 (81.3)	3½ (88.9)	3 3/32 (78.6)	0.895 (22.7)	2 (50.8)	0.503 (12.8)	1/8 (3)	5/32 (4)
4	4.708 (119.6)	4.307 (109.4)	4 19/32 (116.7)	4⅛ (104.8)	0.895 (22.7)	2 1/16 (52.4)	0.503 (12.8)	1/8 (3)	7/32 (5.6)
5	5.728 (145.5)	5.312 (134.9)	5⅝ (142.9)	5⅛ (130.2)	0.897 (22.8)	2⅛ (54)	0.503 (12.8)	1/8 (3)	7/32 (5.6)
6	6.929 (176)	6.362 (161.6)	6 13/16 (173)	6 5/32 (156.4)	0.963 (24.5)	2¼ (57.1)	0.659 (16.7)	1/8 (3)	7/32 (5.6)

FIG. 34 Adapter End Dimensions

9.6 All the seals and washers shall be compatible with the liquid for which the coupling is to be employed and the supplier must state, upon request, the full specification of the materials supplied.

10. Number of Tests

10.1 A prototype coupling of each size of each particular design shall be tested to determine conformance to this specification.

10.2 Each coupling shall be tested as outlined in production testing of 11.2.

11. Test Methods

11.1 Prototype testing of each size of each particular design shall be as follows. Maintain the indicated test pressures for at least 1 min without leakage.

11.1.1 Pressure test to twice the MAWP after having been cycled (connected, closed, opened, and disconnected) three times.

11.1.2 Pressure test at MAWP while applying a moment of 1000 in.-lbs (113 N·M) to one coupling half attempting to twist it loose. Reapply MAWP after the moment is removed.