



Standard Practice for Piping System Drawing Symbols¹

This standard is issued under the fixed designation F 1000; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This practice establishes piping system drawing symbols for marine use.

1.2 This set of standard symbols is intended for use on piping system diagrammatics and arrangements for ships.

1.3 Where graphical symbols are required for an item or equipment not covered by this practice, the form and character of the symbol will be left to the discretion of the activity concerned, provided that the symbol used does not duplicate any of those contained herein, and is clearly understandable, subject to one interpretation only, or explained by a suitable note on the drawing when necessary.

1.4 Since symbolic representation does not usually involve exact or scale layout or the actual run or leads of piping, the same symbol may be used for all projections of the system (plan, elevations, and sections).

1.5 Symbols for fluid power, heating, ventilation, and air conditioning (HVAC), and Navy damage control diagrams are not included in this practice.

2. Significance and Use

2.1 Fig. 1 provides symbols for strainers, separators, and filters.

¹ This practice is under the jurisdiction of ASTM Committee F-25 on Shipbuilding and is the direct responsibility of Subcommittee F25.13 on Piping Systems.

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2.2 Fig. 2 provides symbols for valves. Valves are categorized under the following headings: globe, angle, check, ball, butterfly, gate, relief, manifolds, control, noise control, and miscellaneous.

2.3 Fig. 3 provides symbols for valve appendages such as actuators and locking devices. Symbols shown on Fig. 3 are to be combined with the appropriate symbol from Fig. 2.

2.4 Fig. 4 provides symbols for piping system-related instrumentation. These symbols are categorized under the following headings: pressure, temperature, flow, level, switches, alarms, and miscellaneous.

2.5 Fig. 5 provides symbols for fans, pumps, and turbines.

2.6 Fig. 6 provides symbols for plumbing components.

2.7 Fig. 7 provides symbols for pipe and pipe fittings.

2.8 Fig. 8 provides symbols for noise control components and designations. These symbols are generally used for submarine design.

2.9 Fig. 9 provides symbols for transitions. These symbols identify transitions such as pipe material or pipe schedule changes.

2.10 Fig. 10 provides symbols for miscellaneous components. These are components which could not be classified under the above categories. Examples include heat exchangers, flasks, and sea chests.

2.11 Fig. 11 provides symbols for grooved piping.

3. Keywords

3.1 drawing symbols; piping; piping drawings; piping symbols

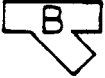
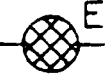
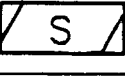
Number	Title	Symbol	Notes
1	Strainer, duplex basket type		
2	Strainer, duplex edge type		
3	Strainer, duplex magnetic		
4	Strainer, Y-type basket		
5	Strainer, Y-type edge		
6	Strainer, simplex basket type		
7	Strainer, simplex edge type		
8	Strainer, box type		
9	Strainer, basket type, steam		
10	Strainer, sea chest		To be combined with the symbol for sea chest (Fig. 10, no. 24)
11	Separator, moisture		
12	Separator, cyclone		
13	Separator, oil-water		Parallel plate type
14	Filter		

FIG. 1 Strainers, Separators and Filters

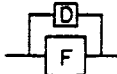
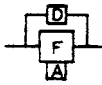
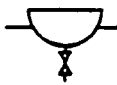
Number	Title	Symbol	Notes
15	Filter with shielded container		
16	Filter with mechanical differential pressure indicator		
17	Filter with mechanical differential pressure indicator and automatic bypass		
18	Filter, oil, cartridge type		
19	Filter, coalescing		
20	Filter, duplex		
21	Filter, charcoal		
22	Precipitator, electrostatic		
23	Centrifugal purifier		
24	Screen		Typically used on blower intake.

FIG. 1 (continued)

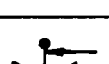
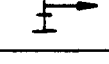
1. Globe			
Number	Title	Symbol	Notes
1.1	Valve, globe		
1.2	Valve, globe with flow control device		
1.3	Valve, globe, stop check		
1.4	Valve, globe, positive stop		
1.5	Valve, globe, combined spring-loaded exhaust and relief		
1.6	Valve, globe, Y-pattern		
1.7	Valve, globe, stop check, Y-pattern		
1.8	Valve, globe, reverse seated		
1.9	Bridgewall Note 1  Note 2		Note 1: Fluid in pipe on this side of valve is isolated from stem packing with valve shut. Note 2: Fluid in pipe on this side of valve is in contact with stem packing with valve shut.
2. Angle			
2.1	Valve, angle		
2.2	Valve, angle, bellows packless		

FIG. 2 Valves

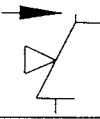
2. Angle — Continued			
Number	Title	Symbol	Notes
2.3	Valve, angle, diaphragm packless		
2.4	Valve, angle, stop check		
2.5	Valve, angle, needle or throttling		
2.6	Valve, angle, check		
2.7	Valve, angle, solenoid		"Solenoid Valve" shown as example. See Fig. 3 for other operators.
2.9	Valve, angle, with lock box		
2.10	Valve, angle, capped		
2.11	Valve, angle, ball		
2.12	Valve, angle, lift check		
3. Check			
3.1	Valve, swing check		
3.2	Valve, lift check		
3.3	Valve, vented swing check		
3.4	Valve, check, spring loaded		Include normally shut or normally open as shown on lines 11.38 or 11.39; as applicable.

FIG. 2 (continued)

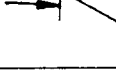
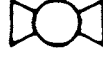
3. Check — Continued			
Number	Title	Symbol	Notes
3.5	Valve, swing check, Y-pattern		
3.6	Valve, check, hydraulic		
3.7	Valve, check, hydraulic with external loading		
3.8	Valve, check in-ball or poppet		
3.9	Valve, check, in-line ball or poppet, spring loaded		
3.10	Valve, wafer check		
3.11	Valve, check, with manual gaging provision		
3.12	Valve, check, flow limiting		
3.13	Valve, check, counterbalanced with external weights		
3.14	Valve, flapper		
3.15	Valve, check, swing, with integral orifice		This valve permits limited backflow.
4. Ball			
4.1	Valve, ball		
4.2	Valve, ball, bleed port		

FIG. 2 (continued)

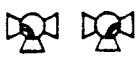
4. Ball - Continued			
Number	Title	Symbol	Notes
4.3	Valve, ball, three port		
4.4	Valve, ball, three port, normally shut		
4.5	Valve, ball, three port - showing other than normally shut		
4.6	Valve, ball, spring return		
4.7	Valve, ball check		Combination of ball and swing check.
4.8	Valve, ball, four port		
5. Butterfly			
5.1	Valve, butterfly		
5.2	Valve, butterfly, locked open		
5.3	Valve, butterfly, locked shut		
6. Gate			
6.1	Valve, gate		
6.2	Valve, gate, double disc with internal bypass		Space between discs vents to side with mark.
6.3	Valve, gate, with three-way bypass		

FIG. 2 (continued)

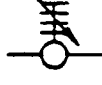
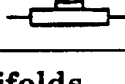
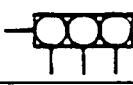
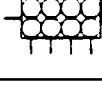
7. Pressure Relief			
Number	Title	Symbol	Notes
7.1	Valve, angle, pressure relief (self actuated)		
7.2	Valve, angle, pressure relief, differential		
7.3	Valve, angle, pilot-actuated pressure relief		
7.4	Valve, inward pressure relief, high capacity gas flow		
7.5	Valve, outward pressure relief, high capacity gas flow		
7.6	Valve, self-actuated pressure relief, globe		
7.7	Valve, pilot-actuated pressure relief, globe		
7.8	Valve, pressure relief, angle, diaphragm		
7.9	Valve, boiler safety		
7.10	Valve, relief, superheater safety, pilot actuated		
8. Manifolds			
8.1	Manifold, single row		
8.2	Manifold, double row		

FIG. 2 (continued)

8. Manifolds - Contined			
Number	Title	Symbol	Notes
8.3	Manifold, single row, stop check valves		
8.4	Manifold, double row, "●" locked shut		
8.5	Manifold, double row, "◐" stop check valves		
8.6	Manifold, single row, interlocked		
9. Control			
9.1	Valve, control, pilot actuated (increased actuating pressure closes valve)		
9.2	Valve, control, pilot actuated (increased actuating pressure opens valve)		
9.3	Valve, pressure reducing (increase of downstream pressure shuts valve)		
9.4	Valve, pressure regulating (increase of upstream pressure opens valve)		
9.5	Valve, priority (decrease of upstream pressure shuts valve)		
9.6	Valve, pressure reducing, diaphragm (increase of downstream pressure shuts valve)		

FIG. 2 (continued)

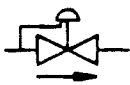
9. Control			
Number	Title	Symbol	Notes
9.7	Valve, pressure regulating, diaphragm (increase of upstream pressure opens valve)		
9.8	Valve, control, diaphragm, pilot actuated (increased actuating pressure closes valve)		
9.9	Valve, control, diaphragm, pilot actuated (increased actuating pressure opens valve)		
9.10	Valve, control, diaphragm, pilot actuated (increased actuating pressure closes valve) with check feature		
9.11	Valve, control, diaphragm, pilot actuated (increased actuating pressure opens valve) with check feature		
9.12	Valve, thermostatic expansion		
9.13	Valve, thermostatic control		
9.14	Valve, thermostatic control, three-way		
9.15	Valve, temperature control		
9.16	Valve, three-way modulating temperature control		

FIG. 2 (continued)

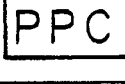
9. Control - Continued			
Number	Title	Symbol	Notes
9.17	Valve, three-way modulating (pressure sensing)		
9.18	Valve, back pressure regulator with remote sensing		
9.19	Valve, regulator, back pressure		
9.20	Valve, feedwater regulator, motor or manual operation		
9.21	Valve, boiler feedwater regulator with manual control		
9.22	Valve, compressed gas cylinder regulator		
9.23	Valve, proportioning, automatic		Two inlets, one outlet
9.24	Valve, temperature pilot control		
9.25	Valve, level pilot control		
9.26	Valve, pressure pilot control		
9.27	Valve, manual opening automatic closing		
9.28	Valve, regulated bypass		
9.29	Valve, hydraulically operated flow control w/pilot		

FIG. 2 (continued)

9. Control - Continued			
Number	Title	Symbol	Notes
9.30	Valve, globe, relief, adjustable or spring loaded, reducing		
9.31	Valve, hydraulic control, three-way		Water pressure actuates valve
9.32	Valve, micrometer		
9.33	Valve, unloading		
9.34	Valve, governor		
9.35	Valve, capacity control		
9.36	Valve, control, balanced pressure proportioning		
9.37	Valve, typical control valve, with test fitting		

FIG. 2 (continued)

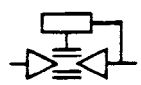
10. Noise Control			
Number	Title	Symbol	Notes
10.1	Valve, quiet throttling		In general, symbols for quiet valves are accompanied by the quiet component symbol: QC
10.2	Valve, quiet vent		
10.3	Valve, vent, quiet air throttling with shroud		
10.4	Valve, quiet reducing		
10.5	Valve, quiet reducing, pilot operated		
10.6	Valve, standard, with attached quieting orifice		
10.7	Valve, quiet automatic balancing		
10.8	Valve, quiet throttling, tank mounted		
11. Miscellaneous			
11.1	Valve, frictional throttle		
11.2	Valve, priming, float type		
11.3	Valve, needle		
11.4	Valve, three-way, two position		
11.5	Valve, gage, with test connection		

FIG. 2 (continued)

11. Miscellaneous - Continued			
Number	Title	Symbol	Notes
11.6	Valve, minimum volume vent with cap		
11.7	Valve, minimum volume drain with cap		
11.8	Valve, minimum volume vent without cap		
11.9	Valve, minimum volume drain without cap		
11.10	Valve, foot		
11.11	Valve, four way		
11.12	Valve, double ball, combination hull & backup		
11.13	Valve, combination poppet hull and ball backup		
11.14	Valve, angle, hull		
11.15	Valve, double-poppet hull and backup		
11.16	Valve, poppet, hull		
11.17	Valve, angle, ball, hull		

FIG. 2 (continued)

11. Miscellaneous - Continued			
Number	Title	Symbol	Notes
11.18	Valve, diaphragm, packless		
11.19	Valve, petcock		
11.20	Valve, cock stop		
11.21	Valve, cock stop, plug or cylinder, three-way, two-port		
11.22	Valve, cock stop, plug or cylinder, four-way, two-port		
11.23	Valve, demand regulator		
11.24	Valve, angle, sentinel		
11.25	Valve, drain regulator, float-operated, with gage glass and vent		
11.26	Valve, vent/drain		
11.27	Valve, throttle trip		
11.28	Valve, pilot, four-way		
11.29	Valve, automatic shutoff		
11.30	Valve, salvage hull, with capped salvage hose connection		

FIG. 2 (continued)

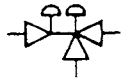
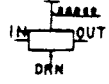
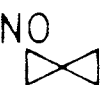
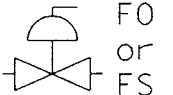
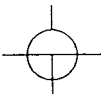
11. Miscellaneous — Continued			
Number	Title	Symbol	Notes
11.31	Valve, ship's whistle control		
11.32	Valve, diaphragm, hand expansion		
11.33	Valve, vacuum breaker		
11.34	Valve, fueling or defueling		
11.35	Valve, manipulating, four-way, three-position		
11.36	Valve, manipulating, three-way		
11.37	Valve, rotary, solenoid-operated with manual override		This valve is also referred to as: "Solenoid Operated Pilot Valve" (SOPV). May have two outlet ports.
11.38	Valve, normally shut		Global valve shown for example.
11.39	Valve, normally open		Global valve shown for example.
11.40	Valve, fails open (FO) or fails shut (FS). Control valve shown for example.		
11.41	Cock, stop, plug or cylinder, four-way, three-port		
11.42	Foot valve special		

FIG. 2 (continued)