Designation: F1030 – 86 (Reapproved 2023)

An American National Standard

Standard Practice for Selection of Valve Operators[1]

This standard is issued under the fixed designation F1030; 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 practice provides guidance in the selection of manual and power-actuated valve operators.

1.2 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.

1.3 *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.*

1.4 *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 *ASME Standards:*[2]

B16.5 Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard

3. List of Valve Operator Types

3.1 *Manual Operators:*
3.1.1 Handwheels.
3.1.2 Tee-wrenches.

3.2 *Electric Operators:*
3.2.1 Stem Nut Driven.
3.2.2 Handwheel Driven.

3.3 *Pneumatic Operators:*
3.3.1 Stem Nut Driven.
3.3.2 Handwheel Driven.

3.4 *Hydraulic Operators:*
3.4.1 Stem Nut Driven.
3.4.2 Handwheel Driven.

4. General Requirements

4.1 General requirements apply to all types of valve operators.

4.2 Operating terminals shall be accessible during all service conditions but shall not constitute an obstruction in working spaces.

4.3 Valve controls that are not immediately identifiable as to service shall be fitted with name plates.

4.4 Valve operating stations shall be fitted with a valve position indicator unless valve position is obvious for the service intended (full open or full closed), or valve is classified damage control smaller than 1½ in. (38.1 mm).

4.5 Positioning of the valve by either the local or remote actuators shall not void the ability of any other actuator to position the valve.

4.6 All valves, regardless of size, shall be readily operable by one man in a reasonable and limited time period, either through a manual or power-actuated valve operator.

5. Manual Valve Operators

5.1 Material for handwheels and tee-wrenches for casualty or damage control shall be either malleable iron, ductile iron, or steel.

5.2 Portable valve wrenches shall be labeled and stored near the valve operating station. Valve operating wrenches shall fit and turn (to open and close) deckbox operator covers.

5.3 Valves shall be located to prevent the necessity for ratchet wrenches wherever possible. Ratchet wrenches are, however, permitted where valve location prevents complete wrench rotation.

5.4 Handwheel diameter and tee-wrench handle length, based on the system torque at the operating station, is presented in Table 1.

6. Requirements for Power-Actuated Valve Operators

6.1 Requirements for power-actuated operators apply to electric, pneumatic, and hydraulic valve operators.

[1] This practice 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 American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, http://www.asme.org.

TABLE 1 Handwheel Diameters and Tee-Wrench Handle Lengths

Torque, lbf·ft	Tee-Wrench Handle Length, in. (mm)	Handwheel Diameter, in. (mm)
7.5	10 (254)	2 (50.8)
12.3	10 (254)	3 (76.2)
17.7	10 (254)	4 (101.6)
23.3	10 (254)	5 (127.0)
29.5	10 (254)	6 (152.4)
35.3	12 (304.8)	7 (177.8)
41.3	12 (304.8)	8 (203.0)
47.6	20 (508)	9 (228.6)
54.2	20 (508)	10 (254.0)
61.0	20 (508)	11 (279.4)
67.5	20 (508)	12 (304.8)
80.5	20 (508)	14 (355.6)
94.0	20 (508)	16 (406.4)
108.0	. . .	18 (457.2)
128.6	. . .	21 (533.4)
150.0	. . .	24 (609.6)
168.8	. . .	27 (685.8)
187.5	. . .	30 (762.0)
225.0	. . .	36 (914.4)

TABLE 2 Hydraulic Pump Schedule

Number of Pumps, min	Number of Valves Operated, max
1	5
2	10
3	20
4	30
5	40

6.2 All power-actuated valves, except for valves within tanks, shall have a means for local, manual operation. Manual operation shall override power operation of the valve. Stem nut driven electric, pneumatic, and hydraulic operators shall return to the power mode after manual reset.

6.3 To prevent personnel injury during remote actuation of the valve, the manual handwheel shall be either the solid disk type, or it shall have a spoke cover plate or handwheel enclosure, or it shall disengage so that it does not rotate.

6.4 Valve actuators in critical systems may be provided with an energy storage system with sufficient capacity to cycle the valve once (from the initial position to the opposite and return).

7. Electric Valve Operators

7.1 The valve operator shall be powered by the ship's service power system. Critical valve operators may be additionally powered by an emergency power system.

7.2 Handwheel acting operators shall consist of the electric motor, gearing, limit and torque switches, reversing starter and pilot lights, and permanently mounted handwheel to form a complete self-contained unit to be mounted directly on the valve or through a reach rod transmission with flanges in accordance with ASME B16.5.

7.2.1 Renewable stem nuts shall be provided for stem acting operators instead of the permanently mounted handwheels.

7.3 The operator shall be suitable for marine service rated for the ambient temperature in which it will operate. For weather deck applications 104 °F (40 °C) is considered standard. For machinery spaces 122 °F (50 °C) is standard.

7.4 The motor shall be one of the following:

7.4.1 *Single Phase,* 115 Vac, capacitor start, capacitor run or,

7.4.2 *Three Phase,* 460 Vac.

7.4.3 Both types shall have insulation of Class B or Class F with Class B temperature rise. The motor shall have built-in thermal and overload protection.

7.5 The operator shall transmit power from the motor to the valve stem, valve handwheel, or reach rod transmission system through a bevel gear, worm gear, or planetary gear system. Ball or roller bearings shall be used throughout.

7.6 The gear system shall not permit backdrive through the operator upon interruption of electric power.

7.7 The closing and opening operation shall be regulated by means of a travel-activated device and a torque-activated device as a backup.

7.8 The operator enclosure shall be explosion proof and submersible, with submersible electric connections where service conditions dictate.

8. Pneumatic Valve Operators

8.1 Position indication of pneumatic-actuated valves shall be accomplished by a self-indicating air cock and a pressure gage or other acceptable means installed in the actuating line as close to the control board as possible.

8.2 Systems with a maximum allowable working pressure in excess of 150 lb/in.^{2} (10.3 bar) shall be designed with a surge tank or other acceptable means of pulsation dampening.

8.3 The system shall be designed so that proper functioning of any unit shall not be affected by back pressure in the system.

8.4 Suitable drains shall be provided at low points of piping systems.

9. Hydraulic Valve Operators

9.1 Each hydraulic operating system shall be self-contained including the necessary piping and a reservoir tank for the operating fluid. Back pressure in the system shall not effect the proper functioning of any system component.

9.2 Systems using hydraulic motors shall have a design pressure of sufficient magnitude for the intended use.

9.3 Systems with piston- or diaphragm-type hydraulic operators shall have a design pressure equal to the design pressure of the piston or diaphragm and shall have relief valve protection.

9.4 The hydraulic fluid used shall have a flashpoint of not less than 199.4 °F (93 °C) for pressures below 150 lb/in.^{2} (10.3 bar) and 316.4 °F (158 °C) for pressures of 150 lb/in.^{2} and above.

9.5 The hydraulic fluid shall be suitable for operation of the system through the entire temperature range to which it may be subjected in service.