Designation: F1020 – 86 (Reapproved 2022)

An American National Standard

Standard Specification for Line-Blind Valves for Marine Applications[1]

This standard is issued under the fixed designation F1020; 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 provides the minimum requirements for design fabrication, pressure rating, and testing for line-blind valves.

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 The following safety hazards caveat pertains only to the test methods portion, Section 5, of 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.*

1.4 *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 *ASTM Standards:*[2]

A53/A53M Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

2.2 *ANSI Standards:*[3]

B16.5 Pipe Flanges and Flanged Fittings, Steel-Nickel Alloy and Other Special Alloys

B31.1 Power Piping

2.3 *MSS Standards:*[4]

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

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

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

2.4 *ASME Standards:*[5]

ASME Boiler and Pressure Vessel Code Sections II, VIII, IX

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *blank, n*—a solid one-piece circular unit inserted into a pipeline to prevent flow.

3.1.2 *line-blind valve, n*—an assembly consisting of a spectacle plate, bolting, and body, the purpose of which is to provide a convenient means to align a piping system to an open or positively closed configuration. The assembly is designed to provide a simplified method of changing over the flow control spectacle plate without the necessity of plate removal from the valve body.

3.1.3 *spectacle plate (also spectacle blind), n*—a figure-eight-shaped unit with one end open for flow and the other solid to prevent flow.

4. Materials and Manufacture

4.1 *Materials:*

4.1.1 Materials for spectacle plates, bolting, and body shall be those contained in ASME Section II. For the purpose of stress calculations, ASME Section VIII values shall be used.

4.1.2 All welding shall be done with procedures and welders qualified in accordance with ASME Section IX and 80 % weld efficiency factor shall be used.

4.1.3 All castings shall be visually inspected and acceptable in accordance with MSS-SP-55.

[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] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[4] 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.

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

4.2 *Manufacture:*

4.2.1 The spectacle plate shall be designed in accordance with ANSI B31.1, Paragraph 104.5.3.

4.2.2 The calculations of 4.2.3 and 4.2.4 shall ensure that a line blind is designed for the gasket material, of all that can be used with the line blind being designed, that imposes the most critical bolt-load conditions as a result of its gasket factor, *m*, and gasket or joint-contact-surface unit seating load, *y*.

4.2.3 The bolting shall be either of the following:

4.2.3.1 Modify the external loads in accordance with Section 6 as determined using ASME Section VIII, Division 1, Appendix 2.

4.2.3.2 The equivalent in cross section to that of ANSI B16.5 flange bolting of equivalent nominal size and pressure.

4.2.3.3 In no case shall bolts have a nominal diameter less than ½ in. (12.7 mm).

4.2.3.4 The material class shall be an approved ANSI B16.5 material or equal in tensile strength.

4.2.3.5 Cast bolting shall be X-rayed or have an 80 % efficiency factor applied.

4.2.4 The body shall be calculated using ASME Section VIII, Division 1, Appendix 2, with consideration for the size and material of bolting in the appendix, the bolt load satisfying Note 2 of Paragraph 2–5 of Appendix 2.

4.2.5 The spectacle plate and mating body facings shall be in accordance with MSS-SP-6.

5. Testing

5.1 Each valve body shall be hydrostatically tested to the shell test pressure in accordance with ANSI B16.5, Table 3. A valve supplied to the WOG standard shall be tested up to the nearest ANSI Class.

5.2 Each valve shall be tested for leakage at pressure 1.5 times the cold water rating of the valve rounded upward to the next higher 25 psi (170 kPa) increment. Acceptance criteria shall be that no leakage occurs during a 10 min "hold time" at pressure.

6. Calculations

6.1 Bolting calculations from ASME Section VIII, Division 1, Appendix 2, shall be modified to account for an externally applied load as a result of piping. Add to the minimum required bolt load for the operating conditions, W_{m1}, an external moment bolt load, H_x, such that the modified total cross-sectional area of the bolts shall be as follows:

$$A'_{m1} = (W_{m1} + H_x)/S_b$$

where:

$H_x = SZ/d_b$,

$Z = \Pi((D_o^4 - D_i^4)/D_o)/32$,

$D_i = D_o - 2t_p$,

$t_p = PD_o/(2(0.875)(S))$, but not less than 0.25 in. (6.4 mm), and

$d_b = C/\Pi + 2((G_o^3 - G_i^3)/(G_o^2 - G_i^2))3\Pi$.

6.1.1 All terms are identical to those defined in ASME Section VIII, Appendix 2, with the addition of the following:

6.1.1.1 A'_{m1} = modified total cross-sectional area of bolts at root of thread or section of least diameter under stress, required for the operating conditions, square inch (square millimetre).

6.1.1.2 H_x = external moment of bolt load, lbf (N).

6.1.1.3 0.875 = assumed pipe wall tolerance factor.

6.1.1.4 S = ASME allowable stress of the pipe material at design temperature, psi (kPa) (for purposes of meeting this specification, 15 000 psi (103.4 MPa) from Specification A53/A53M, Grade B, Type *S* shall be acceptable).

6.1.1.5 Z = section modulus of pipe shell, cubic inches (cubic millimetres).

6.1.1.6 D_o = nominal outside diameter of pipe, inches (millimetres).

6.1.1.7 D_i = calculated inside diameter of pipe, inches (millimetres).

6.1.1.8 t_p = calculated pipe wall thickness, inches (millimetres).

6.1.1.9 d_b = moment arm of external moment on bolts and gasket, inches (millimetres).

6.1.1.10 G_o = outside diameter of contact surface of gasket, inches (millimetres).

6.1.1.11 G_i = inside diameter of contact surface of gasket, inches (millimetres).

6.2 The selection of bolts to be used shall be made such that the actual total cross-sectional area of bolts, A_b, will not be less than A_m, where A_m is taken as the greater of A'_{m1} and A_{m2}.

7. Product Marking

7.1 Each valve must have the following markings in accordance with MSS-SP-25:

7.1.1 Manufacturer's name and trademark.

7.1.2 Appropriate pressure class.

7.1.3 Size of end connection.

7.1.4 ASTM designation of materials.

7.1.5 ASTM designation and year of issue of this specification.

8. Keywords

8.1 blind valve; line-blind valve; marine technology; piping system; ship; valve