

**American Water Works Association**

**AWWA STANDARD**  
*for*  
**METAL-SEATED BUTTERFLY VALVES**

This "Standard for Metal-Seated Butterfly Valves" is based upon the best known experience. Torque requirements for operation increase rapidly with increase in velocity. In specifying valves to be purchased under this standard, care must be exercised by the responsible engineer to ascertain that operating conditions fall within the scope of the standard.

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**Prepared by Committee 8531 D**

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### Latest Revisions to C505

A number of revisions to C505 were approved Sep. 16, 1957; shortly thereafter, on Jan. 26, 1958, the document was made Standard without further change. The revisions include the addition of Sec. 4.3, together with several changes in Sec. 12. These revisions have been incorporated in the fifth and later printings of this standard. All earlier printings are obsolete.

*Designation.* The former designation, "C505-55T," has been changed to "C505-58."

**This printing contains all the revisions and changes referred to above.**

## AWWA Standard for Metal-Seated Butterfly Valves

### Sec. 1—Scope

1.1. This standard covers cast-iron and steel, flanged-end, bell end, and mechanical-joint end metal-seated butterfly valves 3–72 in. in size, for maximum shutoff pressures and line velocities as indicated in Table 1, together with torque requirements for operation. The valves specified are suitable for frequent operation, operation after long periods of idleness, and operation in a throttled position in water lines.

1.2. This standard covers valves designed for the shutoff pressure indicated in Table 1. Valves in each class shall be designed for opening and closing against the shutoff pressure specified with pipeline velocities not exceeding the velocity specified for each class. (Pipeline velocity is defined as water flow, in cubic feet per second, divided by internal area of pipe in square feet.)

### Sec. 2—Information to Be Supplied by Purchaser

In placing orders for valves to be manufactured in accordance with this standard, purchasers should specify the following details:

- 2.1. Designation of AWWA standard applying.
- 2.2. Size of valve.
- 2.3. Class of valve.
- 2.4. Kind of end—flanged, bell, or mechanical joint.
- 2.5. Quantity required.
- 2.6. Whether records of tests are to be furnished as specified under Sec. 5.3 of this standard.
- 2.7. Type of operation required; that is, electric motor, air cylinder,

water cylinder, oil cylinder, or manual. If electric operation, power characteristics for motor; if cylinder operation, medium available (air, water, or oil) and minimum and maximum pressure available for cylinder actuation.

2.8. Time of operation (unless otherwise specified, power-operated valves shall operate from full-open to full-closed position, or vice versa, in approximately 60 sec).

### Sec. 3—Data to Be Furnished by Bidder

3.1. The bidder shall furnish certified drawings and material specifications of the equipment he is proposing to supply. The drawings shall show valve port diameter and shall be in sufficient detail to show that the equipment proposed meets the specifications of the purchaser.

3.2. When required, the bidder shall furnish a statement of the total net assembled weight for each valve.

### Sec. 4—Data to Be Furnished by Manufacturer

4.1. When required, the manufacturer shall submit, for approval by the purchaser, three sets of certified drawings showing the principal dimensions, general construction, and materials used for all parts of the valve. All work shall be done and all valves shall be furnished in accordance with these certified drawings after they have been approved by the purchaser.

4.2. The manufacturer shall furnish certification of tests, if required.

4.3. On the purchaser's request, the manufacturer, the vendor, or the contractor (as may be appropriate) shall furnish a sworn certificate of full compliance with this standard.

### Sec. 5—Materials

5.1. *General.* All materials designated hereinafter, when used in valves produced under this standard shall conform to the requirements designated

TABLE 1  
*Classes of Valves*

| Sizes<br><i>in.</i> | Velocity— <i>fps</i> |          |          |          | Free<br>Discharge | Shutoff<br>Pressure<br><i>psi</i> |
|---------------------|----------------------|----------|----------|----------|-------------------|-----------------------------------|
|                     | 16                   | 25       | 35       | 60       |                   |                                   |
|                     | Class                |          |          |          |                   |                                   |
| 24–72               | M–25–16              | M–25–25  | M–25–35  |          | M–25–F            | 25                                |
| 24–72               | M–50–16              | M–50–25  | M–50–35  |          | M–50–F            | 50                                |
| 3–72                | M–100–16             | M–100–25 | M–100–35 | M–100–60 | M–100–F           | 100                               |
| 3–72                | M–150–16             | M–150–25 | M–150–35 | M–150–60 | M–150–F           | 150                               |
| 3–24                | M–200–16             | M–200–25 | M–200–35 | M–200–60 | M–200–F           | 200                               |

TABLE 2  
*Valve Body Length*

| Valve Size<br><i>in.</i> | Flanged—Face to Face— <i>in.</i> |                    |         | Bell End or Mechanical Joint—<br>Overall Length— <i>in.</i> |                   |
|--------------------------|----------------------------------|--------------------|---------|-------------------------------------------------------------|-------------------|
|                          | Class of Valve                   |                    |         |                                                             |                   |
|                          | 25 psi                           | 50,* 100 & 150 psi | 200 psi | 25 psi                                                      | 50, 100 & 150 psi |
| 3                        |                                  | 5½                 | 6       |                                                             | 10½               |
| 4                        |                                  | 6                  | 7       |                                                             | 12                |
| 6                        |                                  | 7                  | 8       |                                                             | 13                |
| 8                        |                                  | 8                  | 10      |                                                             | 13¾               |
| 10                       |                                  | 9                  | 11      |                                                             | 14½               |
| 12                       |                                  | 10                 | 13      |                                                             | 15½               |
| 14                       |                                  | 12                 | 15      |                                                             | 17¼               |
| 16                       |                                  | 13                 | 16      |                                                             | 18                |
| 18                       |                                  | 14                 | 17      |                                                             | 19                |
| 20                       |                                  | 16                 | 19      |                                                             | 20½               |
| 24                       | 13                               | 18                 | 21      | 17                                                          | 22                |
| 30                       | 15                               | 21                 |         | 20                                                          | 26                |
| 36                       | 17                               | 25                 |         | 21                                                          | 29                |
| 42                       | 19                               | 28                 |         | 24                                                          | 33                |
| 48                       | 21                               | 31                 |         | 25½                                                         | 35½               |
| 54                       | 23                               | 35                 |         | 28                                                          | 40                |
| 60                       | 26                               | 39                 |         | 31                                                          | 44                |
| 66                       | 27                               | 42                 |         |                                                             |                   |
| 72                       | 29                               | 44                 |         |                                                             |                   |

\* 50 psi applies only to sizes 24 in. and larger.

below for each material listed. When reference is made to American Standards Assn. (ASA), American Society for Testing Materials (ASTM), and other standards as may be stipulated, the latest revision thereof shall apply.

**5.2. Physical and chemical properties.** The requirements of ASA, ASTM, or other standards to which reference is made elsewhere in this text shall govern the physical and chemical characteristics of the valve components.

**5.3. Tests.** Whenever valve components are to be made in conformance with ASA, ASTM, or other standards that include test requirements or testing procedures, such requirements or procedures shall be met by the valve manufacturer. The records of such tests shall, if required by the purchaser, be made available to him.

### Sec. 6—Valve Bodies

6.1. Bodies of all valves shall have two hubs for shaft bearings, integral with the valve bodies.

6.2. Valves specified with flanged ends shall have a drilling layout and flange thickness in accordance with the following:

| Valve Class<br>psi | Drilling Layout Standard               |
|--------------------|----------------------------------------|
| 25, 50, 100, 150   | ASA B16.1 (125-psi cast-iron fittings) |
| 200                | ASA B16b (250-psi cast-iron fittings)  |

All flanges shall have full-drilled holes.

6.3. Valves specified with bell ends shall have bells in accordance with AWWA C100.

6.4. Valves specified with mechanical-joint ends shall have ends in accordance with ASA A21.11 (AWWA C111).

6.5. Valves shall have face-to-face dimensions as specified in Table 2.

6.6. Minimum body thickness shall be in accordance with Table 3.

6.7. Unless otherwise specifically requested by the purchaser, bodies of all valves shall be of either cast iron (ASTM A126, Class B) or cast steel (ASTM A27).

### Sec. 7—Valve Shafts

7.1. All valve shafts shall be of a one-piece unit extending completely through the valve disc.

TABLE 3  
*Minimum Body Shell Thickness*

| Valve Size<br>in | Thickness—in.  |                       |                |
|------------------|----------------|-----------------------|----------------|
|                  | Class of Valve |                       |                |
|                  | 25 psi         | 50,* 100 &<br>150 psi | 200 psi        |
| 3                |                | $\frac{1}{2}$         | $\frac{3}{4}$  |
| 4                |                | $\frac{1}{2}$         | $\frac{3}{4}$  |
| 6                |                | $\frac{5}{8}$         | $\frac{3}{4}$  |
| 8                |                | $\frac{5}{8}$         | 1              |
| 10               |                | $\frac{3}{4}$         | 1              |
| 12               |                | $\frac{7}{8}$         | 1              |
| 14               |                | $\frac{7}{8}$         | $1\frac{1}{4}$ |
| 16               |                | 1                     | $1\frac{1}{4}$ |
| 18               |                | $1\frac{1}{8}$        | $1\frac{1}{2}$ |
| 20               |                | $1\frac{1}{8}$        | $1\frac{1}{2}$ |
| 24               | $\frac{3}{4}$  | $1\frac{1}{4}$        | $1\frac{3}{4}$ |
| 30               | 1              | $1\frac{1}{2}$        |                |
| 36               | 1              | $1\frac{1}{2}$        |                |
| 42               | $1\frac{1}{2}$ | $1\frac{3}{8}$        |                |
| 48               | $1\frac{3}{8}$ | 2                     |                |
| 54               | $1\frac{1}{2}$ | $2\frac{1}{4}$        |                |
| 60               | $1\frac{1}{2}$ | $2\frac{1}{2}$        |                |
| 66               | $1\frac{5}{8}$ | $2\frac{1}{2}$        |                |
| 72               | $1\frac{3}{4}$ | $2\frac{3}{4}$        |                |

\* 50 psi applies only to sizes 24 in. and larger.

7.2. All valve shafts shall have a minimum diameter extending through the valve bearings and into the valve disc, as specified in Table 4.

7.3. The valve shafts shall be securely attached to the valve disc by means of keys, dowel pins, taper pins, or any combination of the three. The connection between the shaft and disc