

# KEYSTONE

- 221 - Wafer style resilient seated butterfly valve
- 222 - Lugged style resilient seated butterfly valve
- Molded-in Seat Design

## Features and Benefits

- Molded-in resilient seat provides bubble-tight shutoff to 250 psi.
- Offered in two body styles: wafer and lug. The lugged body is drilled and tapped for isolation and removal of downstream piping at full rated pressure.
- Round, polished disc and hub edge provides 360 degree concentric seating, minimum flow restriction, lower torques and longer seat life.
- Upper and lower inboard bronze bearings ensure longer service life with low operating torques.
- Thru-stem design provides high strength and positive disc control with standardized end connection for operator interchangeability.
- Extended neck allows adequate clearance for flanges and insulation.
- Bidirectional, self-adjusting stem seal, located in the upper journal, is suitable for vacuum and pressure while also preventing external contamination of the stem area.
- Heavy-duty corrosion resistant top bushing, located in the upper journal, absorbs actuator side thrust.
- Cast-in top plate is an integral part of the body and is standardized to allow direct mounting of all Tyco actuators.
- Each valve is factory tested to 110 percent of specified pressure rating.



## General Application

Heating, ventilation, air conditioning and general industrial services.

## Technical Data

|                     |                                      |
|---------------------|--------------------------------------|
| Size Range:         | 2" thru 12"                          |
| Styles:             | 221 - wafer style<br>222 - lug style |
| Pressure Rating:    | 250 psi                              |
| Bidirectional       |                                      |
| Dead End Rating:    | 250 psi                              |
| Temperature Rating: | -40°F thru +250°F                    |
| Flange              |                                      |
| Accommodation:      | ASME 125/150                         |



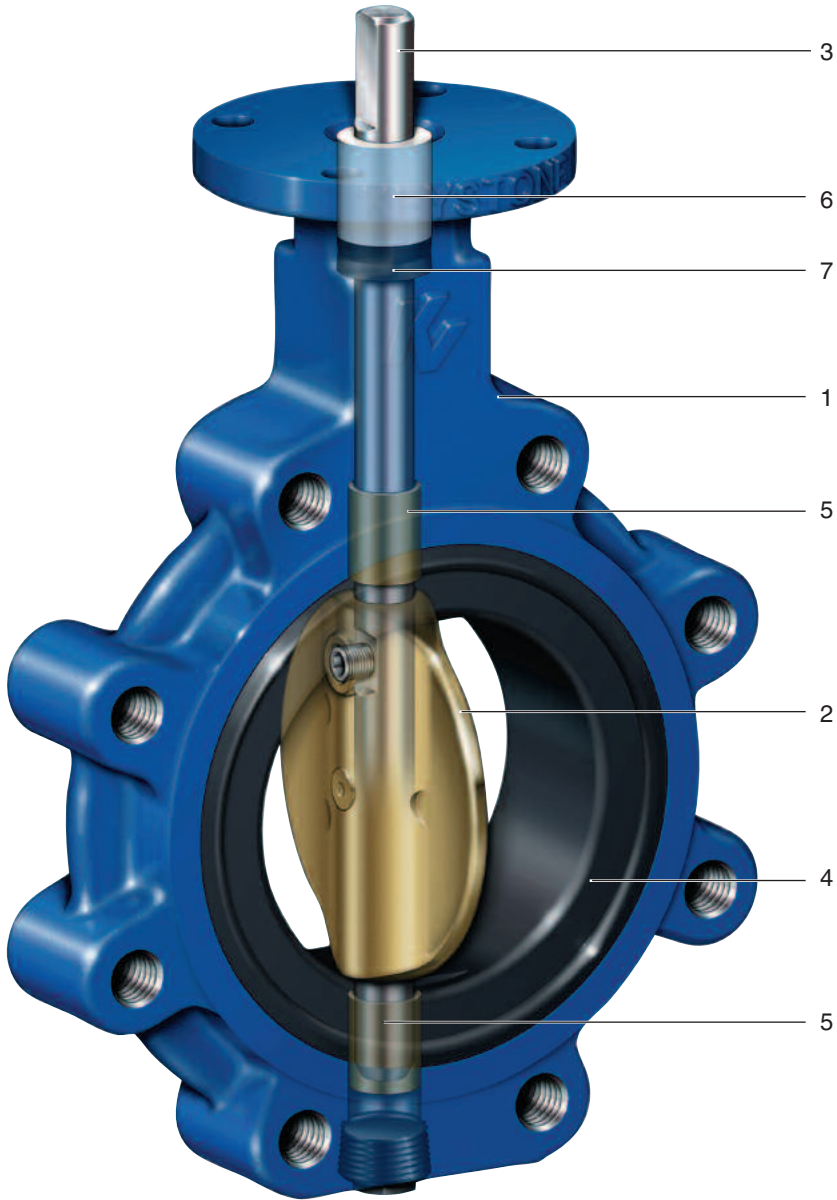
Total Flow Control Solutions™

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# Keystone Butterfly Valves - Figure 221/222

2" thru 12"

## Materials



## Materials

| Part                | Material        | Material Standards           |
|---------------------|-----------------|------------------------------|
| 1. Body             | Cast Iron       | ASTM A126 Class B            |
| 2. Disc             | 304 SS          | ASTM A351 Grade CF8          |
|                     | Aluminum Bronze | ASTM B148 UNS C95200 Grade A |
|                     | 316 SS          | ASTM A743 Grade CF8M         |
| 3. Stem             | 416 SS          | ASTM A582<br>UNS S41600      |
| 4. Molded-in liner  | EPDM<br>NBR     |                              |
| 5. Inboard bearings | Bronze          |                              |
| 6. Upper bushing    | Polyester       |                              |
| 7. Upper stem seal  | NBR             |                              |

Dimensions

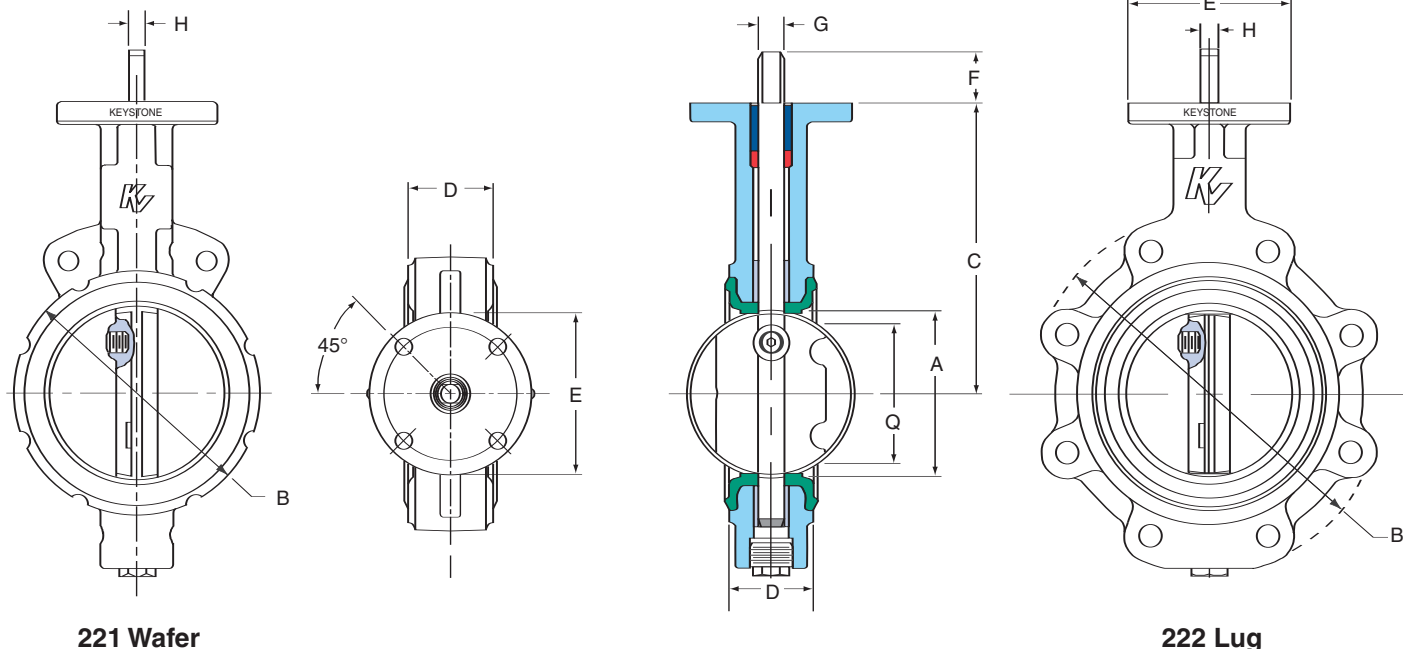


Figure 221 Dimensions (inches)

| Size                          | A                                | B                                | C                               | D                               | Q                               | E | F                             | G                              | H                              | Key   | Top Plate Drilling            |           |                                | Weight (lbs.) | Adapt. Code |
|-------------------------------|----------------------------------|----------------------------------|---------------------------------|---------------------------------|---------------------------------|---|-------------------------------|--------------------------------|--------------------------------|---|-------------------------------|-----------|--------------------------------|---------------|-------------|
|                               |                                  |                                  |                                 |                                 |                                 |   |                               |                                |                                |   | Bolt Circle                   | No. Holes | Hole Diam.                     |               |             |
| 2                             | 2 <sup>1</sup> / <sub>16</sub>   | 4 <sup>1</sup> / <sub>8</sub>    | 5 <sup>5</sup> / <sub>16</sub>  | 1 <sup>11</sup> / <sub>16</sub> | 1 <sup>3</sup> / <sub>8</sub>   | 4 | 1 <sup>1</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>8</sub>  | N/A   | 3 <sup>1</sup> / <sub>4</sub> | 4         | 7 <sup>1</sup> / <sub>16</sub> | 7.7           | BAB         |
| 2 <sup>1</sup> / <sub>2</sub> | 2 <sup>9</sup> / <sub>16</sub>   | 4 <sup>5</sup> / <sub>8</sub>    | 5 <sup>15</sup> / <sub>16</sub> | 1 <sup>13</sup> / <sub>16</sub> | 2                               | 4 | 1 <sup>1</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>8</sub>  | N/A   | 3 <sup>1</sup> / <sub>4</sub> | 4         | 7 <sup>1</sup> / <sub>16</sub> | 8.8           | BAB         |
| 3                             | 3 <sup>1</sup> / <sub>16</sub>   | 5 <sup>3</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>  | 1 <sup>13</sup> / <sub>16</sub> | 2 <sup>5</sup> / <sub>8</sub>   | 4 | 1 <sup>1</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>8</sub>  | N/A   | 3 <sup>1</sup> / <sub>4</sub> | 4         | 7 <sup>1</sup> / <sub>16</sub> | 10.2          | BAB         |
| 4                             | 4 <sup>1</sup> / <sub>16</sub>   | 6 <sup>3</sup> / <sub>8</sub>    | 7 <sup>1</sup> / <sub>8</sub>   | 2 <sup>1</sup> / <sub>16</sub>  | 3 <sup>11</sup> / <sub>16</sub> | 4 | 1 <sup>1</sup> / <sub>4</sub> | 5 <sup>8</sup> / <sub>16</sub> | 7 <sup>1</sup> / <sub>16</sub> | N/A   | 3 <sup>1</sup> / <sub>4</sub> | 4         | 7 <sup>1</sup> / <sub>16</sub> | 16.9          | BAC         |
| 5                             | 5 <sup>1</sup> / <sub>16</sub>   | 7 <sup>3</sup> / <sub>8</sub>    | 7 <sup>11</sup> / <sub>16</sub> | 2 <sup>1</sup> / <sub>4</sub>   | 4 <sup>3</sup> / <sub>4</sub>   | 4 | 1 <sup>1</sup> / <sub>4</sub> | 3 <sup>4</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub>  | N/A   | 3 <sup>1</sup> / <sub>4</sub> | 4         | 7 <sup>1</sup> / <sub>16</sub> | 19.9          | BAD         |
| 6                             | 5 <sup>13</sup> / <sub>16</sub>  | 8 <sup>1</sup> / <sub>2</sub>    | 8 <sup>5</sup> / <sub>16</sub>  | 2 <sup>1</sup> / <sub>4</sub>   | 5 <sup>9</sup> / <sub>16</sub>  | 4 | 1 <sup>1</sup> / <sub>4</sub> | 3 <sup>4</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub>  | N/A   | 3 <sup>1</sup> / <sub>4</sub> | 4         | 7 <sup>1</sup> / <sub>16</sub> | 25.3          | BAD         |
| 8                             | 7 <sup>13</sup> / <sub>16</sub>  | 10 <sup>11</sup> / <sub>16</sub> | 9 <sup>1</sup> / <sub>2</sub>   | 2 <sup>3</sup> / <sub>8</sub>   | 7 <sup>3</sup> / <sub>4</sub>   | 6 | 1 <sup>1</sup> / <sub>4</sub> | 7 <sup>8</sup> / <sub>16</sub> | 5 <sup>8</sup> / <sub>16</sub> | N/A   | 5                             | 4         | 9 <sup>1</sup> / <sub>16</sub> | 40.5          | CAE         |
| 10                            | 9 <sup>13</sup> / <sub>16</sub>  | 13                               | 10 <sup>7</sup> / <sub>8</sub>  | 2 <sup>11</sup> / <sub>16</sub> | 9 <sup>3</sup> / <sub>4</sub>   | 6 | 2                             | 1 <sup>1</sup> / <sub>8</sub>  | N/A                            | 1 <sup>1</sup> / <sub>4</sub> x 1 <sup>1</sup> / <sub>4</sub> | 5                             | 4         | 9 <sup>1</sup> / <sub>16</sub> | 61.1          | CAF         |
| 12                            | 11 <sup>13</sup> / <sub>16</sub> | 14 <sup>13</sup> / <sub>16</sub> | 12 <sup>1</sup> / <sub>4</sub>  | 3 <sup>1</sup> / <sub>8</sub>   | 11 <sup>3</sup> / <sub>4</sub>  | 6 | 2                             | 1 <sup>1</sup> / <sub>8</sub>  | N/A                            | 1 <sup>1</sup> / <sub>4</sub> x 1 <sup>1</sup> / <sub>4</sub> | 5                             | 4         | 9 <sup>1</sup> / <sub>16</sub> | 82.7          | CAF         |

Figure 222 Dimensions (inches)

| Size                          | A                                | B                                | C                               | D                               | Q                               | E | F                             | G                              | H                              | Key   | Top Plate Drilling            |           |                                | Tapped Lug Data                |           |   | Weight (lbs.) | Adapt. Code |
|-------------------------------|----------------------------------|----------------------------------|---------------------------------|---------------------------------|---------------------------------|---|-------------------------------|--------------------------------|--------------------------------|---|-------------------------------|-----------|--------------------------------|--------------------------------|-----------|---|---------------|-------------|
|                               |                                  |                                  |                                 |                                 |                                 |   |                               |                                |                                |   | Bolt Circle                   | No. Holes | Hole Diam.                     | Bolt Circle                    | No. Holes | Tap                                       |               |             |
| 2                             | 2 <sup>1</sup> / <sub>16</sub>   | 4 <sup>3</sup> / <sub>4</sub>    | 5 <sup>5</sup> / <sub>16</sub>  | 1 <sup>11</sup> / <sub>16</sub> | 1 <sup>3</sup> / <sub>8</sub>   | 4 | 1 <sup>1</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>8</sub>  | N/A   | 3 <sup>1</sup> / <sub>4</sub> | 4         | 7 <sup>1</sup> / <sub>16</sub> | 4 <sup>3</sup> / <sub>4</sub>  | 4         | 5 <sup>8</sup> / <sub>16</sub> -11 UNC-2B | 9.0           | BAB         |
| 2 <sup>1</sup> / <sub>2</sub> | 2 <sup>9</sup> / <sub>16</sub>   | 5 <sup>1</sup> / <sub>4</sub>    | 5 <sup>15</sup> / <sub>16</sub> | 1 <sup>13</sup> / <sub>16</sub> | 2                               | 4 | 1 <sup>1</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>8</sub>  | N/A   | 3 <sup>1</sup> / <sub>4</sub> | 4         | 7 <sup>1</sup> / <sub>16</sub> | 5 <sup>1</sup> / <sub>2</sub>  | 4         | 5 <sup>8</sup> / <sub>16</sub> -11 UNC-2B | 10.5          | BAB         |
| 3                             | 3 <sup>1</sup> / <sub>16</sub>   | 5 <sup>13</sup> / <sub>16</sub>  | 6 <sup>5</sup> / <sub>16</sub>  | 1 <sup>13</sup> / <sub>16</sub> | 2 <sup>5</sup> / <sub>8</sub>   | 4 | 1 <sup>1</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>8</sub>  | N/A   | 3 <sup>1</sup> / <sub>4</sub> | 4         | 7 <sup>1</sup> / <sub>16</sub> | 6                              | 4         | 5 <sup>8</sup> / <sub>16</sub> -11 UNC-2B | 11.9          | BAB         |
| 4                             | 4 <sup>1</sup> / <sub>16</sub>   | 7                                | 7 <sup>1</sup> / <sub>8</sub>   | 2 <sup>1</sup> / <sub>16</sub>  | 3 <sup>11</sup> / <sub>16</sub> | 4 | 1 <sup>1</sup> / <sub>4</sub> | 5 <sup>8</sup> / <sub>16</sub> | 7 <sup>1</sup> / <sub>16</sub> | N/A   | 3 <sup>1</sup> / <sub>4</sub> | 4         | 7 <sup>1</sup> / <sub>16</sub> | 7 <sup>1</sup> / <sub>2</sub>  | 8         | 5 <sup>8</sup> / <sub>16</sub> -11 UNC-2B | 21.4          | BAC         |
| 5                             | 5 <sup>11</sup> / <sub>16</sub>  | 8 <sup>1</sup> / <sub>8</sub>    | 7 <sup>11</sup> / <sub>16</sub> | 2 <sup>1</sup> / <sub>4</sub>   | 4 <sup>3</sup> / <sub>4</sub>   | 4 | 1 <sup>1</sup> / <sub>4</sub> | 3 <sup>4</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub>  | N/A   | 3 <sup>1</sup> / <sub>4</sub> | 4         | 7 <sup>1</sup> / <sub>16</sub> | 8 <sup>1</sup> / <sub>2</sub>  | 8         | 3 <sup>4</sup> / <sub>16</sub> -10 UNC-2B | 25.7          | BAD         |
| 6                             | 5 <sup>13</sup> / <sub>16</sub>  | 9 <sup>1</sup> / <sub>4</sub>    | 8 <sup>5</sup> / <sub>16</sub>  | 2 <sup>1</sup> / <sub>4</sub>   | 5 <sup>9</sup> / <sub>16</sub>  | 4 | 1 <sup>1</sup> / <sub>4</sub> | 3 <sup>4</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub>  | N/A   | 3 <sup>1</sup> / <sub>4</sub> | 4         | 7 <sup>1</sup> / <sub>16</sub> | 9 <sup>1</sup> / <sub>2</sub>  | 8         | 3 <sup>4</sup> / <sub>16</sub> -10 UNC-2B | 31.0          | BAD         |
| 8                             | 7 <sup>13</sup> / <sub>16</sub>  | 11 <sup>7</sup> / <sub>16</sub>  | 9 <sup>1</sup> / <sub>2</sub>   | 2 <sup>3</sup> / <sub>8</sub>   | 7 <sup>3</sup> / <sub>4</sub>   | 6 | 1 <sup>1</sup> / <sub>4</sub> | 7 <sup>8</sup> / <sub>16</sub> | 5 <sup>8</sup> / <sub>16</sub> | N/A   | 5                             | 4         | 9 <sup>1</sup> / <sub>16</sub> | 11 <sup>3</sup> / <sub>4</sub> | 8         | 3 <sup>4</sup> / <sub>16</sub> -10 UNC-2B | 48.0          | CAE         |
| 10                            | 9 <sup>13</sup> / <sub>16</sub>  | 13 <sup>7</sup> / <sub>8</sub>   | 10 <sup>7</sup> / <sub>8</sub>  | 2 <sup>11</sup> / <sub>16</sub> | 9 <sup>3</sup> / <sub>4</sub>   | 6 | 2                             | 1 <sup>1</sup> / <sub>8</sub>  | N/A                            | 1 <sup>1</sup> / <sub>4</sub> x 1 <sup>1</sup> / <sub>4</sub> | 5                             | 4         | 9 <sup>1</sup> / <sub>16</sub> | 14 <sup>1</sup> / <sub>4</sub> | 12        | 7 <sup>8</sup> / <sub>16</sub> -9 UNC-2B  | 75.8          | CAF         |
| 12                            | 11 <sup>13</sup> / <sub>16</sub> | 15 <sup>11</sup> / <sub>16</sub> | 12 <sup>1</sup> / <sub>4</sub>  | 3 <sup>1</sup> / <sub>8</sub>   | 11 <sup>3</sup> / <sub>4</sub>  | 6 | 2                             | 1 <sup>1</sup> / <sub>8</sub>  | N/A                            | 1 <sup>1</sup> / <sub>4</sub> x 1 <sup>1</sup> / <sub>4</sub> | 5                             | 4         | 9 <sup>1</sup> / <sub>16</sub> | 17                             | 12        | 7 <sup>8</sup> / <sub>16</sub> -9 UNC-2B  | 106.5         | CAF         |

Note

'Q' dimension is the minimum allowable pipe or flange inside diameter at the centered body face to protect the disc sealing edge against damage when opening the valve.

# Keystone Butterfly Valves - Figure 221/222

2" thru 12"

## Valve $C_v$

| Size (in) | Size [mm] | 10° | 20° | 30° | 40° | 50°   | 60°   | 70°   | 80°   | 90°   |
|-----------|-----------|-----|-----|-----|-----|-------|-------|-------|-------|-------|
| 2         | 50        | 0   | 1.3 | 5   | 14  | 26    | 40    | 52    | 59    | 60    |
| 2½        | 65        | 0   | 1.4 | 6   | 21  | 44    | 74    | 107   | 138   | 150   |
| 3         | 80        | 0   | 1.5 | 8   | 29  | 67    | 115   | 175   | 234   | 262   |
| 4         | 100       | 1   | 15  | 48  | 107 | 196   | 318   | 463   | 589   | 647   |
| 5         | 125       | 3   | 32  | 99  | 206 | 362   | 579   | 832   | 1,045 | 1,141 |
| 6         | 150       | 4   | 47  | 145 | 295 | 510   | 810   | 1,160 | 1,450 | 1,580 |
| 8         | 200       | 6   | 84  | 239 | 450 | 751   | 1,190 | 1,754 | 2,385 | 2,892 |
| 10        | 250       | 9   | 133 | 360 | 652 | 1,064 | 1,683 | 2,524 | 3,596 | 4,593 |
| 12        | 300       | 12  | 192 | 509 | 899 | 1,449 | 2,288 | 3,470 | 5,085 | 6,682 |

## Note

$C_v$  is the valve flow capacity expressed as the flow rate of 60°F water, in US gallons per minute, which produces a 1 psi pressure drop across the valve.

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