tyco
Flow Control

KEYSTONE

- **F611 Wafer style resilient seated butterfly valves.**
- **F612 Lugged style resilient seated butterfly valves.**

## Features

- Rounded polished disc edge gives full concentric sealing, lower torques, longer seat life and bubble-tight shut-off.
- The seat is field replaceable and fully isolates the body and stem from the flow.
- Primary stem sealing exceeds the pressure rating of the valve and prevents leakage through shaft area to atmosphere.
- A secondary shaft seal provides back-up safety.
- Top and bottom inboard shaft bearings for optimum support and minimum friction to prolong valve life.
- Top bushing absorbs actuator side thrust loads.
- Top seal prevents moisture penetrating into the shaft area.
- The thin disc provides minimum obstruction to flow, resulting in smooth flow characteristics.
- A molded-in O-ring in the seat for flange sealing eliminates the need for gaskets.
- Extended body neck allows pipe insulation.
- Body locating holes ease installation and centering between the flanges.
- Available approvals: PED (CE Mark), DNV, Lloyds.

## General Applications:

These valves are ideally suited to many applications where tight shut-off is required, such as:

- Industrial processing
- Water & wastewater
- Dry bulk conveying
- Paper mills
- Light slurry handling
- Food & beverage.

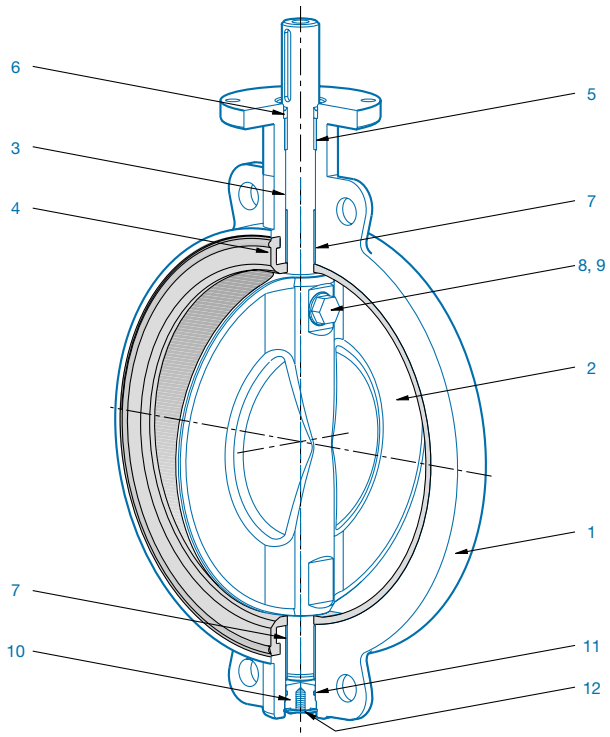
## Technical Data:

**Size Range:**
F611 (wafer style) 350-600 mm
F612 (lugged style) 350-600 mm
**Pressure:** 1600 kPa (max)
**End of line:** up to 1200 kPa (max)
**Temperature:** minus 40 to 150°C
**End Connections:**
AS 2129 C, D, E & F
ANSI 150
PN 6/10/16
JIS, 10K



# Butterfly Valves - Figure 611 & 612
## 350mm - 600mm




**Pressure Ratings:**
**Maximum Operating Pressure:**

| | |
|---|---|
| Standard Seat | = 1000 kPa |
| Super Seat | = 1600 kPa |

**End of Line Service:**

| | |
|---|---|
| Standard Seat | = 600 kPa |
| Super Seat | = 1000 kPa |

**Temperature Rating:**
Minus 40ºC to 120ºC with EPDM & XEPDM
Minus 15ºC to 100ºC with Buna N & XBuna N
Minus 30ºC to 150ºC with HT EPDM

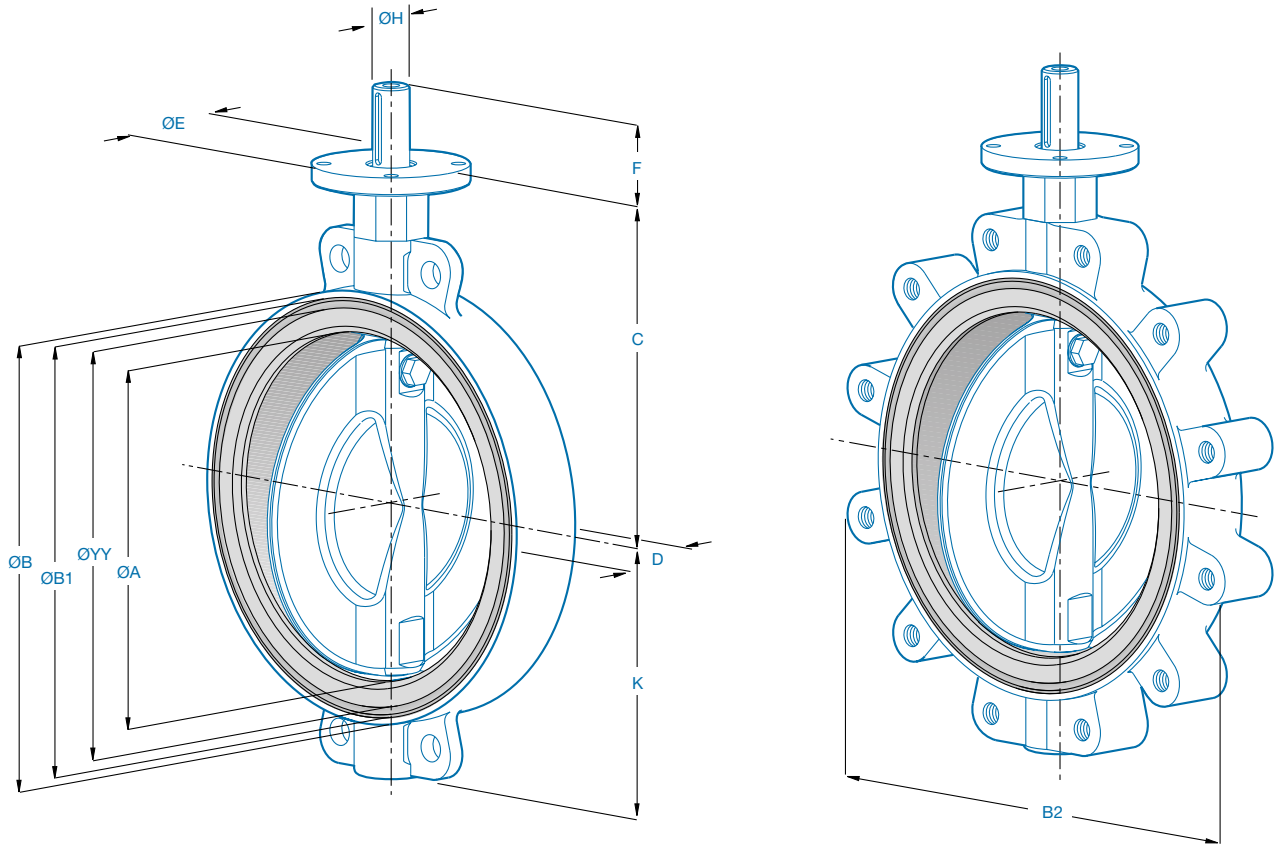
***Note:***
*PED approved valves have a temperature limitation of minus 28ºC due to body material.*
*Consult factory for available trims.*

## Parts List

| No. | Description | Standard Material | Material Specification |
|---|---|---|---|
| 1 | Body | Ductile Iron | ASTM A536 Gr 65-45-12 |
| 2 | Disc | 316 Stainless Steel | ASTM A351 Gr CF8M |
| | | Aluminium Bronze | ASTM B148 C95200 |
| | | Ductile Iron (ENP Coated) | ASTM A536 Gr 65-45-12 |
| 3 | Shaft | 431 Stainless Steel | EN10088-3 X17CrNi16-2 |
| | | Super Duplex Stainless Steel | EN10088-3 X2CrNiMoN25-7-4 |
| 4 | Seat | EPDM# | EM-D1-48 |
| | | Buna N# | EM-D1-49 |
| | | HT EPDM# | EM-D1-50 |
| | | XEPDM# | - |
| | | XBuna N# | - |
| 5 | Shaft Bush | Polyacetal | - |
| 6 | Shaft Seal | Buna N | - |
| 7 | Bearings | PTFE/Steel Backed | - |
| 8 | Disc Screw | Duplex Stainless Steel | EN10088-3 X2CrNiMoN22-5-3 |
| 9 | Disc Screw O Ring | Buna N | - |
| 10 | Body Plug | Carbon Steel | AS1443 1040 |
| 11 | Body Plug O Ring | Buna N | - |
| 12 | Circlip | Carbon Spring Steel | DIN472 |

***Note:***
*# Food grade seat = These seat compounds are produced in conformance with FDA21, Chapter 1, Section 177.2600. The compounds are prepared solely from polymers and adjuvant substances approved by this specification.*
*X = Super Seat version.*
*ENP = Electroless Nickel Plated (for corrosion resistance).*
*Aluminium bronze disc material is only suitable for a maximum operating pressure of 1000 kPa.*

# Butterfly Valves - Figure 611 & 612
## 350mm - 600mm




## Dimensions (mm)

| Valve Size mm | Stem Conn. Code | ØA | ØB | ØB1 | B2 | C | D | ØE | F | K | Q | ØYY | H inches | Key inches | Top Plate Hole PCD | Top Plate Hole Dia. | Mass kg F611 | Mass kg F612 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 350 | CAG | 325 | 416 | 398 | 527 | 325 | 78 | 150 | 76 | 260 | 319 | 378 | 1⅜ | 5/16 x 5/16 | 127 | 14 | 42 | 60 |
| 400 | CAG | 380 | 474 | 455 | 586 | 360 | 102 | 150 | 76 | 298 | 369 | 435 | 1⅜ | 5/16 x 5/16 | 127 | 14 | 64 | 120 |
| 450 | DAH | 434 | 534 | 515 | 662 | 395 | 114 | 203 | 76 | 334 | 422 | 495 | 1⅝ | ⅜ x ⅜ | 165 | 22 | 85 | 144 |
| 500 | DAJ | 486 | 589 | 569 | 716 | 430 | 127 | 203 | 108 | 370 | 472 | 549 | 1⅞ | ½ x ⅜ | 165 | 22 | 107 | 173 |
| 600 | DAK | 585 | 691 | 670 | 827 | 500 | 154 | 203 | 108 | 443 | 569 | 650 | 2¼ | ½ x ⅜ | 165 | 22 | 147 | 250 |

***Notes:***
*"Q" dimension is the disc chordal dimension at face of valve for disc clearance into lined pipe or fittings.*
*"H" dimension is the stem connection.*
*"ØB1" dimension is to the outside of the seat.*
*"ØYY" dimension is to the O-ring seal.*
*Mass may vary depending on trim materials used.*
*Dimensions are nominal to ±1mm.*

# Butterfly Valves - Figure 611 & 612
## 350mm - 600mm

### Anticipated Seating & Unseating Torque Values - Nm (Standard Seats)

| Valve Size mm | Shut Off Pressure kPa(bar) — Normal Service 0 (0) | 350 (3.5) | 700 (7) | 1000 (10) |
|---|---|---|---|---|
| 350 | 425 | 492 | 559 | 660 |
| 400 | 571 | 672 | 773 | 923 |
| 450 | 746 | 889 | 1032 | 1247 |
| 500 | 950 | 1146 | 1342 | 1636 |
| 600 | 1450 | 1789 | 2128 | 2637 |

***For conditions that vary from those noted, then apply the following Application Factor Multipliers:***

*Operated less than once per day x 1.2*
*Dry Service with gas or air x 1.5*
*Dry Service with abrasives, cement x 1.7*
*Lubrication oils x 0.5*
*Temperature - lower than minus 4.5°C x 1.2*
*- higher than 93°C x 1.2*
*Chemical attack: Consult factory*

***Note:***

*To apply the as noted Application Factor Multipliers:*

1. *Find the base torque value by selecting the required valve size from the left hand column and read across to the intended line pressure column. Note the torque value. (You can interpolate between line pressure values.)*
2. *Find the zero pressure torque for the same valve on the same row and subtract this zero pressure torque from the value in step 1.*
3. *Multiply the zero pressure torque value by the expected Application Factors.*
4. *Add the difference between the zero pressure torque and the line pressure torque (value of step 2 plus value of step 3) to give the new torque value specific to the actual service conditions.*

***Example:***

*A 500mm Figure 611 DEE2 AS 2129 E valve is to be used in a clean water application. The line pressure is 1000 kPa (10 bar) @ 100ºC. The valve may only cycle twice per month.*

1. *Using the Normal Service Torque Values table Base Torque value for 500mm @ 1000 kPa (10 bar) = 1636Nm*
2. *Find torque value at zero kPa = 950 Nm*
   *Subtract 1636 - 950 = 686 Nm*
3. *Multiply zero pressure torque value by Application Factors*
   *Application Factors:*
   *Operated less than once per day = x 1.2*
   *Temperature higher than 93°C = x 1.2*
   *Multiply Application Factors 1.2 x 1.2 = 1.44 ( round off to 1.4 )*
   *950 x 1.4 = 1330 Nm*
4. *Add the difference between zero pressure and line pressure, as per step 2 to the value determined in step 3.*
   *686 + 1330 = 2016 Nm*

*The new torque value for this valve, specific to the actual service conditions is 2016 Nm.*

### Notes:

1. *The charted seating and unseating torques are the sum of all friction and for opening and closing of the disc against the indicated pressure differential for normal service.*
2. *Normal Service: Clean liquid service at temperatures between minus 4.5°C to 93°C with no internal deposition or chemical attack.*
   *Operated a minimum of once per day.*
3. *The relationship between values are linear, therefore you can interpolate between nominated values.*
4. *The effect of dynamic torque is not considered in tabulation.*
5. *In sizing operators it is not necessary to include safety factors.*

## Notes:

*As the Super Seat is intended for high pressure applications the base torque commences at 1000 kPa/10 bar.*
*Superseats are suitable for:*

- *Severe vacuum applications.*
- *High line velocities up to 9 m/s for liquids.*
- *Slip-on flanges.*
- *Full rated end-of-line service.*
- *Pressure testing during erection and commissioning.*

## Anticipated Seating & Unseating Torque Values - Nm (Super Seat*)

| Valve Size mm | Shut Off Pressure kPa/(bar) Normal Service 1000 (10) | 1400 (12) | 1600 (16) |
|---|---|---|---|
| 350 | 851 | 986 | 1053 |
| 400 | 1173 | 1374 | 1474 |
| 450 | 1563 | 1849 | 1992 |
| 500 | 2026 | 2419 | 2615 |
| 600 | 3198 | 3876 | 4216 |

***For conditions that vary from those noted, then apply the following Application Factor Multipliers:***
*Operated less than once per day x 1.2*
*Dry Service with gas or air x 1.5*
*Dry Service with abrasives, cement x 1.7*
*Lubrication oils x 0.5*
*Temperature - lower than minus 4.5°C x 1.2*
*- higher than 93°C x 1.2*
*Chemical attack: Consult factory*

***Note:***
*To apply the as noted Application Factor Multipliers:*

1. *Find the base torque value by selecting the required valve size from the left hand column and read across to the intended line pressure column. Note the torque value. (You can interpolate between line pressure values.)*
2. *Find the 1000 kPa/(10 bar) pressure torque for the same valve on the same row and subtract this zero pressure torque from the value in step 1.*
3. *Multiply the 1000 kPa/(10 bar) pressure torque value by the expected Application Factors.*
4. *Add the difference between the 1000 kPa/(10 bar) pressure torque and the line pressure torque (value of step 2 plus value of step 3) to give the new torque value specific to the actual service conditions.*

## Maximum Allowable Shaft Torques (Nm)

| Valve size | 350 | 400 | 450 | 500 | 600 |
|---|---|---|---|---|---|
| 431S/S | 1650 | 1987 | 3437 | 3819 | 6531 |
| Super Duplex S/S | 1512 | 1987 | 3333 | 3819 | 6531 |

***Notes:***
*The values listed represent the maximum torques which can be transmitted through the actuator flange. These values are based upon specific criteria and can be lower than the maximum allowable shaft torques. In this case the criteria can be changed in order to reach the maximum allowable shaft torques.*

## Flowrate Co-efficients - Kv Values (Nm)Flowrate Co-efficients - Kv Values (Nm)

| Size (mm) | Disc Opening (Degrees) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° |
| 350 | 119 | 304 | 637 | 1142 | 1936 | 3110 | 5010 | 8969 | 10407 |
| 400 | 155 | 397 | 832 | 1492 | 2529 | 4062 | 6544 | 11714 | 13592 |
| 450 | 196 | 503 | 1053 | 1888 | 3200 | 5141 | 8288 | 14826 | 17203 |
| 500 | 242 | 621 | 1300 | 2331 | 3951 | 6347 | 10224 | 18303 | 21238 |
| 600 | 349 | 894 | 1871 | 3357 | 5689 | 9140 | 14723 | 26357 | 30583 |

***Note:***
*Kv = The volume of water in $m^3$/hr that will pass through a valve with a pressure drop of 1 bar (100 kPa) @ 20°C.*

## Simplified Sizing Formulas

### LIQUID

$$Kv = Q\sqrt{\frac{S.G}{\Delta P}}$$

**WHERE**
**Q** = Flow through valve ($m^3$/hr)
**S.G.** = Specific gravity (water = 1)
**ΔP** = Pressure drop across valve (bar)

### GAS

$$Kv = \frac{Q}{28.5}\sqrt{\frac{S.G.}{P_2\Delta P}}$$

**WHERE**
**Q** = Flow through valve ($Nm^3$/hr)
**S.G.** = Specific gravity (air = 1)
**ΔP** = Pressure drop across valve (bar) [Less than $^1/_2$ inlet pressure (bar)]
**$P_2$** = Outlet pressure (bar)

### HEAD LOSS

$$HL = \frac{10.194\ \Delta P}{S.G.}$$

**WHERE**
**HL** = Head Loss (m)
**ΔP** = Pressure drop across valve (bar)
**S.G.** = Specific gravity (water = 1)

## Typical Specifying Sequence

| Example: | 400 | F611 | DEH2 | AE |
|---|---|---|---|---|
| | Valve Size | Figure No. | Trim Code | End Connections |

## Valve Trims

| Figure No. | Trim Code | Body | Disc | Shaft | Seat | Bush | Packing |
|---|---|---|---|---|---|---|---|
| F611/F612 | DEH2 | Ductile Iron | 316 S/S | 431 S/S | EPDM | Polyacetal | Buna N |
| F611/F612 | DEH3 | Ductile Iron | 316 S/S | 431 S/S | Buna N | Polyacetal | Buna N |
| F611/F612 | DEHQ | Ductile Iron | 316 S/S | 431 S/S | XEPDM | Polyacetal | Buna N |
| F611/F612 | DEHR | Ductile Iron | 316 S/S | 431 S/S | XBuna N | Polyacetal | Buna N |
| F611/F612 | DEHT | Ductile Iron | 316 S/S | 431 S/S | HT EPDM | Polyacetal | Buna N |
| F611/F612 | DLH2 | Ductile Iron | Al Bronze | 431 S/S | EPDM | Polyacetal | Buna N |
| F611/F612 | DLH3 | Ductile Iron | Al Bronze | 431 S/S | Buna N | Polyacetal | Buna N |
| F611/F612 | DLHQ | Ductile Iron | Al Bronze | 431 S/S | XEPDM | Polyacetal | Buna N |
| F611/F612 | DLHR | Ductile Iron | Al Bronze | 431 S/S | XBuna N | Polyacetal | Buna N |
| F611/F612 | DLHT | Ductile Iron | Al. Bronze | 431 S/S | HTEPDM | Polyacetal | Buna N |
| F611/F612 | DYH2 | Ductile Iron | Ductile Iron | 431 S/S | EPDM | Polyacetal | Buna N |
| F611/F612 | DYH3 | Ductile Iron | Ductile Iron | 431 S/S | Buna N | Polyacetal | Buna N |
| F611/F612 | DYHQ | Ductile Iron | Ductile Iron | 431 S/S | XEPDM | Polyacetal | Buna N |
| F611/F612 | DYHR | Ductile Iron | Ductile Iron | 431 S/S | XBuna N | Polyacetal | Buna N |
| F611/F612 | DYHT | Ductile Iron | Ductile Iron | 431 S/S | HT EPDM | Polyacetal | Buna N |
| F611/F612 | DES2 | Ductile Iron | 316 S/S | Super Duxplex S/S | EPDM | Polyacetal | Buna N |
| F611/F612 | DES3 | Ductile Iron | 316 S/S | Super Duxplex S/S | Buna N | Polyacetal | Buna N |
| F611/F612 | DESQ | Ductile Iron | 316 S/S | Super Duxplex S/S | XEPDM | Polyacetal | Buna N |
| F611/F612 | DESR | Ductile Iron | 316 S/S | Super Duxplex S/S | XBuna N | Polyacetal | Buna N |
| F611/F612 | DEST | Ductile Iron | 316 S/S | Super Duxplex S/S | HT EPDM | Polyacetal | Buna N |
| F611/F612 | DLS2 | Ductile Iron | Al Bronze | Super Duxplex S/S | EPDM | Polyacetal | Buna N |
| F611/F612 | DLS3 | Ductile Iron | Al Bronze | Super Duxplex S/S | Buna N | Polyacetal | Buna N |
| F611/F612 | DLSQ | Ductile Iron | Al Bronze | Super Duxplex S/S | XEPDM | Polyacetal | Buna N |
| F611/F612 | DLHR | Ductile Iron | Al Bronze | Super Duxplex S/S | XBuna N | Polyacetal | Buna N |
| F611/F612 | DLST | Ductile Iron | Al. Bronze | Super Duxplex S/S | HT EPDM | Polyacetal | Buna N |
| F611/F612 | DYS2 | Ductile Iron | Ductile Iron | Super Duxplex S/S | EPDM | Polyacetal | Buna N |
| F611/F612 | DYS3 | Ductile Iron | Ductile Iron | Super Duxplex S/S | Buna N | Polyacetal | Buna N |
| F611/F612 | DYSQ | Ductile Iron | Ductile Iron | Super Duxplex S/S | XEPDM | Polyacetal | Buna N |
| F611/F612 | DYSR | Ductile Iron | Ductile Iron | Super Duxplex S/S | XBuna N | Polyacetal | Buna N |
| F611/F612 | DYST | Ductile Iron | Ductile Iron | Super Duxplex S/S | HT EPDM | Polyacetal | Buna N |

***End Connections***
*AE = AS2129 Table E DES2*
*AN = ANSI B16.5 Class 150*
*Others available on request*

***Note:***
*XEPDM & XBuna N denotes Super Seat option.*
*HT EPDM denotes high temperature EPDM.*
*Ductile iron discs are Electroless Nickel Plated (ENP).*
*Consult factory for available PED trims.*

# Butterfly Valves - Figure 611 & 612
## 350mm - 600mm

## Available Actuators and accessories

| Figure No. | Description |
|---|---|
| F79U/E | Aluminium Pneumatic actuators, double acting or spring return. |
| F79B | Ductile Iron Pneumatic actuators, double acting or spring return. |
| F79S | Stainless Steel Pneumatic actuators, double acting or spring return. |
| F777 | Electric actuators. |
| F77Q | Heavy Duty Electric actuators. |
| F791 | Solenoid valves. |
| F792 | Limit switches. |
| F793 | Positioners. |
| F401 | Manual Handle |
| F427 | Gear operators. |