# PERFORMANCE BALL VALVE

## Seats and Sealing Solutions

**General Offices North America**

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# Defining Ball Valves & Polymer Seals

Ball valves are a species of plug valves having a ball-shaped closure member. The seat matching the ball is circular so that the seating stress is circumferentially uniform. Most ball valves are also equipped with soft seats that conform readily to the surface of the ball. Thus, from the point of sealing, the concept of the ball valve is excellent.

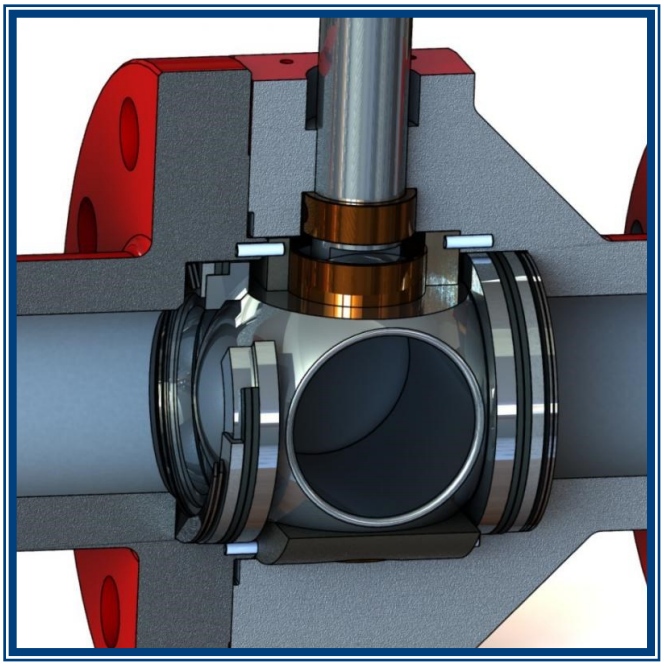
The flow-control characteristic that arises from a round port moving across a circular seat and from the double pressure drop across the two seats is very good. However, if the valve is left partially open for an extended period under conditions of a high pressure drop across the ball, the soft seat will tend to flow around the edge of the ball orifice and possibly lock the ball in that position. Ball valves for manual control are therefore best suited for stopping and starting flow and moderate throttling. If flow control is automatic, the ball is continuously on the move, thus keeping this failure from normally occurring.

Because the ball moves across the seats with a wiping motion, ball valves will handle fluids with solids in suspension. However, abrasive solids will damage the seats and the ball surface. Long, tough fibrous material may also present a problem, as the fibers tend to wrap around the ball.

**Seat Materials for Ball Valves**

The most important seat material for ball valves is PTFE, which is inert to almost all chemicals. This property is combined with a low coefficient of friction, a wide range of temperature application, and excellent sealing properties. However, the physical properties of PTFE include also a high coefficient of expansion, susceptibility to cold flow, and poor heat transfer.

The seat must therefore be designed around these properties. Plastic materials for ball valve seats also include filled PTFE, TFM, PEEK, nylon, and many others. However, as the seating material becomes harder, the sealing reliability tends to suffer, particularly at low-pressure differentials. Elastomers such as buna-N are also used for the seats, but they impose restrictions on fluid compatibility and range of temperature application. In addition, elastomers tend to grip the ball, unless the fluid has sufficient lubricity. For services unsuitable for soft seating's, metal and ceramic seating's are being used.



*Advanced EMC Technologies knows few components are more critical to valve performance than seats and their design.*

## Polymer Selection - Seat Design—Surface Quality

- Increasing need for reliability and overall product performance is paramount in Ball Valve or other valve sealing applications where catastrophic failure could occur.
- Innovative PTFE seat and polymer materials will meet most valve seating requirements. In addition, new more robust PTFE sealing compounds have been developed to specific customer applications. Valve seats require low friction, chemically inert materials and proper surface finish to achieve optimum seal performance. Specially engineered PTFE energized seals can be designed for the most demanding Ball Valve Seat applications where conventional sealing is not preforming at required levels.
- With hundreds of Ball Valve Seat PTFE and Polymer compounds Advanced EMC stands ready to provide solutions for the most critical of industrial applications.

**PTFE, PEEK and other special polymer Ball Valve Seat solutions; available at Advanced EMC Technologies.**

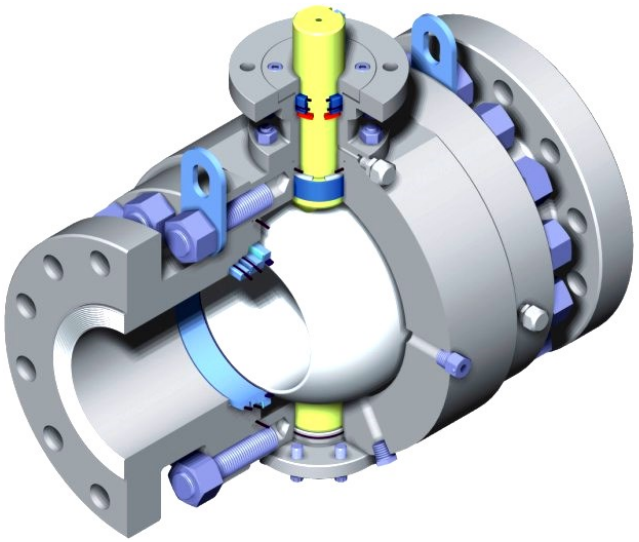
⇒ Specially formulated PEEK, PTFE, Modified PTFE, Ultra UHMW Blends.

⇒ Ball Valve seat and seals to 100” diameter.

⇒ Corrosion resistant seats & seals.

⇒ FDA and Dairy approved.

⇒ From cryogenic to 450 degrees F.



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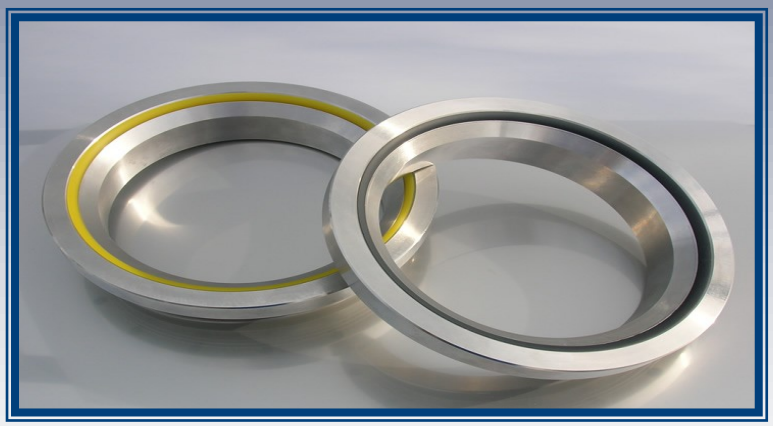
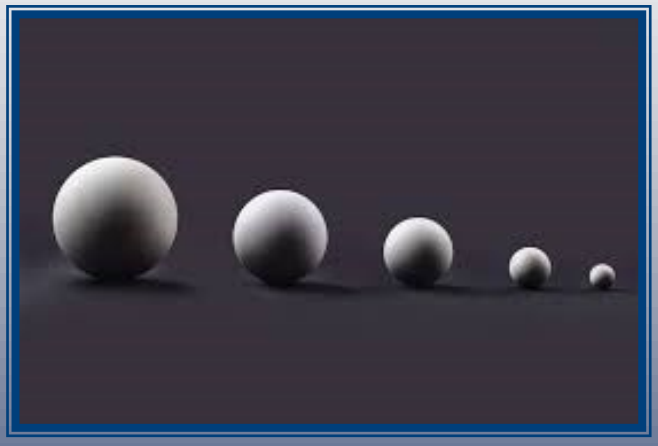
# Fluorolon PTFE & Polymer Ball Valve Seats





## Material Sealing Selection For Ball Valve Applications

⇒ Fluorolon 1000 (Virgin PTFE): PTFE Inert to most media, low friction coefficient, subject to temperature limitations. Good sealing performance in gas applications.

⇒ Fluorolon 1034 (PTFE Carbon Graphite): Inert to most media used in higher P-T applications than Virgin PTFE, good in steam and thermal oil service.

⇒ Fluorolon 1015 (PTFE + 15% Glass Fiber)
Good resistance to wear and deformation under load. Long er service life and higher pressure resistance than virgin PTFE. Suitable for foodstuffs, pharmaceutical and cosmetic industry.

⇒ Fluorolon 5000 (PEEK (Poly-ether-ether-ketone):
Suitable for Tobacco, nuclear services and high temperatures at higher pressures. Higher friction than PTFE. Not recom mended for concentrated Sulfuric Acid.

* Seats Available in Other Compounds

*PTFE Balls In Virgin and Filled Compounds

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# BALL VALVE SEAT VARIATIONS

## Standard Seats


PTFE


15% Glass Filled PTFE


TFM


UHMWPE

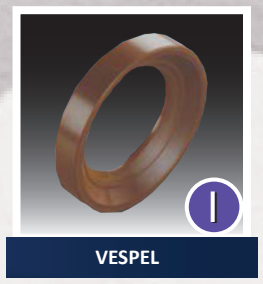

C-PTFE


PCTFE


PEEK


VIRGIN PEEK


DELRIN




VESPEL


G-MO PTFE


25% Glass Filled PTFE


TFM


C-PTFE

## Cavity Filler Seats One piece seat and seal to minimize body cavity voids


PTFE


15% Glass Filled PTFE


TFM


UHMWPE

## Diverter Seats One piece seat and seal for diverterand double block & bleed valves


PTFE


15% Glass Filled PTFE

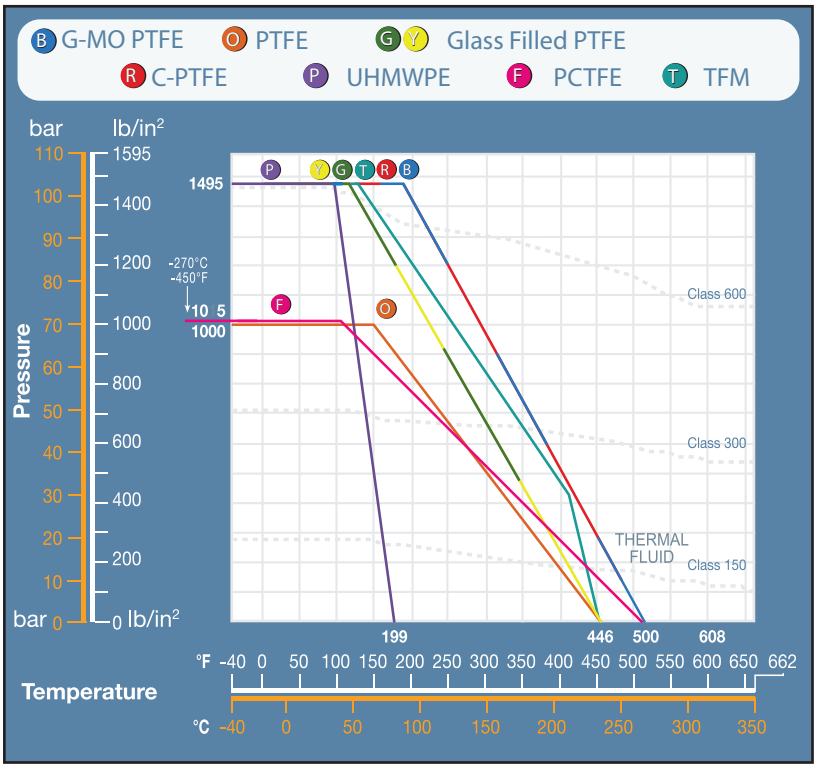

TFM

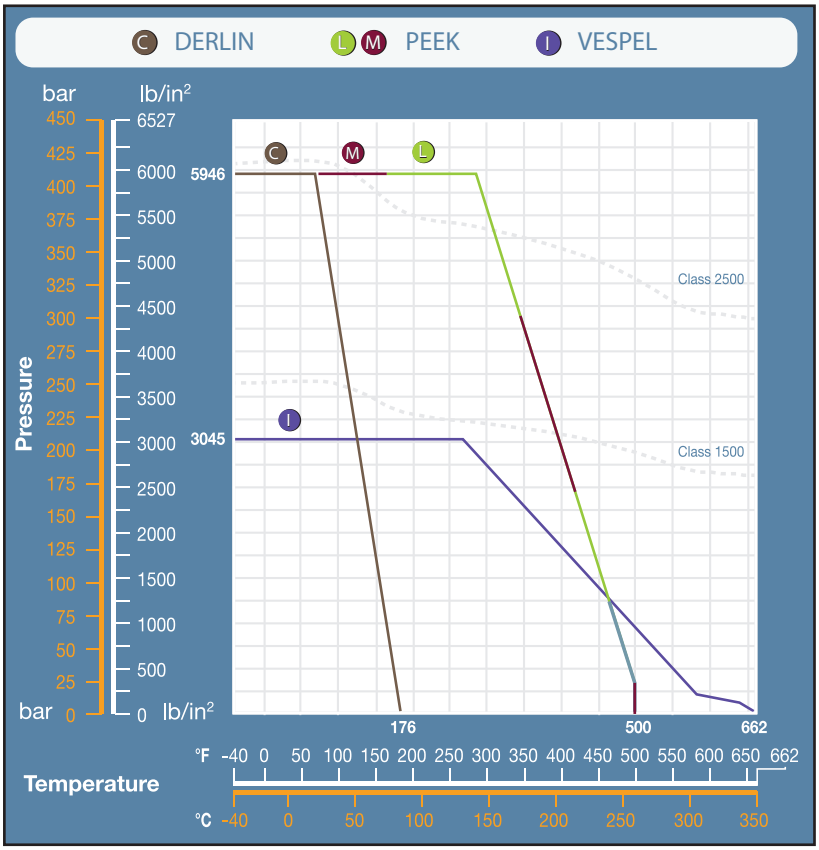

UHMWPE


C-PTFE

Advanced EMC Technologies

# Pressure / Temperature Rating*




DELRIN® is registered trademark of DuPont , VESPEL® is a registered trademark of DuPont, TFM™ is a trademark of Dyneon, PEEK® is a trademark of VICTREX

# Materials

**O VIRGIN PTFE**

Inert to most chemicals, low coefficient of friction, recommanded for water, foodstuff and corrosive chemicals. FDA grade. Color: White

**G 25% GLASS FILLED PTFE**

Similar to 15% glass filled PTFE seats but better resistance to wear and deformation under load. Color: Gray-White with red stripe

**Y 15% GLASS FILLED PTFE**

Withstands higher presures than virgin PTFE. GOOD resistance to wear and deformation under load. Color: Off white with blue stripe

**B GLASS & METAL OXIDE FILLED PTFE**

Withstands higher temperatures and presures than filed PTFE, good resistance under load, not recommanded for foodstuff. Color : Blue

**R CARBON FILLED PTFE**

Specially for steam and thermal oil, low co-efficient of friction, inert to most media. Color : Pale Black with white stripe

**P ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE (UHMWPE)**

Good to nuclear, Tobacco, H2SO4 and chemical resistance applications, low coefficient of friction. Temperature limit of 199°F
Color : Pale White with green stripe

**F PCTFE**

Cryogenic applications such as oxygen, hydrogen, nitrogen and more, suitable for temperatures up to - 450°F
Color : See through white

**T TFM™ (MODIFIED PTFE)**

TFM™ is a chmically modified PTFE that offers enhanced properties while retaining all the proven advantages of conventional PTFE. FDA grade. Color: white with brown stripe

**C ACETAL RESIN (DELRIN®)**

Suitable for high pressures, good resistance to wear and deformation under load, temperature limit 176°F
Must not be used in presence of oxygen.
Color: Creamy White with black stripe

**L CARBON FILLED PEEK®**

Suitable for elevated temperatures, good resistance under high pressure loads, low coefficient of friction, suitable for many corrosive applications Color: Charcoal Black with yellow stripe

**M VIRGIN PEEK®**

Similar to filled PEEK® but higher coefficient of friction, suitable for nuclear, Tobacco, clean applications. FDA grade. Color: Beige

**I VESPEL®**

Vespel® is a polyimide material that has high temperature capabilities under load and is mainly used for heat transfer applications, hot gases and oils, Vespel® must not be used with STEAM or media containing WATER or WATER VAPOR. Color: brown

*The graph lines represent the maximum presuure / temperature rating of the seat material. When selecting a seat material, the lower rating between the valve body and seat should be considerd. For more information please contact Advanced EMC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