

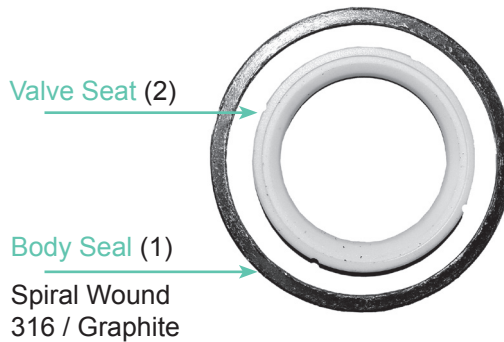


## Valve Seat & Seal Selection Guide

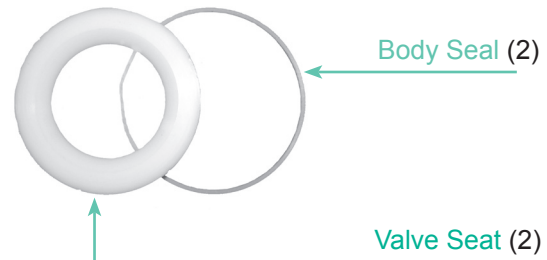
**Choosing The Right Seat Material is the Most Challenging Decision in Ball Valve Selection**

### Valve Soft Parts

#### Flanged End



#### 3PC Valves

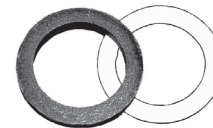


Flanged End, 2 and 3 PC Valves share the same stem packing.

V-Ring Stem Seal (5)



Thrust Washer (2)



**VALVE REPAIR KIT INCLUDES ALL SOFT PARTS**  
**Seats - Body Seals - Stem Packing - Thrust Washer**

Flo-Tite ball valves are available with a variety of seat & seal options to allow use in a wide range of general as well as special services. These soft-seated ball valves are factory tested for tight shutoff and will continue to perform so for extended period.

One of the most important factors affecting shutoff capability is the nature of media being handled. Service life is affected by all of the following factors.

**Pressure**

**Temperature**

**Degree of Pressure Fluctuation**

**Degree of Thermal Fluctuation**

**Type of Media**

**Cycling Frequency**

**Velocity of the Media**

**Speed of Valve Operation**

All of these factors are interrelated in actual service. Maximum service life, therefore, can be gained by reducing the severity of any of these factors.

Our listing of seat materials has been prepared to assist the specifying engineer & the end user in the proper seat and seal selection. This information should be used in conjunction with pressure temperature rating graph found in our catalogue for the applicable valve.

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# STANDARD SEAT SELECTIONS

Seat Code	Material	Technical Description	Color	Approx. Torque Adders to the standard seats indicated in catalog page
D	DELTRIN	This seat is very rigid and does not undergo cold flow. They can withstand pressures of up to 6000 psi dependent on valve size and a temperature range of -70°F to 180°F. Delrin also withstands nuclear radiation at doses of up to 106 rads. Do not use on oxygen service, or steam.	Green	+50%
F	Super-Tek (TFM)	Super-Tek, most popular seat material used by Flo-Tite. Super-Tek (TFM) offers most all of the properties of reinforced PTFE with improved thermo-mechanical properties offering lower coefficient of friction for lower torques and less permeability, reduced cold flow deformation and enhanced deformation recovery. Temperature Range -50°F to 500°F	Off-White	Standard seats in most all valves Torques indicated in catalog page
K	Kel F (PCTFE)	This material is a fluorocarbon rubber. Kel F is a registered trademark of 3M Corp. It can be used for cryogenic service at temperatures of -400°F up to 500°F at pressures up to 1500 psi	Translucent White	+50%
M	Metal	Recommended for service with severe flashing or hydraulic shock, abrasive media or where possible trapped metal may exist. Flo-Tite's metal seats are hand lapped to the ball as individually matched sets, assuring line contact between valve ball and seats, resulting in smooth operation and tight shut off class. Flo-Tite offers metal seats in different classes of Shut Off including Class IV, V and VI.	Metallic	ANSI Class 150 +60% ANSI Class 300 +70% ANSI Class 600 +80%
N	Nylon	Special Nylon seats are offered for higher pressure and lower temperature service. They can be used in high-pressure air, oil and other gas media but are not suited for strong oxidizing agents. Temperature rating -30°F to 200°F	Translucent White	+40%
P	Peek	This material offers a unique combination of chemical mechanical electrical and thermal properties. The only solvents which will attack Peek is concentrated nitric acid & sulfuric acid. It will withstand temperatures up to 600°F and pressures up to 4500 psi	Black	+60%
R	Reinforced TFE	This is produced by adding 15% fibrous glass or carbon to Virgin Teflon and has a greater pressure temperature rating than Teflon up to 420°F. They also have a better cycle life than Teflon.	Off-White	Standard as indicated in literature
S	Stainless Filled PTFE (S-Tek)	S-Tek (stainless filled PTFE) combined the strength of metal with the lubricity of PTFE. 50% 316 powder combined with 50% PTFE. Offers the abrasion resistance of metal with higher pressure and temperature ratings than RPTFE. Temperature rating -20° to 550° / Steam rating 250 SWP.	Dark Gray	+50%
T	Virgin TFE	This is the most widely used seating material and is excellent for most services. It has excellent chemical resistance throughout valve industries and a low coefficient of friction. Temperature Range -50°F to 450°F	White	Standard as indicated in literature
U	UHMW Polyethylene	UHMW polyethylene is used for highly radioactive materials where PTFE is not acceptable (> 104 rads ) and is rated 2 x 107 rads. These seats also meet the requirements of the tobacco industry whenever PTFE is prohibited, and are especially well-suited for handling highly abrasive media. Temperature Range -70°F to 200°F, not suitable for steam	Opaque White	+40%
V	Devlon	Devlon material is one of the toughest and hardest wearing thermoplastics available. It provides wear resistance, impact strength and moisture absorption properties. Devlon is used in many valve seats which require a broad range of working temperatures, excellent corrosion resistance and outstanding resistance in high pressure applications.	Yellow	+40% if not listed as standard material and indicated in literature
Y	Super-Tek III	This is a Teflon base filled with glass amorphous carbon powder and graphite. It has lower thermal contraction-expansion rate than PTFE and is ideal for steam or thermal fluid applications up to 575°F. Super-Tek III is also good for Cryogenic applications as low as -300°F	Black	+40%

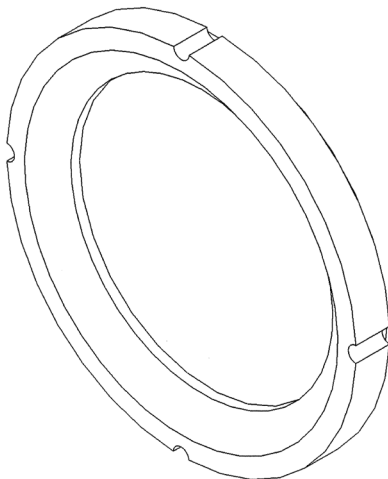
# STANDARD SEAL SELECTIONS

Seal Code	Material	Technical Description	Color
G	GRAPHOIL	Useable from -70° to 1000°F on almost any media. It is the standard seal on all fire rated valves	Green
R	Reinforced TFE	This is produced by adding 15% fibrous glass to Virgin Teflon and has a greater pressure temperature rating than Teflon. They also have a better cycle life than Teflon.	Off-White
S	Stainless Filled TFE	Combined the strength of metal with the lubricity of TFE. 50% 316 powder combined with 50% TFE. Offers the abrasion resistance of metal with higher pressure and temperature ratings than RPTFE. Temperature rating -20°F to 550°F / Steam rating 250 SWP	Gray
T	Virgin TFE	Teflon is excellent at pressure below 1500 psi & at temperatures from -20°F to 400°F. It will not withstand temperature fluctuations in excess of 200°F & are not reusable. It has excellent resistance to a wide range of chemicals.	White
U	UHMW Polyethylene	This is rated to 1500 psi at temperatures from -70° to 200°F. This can be used in low to medium level radiation service and in applications where fluorocarbons can not be tolerated. Abrasion resistance is quite good.	Opaque White
V	Viton	These body seals are excellent at all rated pressures with a temperature range of -20° to 400°F. Viton is the best elastomer seal for higher temperature applications, but it should not be used on steam.	Black

New seat & seal materials and sealing techniques continuously become available through our dedicated research and development programs. For seat or seal application requirements not covered in this bulletin, please consult Flo-Tite.

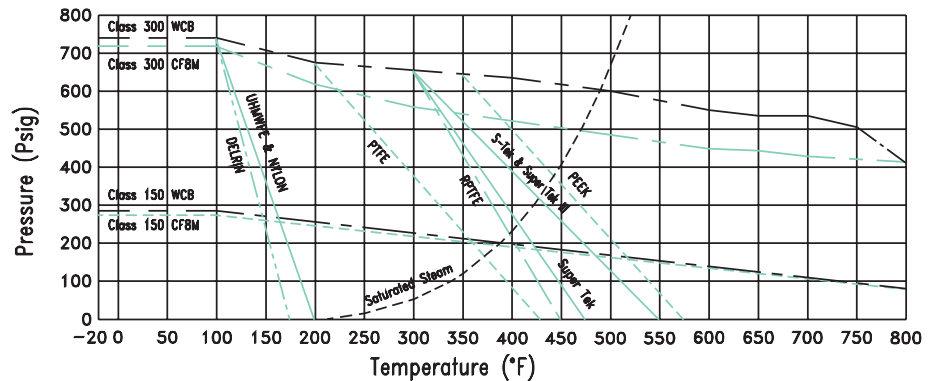
All products that contact plastics and elastomers comply with USP Biological Reactivity Test #87 & #88 Class VI plastics and FDA CFR21 Part 177.

## Pressure Relieving & Equalizing Seat Design



Specially designed seats allow equalization of pressure in the ball cavity which reduces operating torque and increases seat life.

## Pressure Temperature Chart

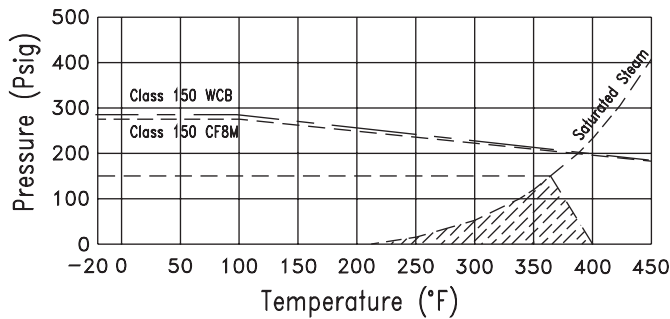


# STEAM APPLICATION TECHNICAL DATA

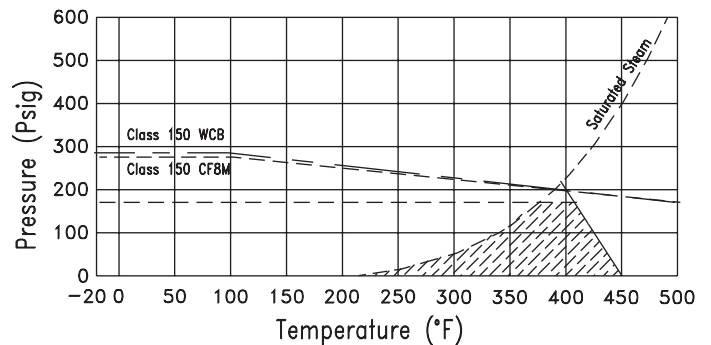
Steam is damaging to valve parts at the moment of opening and closing, or when throttling. The high velocity of the steam erode the seat and metal parts. High speed steam may carry water droplets, dissolved gases and other suspended solids and result in more severe erosion and corrosion. In addition, steam systems will often go through a thermal cycle of start-up and shut down. This thermal cycle presents a special challenge to the sealing capability of the valves in steam service. Ball valves are well suitable for steam service if careful with the material selection and valve design. However, like all other valves, ball valves are generally rated at a lower pressure for steam service than for liquid or dry gaseous service. Flo-Tite Ball Valves are an excellent choice for a wide range of steam service. Graphite body seals are completely encapsulated and contained. Stem packings are live loaded for all sizes. Live loaded stem packing will compensate for thermal cycling and well contained body seal will prevent extrusion into crevice during thermal cycle. Our standard design valves are provided with a 1/8" hole drilled in the stem tang slot. This feature is critical for steam service since it prevents excessive pressure build-up in the cavity from trapped liquid when the valve is in the open position. Flo-Tite ball valves are supplied with stainless steel ball and stem as standard. This is specially suitable for steam service since aggressive steam attacks coated carbon steel trim. Flo-Tite standard design valves with stainless steel trim and Super-Tek TFM seats are good for 150 psig saturated steam. When equipped with S-Tek or Super-Tek III seats, Flo-Tite valves are good for 250 psig saturated steam. Other seat options will bring Flo-Tite valves to higher steam pressure rating, see chart below.

Service Pressure	Corresponding Saturated Steam Temperature	Seat	Stem Seal	Body Seal
Pressure Steam up to 150 psi	Maximum 366 °F	PTFE or Super-Tek	TFM	Graphite
Pressure Steam up to 170 psi	Maximum 375 °F	RPTFE	Graphite	Graphite
Pressure Steam up to 250 psi	Maximum 406 °F	S-Tek or Super Tek III	Graphite	Graphite
Pressure Steam up to 300 psi	Maximum 422 °F	Peek	Graphite	Graphite
Pressure Steam above 300 psi	Higher than 422 °F	Metal	Graphite	Graphite

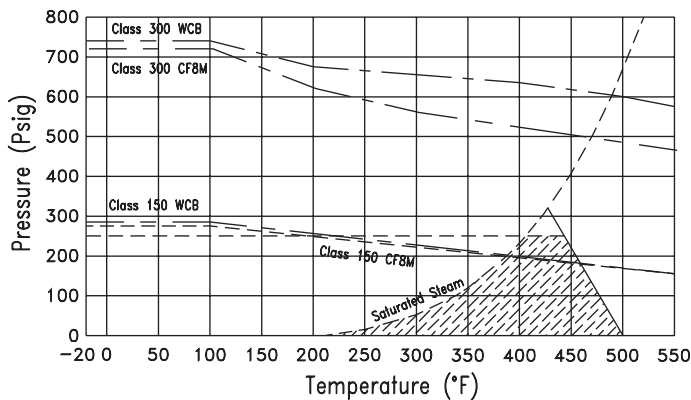
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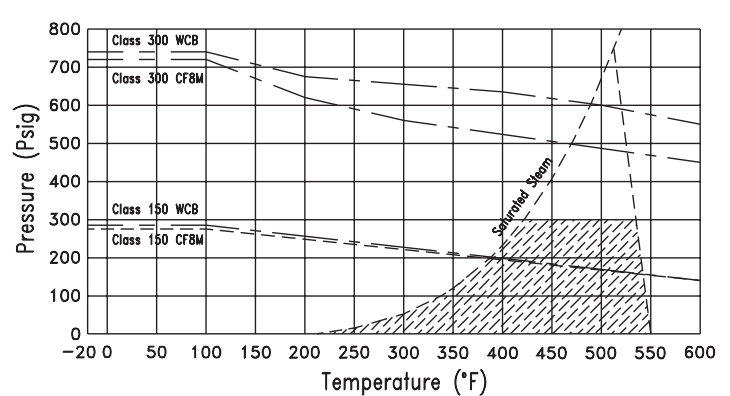
Steam Rating (PTFE & SuperTek)



Steam Rating (RPTFE)



Steam Rating (S-Tek & SuperTek III)



Steam Rating (PEEK), 6" & smaller



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