Engineering Bulletin

Ball Valve Seat and Seal Materials

GENERAL NOTES

- The information and temperature values listed in this bulletin are general guidelines and are based on industry standards. For more specific ratings, you must refer to the Sharpe® or Quadrant® individual product cut sheets for each valve's individual pressure and temperature ratings.
- For specific material compatibility assistance please contact ASC Engineered Solutions for guidance. However, it is the responsibility of the customer to determine the suitability of Sharpe® brand products in their particular application.

SEAT MATERIALS

❖ T - Virgin PTFE

➢ Polytetrafluoroethylene is a fluorocarbon based polymer. This sealing material has excellent chemical resistance and a low coefficient of friction. PTFE is non-contaminating and accepted by the FDA for use in food services. Its temperature range is load dependent. Find P/T curves within valve documents. Color = white

❖ M - TFM® PTFE

➢ Dyneon® TFM PTFE is a modified PTFE Polymer. It is a second generation PTFE that maintains the exceptional chemical and heat resistance properties of the first generation PTFE. It has a denser polymer structure than conventional PTFE. It exhibits better stress recovery, which is important for applications such as seals, seats and gaskets. It extends pressure and temperature ranges higher than PTFE. Find P/T curves within valve documents. Color = white

❖ R - Reinforced Polytetrafluoroethylene (RTFE)

➢ PTFE's mechanical properties are enhanced by adding filler material. This blend improves strength, stability and wear resistance. The glass reinforcement fibers allow for applications at higher pressure and wider temperature ratings compared to unfilled PTFE. Find P/T curves within valve documents. Color = off-white

❖ N - Nova

➢ Nova is a PTFE base filled with glass, amorphous carbon powder and graphite. It exhibits less thermal contraction-expansion than PTFE, and is good for steam or thermal fluid applications. Find P/T curves within valve documents. Color = black

❖ B - Super Nova

- Super Nova is a free-flowing compound based on modified PTFE containing electro-graphitized carbon. Its features are the following: increased thermal dimensional stability, increased surface hardness, improved deformation under load, reduced friction & wear and good chemical stability. Super Nova is good for steam and thermal fluids. Find P/T curves within valve documents. Color = black

❖ D - Delrin®

- Delrin® is DuPont's trademark for Polyoxymethylene. This material is very rigid and does not undergo cold flow. It has a combination of strength, stiffness, hardness, dimensional stability, toughness, fatigue resistance, abrasion resistance, low wear and low friction. This is not a high-temperature material. Find P/T curves within valve documents. Color = glossy white **Do not use Delrin® in oxygen service.**

❖ U - Ultra High Molecular Weight Polyethylene (UHMWPE)

- UHMWPE is a very tough material. It is highly resistant to most corrosive chemicals, with the exception of oxidizing acids and organic solvents. It has a very low coefficient of friction, and is highly abrasion resistant. Find P/T curves within valve documents. Color = white

❖ P - PEEK (Unfilled) Polyether Ether Ketone

- PEEK polymer offers a unique combination of chemical, mechanical and thermal properties. It is excellent for water and steam applications at elevated temperatures up to 600°F (316°C). Find P/T curves within valve documents. It is not suitable for sulfuric acid. Color = beige

❖ V - Vespel® SP-21 (special order only)

- Vespel® is manufactured by DuPont using high performance polyimide resin. SP-21 is 15% by weight graphite filler. Graphite is added to provide low friction and increased wear resistance for bearings, thrust washers, and dynamic seals. It performs well in a variety of chemical environments and a variety of industrial fluids, at elevated temperatures. Continuous operating temperature range is from cryogenic temperatures to 550°F (288ºC).

❖ K - PCTFE - Polychlorotrifluoroethylene

- PCTFE is a fluorocarbon based polymer. It offers a unique combination of physical and mechanical properties: non-flammability, chemical resistance, and near zero moisture absorption making it suitable for cryogenic applications. Find P/T curves within valve documents.

METAL SEATS

❖ B - Bi-directional

➢ This set up has a seat seal behind each seat, on both upstream and downstream sides of the valve, to provide shut-off in both directions. There are 3 standard seat set up variations for a Bi-directional metal seated valve.

- B6T – Uses a 316 hard chrome plated ball and Stellite® 6 seats that are mate lapped together with PTFE seat seals. For application temperatures up to 400°F (204°C) at low pressures.
- B6V – Utilizes a 316 hard chrome plated ball and Stellite® 6 seats that are mate lapped together with Viton® seat seals. For application temperatures up to 400°F (204°C).
- B6G – Utilizes a 316 hard chrome plated ball and Stellite® 6 seats that are mate lapped together with graphite seat seals. For application temperatures up to 750°F (399°C).

❖ U - Uni-directional

➢ This set up utilizes a seat seal behind the downstream seat, and the upstream seat is spring-loaded against the ball to assist in downstream sealing and to provide compensation for thermal expansion effects at high temperatures, which provides a shut-off in only one direction. There are 3 standard seat set up variations for a Uni-directional set up.

- U6T7 – Utilizes a 316 hard chrome plated ball and Stellite® 6 seats that are mate lapped together with a PTFE seat seal and 17-7 seat spring. For application temperatures up to 400°F (204°C).
- U6V7 – Utilizes a 316 hard chrome plated ball and Stellite® 6 seats that are mate lapped together with a Viton® seat seal and 17-7 seat spring. For application temperatures up to 400°F (204°C).
- U6GZ – Utilizes a 316 hard chrome plated ball and Stellite® 6 seats that are mate lapped together with a graphite seat seal and Inconel seat spring. For application temperatures up to 1000°F (538°C).

STEM & BODY SEAL MATERIALS

❖ B - Buna N or Nitrile

- This sealing material is widely used because of its compatibility with most hydraulic fluid media. Works with petroleum oils, water, water glycol, di-ester based fluids, air and inactive gases. Typical temp. limits range from -30ºF to 200°F (-34ºC to 93°C). Color = black

❖ E - Ethylene-Propylene EPDM

- This material is recommended for low pressure steam, hot water, phosphate ester based fluids, weak alkalis and acids. It is not recommended for petroleum service, hydrocarbons and alcohols. Typical temperatures -65ºF to 300ºF (-54°C to 149°C). Color = black

❖ V - Viton®- Fluorocarbon Rubber (FKM)

- Viton® is DuPont's trademark for fluoroelastomer. It is well known for its excellent heat resistance. Viton® offers excellent resistant to aggressive fuels and chemicals. Typical temperature ranges from -40ºF to 400ºF (-40°C to 204°C). Viton® should not be used on steam. Color = red

❖ T - PTFE or ❖ M - TFM® Modified PTFE or ❖ N - Nova

- The above fluorocarbon-based polymers are used in multiple different sealing applications: as Seats as well as Stem & Body seals. Chemical resistance and Temperature ranges can slightly exceed those listed for the corresponding Seat Materials due to geometry and functional differences.

❖ G - Flexible Graphite

- Flexible graphite is chemically resistant to attack from nearly all organic and inorganic fluids with the exception of highly oxidizing chemicals and concentrated highly oxidizing mineral acids. Its temperature range is from -400ºF to 1000°F (-240ºC to 538°C). Color = black

❖ I - Impregnated Flexible Graphite

- Flexible graphite is impregnated with resin to improve sealing performance and prevent moisture entrapment. Resin impregnation reduces the graphite permeability and is often selected for low molecular weight gases at elevated temperatures. Color = black

Do not use in oxygen service.