

## TECHNICAL INFORMATION

### MOLECULARLY ENHANCED-PTFE

**Molecular Enhanced-PTFE (ME-PTFE)** is a PTFE based material. The material has trace amounts (far less than 1% of modifiers that perform several important functions). They allow the raw material to flow more easily during the molding process; they fill some of the voids that naturally form in a PTFE structure. Thus, the seat density is higher and its permeability lower. Most importantly, the modifiers form additional molecular bonds that strengthen the PTFE chain. Hence, the material is strengthened without the use of any fillers. ME-PTFE is a structurally reinforced material.

~~ME-PTFE is classified as a virgin PTFE material. It is FDA and USDA approved as a PTFE equal. The modifiers in ME-PTFE are molecularly bonded to the main structure; hence, there are no additives or fillers that can become separated and contaminate process lines. ME-PTFE is a virgin material.~~

Its structural enhancement make ME-PTFE more resistant to creep relative to PTFE seats. Creep is also know as "cold flow". This means that under pressure, ME-PTFE seats are more resistant to moving and permanent deformation. Torque increases normally associated with leaving a valve under pressure for extended lengths of time are minimized with ME-PTFE.

Structural enhancement creates a material which is significantly stronger than virgin PTFE. The compressive strength of ME-PTFE is essentially the same as 25% carbon reinforced PTFE. This strength is also maintained at elevated temperatures.

This exceptional strength at elevated temperatures is basis of ME-PTFE high pressure-temperature ratings.

To confirm these rating, a number of laboratory tests have been performed on ME-PTFE seats. Life cycle testing has shown that ME-PTFE wears equal to, or better than, virgin PTFE. **Pressure cycle testing has confirmed ME-PTFE exceptional resistance to creep. ME-PTFE seats are capable of being pressurized to a maximum pressure rating in both directions of flow, while still maintaining bubble-tight shutoff when retested at low pressure.** As a further measure of performance, measurements were taken that record ball movement as a function of pressure. **The amount of ball movement under pressure is significantly less than the amount of movement which an identical virgin PTFE seat allows. Less ball movement means less seat distortion.** This was repeated at 325°F and 400°F. **The amount of ball movement or seat distortion which ME-PTFE demonstrates is less than that of Reinforced-PTFE.**

**Steam testing on ME-PTFE seats have been conducted on 2" valves. Test conditions were 325 psi saturated steam, and a pressure drop of 150 psi. Valves were cycled for 1000 cycles. No leakage was evident throughout the test. At the conclusion of the testing, the valves were found to be bubble tight when tested at 80 psi air.**

ME-PTFE offers further enhancements, PTFE, including ME-PTFE, is one of the slipperiest substances known to man. Any fillers that are added to PTFE can only increase the coefficient of friction of the resultant material. This means that while ME-PTFE carries reinforced PTFE ratings, it requires the operation torque of virgin PTFE.

Because ME-PTFE contains no Glass, it is suitable for use on all concentrations of caustics, or other chemicals that may attack the glass of traditionally reinforced PTFE seats. ME-PTFE contains no carbon. When carbon is used as a reinforcement it can under some circumstances, separate from the base PTFE seat material and become a color contaminant.

PTFE seat materials have traditionally been incompatible with styrene and butadiene surfaces. This incompatibility is not a chemical problem, but a physical phenomenon caused by the permeability that exists in the PTFE seat structure. These particular fluids are capable of permeating PTFE and vaporizing to cause what is known as "popcorning". Because ME-PTFE is less permeable than traditional PTFE, it is less susceptible to this phenomenon.

Field tests have been conducted on valves supplied with ME-PTFE seats and PFA seats in this type of service. There was no evidence of gross "popcorning" in either seat material, however, the valves with PFA seats showed a significant increase in operating torque throughout these tests while the ME-PTFE seated valve torques remained constant. These tests show that ME-PTFE is compatible with these media and should be used in place of PFA.

**In summary, ME-PTFE is the universal ball valve seat of choice. It has the high pressure temperature ratings of reinforced PTFE. It has the low operating torques of virgin PTFE. It has none of the potentially contaminating fillers of reinforced PTFE. ME-PTFE is structurally reinforced PTFE, and virgin PTFE, all in one high performance seat.**