KTM E-SEAT VALVES
TECHNICAL INFORMATION

KTM E-Seat Valves

E-Seat valve technology offers process purity, strength, integrity, low permeability, high resiliency

GENERAL INFORMATION

Composed of a unique molecularly enhanced copolymer of PTFE and PFA, Emerson's KTM E-Seat offers a full range of properties formerly requiring two separate materials. The E-Seat copolymer provides pressure available only with glass fiber filament or carbon-reinforced PTFE. In high-temperature operations, the seat remains white, eliminating the risk of color contamination associated with seats made from darker reinforced materials.
Standard in all KTM floating-style ball valves, the E-Seat is excellent on a wide variety of applications but is particularly recommended for use on styrene and butadiene, where low permeability is a performance factor; and on low-pressure steam, where flaking of virgin PTFE is a problem. It is also recommended for use on food and beverage, pharmaceutical and biotech, paper, clean gas and any other applications where product purity and the lack of foreign fillers such as glass are critical to the user.

PROPERTIES AND PERFORMANCE

Table 1 compares the performance of the E-Seat with seats made from virgin PTFE and 10-20% carbon-filled PTFE. Note that the E-Seat has:

- A tensile strength greater than or comparable to the other two.
- Greater compressive strength than the others.
- The least creep percentage of the three materials, which gives it the least distortion that causes cold flow.
- Greater hardness (Shore Durometer) than virgin PTFE.
- The highest coefficient of linear thermal expansion, translating into better flexibility.
- A coefficient of wear significantly below that of virgin PTFE.
- A specific gravity and friction coefficient equal to that of virgin PTFE.

TABLE 1

Seat Material		Virgin PTFE	PTFE/PFA Copolymer (E-Seat)	Reinforced PTFE 10-20% Carbon filled
Tensile strength psi		4480	3556 - 4267	3485
Compressive creep percentage[1]	24 hours permanent deformation	16.7 8.4	5 2.7	5.5 3
Compressive stress psi	0.2% off set	(1095)	(1863)	(1721)
	1% deformation	(626)	(1181)	(1053)
Hardness (shore durometer)		55	60	65
Coefficient of linear thermal expansion 77 °F - 302 °F		12.6	13.9	7.8
Coefficient of Wear K $\frac{inch^2\ sec}{lb\ ft\ hr} \times 10^{-8}$		15,001	7500 - 9643	13
$\frac{cm^2\ sec}{kg\ m\ hr} \times 10^{-6}$		7000	3500 - 4500	6
Specifc gravity		2.14 - 2.17	2.14 - 2.20	2.06 - 2.12
Stationary static coefficient of friction		0.05 - 0.08	0.05 - 0.08	0.05 - 0.08

NOTES

1. 73 °F 1991 psi
2. ( ) direction of perpendicular to molding direction.

CHARACTERISTICS FOR COMPRESSIVE CREEP OF SEATS

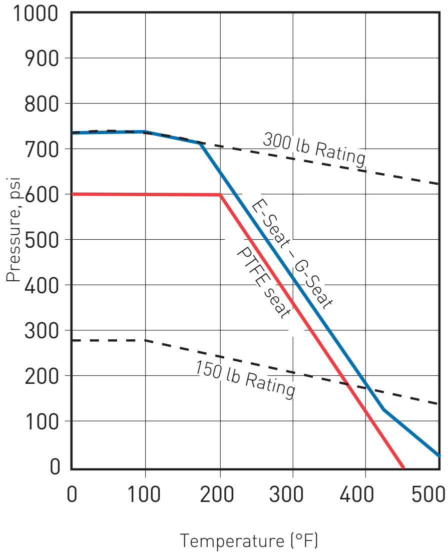
Table 2 data show the E-Seat to have superior characteristics throughout the full range of temperatures. Data was collected over a 24-hour period with a fixed pressure of 1991 psi. Because compressive creep is of such major importance in a valve seat, results from a wider range of temperatures are shown.

TABLE 2

	Temperature				
Seat model	**77 °F**	**212 °F**	**302 °F**	**392 °F**	**482 °F**
T	18.7	33.7	42.7	50.0	67.2
G	11.9	28.0	36.2	44.2	52.7
E	10.3	23.3	32.6	41.0	55.2

Figure 1 shows pressure/temperature ratings of the three seat materials with a full bore of 3 and 4 inches and a reduced bore of 4 inches. The E-Seat provides characteristics identical to the carbon-filled material, while retaining its pure white color. The same is true at full bores ranging from ½ to 8 inches and reduced bores of ½ to 10 inches.

FIGURE 1



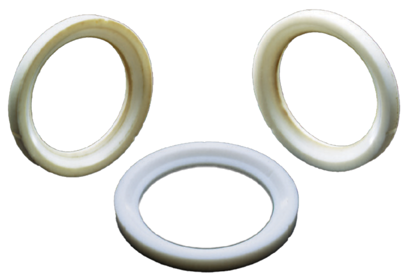
THE POPCORN FACTOR

Figure 2 shows a virgin PTFE seat after attack by a reactive monomer (in this case, styrene). The material's molecular matrix has been penetrated due to vapor pressure by uninhibited monomer, allowing a polymeric reaction to take place.
Commonly called "popcorn polymerization," this reaction can totally destroy seat material. Using butadiene - generally considered the worst-case scenario due to its small molecular size - Emerson tested the E-Seat copolymer for two years as 120 psi and 180 °F.
The seats experienced minimum distortion and, after the two-year period, did not leak in service. Pressure tests after removal, at 1.1 times design, also showed no leakage.

Figure 3 shows two of the seats tested. For comparison, a new seat is shown in the foreground.

FIGURE 2

FIGURE 3



SUMMARY

Emerson's KTM PTFE/PFA copolymer E-Seat offers the protection from color contamination as with virgin PTFE seats - but, unlike virgin PTFE, it offers equal or better strength, integrity, permeability and resiliency previously associated only with reinforced PTFE.

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