



# CHEMRAZ® SUBFAB PROPERTIES

A Perfluoroelastomer designed specifically for SubFAB applications

## FFKM INCREASES MANUFACTURING PRODUCTIVITY

Chemraz SubFAB, a perfluoroelastomer, is specifically designed to withstand the highly corrosive environments that are commonly seen in SubFAB applications. Specifically in the exhaust areas of the SubFAB including Pumps, Abatement systems, and piping fittings. Chemraz SubFAB addresses application challenges typically found in the SubFAB where temperatures and chemical exposures are high and increasing.

As device sizes have continued to shrink, the processes used to make the device features are evolving. Atomic layer processing and 3d device architectures are a few things driving changes in process chemistries and temperatures, as well as longer processing times. The more aggressive nature of these new processes also leads to more aggressive effluent gases that need to be handled in the SubFAB. These changes often challenge the conventional sealing materials used in the SubFAB to handle these process effluents.

Chemraz SubFAB is intended to upgrade systems using conventional sealing materials such as fluoroelastomers (and others) that can no longer handle the temperatures and/or chemical exposure found in the SubFAB applications. Chemraz SubFAB is also intended to lower the overall Cost of Ownership of the SubFAB by matching performance with application.

## FEATURES AND BENEFITS

- Broad chemical resistance to typical Subfab effluents, including Fluorine and Oxygen
- 300°C Operating temperature capability
- Low cost of ownership, whether upgrading from FKM or looking to lower costs.
- Patent PENDING, Optimal-High Temperature- seal design accounts for the limitations of the KF fittings that can lead to elevated stress in the seal materials and premature failures.
- Optimized physical properties for long life in static vacuum fittings.
- Color to distinguish it from typical perfluoroelastomers & fluorocarbon elastomers.

## APPLICATIONS

- ISO-KF vacuum fittings. Including typical sizes:
  - KF10, KF16, KF25, KF40, KF50, ISO63, ISO80, ISO100, ISO160, ISO200, and ISO250
- Interconnecting vacuum piping in the SubFAB
- Rough Pumps
- Gas Abatement systems/Scrubbers
- SubFAB valves

**Note:** Due to the nature of the material, slight variations in this color may exist in Chemraz SubFAB. There may also be the possibility for darker or lighter areas to be present on the parts. These natural variations should be considered cosmetic, and will not affect the performance of the parts.

*Statements and recommendations in this publication are based on our experience and knowledge of typical applications of this product and shall not constitute a guarantee of performance nor modify or alter our standard warranty applicable to such products.*

*Prior to actual use it is recommended compatibility tests be run to determine suitability in a specific application. This is critical where failure could result in injury or damage. A regular program of inspection and replacement should be implemented. Greene, Tweed technical personnel are available to help with a recommendation.*

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Compound No./Material Name: CHEMRAZ <sup>®</sup> SUBFAB	Material Description: GREY PERFUOROELASTOMER	Manufacturing Method: COMPRESSION MOLDED
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DESCRIPTION	Chemraz <sup>®</sup> SUBFAB	TEST METHOD
<b>PHYSICAL PROPERTIES</b>		
Color	Grey	
Specific Gravity	2.3	D792
Hardness, Shore A	80	D2240
<b>MECHANICAL PROPERTIES</b>		
Tensile Strength @ Break **	1700 psi (11.7 Mpa)	D1414
Elongation **	190%	D1414
Modulus @ 50% Elongation **	460 psi (3.2 Mpa)	D1414
Modulus @ 100% Elongation **	870 psi (6.0 Mpa)	D1414
Compression Set, 70 hrs @ 200° C **	21%	D395
Compression Set, 70 hrs @ 300° C **	45%	D395
<b>THERMAL PROPERTIES - COEFFICIENT OF THERMAL EXPANSION</b>		
21° C to 100° C	334.6 in/in/° C x 10 <sup>-6</sup>	831-14
100° C to 200° C	350.4 in/in/° C x 10 <sup>-6</sup>	831-14
200° C to 300° C	397.5 in/in/° C x 10 <sup>-6</sup>	831-14
<b>VACUUM PROPERTIES - HELIUM PERMIABILITY</b>		
21° C	9.00 x 10 <sup>-12</sup> $\frac{\text{cm}^3 \cdot \text{cm}}{\text{cm}^2 \cdot \text{s} \cdot \text{Pa}}$	D1434-82
100° C	1.39 x 10 <sup>-11</sup> $\frac{\text{cm}^3 \cdot \text{cm}}{\text{cm}^2 \cdot \text{s} \cdot \text{Pa}}$	D1434-82
200° C	2.72 x 10 <sup>-11</sup> $\frac{\text{cm}^3 \cdot \text{cm}}{\text{cm}^2 \cdot \text{s} \cdot \text{Pa}}$	D1434-82
<b>ORGANIC OUTGASSING</b>		
Total - 30 Minutes @ 100° C	0.2 ppmw	
Total - 30 Minutes @ 200° C	1.1 ppmw	
Total - 30 Minutes @ 300° C	6.0 ppmw	

Typical Properties/CHEMRAZ<sup>®</sup> SubFAB

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Recommended for applications involving effluents from ETCH, Deposition, Diffusion, Ashing and other processes.

## CHEMICAL COMPATIBILITY CHART

E= Excellent

G = Good

P= Poor

CHEMICAL		SUBFAB	FKM
Ammonium Fluoride	NH <sub>4</sub> F	E	G
Acetylene	C <sub>2</sub> H <sub>2</sub>	E	E
Ammonia	NH <sub>3</sub>	E	P
Argon	Ar	E	E
Arsenic Chloride	AsCl	E	P
Arsenic Trichloride	AsCl <sub>3</sub>	E	P
Arsine	AsH <sub>3</sub>	E	F
Boron Tribromide	BBr <sub>3</sub>	E	E
Boron Trichloride	BCl <sub>3</sub>	E	E
Boron Trifluoride	BF <sub>3</sub>	G	E
Bromine	Br	G	E
Carbon Dioxide	CO <sub>2</sub>	E	G
Carbon Tetrachloride	CCl <sub>4</sub>	G	E
Carbon Tetrafluoride	CF <sub>4</sub>	G	E
Chlorine	Cl <sub>2</sub>	G	E
Chloropenta	C <sub>2</sub> F <sub>5</sub> Cl	G	E
Dichloro Difluoro	CCl <sub>2</sub> F <sub>2</sub>	G	G
Dichloro Silane	SiH <sub>2</sub> Cl <sub>2</sub>	E	G
Dimethylamine (DMA)	(CH <sub>3</sub> ) <sub>2</sub> NH	G	P
Disilane	Si <sub>2</sub> H <sub>6</sub>	E	G
Difluoro Ethane	CH <sub>3</sub> CHF <sub>2</sub>	G	P
Fluorine	F <sub>2</sub>	E	G
Fluoroform (F-23)	CHF <sub>3</sub>	E	P
Germanium	GeH <sub>4</sub>	E	G
Helium	He	E	E
Hexachloro Disilane	Si <sub>2</sub> Cl <sub>6</sub>	E	G
Hexafluoro Ethane	C <sub>2</sub> F <sub>6</sub>	G	G
Hydrogen	H <sub>2</sub>	E	E
Hydrogen Bromide	HBr	E	E

CHEMICAL		SUBFAB	FKM
Hydrogen Chloride	HCl	G	E
Hydrogen Fluoride	HF	E	P
Hydrogen Selenide	H <sub>2</sub> Se	E	F
Hydrogen Sulfide	H <sub>2</sub> S	G	P
Methyl Chloride	CH <sub>3</sub> Cl	E	E
Monomethylamine	CH <sub>5</sub> N	G	F
Nitrogen	N <sub>2</sub>	E	E
Nitrogen Trifluoride	NF <sub>3</sub>	E	G
Nitrous Oxide	N <sub>2</sub> O	E	E
Oxygen	O <sub>2</sub>	E	P
Ozone	O <sub>3</sub>	E	E
Perfluoro-propane	C <sub>3</sub> F <sub>8</sub>	G	P
Phosphine	PH <sub>3</sub>	E	F
Phosphorous Trifluoride	PF <sub>3</sub>	E	E
Potassium Hydroxide	KOH	F	P
Silane	SiH <sub>4</sub>	E	G
Silicon Tetrachloride	SiCl <sub>4</sub>	G	G
Silicon Tetrafluoride	SiF <sub>4</sub>	G	P
Silicon Trifluoride	SiF <sub>3</sub>	G	P
Sodium Hydroxide	NaOH	F	G
Sulfur Hexafluoride	SF <sub>6</sub>	G	F
Tetraethylorthosilicate (TEOS)		E	E
Tetrafluoromethane (F-14)	CF <sub>4</sub>	E	E
Trichloroethane	C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub>	E	E
Trichlorosilane	SiHCl <sub>3</sub>	E	E
Trifluoromethane	CHF <sub>3</sub>	E	G
Trimethylamine	(CH <sub>3</sub> ) <sub>3</sub> N	G	P
Trisilane	Si <sub>3</sub> H <sub>6</sub>	E	G
Tungsten Hexafluoride	WF <sub>6</sub>	E	F