

		PFAS Alternatives in the Proposed Restrictions→						
Materials	PVDF	EPDM	Silicone	PEEK	Mica	Polyvinyl chloride	Polyethylene	Ceramic Based
Flexibility	Semi rigid	Flexible	Flexible	Rigid	Rigid	Flexible~ Semi rigid	Flexible~ Semi rigid	Rigid
Continuous use temperature(°C)	175	90	180	260	> 500(Mica) 180(Adhesive)	100	120	> 500
Tensile breaking strength(MPa)	45	5~20	3~12	90		15~50	10~30	
Tensile breaking elongation(%)	200	100~800	100~500	50	≠0	500~100	500~1000	≠0
Flexural Modulus(MPa)	800	5~10	5~10	4000	> 10000	20~3000	20~2000	> 10000
Oil resistance	Excellent	Poor	Poor	Excellent	Poor (Adhesive)			
Abrasion resistance	Excellent	Poor	Poor	Excellent	Excellent			
Heat Shrinkable Tubing (Shrink ratio)	Possible (min.50%)	Possible (50%)	Possible (50%)	Possible (15~20%)	Impossible	Possible (min.50%)	Possible (min.50%)	Impossible

Comparison of properties between [PVDF] and other PFAS alternatives. Gray shaded cells are issues when substituting PVDF heat-shrink sleeve. Materials with 175°C or higher are Silicone, PEEK, Mica and Ceramic. Mica and Ceramic are inorganic, so cannot processed into tubing. Silicone and PEEK are potential candidate, but they have following issues:
 PEEK : Very stiff (see "Flexural Modulus"), Shrink ratio is low
 Silicone : Weak in mechanical strength (see "Tensile breaking strength"), oil resistance, abraision
 Therefore, they cannot be the substitute of PVDF heat-shrink tubing.

Shrink ratio:
 $(D-d)/D * 100 (\%)$

where as D: Inside diameter before shrink
 d: Inside diameter after shrink

Shrink ratio
 50% = 2:1 shrink
 67% = 3:1 shrink

