	Form Title:	<p align="center">ENGINEERING BULLETIN</p>	Document #:	<p align="center">EB-03-23</p> <small>(Form: DEF-003A-1)</small>
				Revision:
	Document Title:	<p align="center">PTFE Gaskets and Seals (Filled, Envelope and Encapsulated)</p>	Date:	<p align="center">Dec. 21, 2023</p>
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Teflon® is the trademark name for polytetrafluoroethylene (PTFE). PTFE is impervious to almost all industrial chemicals, making it one of the most corrosion resistant materials available.

Pros of PTFE:

- Highly resistant to most acids, alcohols, detergents, solvents and chemicals.
- Very long shelf life.
- Temperature range capability of -325°F to +500°F.

Cons of PTFE:

- PTFE is a hard, less-forgiving material which makes sealing surfaces with less than ideal surface finish more difficult.
- PTFE is an inelastic material; therefore, it can cold-flow and lose its ability to seal.
- PTFE is very susceptible to nicks or gouges.
- PTFE seals typically cannot be reused once a joint is disassembled.
- PTFE is NOT compatible with certain alkali metals and fluorinating agents such as xenon difluoride and cobalt (III) fluoride.

Blended PTFE with Fillers - Betts Industries offers TTMA flange gaskets manufactured from a Teflon™ resin that is homogeneously blended with inorganic fillers. Our premium material offers many advantages over generic filled-PTFE gaskets. Additionally, the design enhances sealing by incorporating a reduced surface area profile to increase the flange's applied seating stress. For PTFE gaskets, flanges with phonographic finishes and more rigid stainless steel flanges are preferred and aid in sealing. PTFE gaskets are suitable for use in general industrial applications where resistance to highly aggressive chemicals is required.




Pros of Betts' PTFE with Fillers:

- Improved physical and mechanical properties with excellent chemical resistance.
- Filler composition and shape prevents wicking which can cause leakage or corrosion of flange surfaces.
- Gaskets separate cleanly from flanges after use.
- Does not exhibit cold-flow problems associated with virgin PTFE.
- Not as hard as some other filled PTFE products.
- FDA approved and conforms to 21CFR 177.1550 and ASTM F104: F452111-A9B5E11K6M6.
- Temperature range capability of -350°F to +500°F.

Gasket Size	Betts Part #
2" TTMA Pipe Flange	RGA201TD
3" TTMA Pipe Flange	RGA301TD
4" TTMA Pipe Flange	RGA401TD
6" TTMA Pipe Flange	RGA601TD
3" TTMA Sump	G15181TD
4" TTMA Sump	G15266TD
6" TTMA Sump	G25507TD
4" Internal Flange	G27229TD

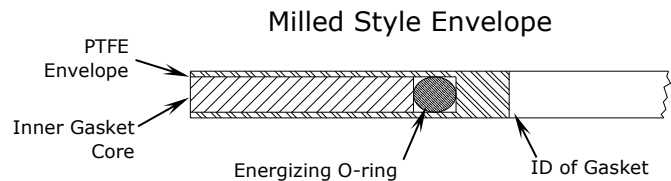
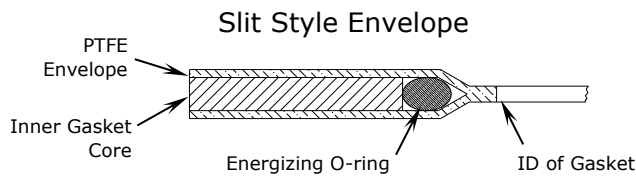
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Cons of Filled PTFE Gaskets:

- Filled PTFE does not seal as effortlessly as elastomeric gaskets.
- Flanges must have a good surface finish and be free of nicks or gouges.
- Proper flange tightening and retorquing follow-up procedures must be followed for best results.

PTFE Envelope Gaskets – Envelope gaskets have a PTFE outer layer that sandwiches an inner gasket made from a more resilient but less chemically resistant material. The PTFE envelope is on both flange surfaces and the ID while the OD and the bolt holes are open to the inner core. Betts’ line of envelope gaskets also incorporate a silicone O-ring contained within the PTFE envelope that offers an additional compression energizer. Also, flanges with phonographic finishes are preferred and aid in sealing. The standard style envelope gasket is a slit configuration as shown below. A fully machined style or “milled” style envelope is available by adding “-MIL” to the end of the part number.



Both styles are suitable for use in general industrial applications where resistance to highly aggressive chemicals is required.


Pros of Betts’ Envelope Gaskets:

- Low minimum seating stress required for sealing.
- Excellent chemical resistance.
- Gaskets separate cleanly from flanges after use.
- Does not exhibit the cold flow problems associated with virgin PTFE.

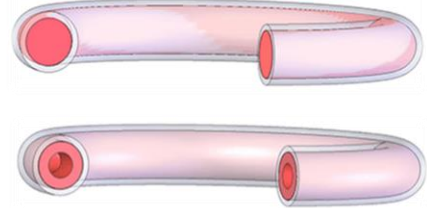
Cons:

- PTFE Envelope Gaskets do not seal as effortlessly as elastomer gaskets.
- Flanges must have a good surface finish and be free of nicks or gouges.
- Proper flange tightening procedures must be followed for the best results.
- If the envelope is damaged, inner core will be susceptible to chemical attack.

Gasket Size	Betts Part #
2" TTMA Pipe Flange	RGA202TF
3" TTMA Pipe Flange	RGA302TF
4" TTMA Pipe Flange	RGA402TF
6" TTMA Pipe Flange	RGA602TF
3" TTMA Sump	G75344TF
4" TTMA Sump	G75346TF
6" TTMA Sump	G28292TF

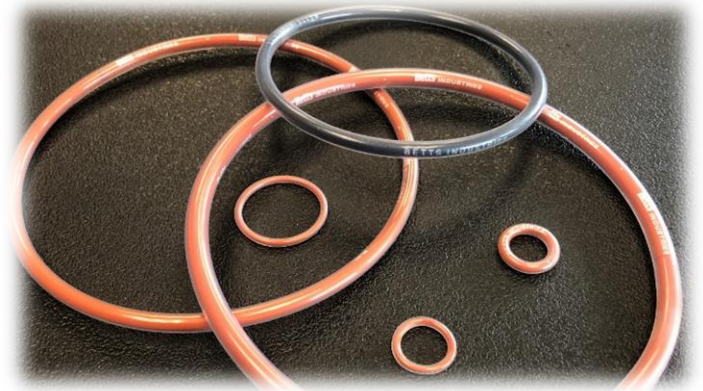
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FEP and PFA Encapsulated O-rings - FEP (Fluorinated Ethylene Propylene) and PFA (Perfluoroalkoxy) are fluoropolymer variations that have chemical resistance similar to PTFE yet also have melt-processable characteristics which allows them to be processed using conventional injection molding and screw extrusion techniques. Encapsulated O-rings have completely bonded and sealed FEP or PFA fluoropolymer sleeves which deliver excellent chemical resistance while offering an isolated and protected elastomeric core to provide energizing resiliency. Encapsulated O-rings are available with both solid and hollow cores to satisfy specific sealing requirements.



Pros of Betts' FEP/PFA Encapsulated O-rings:

- Excellent chemical resistance.
- Broad temperature range of -40°F to +400°F. (higher with PFA)
- Abrasion and compression set resistant.
- Good lubricity with a low coefficient of friction.
- FDA approved and conforms to 21CFR 177.1550.



Cons:

- Difficult to seal compared to elastomeric compounds.
- If the outer sleeve is damaged, the inner core will be susceptible to chemical attack.
- More difficult to install compared to elastomeric compounds.
- Susceptible to damage from grit, dirt, and particulate.
- Typically, only a single use seal/difficult to uninstall without damage.
- Not ideal for high frequency reciprocating/rotating equipment.

Please contact Betts Industries Engineering or Customer Service departments if there are any additional questions.