ThinQk
Pump Parts

ORIGINAL QUALITY
AT A BETTER PRICE

FEP Encapsulated O-Ring

AODDP REPLACEMENT PARTS

ENCAPSULATED O-RINGS JOINT / FUSE LINE

This memo is to address concern with regard to the “undercuts or cracks” found on Thinqk’s encapsulated O-rings. This is NOT a defect, but simply a “fuse line” which is a result of the manufacturing process required to encapsulate the elastomer.
The Teflon encapsulation process requires the joining or “fusing” of the melt processable FEP or PFA encapsulation essential to make the o-ring homogeneous with no splits or voids in the encapsulation. This process provides 100% barrier protection to the elastomer core.

I would like to elaborate on this issue: As mentioned, the fuse area of the O-Ring will exhibit a fuse line. This is a required part of our manufacturing process. (A process that has been successful since 1976) We take great care to make the fuse area as smooth as possible, but the process will always create a slight fuse line which we have procedures to keep the projection, depth, or length of the fuse line below accepted industry standards for visual defects (MIL-Std 413).

Keep in mind, a standard elastomeric O-Ring has a parting line around the entire circumference of the O-Ring on the inside and outside diameter. In our discussion of the fuse area, it is only a small part of the surface area of the O-Ring. In addition, we generally try to locate the fuse area at a “non-critical” surface area of the O-Ring.

Thinqk is very confident in the performance and quality of the O-Ring and can assure you that this fuse line is not a leak path or defect causing a leak; nor is it a “crack” in the encapsulation. I can also assure you that the elastomer core is fully encapsulated.

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STORAGE & SHELF LIFE

Storage
Storage Storage life varies with resistance of each synthetic elastomer to normal storage conditions.

Temperature
Avoid excessively high temperatures for long periods of time. An average not exceeding 75℉ to 80℉ with peaks not exceeding 100℉ are recommended based on the storage conditions.

Ozone
Avoid excessive concentrations of ozone. Elastomers should not be stored near ozone generating equipment or operations such as welding. Most normally occurring ambient ozone levels are acceptable (providing the elastomer is not stored under tension).

Tension
Do not store elastomers under tension as that could promote ozone attack.

Chemicals
Do not store unlike elastomers in the same container as they can absorb volatile constituents from each other. For this same reason, do not store them near volatile chemicals.

Light
Shield elastomers from ultraviolet light. Sunlight is particularly harmful.

Packaging
Polyethylene bags stored in larger cardboard containers or polyethylene lined craft paper bags insure optimal storage life.

SHELF LIFE

Encapsulation Materials:
FEP - Unlimited shelf life
PFA - Unlimited shelf life

Elastomers:
Viton : 20 years
Silicone : 20 years
EPDM : 5 to 10 years

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FEP (Fluorinated Ethylene Propylene) DETAILED PROPERTIES

The table below lists a generally accepted summary of properties that we believe to be reliable. Please note that many of these resins are produced in several varieties and property characteristics may vary. Therefore, determination of resin is dependent on the application and this table is only meant to serve as a general guideline.

FEP Properties	ASTM or Unit	FEP
MECHANICAL PROPERTIES		
Specific Gravity	D792	2.15
Elongation %	D638	250~330
Tensile Strength (psi)	D638	2,800~5,000
Flexural Strength (psi)	D790	no break
Compressive Strength	D695	2,200
Tensile Elastic Modulus (Young's Modulus) (psi)	D638	50,000 (psi)
Flexural Modulus 103MPa (103kgf/cm2)	D790	78,000~92,000
	D790	0.5-0.6 (5.5-6.5)
Flex Life (MIT cycles)	D2176	5,000~80,000
Hardness Durometer Shore D	D636	D55
Coefficient of Friction	on steel	0.05
Abrasion Resistance 1000 revs.	Taber	14~20
Impact Strength IZOD 73℉/23℃, notched ft/lbs/in	D256	no break
THERMAL PROPERTIES		
Melting Point	℃ (℉)	260 (500)
Upper Service Temperature(20,000h)	℃ (℉)	200 (392)
Flame Rating**	UL 94	V-0
Thermal Conductivity	BTU/hr/ft2/deg F in	1.4
	cal/sec/cm2,℃/cm	6 x 10-4
Linear Coefficient of Thermal Expansion 10-5 ℃	D696	8.3~10.5
Heat of Fusion	BTU/LB	11
Heat of Combustion	BTU/LB	2200
Low Temperature Embrittlement	℃ (℉)	-268 (-450)
ELECTRICAL PROPERTIES		
Dielectric Constant	D150/103Hz	2.1
	D150/106Hz	2.1
Dielectric Strength 10 mil film	D149	>2000
Volume Resistivity ohm-cm	D257	>1018
Surface Resistivity ohm/sq.	D257	>1017
GENERAL PROPERTIES		
Chemical/Solvent Resistance	D543	Excellent
Water Absorption, 24h	%	95 >95
Deformation Under Load	*D621/100℃	5.0
	**D621/25℃	3.0
Refractive Index		1.338
Limiting Oxygen Index	>95	>95
Properties	ASTM or Unit	FEP

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INSTALLATION INSTRUCTIONS

Instructions for Installing FEP O-Rings

Any surface in direct contact with the O-Ring should be smooth and free from sharp edges, burrs and deep scratches. A 20 micro-inch finish is recommended.

If it is difficult to install the O-Ring over a shaft, it may be "stretched" by first immersing the O-Ring in boiling water for a few minutes. This softens and enlarges the O-Ring. After installation, it may be necessary to apply heat to the O-Ring once again so it will shrink back to a tight fit when cooled.

Do not bend the O-Ring too sharply as the Teflon will tend to kink under the strain, however, if it does become kinked, it will not affect the operation in most applications.

Sealing with Teflon encapsulated O-Rings is sometimes a little different than sealing with rubber O-Rings. A rubber O-Ring will readily flow into imperfections of sealing surfaces. Teflon, being harder, takes time to flow into imperfections. The O-Ring may leak on initial start-up. To correct this situation if it occurs after installing the O-Ring, allow it to rest in place under load for a few hours or overnight. This allows the Teflon to cold flow and fill voids for proper sealing on start-up. Another method is to install a pre-heated O-Ring, and allow to cool under load. The heated O-Ring is softer and flows quicker into imperfections.

CAUTION

Within normal use temperatures, Teflon is attacked by so few chemicals that it is easier to describe the exceptions rather than list the chemicals with which Teflon is compatible. Teflon should not be used with the following:

1. Alkali metals such as elemental sodium, potassium, lithium, etc. These alkali metals remove fluorine from the polymer molecule.

2. Extremely potent oxidizers, fluorine (F2) and related compounds (e.g., chlorine trifluoride, CIF3). These can be handled by Teflon, but only with great care, as fluorine is absorbed into the resins, and the mixture becomes sensitive to a source of ignition such as impact.

3. 80% NaOH or KOH, metal hydrides such as borances (e.g., B2H6), aluminum chloride, ammonia (NH3), certain amines (R-NH2) and imines (R-NH) and 70% nitric acid at temperatures near the suggested service limit.

Hints for Inserting Coupling Gasket

Teflon encapsulated coupling gaskets are more rigid than plain elastromeric gaskets due to the Teflon encapsulation and are therefore a little more difficult to insert. After installing just a few, you will be an expert.

Insert gasket perpendicular to opening with OD of gasket 90° from the locking arm holes to prevent damage to Teflon. Tip gasket and insert lower part of gasket into groove directly under 1 locking arm hole. Cover the other locking arm hole with a thin flat object such as a 6" stainless steel pocket rule and work balance of gasket, starting from the part already in the groove, past the covered locking arm hole and into the groove.

Teflon encapsulated coupling gaskets are far superior to other gasket materials when used in corrosive applications.

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WHY THINQK

NOT ALL TEFLON ENCAPSULATED O-RINGS ARE OF EQUAL QUALITY AND PERFORMANCE ABILITIES EVEN THOUGH THEY MAY LOOK ALIKE!

FACT 1: Most manufacturers of encapsulated O-Rings use CYANOACRYLATE (quick glue) to join the ends of the Viton cord instead of vulcanizing with a fully curable fluorocarbon based adhesive. The glued joint is inferior to a vulcanized joint at elevated temperatures.

PROBLEM A: Introducing a foreign material, cyanoacrylate, may cause contamination thru permeation of the FEP or PFA jacket.

PROBLEM B: Certain chemicals, thru permeation, will attack and break down the glue, causing premature seal failure.

PROBLEM C: The quick glue bond is dramatically weakened during a rise in temperature and breaks down completely nearing 400°F; whereby the elastomer shrinks and the joint separates leaving a gap between the ends of the Viton cord.

PROBLEM D: When heating and stretching a glued O-Ring to fit over a shaft, the bond may break.

SOLUTION: Insist on Thinqk's vulcanized encapsulated O-Rings! Ask your supplier what method they use to join the ends of their Viton encapsulated O-Rings...or simply run your own test by placing the O-Ring in an oven at 350°F for only 15 minutes. It will be clearly visible that the splice has completely separated, creating a gap or potential leak path.

FACT 2: Occasionally, Teflon encapsulated O-Rings will exhibit an AIR GAP of .005" - .010" between the elastomer core and the Teflon jacket.

PROBLEM A: The air gap allows considerably more compression set and reduces the resilience of the encapsulated O-Ring, resulting in premature leakage.

SOLUTION: Run compression tests to compare Thinqk's encapsulated O-Rings with other supplier O-Rings...or specify Thinqk's O-Rings which have no air gap.

Design Recommendation Disclaimer: Recommendations on application design and material selection are based upon available technical data and are offered as suggestions only. Each user should conduct evaluations to determine the suitability for his particular application. Thinqk Ltd. offers no express or implied warranties concerning the form, fit, or function of a product in any application.

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