



Advanced EMC
Technologies

PTFE Rotary Shaft Seals Engineering Guide



Table of Contents

PTFE Seal	3
Series A Seal	4
Series B Seal	5
Series C Seal	6
Series D Seal	7
Series E Seal	8
Fluoropolymers Materials	9
Seal Data Sheets	10

PTFE Seals

PTFE rotary shaft seals offer outstanding performance in situations with extreme temperatures, high pressure, chemically inert static and dynamic sealing for the most demanding applications. Our thin flexible PTFE sealing jacket, resilient by design, applies outward pressure to the sealing element at low pressures.

A highly efficient seal is created as the system pressure increases enough to take over from the spring and engage the shaft or bore. The spring or energized seal assembly provides permanent resilience to the seal jacket and compensates for jacket wear, hardware misalignment and eccentricity. The jacket material is critical in design to assure proper seal performance.

We offer PTFE compounds specific to the application i.e. High PV seals, cryogenic seals, high temperature seals, and PTFE seal alloys with fillers such as PTFE Graphite, PTFE Polyimide, PTFE Carbon, PPS PTFE, and Rulon L, Rulon J and Rulon AR equivalents.

BENEFITS

- Static and dynamic sealing
- Chemically resistant seals
- Low friction - High PV - 35 m/s
- Dry running or lubricated seals
- Pressure to 500 psi
- FDA/USDA Compliant
- Wider temperature ranges and longer life span than elastomeric seals
- Usable in high pressure or vacuum conditions

APPLICATIONS

- Pumps
- Gearboxes
- Motors
- Turbine Engines
- Compressors
- Alternators and Generators
- Mixers

Series A Seal

The Series A seal, or standard seal, is an excellent general purpose rotary shaft seal for use in moderate conditions.

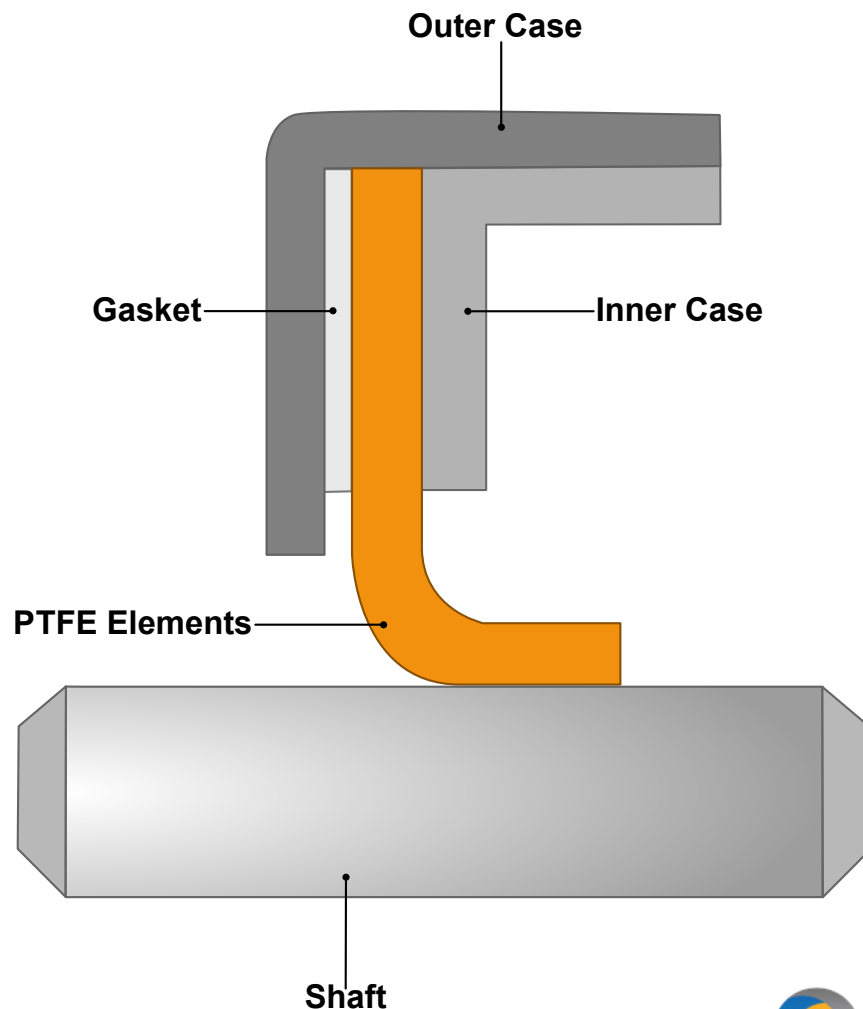
Typically it is used for operating pressures less than 75 psi with maximum PV of 75,000 lubricated, 37,000 non-lubricated in environments where outside contaminants are not a major problem.

Typical Applications:

- Gearboxes
- Environmental Seals

BENEFITS

- Static and dynamic sealing
- Chemically resistant
- Low friction
- Dry running up to 5000 fpm in lubricated media
- Typical pressure applications to 75 psi
- FDA/USDA Compliant



Series B Seal

The Series B Seal, is an economical seal for a wide range of lubricated and non-lubricated applications.

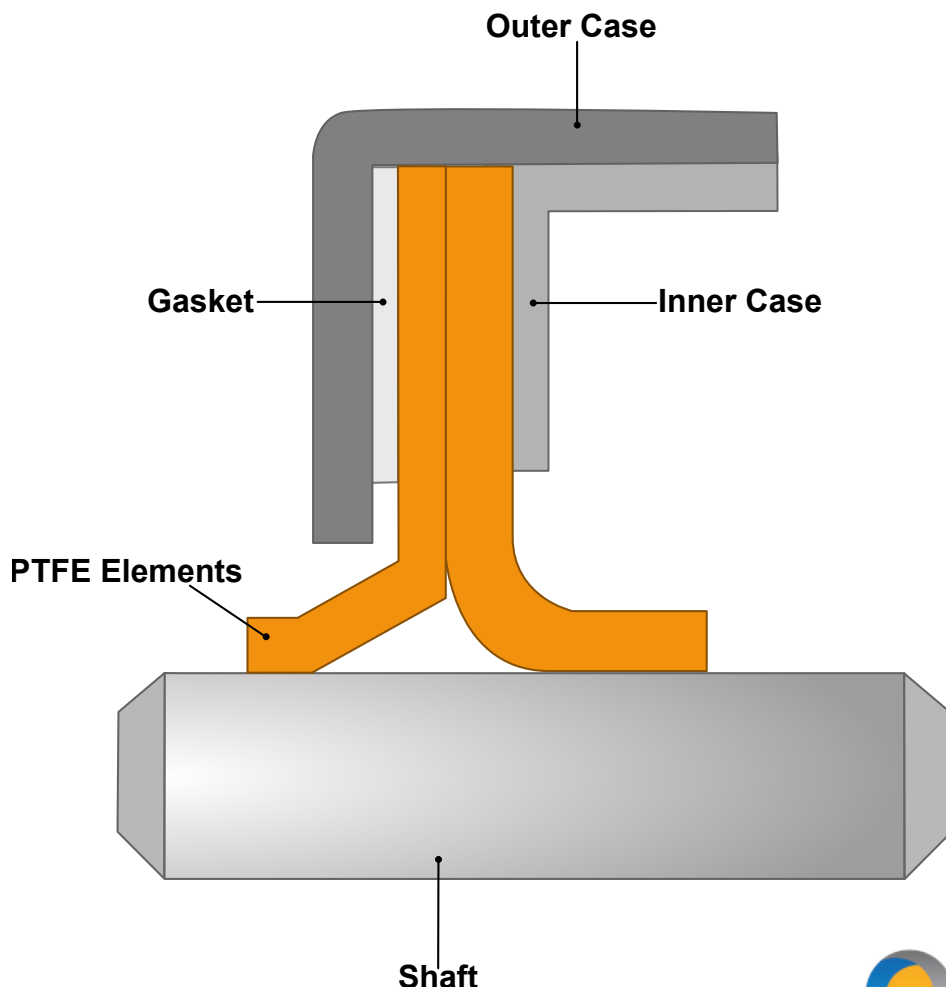
These seals are intended for use in higher pressure applications. It gives you more protection than the standard seal with a dust lip, and provides additional sealing power to both keep lubricant in and contaminants out.

Typical Applications:

- Gearboxes
- Environmental Seals

BENEFITS

- Static and dynamic sealing
- Chemically resistant
- Low friction
- Lubricated up to 3000 fpm
- High pressure applications to 125 PSI
- Maximum PV 75,000 lubricated / 37,500 non-lubricated
- FDA/USDA Compliant



Series C Seal

The Series C seal incorporates spring loading to improve sealing where shaft run-out or shaft misalignment is anticipated.

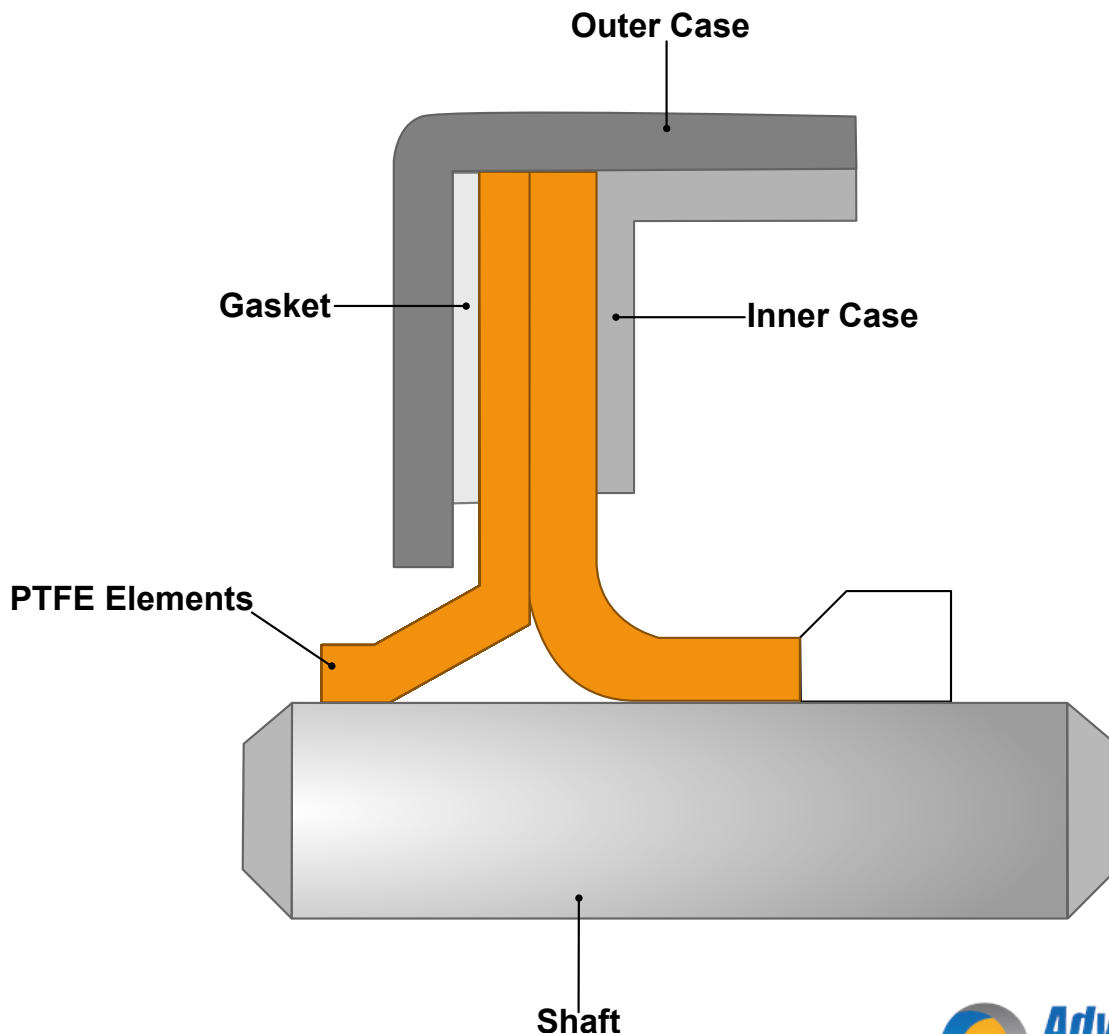
It offers longer life and improved sealing of gases and abrasive media due to higher lip load.

Typical Applications:

- Gear Boxes
- Submersible Pumps/Motors
- Mixers

BENEFITS

- Static and dynamic sealing
- Chemically resistant
- Low friction
- Dry running up to 2500 fpm, 5000 fpm in lubricated service
- Higher pressure applications to 125 psi
- FDA/USDA Compliant



Series D Seal

Series D seals improves sealing where shaft runout or bore / shaft misalignment exist. These designs offer positive sealing during long term storage.

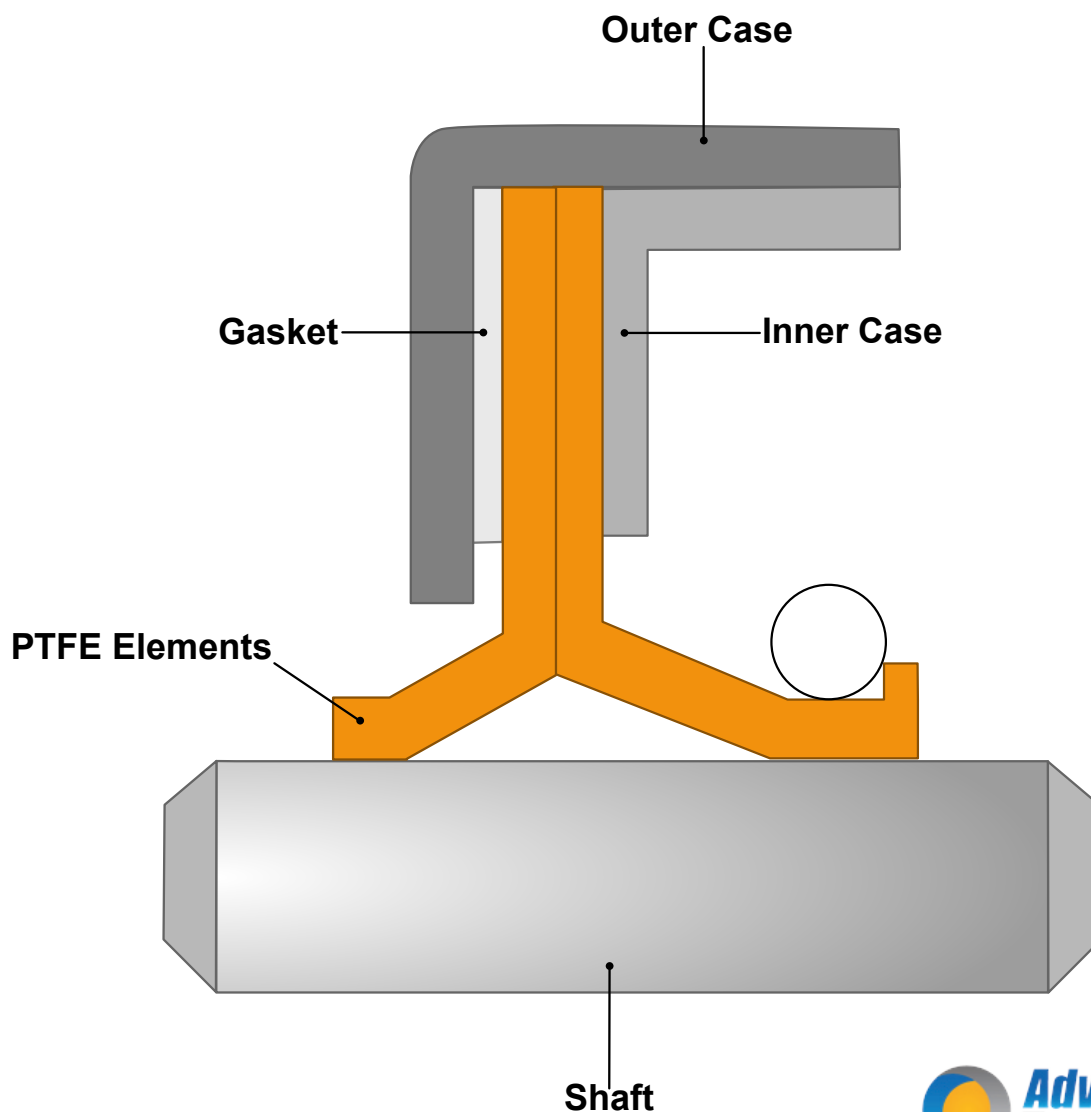
They can be used at shaft speeds up to 2,000 ft./Min.

Typical Applications:

- Mixers
- Gearboxes
- Augers

BENEFITS

- Static and dynamic sealing
- Chemically resistant
- Low friction
- Dry running up to 2000 fpm, 5000 fpm in lubricated service
- Higher pressure applications to 75 psi
- FDA/USDA Compliant



Series E Seal

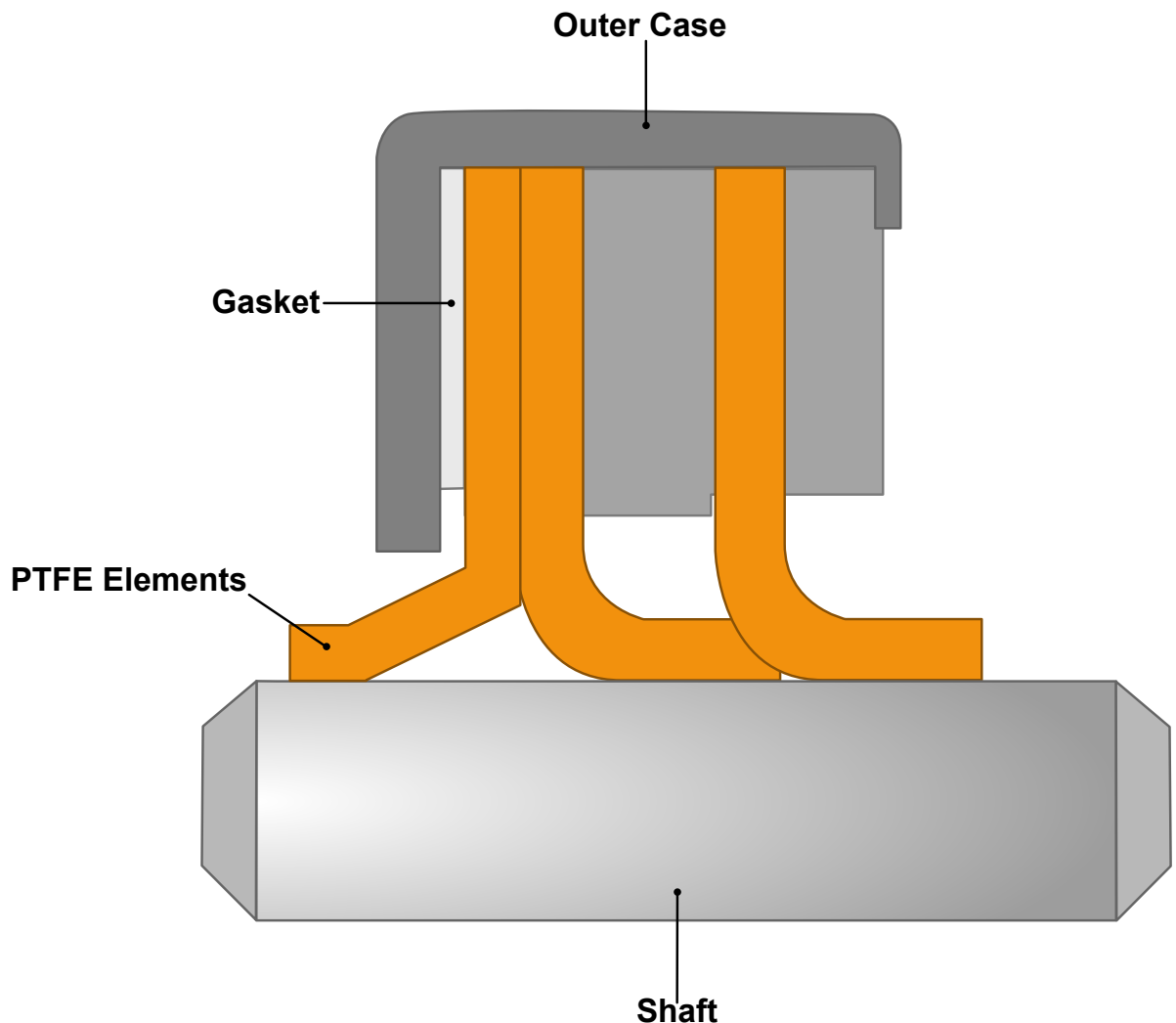
Series E seals are designed for pressures up to 400 PSID lubricating media with speeds up to 3,500 ft./Min.

Typical Applications:

- Hydraulic Motor
- Pumps
- Hydrostatic Transmissions
- Other High Pressure Hydraulic Equipment.

BENEFITS

- Static and dynamic sealing
- Chemically resistant
- Low friction
- Dry running up to 3500 fpm
- Maximum PV 300,000 lubricated / 50,500 non-lubricated
- FDA/USDA Compliant



How to Choose

Unfilled PTFE

Unfilled PTFE, also known as virgin PTFE, has the lowest friction of all members of the PTFE material family. It is FDA approved, so it can be used in food, dairy, and pharmaceutical applications. Unfilled PTFE has been found to perform especially well in cryogenic environments. Its best used for low to non-pressure situations, and works best on shafts with a low hardness.

Glass-filled PTFE

When PTFE is glass filled, the glass will usually be in the form of fibers or beads. Its primary contribution to PTFE seals is to prolong the life of the PTFE seal and increase its overall strength. However, because glass is inherently hard and therefore abrasive to many surfaces, it is not recommended for use on shafts with a low hardness value.

Molybdenum Disulfide-filled PTFE

Molybdenum Disulfide (MoS_2) is added to PTFE to increase its overall wear resistance and life. While this can also be accomplished via glass filler, MoS_2 is not as abrasive as glass. However, it is still not recommended for softer shaft surfaces.

Molybdenum Disulfide and Glass-filled PTFE

The combination of MoS_2 and glass offers better elongation characteristics than virgin PTFE while remaining less abrasive than glass-filled PTFE. It works best on harder shafts.

Carbon-filled PTFE

When carbon is used as a filler, it can come in a variety of forms and grades, including fibers or powder, graphite or carbon, and natural or synthetic. In general, carbon acts as a natural lubricant, which means that adding it as a filler increases the wear resistance of virgin PTFE but does not affect PTFE's extremely low friction as much as, say, glass or MoS_2 . Carbon-filled PTFE rotary seals are ideal for aggressive environments involving steam, corrosive chemicals, high temperatures, and high pressure. In addition, it works for shafts with soft surfaces all the way through the hardest surfaces.

Carbon and Molybdenum Disulfide filled PTFE

Carbon and MoS_2 can also be combined together with PTFE. The result is interesting: even better wear resistance coupled with the capability of dry-running (non-lubricated applications) and high temperatures. In addition, this combination can work with softer shaft surfaces than just MoS_2 alone supports.

Fluoropolymers Materials

Material Group	Description	Application Details
1000	PTFE Virgin	Slow Rotary light duty service FDA Compliant
1025	PTFE- 25% Glass Filled	Wear and extrusion resistant. High abrasion to mating parts < 62 Rc
1034	PTFE- 23% / 2% Carbon / Graphite	General purpose service where extrusion and deformation are needed
1050	PTFE- 15% / 5% Glass / Molly	Wear resistant for higher speed applications. Good in vacuum and inert gases.
1058	PTFE- Polyimide	Low abrasion to mating parts. For use with soft materials such as 300 SS and Aluminum.
1080	PTFE-Modified	Wear resistant. Higher mechanical strength. Low permeation.

This information corresponds to our current information on the subject. It is offered solely to provide suggestions for your own experimentation. It is not intended, however, to substitute for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. Since we cannot anticipate all variations in actual end-use conditions,

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Fluorolon Virgin PTFE 1000

Fluorolon Virign PTFE 1000 is a high molecular weight polymer, one of the most versatile plastic materials known and useful for a large range of products for applications excluded to other materials. The characteristics are: high heat resistance, high resistance to chemical agents and solvents, high dielectric properties, low friction and non-toxicity.

Applications: Virgin PTFE 1000 is used primarily for seals, seats, bearings and insulators.

Property	Specified	Units	Method
Specified Gravity	2.14 - 2.20	gr / cc	ASTM D792
Tensile Strength	1500 - 3500	Psi	ASTM D638
Elongation	250 - 350	%	ASTM D638
Hardness	50 - 60	Durometer D	ASTM D1706
Deformation 78 F@ 2000psi / 24h	14-16	%	ASTM D621
Water Absorption	0.001	%	ASTM D570
Coefficient of Friction	0.04	*F	*3
Dielectric Constant	2.00	-	ASTM D150
Dielectric Strength	1000	volts	ASTM D257
Coefficient of Thermal Expansion	5.5 x 10 ⁻⁵ th	In. / In. / Ft.	ASTM D696
Compressive Strength	1100	psi	ASTM D695-57
Max Service Temp Continuous	500	*F	-

Fluorolon PTFE

Glass Alloy 1025

Fluorolon Virgin PTFE 1025 is a high molecular weight polymer reinforced with 25% glass fibers, these reinforcements provide enhanced mechanical properties. The glass increases compressive strength and reduces cold flow. The characteristics are: high heat resistance, high resistance to chemical agents and solvents, high dielectric properties, low friction, and non-toxicity.

Applications: Virgin PTFE 1025 is used primarily for seals, seats, bearings and insulators.

Property	Specified	Units	Method
Specified Gravity	2.16 - 2.21	gr / cc	ASTM D792
Tensile Strength	2100	Psi	ASTM D638
Elongation	150	%	ASTM D638
Hardness	58	Durometer D	ASTM D1706
Deformation 78 F@ 2000psi / 24h	4-9	%	ASTM D621
Water Absorption	<0.01	%	ASTM D570
Coefficient of Friction	21	*F	*3
Dielectric Constant	2.5	-	ASTM D150
Dielectric Strength	-	volts	ASTM D257
Coefficient of Thermal Expansion	3.8 x 10 ⁻⁵	In. / In. / Ft.	ASTM D696
Compressive Strength	1600	psi	ASTM D695-57
Max Service Temp Continuous	500	*F	-

Fluorolon PTFE

Alloy 1034

Fluorolon PTFE 1034 is reinforced with carbon: graphite the percentage varying between 5 and 30%. The added fiber improves the wear properties, reduces extrusion. The coefficient of friction is slightly increased and for this reason, graphite is sometimes added to compensate this side effect. The material has the ability to run under dry or wet conditions making it an ideal bearing and seal material.

Applications: Virgin PTFE 1034 is used primarily for seals, seats, bearings and insulators.

Property	Specified	Units	Method
Specified Gravity	20.6	gr / cc	ASTM D792
Tensile Strength	2300	Psi	ASTM D1708
Elongation	105	%	ASTM D1708
Deformation	12.6	Durometer D	ASTM D621-59
Flexural Strength	4300	psi	ASTM D790
Flexural Modulus	240,000	psi	ASTM D695
Compressive Strength	2500	psi	-
Hardness	86	Shore d	ASTM D150
Coefficient of Thermal Expansion	47 10 x 6th	In. / In. / Deg. *F	ASTM D696
Water Absorption (24 hrs)	.007	%	ASTM D570
Max Service Temperature	500	*F	-
Coefficient of Friction	.08	Static	M-D3702

Fluorolon PTFE

G/MOS2 1050

Fluorolon Virgin PTFE 1050 is reinforced, 15% Glass / 5% Molybdenum Disulfide. The improves the wear properties, reduces extrusion. The material has the ability to run under dry or wet conditions making it an ideal bearing and seal material. The material is excellent in dry gas applications.

Applications: Fluorolon 1050 is used primarily for high pressure seals, seats, bearings best in vacuum/inert gas sealing. Not for use in rotary. Can be abrasive.

Property	Specified	Units	Method
Specified Gravity	2.06	gr / cc	ASTM D792
Tensile Strength	3200	Psi	ASTM D1708
Elongation	200	%	ASTM D1708
Flexual Modulus	245,000	%	ASTM D790
Flexural Strength	2550	psi	ASTM D790
Compressive Modulus	119,000	psi	ASTM D695
Compressive Strength	1800	psi	ASTM D695
Hardness	86	Shore D	-
Coefficient of Thermal Expansion	39 10 x 6th	In. / In. / Deg. *F	ASTM D696
Water Absorption (24 hrs)	.007	%	ASTM D570
Max Service Temperature	500	*F	-
Coefficient of Friction	.19	-	M-D3702

Fluorolon PTFE 1058

Polyimide filled PTFE is used to improve the creep resistance of PTFE. It is widely used for rod packing, rider- and piston rings in compressor applications. Fluorolon 1058 has been approved in “bone dry” gas compressors as a piston and ring rider. Fluorolon 1058 supersedes Fluorolon 1310.

Applications: Fluorolon 1058 is used primarily for gliding elements in weaving machines, compressor rings in pumps and dry gas compressors. Can be used in both medium and hard mating surfaces.

Property	Specified	Units	Method
Tensile Strength	2100	psi	ASTM D638
Elongation at Break	200	%	ASTM D638
Specified Gravity	2.05	Grams / CC	ASTM D792
Hardness	64	Shore D	ASTM D2240
Flexural Strength	1400	psi	ASTM D695
Compressive Modulus	78,000	psi	ASTM D695
Melt Point	620	*F	ASTM D3418
Service Temperature Continuous	500	*F	-
Coefficient of Thermal Expansion	53 10 x 5th	In. / In. / Deg. *F	ASTM D696
Water Absorption (24 hrs)	.006	%	ASTM D570

Fluorolon PTFE 1080

Polyimide filled PTFE is used to improve the creep resistance of PTFE. It is widely used for rod packing, rider- and piston rings in compressor applications. Fluorolon 1080 has been approved in “bone dry” gas compressors as a piston and ring rider. Fluorolon 1080 supersedes Fluorolon 1310.

Applications: Fluorolon 1080 is used primarily for gliding elements in weaving machines, compressor rings in pumps and dry gas compressors. Can be used in both medium and hard mating surfaces.

Property	Specified	Units	Method
Specified Gravity	2.16	gr / cc	ASTM D4894/4895
Tensile Strength	6240	psi	ASTM D4894/4895
Hardness	59	Shore D	ASTM D1700
Elongation	250 - 350	%	ASTM D4894
Modulus of Elasticity	94.3	ksi	-
Electrical Resistivity	1E+14	ohm-cm	IEC 60093
Dielectric Strength	2670	kV / in.	IEC 60243-01
Surface Resistance	1E+17	ohm	IEC 60093
Coefficient of Thermal Expansion	5.4 x 10.3	In. / In. / Deg. *F	ASTM D696
Maximum Service Temperature	500	*F	-

Part Number	Shaft Diameter	Outer Diameter	Width	Part Code	Shaft Diameter	Outer Diameter	Width
	(mm)	(mm)	(mm)		(mm)	(mm)	(mm)
SL00601607	6	16	7	SL04005208	40	52	8
SL00602207	6	22	7	SL04005508	40	55	8
SL00702207	7	22	7	SL04006208	40	62	8
SL00802207	8	22	7	SL04205508	42	55	8
SL00802407	8	24	7	SL04206208	42	62	8
SL00902207	9	22	7	SL04506208	45	62	8
SL01002207	10	22	7	SL04506508	45	65	8
SL01002507	10	25	7	SL05006508	50	65	8
SL01202407	12	24	7	SL05007208	50	72	8
SL01202507	12	25	7	SL05008010	55	80	10
SL01203007	12	30	7	SL05507208	55	72	8
SL01502607	15	26	7	SL05508008	55	80	8
SL01503007	15	30	7	SL06007508	60	75	8
SL01503507	15	30	7	SL06008008	60	80	8
SL01603007	16	30	7	SL06008508	60	85	8
SL01803007	18	30	7	SL06508008	65	80	8
SL01803507	18	35	7	SL06508510	65	85	10
SL02003507	20	35	7	SL06509010	65	90	10
SL02004007	20	40	7	SL07009010	70	90	10
SL02203507	22	35	7	SL07009510	70	95	10
SL02204007	22	40	7	SL07509510	75	95	10
SL02503508	25	35	8	SL07510010	75	100	10
SL02504007	25	40	7	SL08010010	80	100	10
SL02504707	25	47	7	SL08011010	80	110	10
SL02505207	25	52	7	SL08511012	85	110	12
SL02804007	28	40	7	SL08512012	85	120	12
SL02804707	28	47	7	SL09012012	90	120	12
SL02805207	28	52	7	SL09512012	95	120	12
SL03004208	30	42	8	SL10012512	100	125	12
SL03004207	30	42	7	SL10013012	100	130	12
SL03004707	30	47	7	SL10013512	100	135	12
SL03005207	30	52	7	SL10014012	100	140	12
SL03204508	32	45	8	SL10513012	105	130	12
SL03205208	32	52	8	SL14017015	140	170	15
SL03505008	35	50	8				
SL03505208	35	52	8				
SL03505508	35	55	8				
SL03805508	38	55	8				

Part Number	Shaft Diameter (mm)	Outer Diameter (mm)	Width (mm)	Part Code	Shaft Diameter (mm)	Outer Diameter (mm)	Width (mm)
DLS00601608	6	16	8	DLS04005209	40	52	9
DLS04005209	6	22	8	DLS04005509	40	55	9
DLS00702208	7	22	8	DLS04006209	40	62	9
DLS00802208	8	22	8	DLS04205509	42	55	9
DLS00802408	8	24	8	DLS04206209	42	62	9
DLS00902208	9	22	8	DLS04506209	45	62	9
DLS01002208	10	22	8	DLS04506509	45	65	9
DLS01002508	10	25	8	DLS05006509	50	65	9
DLS01202408	12	24	8	DLS05007209	50	72	9
DLS01202508	12	25	8	DLS05008010	55	80	10
DLS01203008	12	30	8	DLS05507209	55	72	9
DLS01502608	15	26	8	DLS05508009	60	80	9
DLS01503008	15	30	8	DLS06007509	60	75	9
DLS01503508	15	30	8	DLS06008009	60	80	9
DLS01603008	16	30	8	DLS06008509	60	85	9
DLS01803008	18	30	8	DLS06508009	65	80	9
DLS01803508	18	35	8	DLS06508510	65	85	10
DLS06508510	20	35	8	DLS06509010	65	90	10
DLS02004008	20	40	8	DLS07009010	70	90	10
DLS07009010	22	35	8	DLS07009510	70	95	10
DLS07009510	22	40	8	DLS07509510	75	95	10
DLS07509510	25	35	9	DLS07510010	75	100	10
DLS07510010	25	40	8	DLS08010010	80	100	10
DLS02504708	25	47	8	DLS08011010	80	110	10
DLS02505208	25	52	8	DLS08511012	85	110	12
DLS02804008	28	40	8	DLS08512012	85	120	12
DLS02804708	28	47	8	DLS02804708	90	120	12
DLS02804708	28	52	8	DLS09512012	95	120	12
DLS03004209	30	42	9	DLS10012512	100	125	12
DLS03004208	30	42	8	DLS10013012	100	130	12
DLS03004708	30	47	8	DLS10013512	100	135	12
DLS03005208	30	52	8	DLS10014012	100	140	12
DLS03204509	32	45	9	DLS10513012	105	130	12
DLS03204709	32	47	9	DLS13016012	130	160	12
DLS03205209	32	52	9	DLS14017015	140	170	15
DLS03505009	35	50	9	DLS063.5079.209.5	63.5	79.2	9.5
DLS03505209	35	52	9	DLS063.5082.510	63.5	82.5	10
DLS03505509	35	55	9	DLS056082.511	56	82.5	11
DLS03805509	38	55	9				



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