



Thermoset Elastomers - Rubber

Unlike thermoplastic elastomers, thermosetting elastomers gain their strength from an irreversible cross linking process that occurs when the compound is subjected to pressure and heat. During this process, or “cure”, special chemical agents within the compound react to the heat and pressure to vulcanize the molecules together. Once cured, thermoset compounds obtain the necessary physical properties needed to function in fluid sealing applications. Reheating thermoset compounds will not cause them to melt as thermoplastics do. For typical physical properties, see Table 3.

Nitrile (NBR)

Nitrile rubber (NBR) is the general term for acrylonitrile butadiene copolymer. Nitrile compounds offer good resistance to abrasion, extrusion, and compression set. The acrylonitrile (ACN) content influences the physical properties of the compound. As the ACN content increases, oil and solvent resistance improve, tensile strength, hardness and abrasion resistance increase, while permeability, low temperature flexibility, and resilience decrease. Parker offers a variety of nitrile compounds, formulated with varying ACN content, to provide the best physical properties for a wide range of applications. Typical temperature ratings are -40°F to +250°F (-40°C to +121°C).

N4008A80 - NBR

80 Shore A hardness low temperature nitrile. This is a premium, low ACN nitrile for use when low temperature sealability is the primary requirement.

N0304A75 - NBR

75 Shore A hardness low temperature nitrile. This is a low ACN nitrile with an extended upper end temperature formulated for aerospace T-seal applications. N0304A75 is compliant with AMS-P-83461 which supersedes MIL-P-25732.

N4115A75 - NBR

75 Shore A hardness general purpose nitrile with medium ACN content for use where a softer seal is needed.

N4180A80 - NBR

80 Shore A hardness general purpose nitrile with medium ACN content. N4180A80 has good chemical compatibility, sealability and moderate extrusion resistance. N4180A80 has excellent compression set resistance even at higher temperatures.

[N4181A80 - NBR](#)

80 Shore A hardness, medium ACN nitrile with fiber added for reinforcement. The fibers also help to retain lubrication for reduced friction. N4181A80 is often used in the 8600 wiper seal to resist extrusion.

[N4121A90 - NBR](#)

90 Shore A hardness, high ACN nitrile with an exceptionally high modulus which gives this compound outstanding extrusion resistance. N4121A90 also has good compression set properties.

[Nitroxile™ \(Carboxylated Nitrile\) \(XNBR\)](#)

Carboxylated nitriles are formed by exposing nitrile polymer to carboxylic acid groups during polymerization. This forms an improvement over nitrile by producing a more wear resistant seal compound with enhanced modulus and tensile strength. Nitroxile offers exceptionally low friction characteristics and has excellent resistance to petroleum oils, hydrocarbon fuels and water. The typical temperature range for Nitroxile is -10°F to +250°F (-23°C to +121°C).

[N4257A85 - XNBR](#)

85 Shore A hardness carboxylated nitrile that has an internal lubricant as an aid to reduce friction. It is ideal for pneumatic applications with excellent compression set properties.

[N4274A85 - XNBR](#)

85 Shore A hardness carboxylated nitrile that is formulated with a proprietary internal lubricant for exceptionally low friction operation. This is the premier carboxylated nitrile in the sealing industry.

[N4263A90 - XNBR](#)

90 Shore A hardness carboxylated nitrile that is formulated for increased hardness, modulus and tensile strength to provide extra toughness in applications requiring nitrile seals. This compound has excellent resistance to extrusion, explosive decompression and

[Hydrogenated Nitrile \(HNBR\)](#)

Hydrogenated nitrile offers improved chemical compatibility and heat resistance over standard nitrile by using hydrogen in the formulation to saturate the backbone of the nitrile molecule. However, the compound usually becomes less flexible at low temperatures. This can be offset to some degree by adjusting the ACN content as is done with NBR. Typical temperature ratings are -25°F to +320°F (-32°C to +160°C).

[N4032A80 \(KB162\) - HNBR](#)

80 Shore A hardness hydrogenated nitrile.

[N4031A85 \(KB183\) - HNBR](#)

85 Shore A hardness hydrogenated nitrile formulated for low temperatures.

[N4033A90 \(KB163\) - HNBR](#)

90 Shore A hardness hydrogenated nitrile formulated for improved chemical compatibility.

[N4007A90 - HNBR](#)

90 Shore A hardness hydrogenated nitrile featuring excellent resistance to extrusion and explosive decompression to meet Norsok M-710.

Ethylene Propylene (EPR)

Ethylene propylene has excellent dimensional stability in water-based fluids and steam; however, it should never be exposed to petroleum lubricants, water / oil emulsions, solvents or other petroleum based fluids (CAUTION! Do not lubricate the seals with petroleum oils or greases during installation). Ethylene propylene rubber is compatible with Skydrol®4 and other phosphate ester fluids used in aircraft hydraulic systems. EPR is also the recommended seal material for automotive brake fluids (DOT 3, 4 and 5) as well as many commercial refrigerants. Ethylene propylene rubber is also useful in sealing weak alkalis, acids, and methyl ethyl ketone (MEK). The typical temperature range is -65°F to +300°F (-54°C to +149°C).

E4259A80 - EPR

80 Shore A hardness general purpose EPR with excellent dimensional stability in water-based fluids and steam. This compound has excellent chemical compatibility and compression set resistance.

E4207A90 - EPR

90 Shore A hardness general purpose EPR with excellent dimensional stability in water-based fluids and steam. With its additional hardness it is able to be used at higher pressures than the 80 Durometer compounds. It has excellent compression set properties as well as excellent compatibility with such fluids as DOT 3 brake fluid.

E4270A90 - EPR

90 Shore A hardness EPR formulated for steam/geothermal environments with an upper temperature range of +600°F (+315°C). Excellent compression set resistance.

Fluorocarbon Elastomers (FKM)

Fluorocarbon elastomers are highly specialized polymers that show the best resistance of all rubbers to chemical attack, heat and solvents. FKM is of critical importance in solving problems in aerospace, automotive, chemical and petroleum industries. FKM is suitable for use in most hydraulic fluids except Skydrol® types and ester-ether fluids. Standard temperatures range from -20°F to +400°F (-29°C to +204°C).

V4205A75 - FKM

75 Shore A hardness general purpose fluorocarbon.

V1289A75 - FKM

75 Shore A hardness fluorocarbon formulated for improved low temperature performance of -40°F to +400°F (-40°C to +204°C).

V4208A90 - FKM

90 Shore A hardness general purpose fluorocarbon.

V4266A95 - FKM

95 Shore A hardness extended wear and extrusion resistant fluorocarbon.

Table 3-3. Typical Physical Properties — Thermoset Elastomers

Parker Material Code	Material	Color	Typical Applications & Description	Service Temperature Range °F (°C)	Tensile Strength at Break psi (MPa)	Ultimate Elongation	Shore A Hardness	100% Modulus psi (MPa)	Compression Set		Abrasion Rating (1) Worst to (10) Best
									Set	at °F (°C)	
Nitrile (NBR)											
N4115A75	Nitrile	Black	General purpose nitrile with medium ACN content for use where a softer seal is required.	-40 to +225 (-40 to +107)	2215 (15.3)	328%	74	641 (4.4)	23.6%	212 (100)	1.9
N4180A80	Nitrile	Black	General purpose nitrile with good chemical compatibility, seal ability and compression set.	-40 to +250 (-40 to +121)	2199 (15.2)	275%	80	1007 (6.9)	19.4%	302 (150)	1.9
N4181A80	Flocked Nitrile	Black	Fiber added reinforcement helps retain lubrication for reduced friction. Used in 8600 wipers.	-40 to +250 (-40 to +121)	2437 (16.8)	345%	80	663 (4.6)	19.4%	302 (150)	2.2
N4121A90	Nitrile	Black	High modulus for outstanding extrusion resistance plus good compression set.	-40 to +250 (-40 to +121)	2415 (16.7)	247%	89	1447 (9.9)	24.0%	212 (100)	2.2
N4008A80	Nitrile	Black	Premium, low ACN nitrile for use when low temperature sealability is required.	-70 to +275 (-57 to +135)	2141 (14.8)	177%	79	1031 (7.1)	26.4%	212 (100)	1.8
N0304A75	Nitrile	Black	Extended temperature range formulated for aerospace T-seal applications.	-65 to +275 (-54 to +135)	1790 (12.3)	213%	75	567 (3.9)	19.4%	212 (100)	1.4
Carboxylated Nitroxile (XNBR)											
N4257A85	Nitroxile	Black	XNBR with internal lubricant to reduce friction. Ideal for pneumatic applications.	0 to +250 (-18 to +121)	2845 (19.6)	249%	80	1223 (8.4)	20.0%	212 (100)	2.7
N4274A85	Nitroxile	Black	Premier XNBR in the industry formulated with proprietary internal lubricant.	-10 to +250 (-23 to +121)	3016 (20.8)	241%	83	1404 (9.7)	31.0%	212 (100)	2.9
N4263A90	Nitroxile	Black	Extra tough XNBR with increased hardness, modulus and tensile strength.	-20 to +275 (-29 to +135)	3103 (21.4)	117%	90	2902 (20.0)	26.4%	212 (100)	3
Hydrogenated Nitrile (HNBR)											
N4031A85 (KA183)	HNBR	Black	Equivalent to Seal Group compound KB183A85, offers low temperature improvement.	-40 to +320 (-40 to +160)	1800 (12.4)	100%	88	1500 (10.3)	25.0%	212 (100)	1.4
N4032A80 (KB162)	HNBR	Black	Equivalent to Seal Group compound KB162A80 offering improved chemical compatibility.	-25 to +320 (-32 to +160)	3335 (22.9)	164%	82	2358 (16.3)	23.0%	302 (150)	3.3
N4033A90 (KB163)	HNBR	Black	Equivalent to Seal Group compound KB163A90 offering improved chemical compatibility.	-25 to +320 (-32 to +160)	3219 (22.2)	107%	88	3329 (22.9)	22.0%	302 (150)	3.2
N4007A90	HNBR	Black	Excellent extrusion resistance and explosive decompression to meet Norsok M-710	-20 to +320 (-29 to +160)	4698 (32.4)	207%	92	2006 (13.8)	14.9%	212 (100)	5.0

Table 3-3. Typical Physical Properties — Thermoset Elastomers (cont'd)

Parker Material Code	Material	Color	Typical Applications & Description	Service Temperature Range °F (°C)	Tensile Strength at Break psi (MPa)	Ultimate Elongation	Shore A Hardness	100% Modulus psi (MPa)	Compression Set		Abrasion Rating (1) Worst to (10) Best
									Set	at °F (°C)	
Ethylene Propylene (EPR)											
E4207A90	Ethylene Propylene	Black	General purpose 90A EPR, has excellent dimensional stability in water-based fluids and steam.	-65 to +300 (-54 to +149)	2285 (15.8)	135%	87	1453 (10.0)	13.0%	257 (125)	2.0
E4250A90	Ethylene Propylene	Black	General purpose 80A EPR, has excellent dimensional stability in water-based fluids and steam.	-65 to +300 (-54 to +149)	2142 (14.8)	162%	79	1057 (7.3)	12.8%	257 (125)	1.8
E4270A90	Ethylene Propylene	Black	Formulated for geothermal environments and steam up to +600°F.	-65 to +400 (-54 to +204)	3047 (21.0)	145%	89	1800 (12.4)	27.1%	302 (150)	3.0
Fluorocarbon Elastomers (FKM)											
V1289A75	Fluoro-elastomer	Black	Fluorocarbon material formulated for improved low temperature applications.	-40 to +400 (-40 to +204)	1497 (10.3)	163%	78	920 (6.3)	17.0%	392 (200)	1.0
V4205A75	Fluoro-elastomer	Black	70 Shore A general purpose fluorocarbon resistant to chemical attack and heat.	-20 to +400 (-29 to +204)	2161 (14.9)	202%	76	903 (5.5)	6.5%	302 (150)	1.8
V4208A90	Fluoro-elastomer	Black	90 Shore A general purpose fluorocarbon resistant to chemical attack and heat.	-5 to +400 (-21 to +204)	1954 (13.5)	152%	90	1327 (9.2)	13.4%	302 (150)	1.6
V4266A95	Fluoro-elastomer	Black	Features extended wear and extrusion resistance over general purpose fluorocarbons.	-5 to +400 (-21 to +204)	2442 (16.8)	102%	92	2210 (15.2)	17.6%	302 (150)	2.2