

# Overview: Elastomers for Oil and Gas Sealing



In Partnership with



## Material design for harsh service demands

Ceetak Ltd is a leading UK designer and developer of seals and sealing solutions. Working in partnership with Parker Hannifin Seals for over 30 years as their accredited UK Distributor, Ceetak offer a wide range of materials and design support from Parker's world class manufacturing facilities to satisfy the demanding application requirements of the Oil and Gas industry.

Here we give an overview of the types of materials available for demanding oil and gas service.

## Parofluor™ Materials

The newest materials developed for oil, gas and chemical processing environments are Parofluor™ perfluoroelastomers. These compounds exhibit chemical resistance and thermal stability similar to PTFE, yet maintain the essential properties of resilience and memory, making them ideal for use as high-performance elastomer seals.

Parofluor™ materials perform in the most aggressive chemical media, including H<sub>2</sub>S, CO<sub>2</sub>, and hydrocarbons.

## Explosive Decompression

A common challenge in subsea and land-based oil and gas applications is explosive decompression or "ED".

This phenomenon occurs when system pressure drops rapidly and the gases that have permeated into the elastomer suddenly expand - causing materials to blister or split. With any material you have to be aware of the blow down rate to avoid ED; however compounds V1238, V1041 and N4007 exhibit superior ED resistance, and are ideal for use in applications where gas pressure dramatically fluctuates.

## Exceptional Performance in varied media

To provide exceptional sealing performance in energy, oil and gas applications, a material must be resistant to a broad range of media. Parker's compounds V8588, V1238, V1041, N4007 along with UltraCOMP™ and PTFE have been evaluated using NACE Standard TM0187-98 criteria. Parker's N4007, V1041 and V1238 have been certified to Norsok M-710 retaining their superior physical properties after exposure to aggressive media.

## Complete Solution

PTFE or UltraCOMP™ provide a complete sealing system against heat, pressure, and chemical attack. Combinations of elastomers and thermoplastic materials have proven to be the best sealing system solution when conditions are extreme.



Material	Feature
E0962A90	Geothermal EPDM, steam to 260°C
N4007A90	Low compression set, superior extrusion and abrasion resistance. It is certified to Norsok M-710 and passes NACE TM0187-98 Standard
V1041A85	Good in H <sub>2</sub> S and ED resistant. Certified to Norsok M-710 and passes NACE TM0187-98 Standard
V1238A95	Superior extrusion and ED resistant fluorocarbon. Good H <sub>2</sub> S resistance. Certified to Norsok M-710.
V8588A90	Perfluorinated elastomer has high temperature resistance, broad chemical compatibility and explosive decompression resistance
Nitroxile™	High wearing, high extrusion resistant materials with good chemical resistance and low compression set. N4263A90 and N4274A85.
PTFE	Parker's PTFE blends can be formulated for high wear and extrusion resistance. These can be formulated to meet specific applications.
UltraCOMP™	Engineered thermoplastic compounds. Formulated for high temperature, high pressure and chemical environments, they have excellent fatigue resistance and are ED resistant. Often used as bearing and back-up devices.
UHMWPE	High wearing plastic for use in abrasive media, excellent in H <sub>2</sub> O based media
Resilon™	Highest performing TPU's on the market today, having low compression set, excellent rebound, and superior resistance to hydrolysis when compared to other TPU's
MolyGard™	Thermoplastic material, super hard. With a hardness of 120 Rockwell, it has excellent extrusion resistance and load bearing abilities
Molythane™	General purpose TPU used in petroleum based fluids, developed for high extrusion and wear resistance
Polymyte™	A 60 shore D plastic-alloy material for high pressures and temperatures to 135°C in petroleum based fluids, and 80°C in H <sub>2</sub> O based fluids.

# Overview: Elastomers for Oil and Gas Sealing



Material Type	Temp range	Min	Max
<b>Nitriles (Buna-N, NBR)</b>			
<b>N4400A75</b>		- 37°C	+ 135°C
75 Shore A durometer peroxide-cured nitrile. Excellent compression set resistance. Applications: Petroleum lubricants, seawater and diesel fuel.			
<b>N4180A80</b>		- 34°C	+ 135°C
80 Shore A durometer, general purpose nitrile, good compression set. Applications: Petroleum lubricants, seawater.			
<b>N9643A90</b>		- 28°C	+ 135°C
90 Shore A durometer packer element - meets API 11D1			
<b>N9589A80</b>		- 28°C	+ 135°C
80 Shore A durometer packer element - meets API 11D1			
<b>Hydrogenated Nitriles (HS, HNBR)</b>			
<b>N4031A85/KA183A85</b>		- 40°C	+ 148°C
Excellent low temperature capability. Extrusion resistant, ED resistant. Passes NACE TM0187-98 Standard.			
<b>N4025A80</b>		- 40°C	+ 148°C
80 Shore A durometer abrasion resistant HNBR developed for low temperature resistance, excellent compression set resistance. Applications: High abrasion, high temperature resistance coupled with low temperature resistance			
<b>N4007A90</b>		- 30°C	+ 148°C
90 Shore A durometer HNBR. High tensile. Excellent abrasion resistance. Applications: High wear and pressure applications			
<b>N4288A85</b>		- 30°C	+ 148°C
85 Shore A durometer. Excellent abrasion resistance. Good compression set. Good in Flex Fuels MTBE.			
<b>Ethylene Propylene (EPDM, EPR)</b>			
<b>E0962A90</b>		- 50°C	+ 260°C
90 Shore A durometer; developed for steam service. Geothermal, high temperature, high pressure steam (intermittent to 285°C), resistant to CO <sub>2</sub> , H <sub>2</sub> S, methanol, glycols and explosive decomposition.			
<b>Nitroxile™</b>			
<b>N4263A90</b>		- 28°C	+ 135°C
90 Shore A durometer Nitroxile. Excellent abrasion resistance. Applications: Petroleum lubricants, seawater and diesel fuel			
<b>N4257A80</b>		- 28°C	+ 135°C
80 Shore A durometer Nitroxile. Internally lubricated. Lower friction and excellent abrasion resistance. Applications: Petroleum lubricants, seawater and diesel fuel			
<b>N4274A85</b>		- 28°C	+ 135°C
85 Shore A durometer Nitroxile. Extreme low friction, internal lubricant for lower friction and excellent abrasion resistance. Applications: Petroleum lubricants, seawater and diesel fuel.			
<b>Fluorocarbon (FKM)</b>			
<b>V4205A75</b>		- 25°C	+ 200°C
75 Shore A durometer, general purpose fluorocarbon. Excellent compression set resistance. Applications: High temperature, high pressure petroleum oils & fuels			
<b>V1238A95</b>		- 25°C	+ 200°C
95 Shore A durometer fluorocarbon. Developed for maximum extrusion resistance, good compression set, ED resistant. NORSOK M-710. Applications: High temperature, high pressure and H <sub>2</sub> S resistance			
<b>V4208A90</b>		- 25°C	+ 200°C
90 Shore A durometer general purpose fluorocarbon. Excellent compression set resistance. Applications: High temperature, high pressure petroleum oils & fuels			
<b>V4266A95</b>		- 25°C	+ 200°C
95 Shore A durometer general purpose fluorocarbon. Applications: Wear and extrusion resistance			
<b>Perfluorinated Elastomers (FFKM)</b>			
<b>V8545A75 (FFKM)</b>		- 25°C	+ 285°C
75 Shore A durometer high temperature resistant, perfluorinated elastomer. Good compression set resistance, extreme chemical resistance and low leachables. Extreme temperatures, chemical mixtures, high concentration H <sub>2</sub> S, steam, amines, polar fluids and solvents.			
<b>V8588A90 Parafluor™ (FFKM)</b>		- 25°C	+ 285°C
90 Shore A durometer high temperature resistant perfluorinated elastomer. Extrusion and explosive decomposition resistant. High temp/high pressure H <sub>2</sub> S, CO <sub>2</sub> amines, polar fluids and solvents.			
<b>Highly Fluorinated Elastomers</b>			
<b>V3819A75 (Hifluor™)</b>		- 25°C	+ 200°C
75 Shore A durometer highly fluorinated material. Lower temperature range, cost effective alternative to perfluorinated materials. Improved compression set and abrasion resistance. Resistant to aggressive chemicals, ketones, amines, acids and bases, polar fluids.			
<b>V8534A90 (Hifluor™)</b>		- 25°C	+ 200°C
90 Shore A durometer highly fluorinated material. Extrusion resistant version of V3819A75. High pressure with aggressive chemicals			

Material Type	Temp range	Min	Max
<b>Aflas TFE</b>			
<b>V4461A90</b>		- 25°C	+ 230°C
90 Shore A durometer material. Improved compression set resistance. Applications: Amines, H <sub>2</sub> S, steam, high temperature			
<b>V1041A85</b>		- 25°C	+ 230°C
85 Shore A durometer material. Improved compression set resistance. Applications: Amines, H <sub>2</sub> S, steam, high temperature. Certified to NORSOK M710. Passes NACE TM0187-98 Standard			
<b>Chloroplene (Neoprene, CR)</b>			
<b>C4107A75</b>		- 40°C	+ 145°C
75 Shore A durometer, excellent oxidation resistance. Applications: Limited in liquefied petroleum gases (LPG) ammonia (amines) and many freons. Moderate oil resistance.			
<b>Elasto-Plastic Materials</b>			
<b>Resilon™ HT P4300A90</b>		- 50°C	+ 135°C
High performance polyurethane designed for better physical properties. Improved compression set and rebound properties, gives increased sealing capabilities.			
<b>Resilon WR P4301A90</b>		- 50°C	+ 135°C
High performance polyurethane similar to P4300 with resistance to water and water-glycol. Provides resistance to water attack while retaining hydraulic fluid compatibility.			
<b>Resilon LF4306A90</b>		- 50°C	+ 135°C
High performance polyurethane similar to P4300 with lower friction, reduced heat build up and reduced wear.			
<b>Polyurethane P4700A90</b>		- 45°C	+ 105°C
Superior polyurethane designed for enhanced physical properties. Improved compression set and rebound properties, gives increased sealing capabilities.			
<b>Molythane™ P4615A90</b>		- 50°C	+ 90°C
Improved blend of polyurethane compounded for high extrusion resistance. Excellent wear and abrasion resistance			
<b>Plastic Alloy Materials</b>			
<b>Polymyte™ Z4651</b>		- 50°C	+ 135°C
High tear strength, abrasion and extrusion resistance. Excellent resistance to petroleum fluids, many phosphate ester fluids, some chlorinated hydraulic fluids, up to 80°C in water, oxygen, common solvents, dilute bases and mineral acids. Good resistance to hostile environments			
<b>MolyGard™ W4650</b>		- 50°C	+ 120°C
Proprietary compound of filled nylon material for load bearing and anti-extrusion			
<b>Nylatron™ W4655</b>		- 50°C	+ 120°C
Nylatron is used for abrasion resistant anti-extrusion devices, bearings or engineered parts. Resistant to most petroleum based fluids. May be used with phosphate ester hydraulic fluids, ketones, alkalis and weak acids.			
<b>PTFE</b>			
<b>0100</b>		- 265°C	+ 215°C
Virgin PTFE best for static applications. Good in vacuum, low gas permeability. Excellent in cryogenics			
<b>0204</b>		- 35°C	+ 285°C
Glass and Moly-filled PTFE. Increases wear resistance in high speed reciprocating service and on hardened shafts in well lubricated rotary applications			
<b>0201</b>		- 35°C	+ 285°C
Glass filled PTFE used for high wear resistance, and has excellent performance in seat and stem packings			
<b>0502</b>		- 35°C	+ 285°C
Carbon filled PTFE for dynamic applications. Increased wear resistance and has low abrasion			
<b>0901</b>		- 35°C	+ 80°C
UHMWPE High wearing plastic used in abrasive media. Excellent in H <sub>2</sub> O based media			
<b>UltraCOMP™ Engineered Thermoplastics</b>			
<b>UltraCOMP HTP W4685, CGT W4738</b>		- 50°C	+ 260°C
Used for replacing brass, bronze or other metallic members in sealing and back-up systems. Non filled UltraCOMP (Parker brand P.E.E.K.) and filled blends (Carbon, Graphite, PTFE) used for replacing brass, bronze or other metallic devices in sealing back-up systems.			

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