



SEAL TECHNOLOGY
PREMIUM-QUALITY SINCE 1867



COG VarioPur[®]

TPU seals. In premium quality.

With VarioPur, COG presents a new product range in the premium segment: The high-performance materials used in the VarioPur series are based on thermoplastic polyurethanes (TPU/AU), and all meet the criteria for high-quality sealing applications. COG's VarioPur[®] TPUs 195, 295 and 395 demonstrate the lowest permanent deformation values, and play a significant role in optimising sealing results.

Highly resistant yet extremely safe: COG VarioPur[®] in action.

COG's VarioPur[®] TPUs are used in many different sectors, including applications in

- Mobile and industrial hydraulics
- Gas processing technology
- Gas spring technology
- Pneumatics
- Valve technology
- Food and pharmaceutical processing technologies

Four of many good reasons to use COG VarioPur[®]:

- Extremely low abrasion values and excellent tear resistance
- Low swelling in mineral oil and good chemical resistance
- Highly gas-tight/low gas permeation
- No brittleness as a result of exposure to ozone or oxygen



First-class properties. Pure high performance.

**Dependable stress resistance.
TPU seals made from COG VarioPur®.**

VarioPur materials are elastic and highly tear resistant. They possess excellent extrusion resistance as well as very good abrasion resistance. Furthermore, they demonstrate similarly good gas tightness, as well as high tolerance to the widest range of gases – from oxygen and nitrogen to all of the synthetic hydrocarbons. With their low permeation rates, low swelling in hydraulic media and lubricating greases and COG's special TPU VarioPur® 395's high level of hydrolysis resistance, these seals are the most dependable choice when it comes to protecting against leakages. Whether hydraulic challenges, difficult chemical environments or demanding low-temperature applications – COG's VarioPur® series was developed especially for complex requirements. Even customised variants can be produced upon request.

Maximum performance. A decision that pays for itself.

Compared to elastomers and other TPUs, the VarioPur compound often provides higher performance – in multiple respects: Higher tolerances to installation spaces, excellent 'snap into place' behaviour and problem-free fitting reduce installation work considerably. And at the same time, the risk of damage caused by the fitting process is also considerably reduced. Components fitted with COG VarioPur® are more robust and less susceptible to faults, resulting in fewer breakdowns and fewer complaints. And applications at up to 400 bar, without backup rings, are possible. So COG VarioPur® reduces costs and offers excellent performance across the board.



Three TPU materials. Three options.

The universal TPU: COG VarioPur® 195.

COG's VarioPur® 195 TPU offers the highest tear and extrusion resistance, and is suitable for applications with pressure of up to 400 bar, even without backup rings. What's more, all of COG's TPUs are generally resistant to mineral oils, synthetic hydrocarbons and HEPR. And so it is with COG VarioPur® 195: Whether Renolin B 15 VG 46 or Renolin D 15 VG 46, IRM 901 or IRM 903, this high-performance material demonstrates high resistance to a wide variety of contact media, mineral oil-based lubricants, silicone and PAO. Its operating temperature range spans -35 °C to 110 °C. And a further sign of its quality: its abrasion resistance exceeds that of traditional materials (such as NBR, FKM, PTFE) by a factor of five to six.

- At least 5–6 times greater abrasion resistance compared to traditional materials, such as NBR, FKM and PTFE
- Operating temperature range: -35 °C to 110 °C
- Compression set: <25 %
- Excellent tear resistance
- The highest resistance to numerous contact media, such as mineral oils (HLP, HLPD, PAOs)

The premium TPU with maximum low-temperature flexibility: COG VarioPur® 295.

As well as all the complex characteristics of a high-performance TPU, COG VarioPur® 295 also provides you with what you need to meet exacting low-temperature demands: Its outstanding low-temperature flexibility, spanning -50 °C to 110 °C, makes this TPU simply extraordinary. The material also scores highly in respect of its tear and extrusion resistance, as well as being highly resistant to lubricants, including mineral oil, silicone and PAO.

- High degree of low-temperature flexibility: -50 °C to 110 °C
- At least 5–6 times greater abrasion resistance compared to traditional materials, such as NBR, FKM and PTFE
- Low compression set
- High level of tear resistance
- The highest resistance to numerous contact media, such as mineral oils (HLP, HLPD, PAOs)



Flagship product with outstanding hydrolysis resistance: COG VarioPur® 395.

This premium material is the ultimate benchmark. Its particular strength lies in its hydrolysis resistance: a quality that simply does not exist in this form in other TPUs. COG VarioPur® 395 really comes into its own in aqueous media, including oil-water emulsions (HFA), water-oil emulsions (HFB) and aqueous polyglycol solutions (HFC). COG VarioPur® 395 combines its excellent tear and extrusion resistance with superb resistance to critical media, including

- Biologically degradable oils (HEES and HETG)
- Stability in hardly inflammable liquids
- Additives in lubricating media
- Alkaline-thickened fats

- The effect of acidic or alkaline cleaning fluids
- Cutting oil emulsions
- The effects of tropical humidity
- Type feature S possible

Triglycerides and synthetic esters from hydraulic oils have as little effect on this high performance compound as do water-free media. This special TPU's exceptional status is due to the fact that it also remains stable in hardly inflammable liquids and biologically degradable media (DIN ISO 15380). In short: a first-class material, even for use in challenging chemical environments.

COG VarioPur® in comparison. The most compelling evidence.

Compared to the traditional material NBR at 90 Shore A, VarioPur impresses thanks to its

- Abrasion resistance: at least 5–6 times greater
- Extrusion resistance: at least 5 times greater
- Gas impermeability: very low nitrogen permeation rates
- Superb dynamic behaviour (blow-by behaviour)
- No brittleness as a result of exposure to ozone or oxygen



ALSO GOOD TO KNOW: COG VarioPur®'s core parameters can be adapted to meet customer requirements. The tailor-made compound is also available in different colours. Whether blue, red or green, upon request, and subject to sufficient ordering quantities, the material can be produced to your very own requirements.

COG VarioPur®.

A top performing trio.



COG's VarioPur® material: specifications

PROPERTIES	COG VarioPur® 195	COG VarioPur® 295	COG VarioPur® 395
Basic Material	TPU/AU	TPU/AU	TPU/AU
Colour	red	green	blue
Operating temperature [°C] (air)	-35 to 110	-50 to 110	-30 to 110
Certifications	In compliance with the guideline RoHS (2011/65/EU) and the EU's end-of-life vehicles regulation (2000/53/EG)	In compliance with the guideline RoHS (2011/65/EU) and the EU's end-of-life vehicles regulation (2000/53/EG)	In compliance with the guideline RoHS (2011/65/EU) and the EU's end-of-life vehicles regulation (2000/53/EG)
Hardness [Shore A] according to DIN ISO 7619-1	94±5	94±5	94±5
Tension at 100 % [N/mm²] according to DIN 53504	>12	>12	>12
Tension at 300 % [N/mm²] according to DIN 53504	>20	>20	>25
Tensile Strength [N/mm²] according to DIN 53504	>50	>50	>40
Elongation at break [%] according to DIN 53504	>450	>450	>350
Tear Resistance [N/mm] according to DIN ISO 34-1	>100	>90	>110
Compression Set 70 h/70 °C [%] according to DIN ISO 851-1	<25	<25	<25
Compression Set 70 h/100 °C [%] according to DIN ISO 851-1	<40	<40	<40
TR 10 [°C] according to ASTM D 1329	-30	-46	-28
Rebound elasticity [%] according to DIN 53512	>48	>52	>36
Abrasion [mm³] according to DIN 53515	<20	<18	<23

High-performance TPU VarioPur and standard TPU: a comparison.

Compared to standard TPUs, COG's VarioPur® seals demonstrate considerably better results when it comes to abrasion and rebound elasticity. With a compression set of less than 25 %, this value is considerably below that of standard TPUs, and therefore in the range of that of good elastomer materials. Furthermore, we were also able to considerably improve low-temperature flexibility, resulting in low temperature properties that are excellent for a TPU. When compared to

other products in the same category, the VarioPur premium TPUs perform considerably better: compared to qualities that are usual in the trade, COG's products come out on top thanks to their better physical parameters. This increases operation time enormously. Their reliability and replacement rates speak for themselves. COG's VarioPur® 195, 295 and 395 therefore perfectly round off the company's portfolio of products for more demanding requirements.

Multitalented. COG VarioPur® at work.

COG VarioPur® seals are used in many different sectors: as well as in mobile and industrial hydraulics, they can also be found in pneumatics and in gas processing technologies. Their high resistance to gases, explosive decompression and lubricants, as well as their gas impermeability and their outstanding low-temperature properties all go to make this premium material the ideal choice in many gas spring and valve technology applications. Whether quick-lock couplings or high pressure water purifiers, properties such as hydrolysis resistance, low levels of abrasion and the low compression set all go to make up the VarioPur premium quality:

- Better high temperature resistance
- Better physical parameters
- Better dynamic properties
- Lower wearout
- Lower friction
- Lower gas permeation
- Better hydrolysis resistance (dependent on material)
- Lower volume swell in contact media
- Resistant to lubricating greases and a wide variety of process liquids
- Better resistance to light and UV light
- Lower compression set: < 25 %
- Compatible with RoHS (2011/65/EU)
- Sustainable choice of raw materials (green footprint)

Developed with clear objectives: Solutions for dynamic and static sealing systems.

Thanks to considerable improvements with regard to high and low temperatures resistance, optimised compression set and dynamic properties, the VarioPur products bring measurable safety benefits. When we developed COG VarioPur®, a stated aim was also to significantly improve chemical resistance, and also to reduce energy costs by improving abrasion values. And we also used renewable materials in the manufacturing process, in order to underline the sustainability of COG's new development (green footprint).