quality sealing and engineering plastics solutions

ECONOMOS®

High wear resistant
polyurethane composite seals
made of X-ECOPUR®

The alternative to PTFE solutions

Composite seals ar

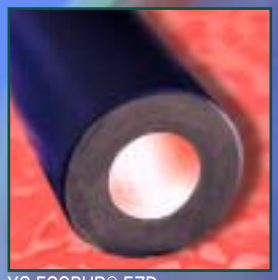
Our engineers and chemists are continually improving our materials, with one aim, to provide the best possible sealing solutions for our customers.

X-ECOPUR® (hard version of polyurethanes)

Compared to standard materials harder grades show nearly the same tensile strength and elongation at break at a considerably higher 100%-modulus of strain as well as higher tear strength. The tensile set is for instance on the same level as with standard materials. X-ECOPUR® versions have higher extrusion resistance than standard materials and therefore allow higher pressure at same geometries.

X-ECOPUR®-57D

XH-ECOPUR®-60D



XS-ECOPUR®-57D

Excellent fitting properties:

Compared to PTFE solutions, ECONOMOS® X-ECOPUR® composite seals show the same material hardness but considerably lower residual deformation (Fig.1) and need lower mounting forces. An additional benefit is the resistance to damage on assembly and installation, which can be a major problem with PTFE compounds. Also there is no requirement for sizing or calibrating the seals after assembly.

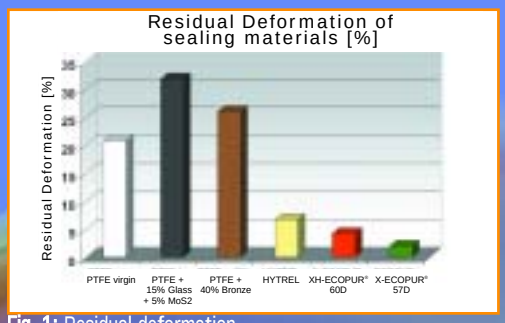


Fig. 1: Residual deformation

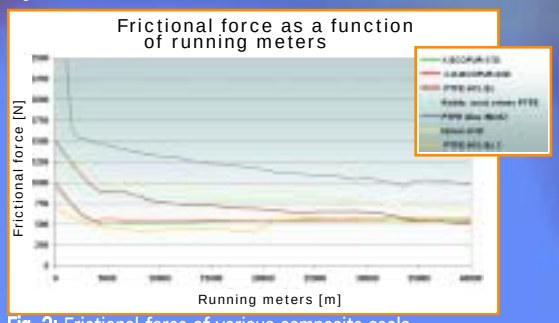


Fig. 2: Frictional force of various composite seals

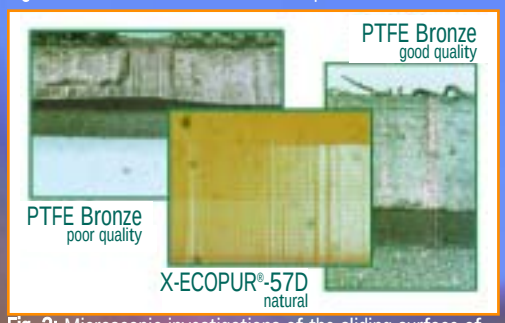


Fig. 3: Microscopic investigations of the sliding surface of composite seals

Leakage:

The requirement of low rod sealing leakage is normally only obtained by fitting seals in costly multipart solutions, as e.g. positioning in a row of 2 sealing elements at same design (tandem arrangement) or in combination of a composite seal with a secondary elastomer or polyurethane lip seal. The superior low leakage-values of ECONOMOS® X-ECOPUR® materials (see comparison, Fig. 4) make these seal profiles - without multipart solutions - ideal for all applications

Fig. 4: Leakage of various composite seal materials

Friction and wear characteristics:

Fig. 2 shows the frictional forces of various seal types as a function of the running meters (full test length: 40 km). Astonishingly the polyurethane grades, X-ECOPUR®-57D and XH-ECOPUR®-60D, show a frictional force of approximately 550 N which is on a lower level than most of the PTFE compounds. Looking at the seal lip surface (sliding zone) after the full test length, the outstanding wear properties of the polyurethane elastomer X-ECOPUR®-57D can be seen very clearly (Fig. 3).

ECONOMOS® has world class expertise in sealing

nd the ECONOMOS®-substitution

Extrusion Resistance:

Fig. 5 shows the benchmarking of the extrusion characteristics of polyurethane composite seals compared to various PTFE compounds. ECONOMOS® X-ECOPUR® variations show superior leakage behavior, extrusion and wear characteristics and competitive friction properties and are capable for higher pressure ranges respectively larger extrusion gaps than compareable PTFE systems and have, due to their superior wear characteristics, a higher lifetime.

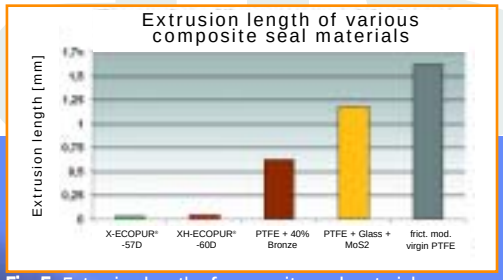


Fig. 5: Extrusion length of composite seal materials

Stick-slip characteristics:

The graphs in Fig. 6 show the acceleration values depending on time at a rod speed of 0,066 m/s and 0,043 m/s at composite seals made of PTFE/Bronze and X-ECOPUR®-57D. So this investigation proves that polyurethane systems are also, in terms of stick-slip properties, absolutely comparable to commonly used PTFE seals.

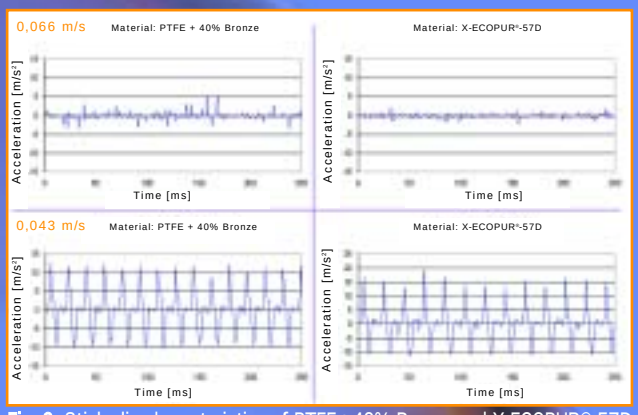
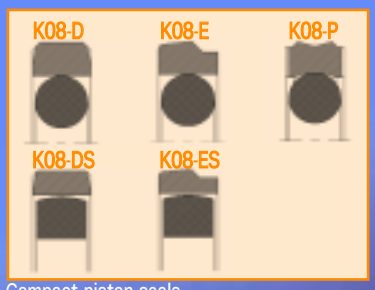


Fig. 6: Stick-slip characteristics of PTFE+40% Bronze and X-ECOPUR®-57D at 0,066 m/s (above) or 0,043 m/s (below)

Composite seals in various materials,
f.l.t..r.: X-S-ECOPUR®-57D, X-ECOPUR®-57D, X-H-ECOPUR®-60D

PTFE COMP.	TEST PARAMETERS	X-PU´S
+	Fitting properties	+++++
+++++	Friction / Stick-slip effect	+++++
++	Leakage	+++++
+++	Wear characteristics	+++++
+++	Pressure resistance	+++++



Compact piston seals

Compact rod seals

Composite seals in XS-ECOPUR®-57D (left) and X-ECOPUR®-57D (right)

Composite seals in various versions.
f.l.t.r:: K08-P, K08-E, S09-ES, S09-D

Applications:

Cylinders for
- mobile hydraulics
- hydraulic presses
- machine tools and clamping units (control cylinders)
- milling machines (feeder cylinders)
- injection moulding machines
- proportioning equipment

Composite seals made of ECONOMOS® X-ECOPUR® polyurethanes are an ideal alternative to PTFE solutions, if temperature range and used media do not require PTFE systems.

Advantages of Composite seals made of optimized ECONOMOS X-ECOPUR® Polyurethane materials:

- available as single piece or small/medium quantities with short delivery times
- lowcost as moulded production for high quantities
- capable for higher pressure or larger extrusion gap
- superior lifetime
- available up to a diameter of 2 metres

and material science.

quality sealing and engineering plastics solutions

Advantages of composite seals made of optimized ECONOMOS® X-ECOPUR® polyurethane materials

- 3 Materials available (X-ECOPUR-57D®, X-H-ECOPUR-60D®, X-S-ECOPUR-57D®)
- available as single piece or small/medium quantities with short delivery times
- low cost as moulded production for high quantities
- ableto operate higher pressure or larger extrusion gap
- greater longevity
- available up to a diameter of 4 metres

Comparison to PTFE-solutions

Residual Deformation

- considerably lower tensile set at same material hardness

Excellent fitting Properties

- Insensibility against damage on assembly and installation, no tools necessary

Leakage

- Low leakage-values
- Extrusion stability

Friction / Wear Resistance

- Superior abrasion resistance of the polyurethane material

Stick-slip Characteristics

- Stick-slip characteristics comparable with conventional PTFE seals

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