

WHITE PAPER



POLYURETHANE MATERIAL FOR APPLICATIONS AROUND THE GLOBE

NEW POLYURETHANE GENERATION 94 AU 30000
MAKES POSSIBLE LONGER OPERATING TIMES UNDER EXTREME CONDITIONS

FREUDENBERG
SEALING TECHNOLOGIES

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INNOVATING TOGETHER

NEW POLYURETHANE GENERATION FOR MOBILE MACHINERY

NEW HIGH-PERFORMANCE MATERIAL IS VERSATILE AND INCREASES OPERATING LIFE AND RESISTANCE TO WEAR

Initial situation

Hydraulic systems in mobile machinery often operate under extreme temperatures around the world. Seals made of appropriate materials are incorporated to guarantee reliable functioning, whatever the conditions. The characteristics of a low-temperature seal differ from those of a seal devised specifically for use in the tropics.

But even seals adapted to these requirements wear out simply due to strong temperature swings and inadequate maintenance. Difficulties also arise because operators of mobile machinery are increasingly turning to leased equipment in the heavy-duty segment. This not only means much longer operating times per year. The maximum capacity of the equipment is more frequently exceeded as well. The results are malfunctions, delays in the completion of projects, and high follow-up costs.

As a result, new materials are in demand that meet more stringent requirements and make longer operating times possible, increasing availability. Manufacturers of mobile machinery also expect more universal sealing solutions. They are expected to cover a broader range of applications than they have in the past, reducing the warehousing of different kinds of seals.

The Freudenberg solution

More than 40 years ago, Freudenberg introduced a material made of polyurethane for high-performance seals, setting new standards in the process. Today, with the 94 AU 30000 polyurethane generation, it has succeeded in developing and manufacturing a new, outstanding basic material for seals. The company's core competencies include the development of its own materials.

Designed for a broader range of applications, the new 94 AU 30000 material displays a much longer operating life as well as greater resistance to water and the impact of moisture than a standard PU seal. It even functions reliably at a temperature of +120 °C. This was achieved with the targeted modification of precisely the PU components that are responsible for temperature characteristics – without compromising the remaining features. Key parameters such as hardness and tensile strength are thus comparable to Freudenberg's proven polyurethane materials.

The visco-elastic behavior of the new material has been fine-tuned so that the flexibility of the soft segments persists despite wide ranges of temperatures. That means that seals made of the new polyurethane generation are still sufficiently flexible at low temperatures and satisfactorily stable at high temperatures. In this way, they expand the options for use in pressure and temperature ranges that have only been feasible with special seals until now.

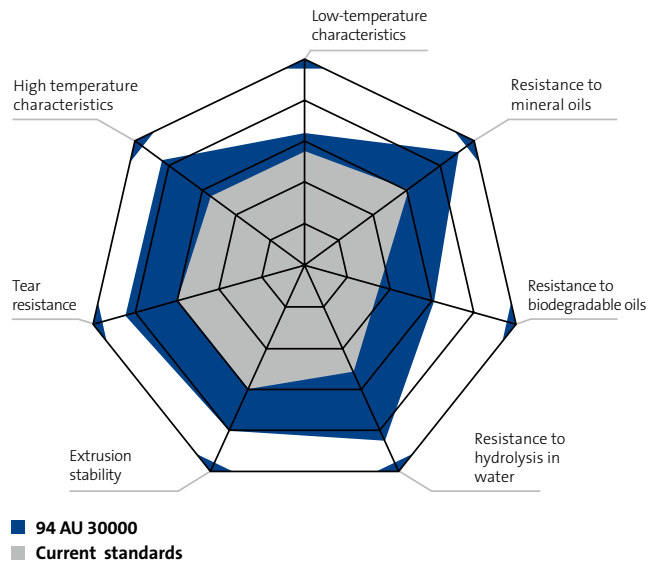


New polyurethane generation expands the boundaries of use

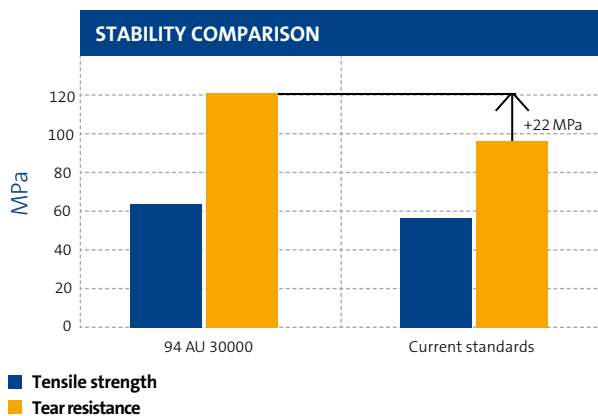
Polyurethane 94 AU 30000 is superior to all standard, commercial polyurethanes. In comparison tests under extreme conditions, seals made of the new material show no appreciable sign of wear while conventional seals fail prematurely. At 120 MPa, tear resistance, which is important for wear performance, is about 30% higher than the values for comparable polyurethanes.

Other outstanding features include applications in mineral hydraulic fluids at up to +120 °C and high resistance to electrolysis even in hot water, at temperatures as high as +80 °C. In this way, the new seals fulfill their designated functions over a much longer timeframe than the current standard solutions and thus increase the equipment's availability for use.

In addition, extrusion stability, that is, resistance to damage from high pressures, has been greatly improved. This ensures that damage from peak pressures in heavy-duty equipment is avoided. It also adds to the operating life of the seals. Due to the cited characteristics, the new polyurethane generation achieves much better results than materials on the market to this point, based on all the relevant criteria.



Benefits of the new polyurethane material 94 AU 30000 (in blue) compared to current standards (in gray)



Extrusion tests in the Freudenberg Sealing Technologies materials lab demonstrate 94 AU 30000's greatly improved tear resistance

ALL THE BENEFITS OF THE NEW POLYURETHANE MATERIAL GENERATION AT A GLANCE

- Ability to withstand stress
 - High extrusion stability allows operating pressures up to 50 MPa
 - High tear resistance boosts operating life and resistance to wear
 - Stability in temperatures from -35 to +120 °C
 - Outstandingly suited to mineral and biodegradable hydraulic fluids
- Versatility
 - Mobile machinery (agricultural/construction equipment, materials-handling technology)
 - General hydraulics applications for use around the world

FLUIDS	94 AU 30000
Hydraulic oil HL, HLP	-35 °C to +120 °C
HFA fluids	+5 °C to +60 °C
HFB fluids	+5 °C to +60 °C
HFC fluids	-35 °C to +60 °C
HFD fluids	upon request
Water	+5 °C to +80 °C
HETG (rapeseed oil)	-35 °C to +70 °C
HEES (synthetic ester)	-35 °C to +90 °C
HEPG (glycol)	-35 °C to +60 °C
Mineral greases	-35 °C to +120 °C

Compatibility with fluid groups

Freudenberg

Freudenberg Sealing Technologies GmbH & Co. KG

Freudenberg Process Seals GmbH & Co. KG
Lorscher Straße 13
69469 Weinheim, Germany

Telefon: +49 6201 / 80 8919 00

Telefax: +49 6201 / 88 8919 69

E-Mail: fps@fst.com

www.fst.com

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About Freudenberg Sealing Technologies

Freudenberg Sealing Technologies is a longstanding technology expert and market leader for sophisticated and novel applications in sealing technology and electric mobility solutions worldwide. With its unique materials and technology expertise, the company is a proven supplier for demanding products and applications, as well as a development and service partner to customers in the automotive industries and in general industries. In 2020, Freudenberg Sealing Technologies generated sales of about 2 billion euros and employed approximately 13,000 people. More information at www.fst.com.

The company is part of the global Freudenberg Group which has four business areas: Seals and Vibration Control Technology, Nonwovens and Filtration, Household Products as well as Specialties and Others. In 2020, the Group generated sales of approximately 8.8 billion euros and employed more than 48,000 associates in around 60 countries. More information is available at www.freudenberg.com.