



Low temperature polyurethane 92 AU 21100 –
the material for use at temperatures
down to -50°C

simrit[®]

Simrit® , Your Global Technology Specialist for Seals and Vibration Control

Simrit, Your Global Technology Specialist for Seals and Vibration Control offers you a complete service package. A unique range of products and services guarantees you numerous advantages over the competition.

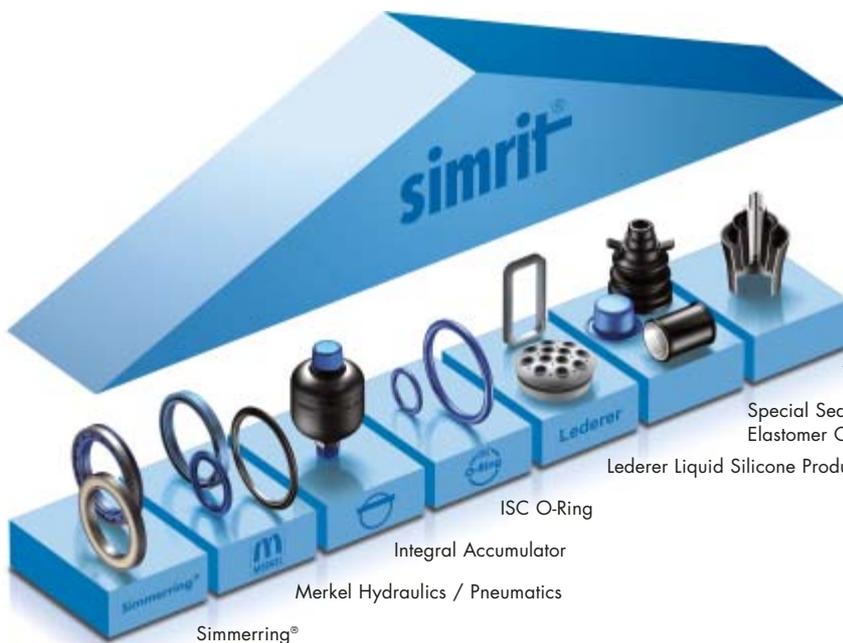
Simrit acts as a partner to general industry. Its position as a market leader is achieved through continuous research, development and manufacture. We have the world's widest range of seals and vibration control products, and can offer you solutions based on the demands of state-of-the-art-technology, solutions which set standards.

This way we secure competitive advantages for you based on experience all around the world: Simrit has a presence throughout Europe, America and Asia, either directly or through its affiliated companies NOK (Japan) or Freudenberg-NOK (USA). The transfer of knowledge between these markets is incorporated directly into the Simrit service package.

With our many Simrit Service Centres and Simrit distribution Partners, we serve and supply more than 100,000 customers worldwide. Our Simrit Partners ensure rapid availability from stock. This means spare parts quickly arrive when and where they are needed. There is a Simrit Partner near you as well.

Make the most of Simrit's service package and give yourself a real competitive edge:

- + Constant innovations
- + Uniquely wide range of products
- + Strong product brands
- + Unique materials expertise
- + A wide range of value added services



Simrit offers a complete package of products and services, including leading brands such as Simmerring®, Merkel, Integral Accumulator, Lederer and ISC O-Ring.

Vibration Control

Special Sealing Products: Bellows, Diaphragms, Elastomer Composite Parts and Precision Mouldings

Lederer Liquid Silicone Products

ISC O-Ring

Integral Accumulator

Merkel Hydraulics / Pneumatics

Simmerring®

Polyurethane materials from Simrit

Extraordinary operating conditions create extraordinary demands on function-critical machine components: higher power density, longer operating times and changing operating conditions in various climatic zones (e.g. polar regions) require seals with special geometry and materials so that they can reliably perform their tasks even at extreme situations. Increasingly stringent environmental protection regulations also give cause for a more critical assessment of leakage behaviour.

The demands on modern seals in hydraulics are therefore high:

- Elastic in the cold but still providing sufficient extrusion resistance at higher temperatures and pressures
- Resistance to various media and additives
- Constant functional reliability over the entire service life



With its varied range of polyurethane (PU) hydraulic seals that have been tested and proven millions of times, Simrit offers successful solutions for all areas of use – the result of many years of experience in material development and processing. Particularly in mobile hydraulic applications, Simrit's PU seals are notable for their high functional stability and reliability.



New low temperature material 92 AU 21100

With the new low temperature material 92 AU 21100, Simrit has succeeded in developing a polyurethane material that is specially designed to meet the specific requirements for use at low temperatures and yet can also handle standard applications with no problems: the operating range of 92 AU 21100 stretches from -50 to +100°C.

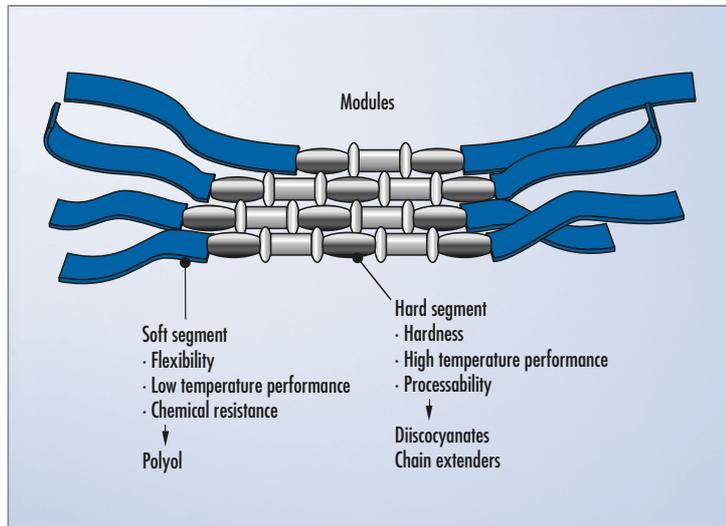


Fig. 1: Polyurethane materials modules

This is made possible by targeted modification of the PU components responsible for temperature properties, while leaving the remaining material properties comparable to Simrit's standard PU materials. The 92 AU 21100 PU material demonstrates particularly beneficial viscoelastic behaviour, whereby the soft segments retain their flexibility over a broad range of temperatures and only solidify at very low temperatures. There is no negative influence on other critical material properties such as hardness and tensile strength, which are comparable with those of proven Simrit traditional polyurethane materials.

In practical terms, this means that seals made of the 92 AU 21100 material are sufficiently flexible even at extremely low temperatures and have the necessary sealing effect immediately after commissioning. This allows initial leakages to be reliably prevented.

Viscoelastic behaviour of seals made from 92 AU 21100

The low temperature 92 AU 21100 material offers outstanding performance (see Table 1). The T_g (DSC) is -55°C and the TR 10 is -57°C (see Table "Comparison between key materials parameters" on page 7).

In order to describe the practical functional behaviour of the material, tests have also been carried out in conjunction with the seal designs used. These fully confirm the outstanding low temperature flexibility of the 92 AU 21100.

Special Testing at Simrit Laboratories involved targeted deflection of the piston rod to identify how quickly the seal can follow the deflection – the lower the temperature, the greater the difficulties with traditional polyurethane and the clearer the advantages of 92 AU 21100 (see Figure 2).

Comparison between physical and chemical properties

		92 AU 21100		Standard
Hardness	DIN 53505	Shore A	92	94
Tensile strength	DIN 53504	MPa	63	64
Breaking elongation	DIN 53504	%	770	470
Rebound resilience	DIN 53512	%	45	40

Table 1

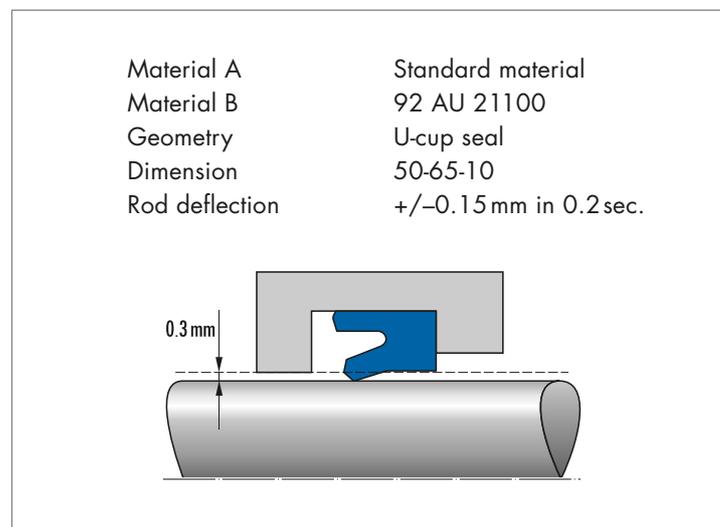


Fig. 2: Examination of low temperature flexibility on seal



The test results in Figure 3 show the detailed response times of the seals tested with eccentric rod deflection and at different temperatures. Compared to traditional polyurethanes, the 92 AU 21100 material has a much shorter response time and thus ensures outstanding low temperature flexibility of the seal. The sealing lips remain in constant contact with the contact area.

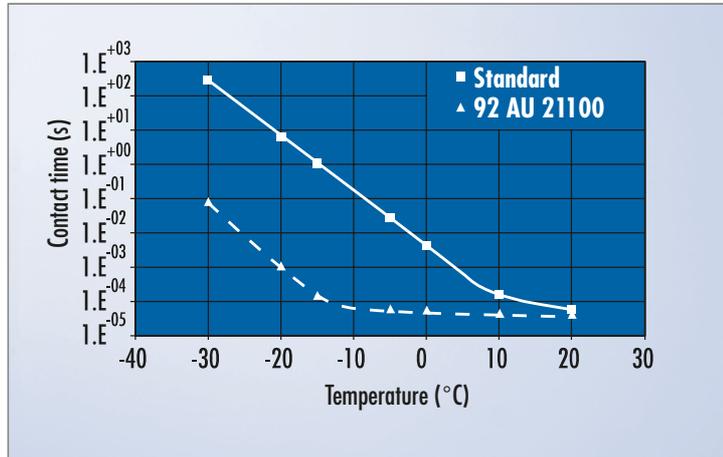


Fig. 3: Contact time for contact of rod with various materials

Here it can also be seen that the low temperature material 92 AU 21100 can stand up to a comparison with conventional polyurethanes in terms of mechanical performance (see Fig. 4).

With the new low temperature 92 AU 21100 polyurethane, a material is now available for diverse applications that will reliably seal hydraulic systems even at extreme temperatures of around -50°C .

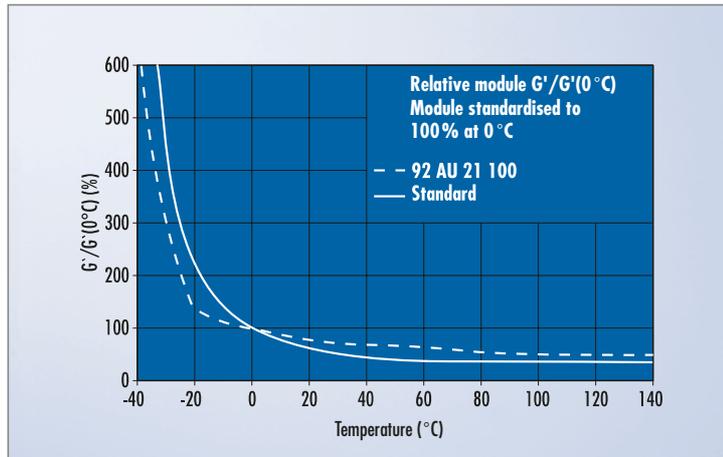
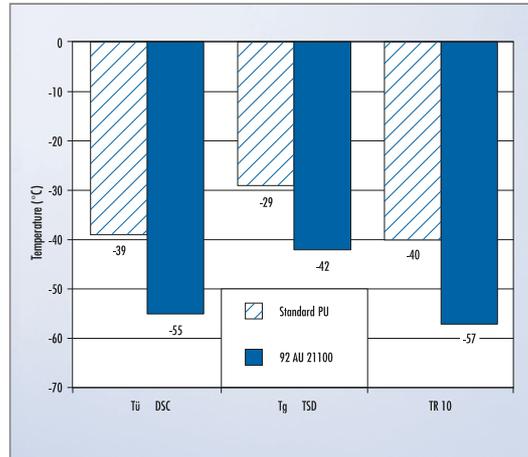
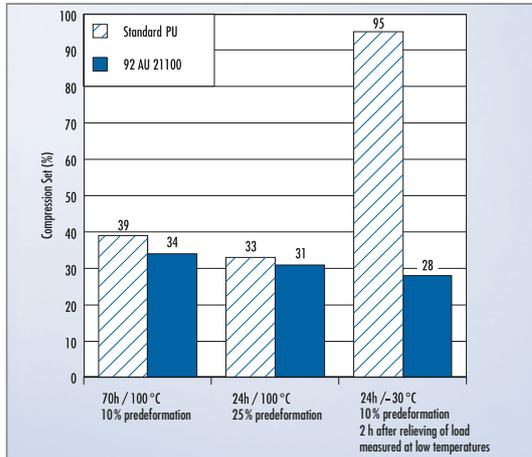


Figure 4

Recommended series in combination with new polyurethane material 92 AU 21100

Rod seals	Piston seals	Wipers
NI 300	SIMKO 300	AUAS
T 20	(OMK-PU)	AUAS R
LF 300	T 19	PU 5
		PU 11
		PRW1

Comparison between key materials parameters



High-performance polyurethane material with unique low temperature flexibility for temperatures down to -50°C . Necessary sealing effect achieved immediately after commissioning.



Simrit® , Your Global Technology Specialist for Seals and Vibration Control

Simrit Services



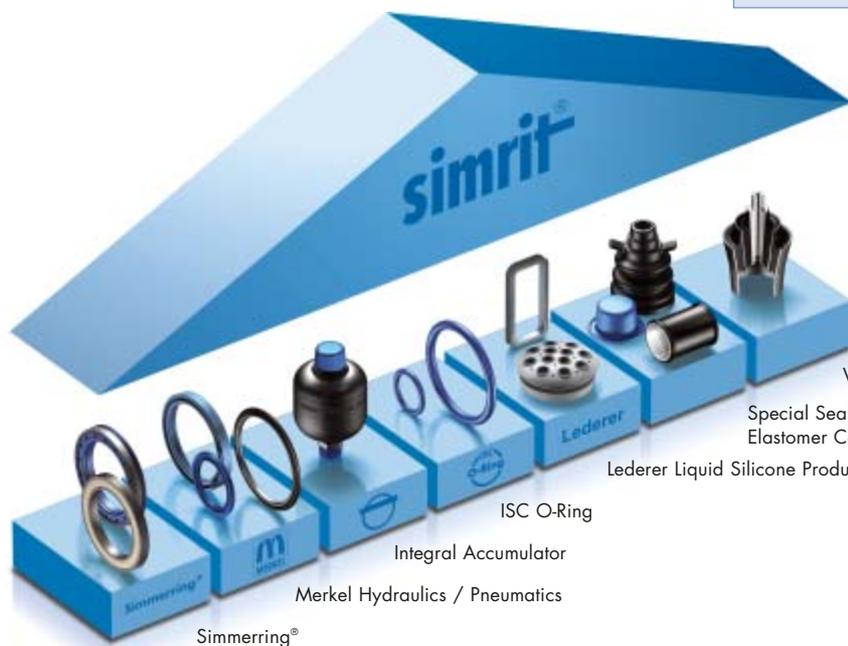
Your Benefits



e.g. Low temperature polyurethane 92 AU 21100

Your Benefits

- Use at temperatures down to -50°C possible
- Tested compatibility with low temperature media
- Excellent slide properties



Simmerring®

Merkel Hydraulics / Pneumatics

Integral Accumulator

ISC O-Ring

Lederer Liquid Silicone Products

Vibration Control
Special Sealing Products: Bellows, Diaphragms,
Elastomer Composite Parts and Precision Mouldings

Headquarters Europe:
Freudenberg Simrit KG
D-69465 Weinheim, Germany



Phone +49 (0) 18 05-Simrit
Phone +49 (0) 18 05-74 67 48
Fax +49 (0) 18 03-74 67 48
e-mail: info@simrit.de
www.simrit.com

