



# STATIC SEALS

## O-RINGS (FOR DYNAMIC AND STATIC APPLICATIONS)

Endless round sealing rings with circular cross-section are used to seal off stationary machine parts from liquid and gaseous media. When certain prerequisites are met, they can also be used as dynamic sealing elements for axial, rotary, and oscillating movements.

- **Rings:** Standard solution for axial and radial applications. Easy to use.
- **X-rings:** Solution for radial use in dynamic applications.
- **D-ring:** Solution with anti-twist protection for radial use in high-pressure applications.
- **R-ring:** Solution with anti-twist protection for axial and radial use.



O-Ring



X-Ring





D-Ring





R-Ring

The following table provides a selection of important Freudenberg "core materials" for O-rings:



MATERIAL	MAX.	CHARACTERISTICS	
70 EPDM 331	Static and dynamic: -40 to +150 °C	Drinking water material; EC Regulation 1935/2004 and 2023/2006 (GMP); 3-A® Sanitary Standard Class II; ACS, AS/NZS 4020:2005; DIN EN 681; FDA 21 CFR §177.2600; NSF 51, NSF 61; ÖNorm B 5014; UBA guideline, W 270; USP Chapter 87 (in vitro); USP Class VI Ch. 88 – 121°C; WRAS BS 6920; Kiwa; ADI-free; RoHS	Food and beverage industry, pharmaceutical industry
75 FKM 233101	Static: -15 to +200 °C	Excellent media resistance; ADI-free; RoHS	Metering of liquids and solids, metering pumps, valves
75 FKM 606	Static: -40 to +230 °C	Excellent resistance to cooling water and oil; excellent high-temperature resistance; ADI-free; RoHS	Wet cylinder liners; hot water systems; turbochargers; cable connectors
80 FKM 610	Static: -40 to +200 °C Dynamic: -25 to +200 °C	Good media and temperature resistance; ADI-free; RoHS	Vacuum technology, hydraulic components
72 NBR 872	Static: -40 to +100 °C Dynamic: -30 to +100 °C	Universal NBR material; ADI-free; RoHS	Seal against mineral oils (+100 °C) and cooling water (+80 °C)
75 NBR 430	Static: -20 to +100 °C	EC Regulation 1935/2004 and 2023/2006 (GMP); 3-AR Sanitary Standard Class II; FDA 21 CFR §177.2600; ADI-free; RoHS	Food and beverage industry
90 NBR 433	Static: -20 to +100 °C	EC Regulation 1935/2004 and 2023/2006 (GMP); 3-AR Sanitary Standard Class II; FDA 21 CFR §177.2600; ADI-free; RoHS	Food and beverage industry
70 HNBR 150531	Static: -40 to +140 °C Dynamic: -25 to +140 °C	Also available as a "low PAK" version; ADI-free; RoHS	Power tools

MATERIAL	 MAX.	CHARACTERISTICS	
75 HNBR 175024	statisch: -40 to +140 °C dynamisch: -25 to +140 °C	Green; ADI-free; RoHS	Motors, air-conditioning applications
75 HNBR 231199	statisch und dynamisch: -40 to +140 °C	Green; Excellent low-temperature resistance; Cold guide value DSC: -36 °C; ADI-free; RoHS	Motors; sealing of sensors in the chemical-pharmaceutical industry
75 HNBR 231142	statisch: -35 to +140 °C	EC Regulation 1935/2004 and 2023/2006 (GMP); 3-A® Sanitary Standard Class II; Arrete 9. Nov. 1994; FDA 21 CFR §177.2600; ADI-free; RoHS	Valves, threaded pipe fittings for the pharmaceutical, food and beverage industries
85 HNBR 230738	statisch und dynamisch: -40 to +140 °C	Green; excellent low-temperature resistance; cold guide value DSC: -37 °C; ADI-free; RoHS	Sealing of the hammer mechanism on power tools
75 FKM 180497	statisch: -25 to +200 °C	EC Regulation 1935/2004 and 2023/2006 (GMP); 3-A® Sanitary Standard Class II; Arrete 9. Nov. 1994; FDA 21 CFR §177.2600; USP Chapter 87 (in vitro); ADI-free; RoHS	Valves, threaded pipe and sensor fittings for the pharmaceutical and food industries

The following table provides a selection of important Freudenberg "specialties" (high-performance materials) for O-rings:

MATERIAL	 MAX.	CHARACTERISTICS	
70 EPDM 291	Static: -50 to +150 °C Dynamic: -40 to +150 °C	Use in water and water steam up to max. +180 °C (briefly +210°C); EC Regulation 1935/2004 and 2023/2006 (GMP); 3-A® Sanitary Standard Class II; Arrete 9. Nov. 1994; FDA 21 CFR §177.2600; NSF 51, NSF 61; USP 36 NF 31 Ch. 381 Type 1; USP Chapter 87 (in vitro); USP Class VI Ch. 88 – 121 °C; WRAS BS 6920; Kiwa; specifically for CIP/SIP media; ADI-free; RoHS	Food and beverage industry, heating and sanitary industry, pharmaceutical industry
70 CR 233906	Static: -30 to +100 °C	Mineral oil resistant; low permeation; longstanding reference applications in SF6 gear switches; ADI-free; RoHS	SF6 gas MV and HV systems
70 CIIR 236460	Static: -60 to +130 °C	Very low permeation; very wide temperature window; ADI-free; RoHS	MV and HV systems with alternative insulating and quenching gases
Fluoroprene® XP	Static: -15 to +200 °C	Blue; EC Regulation 1935/2004 and 2023/2006 (GMP); 3-A® Sanitary Standard Class II; Arrete 9. Nov. 1994; BNIC (Cognac); FDA 21 CFR §177.2600; NSF 51; USP Class VI Ch. 88 – 121°C; USP Chapter 87 (in vitro); ADI-free; RoHS; Universal media resistance, specifically for CIP/SIP media and hot steam, as well as to avoid flavor transfer	Food and beverage industry, chemicals industry
75 Simriz® 483	Static: -20 to +230 °C	White; ADI-free; RoHS	Vacuum technology for medical and pharmaceutical applications
75 Simriz® 484	Static: -10 to +230 °C Briefly: +260 °C	3-A® Sanitary Standard Class II; FDA 21 CFR §177.2600; USP Class VI Ch. 88–121 °C; ADI-free; RoHS	Pumps and separators for the chemicals industry, as well as the pharmaceutical and food industries

## Static seals

MATERIAL	 MAX.	CHARACTERISTICS	
75 Simriz® 494	Static: -15 to +230 °C Briefly: +260 °C	FDA 21 CFR §177.2600; USP Chapter 87 (in vitro); USP Class VI Ch. 88 – 121°C; ADI-free; RoHS	Pumps and separators for the chemicals industry, as well as the pharmaceutical and food industries
75 Simriz® 495	Static: -15 to +230 °C Briefly: +260 °C	Excellent media resistance including amines; good high-temperature resistance; ADI-free; RoHS	Dispersion and homogenization in the chemicals industry
75 Simriz® 498	Static: -5 to +320 °C	Excellent high-temperature resistance; ADI-free; RoHS	Aviation, chemicals and process industries
80 ChemXT 940	Static: -15 to +230 °C	Excellent sealing performance at low temperatures; excellent chemical resistance; ADI-free; RoHS	Quick connectors for HT temperature control units, static housings, O-rings in mechanical seals

### Overview of conformity/approval:

APPROVAL	DESCRIPTION	COUNTRY
ACS	Testing specifications for elastomer materials in the drinking water sector	France
USP	Materials in the medical and pharmaceutical sector / USP = U.S. Pharmacopeia	USA
FDA 21 CFR §177.2600	Elastomer materials in the food sector / FDA = Food and Drug Administration	USA
3-A® Sanitary Standard Class II	Suitability test for the dairy industry	USA
EC Regulation 1935/2004 and 2023/2006 (GMP)	Elastomer materials in the food sector	Europe
NSF 51	Elastomer materials in the food sector	USA
NSF 61	Elastomer materials in the drinking water sector	USA
Kiwa	Testing specifications for elastomer materials in the drinking water sector	Netherlands
ÖNorm B 5014	Testing specifications for elastomer materials in the drinking water sector	Austria
UBA	Testing specifications for elastomer materials in the drinking water sector / UBA = Federal Environment Agency	Germany
W 270	DVGW Worksheet "Bacterial Ooze Formation" / component of the UBA Drinking Water Directive	Germany
ADI-free	Materials free of animal derived ingredients (ADI)	USA / Europe
RoHS	Restriction regarding the use of certain hazardous substances in electrical and electronic equipment	Europe
Arrete	Testing specifications for elastomer materials in the food sector	France
AS / NZS 4020	Elastomer materials in the drinking water sector	Australia
WRAS / BS 6920	Testing specifications for elastomer materials in the drinking water sector	Great Britain

## Micro O-rings

Micro O-rings are available with very small internal diameters ( $d_1 > 0.75$  mm) and cord thicknesses ( $d_3 > 0.4$  mm). They offer tight tolerances (ISO 3601 Part 1 for cord thicknesses not sufficient), material resistance (aging, UV, and media resistance), and a reduced, even burr. Micro O-rings are available in the materials FKM, NBR, HNBR, and EPDM.




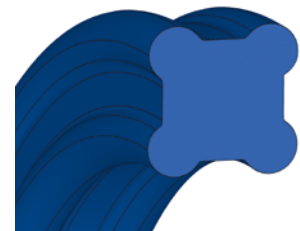
Micro O-rings

## PROFILES FOR STATIC APPLICATIONS

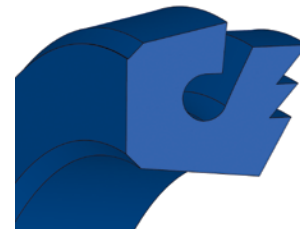
Special profiles, cords, or hoses are used for sealing points that either cannot be sealed or can only be sealed at considerable cost through use of molded parts or O-rings. Over 3,500 different profile dies, as well as numerous materials are available for this.

- **Profiles**
  - Hat seals
  - X-profiles
  - Other special profiles
- **Cords**
  - Cords
  - Cord rings
- **Hoses**
  - Hoses
  - Hose rings

 Wind power pitch bearings, steel works, tunnel boring machines, etc.






X-profile

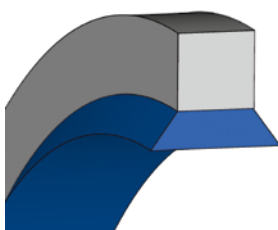


Special profile (example profile 20128)

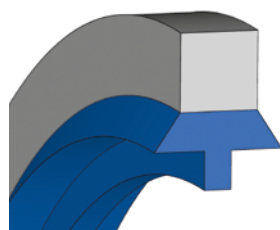
## USIT RINGS

Metallic flat seals with internally vulcanized (Usit I) or externally vulcanized (Usit A, Usit A HY) trapezoidal, rubber-elastic sealing bead. USIT I SF with additional centering diaphragm for static sealing.

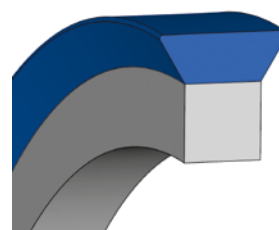
<b>MATERIAL</b>	70 NBR 177646	75 FKM 177645
 <b>MAX.</b>	-30 to +100 °C	-20 to +200 °C
 <b>MAX.</b>	<p>&lt; 100 MPa (installation with counter bore)                      &lt; 40 MPa (installation without counter bore when <math>\varnothing &lt; 40</math> mm; only for USF)                      &lt; 25 MPa (installation without counter bore when <math>\varnothing &lt; 40</math> mm)</p>	
	Screwed connections, flange connections	



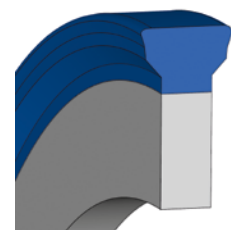
Usit I



Usit I SF



Usit A





Usit A HY

### Hygienic Usit®

The Hygienic Usit® is a further development of the conventional standard Usit ring – developed specifically for the requirements of the process industry. It reliably guarantees hygienic sealing of a screw head. It also facilitates cleaning without difficulty in the form of CIP (cleaning in place), WIP (washing in place), or SIP (sterilization in place) processes without having to disassemble the system.






Hygienic Usit

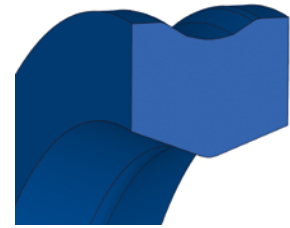
MATERIAL	70 EPDM 291	70 EPDM 253815	75 Fluoroprene® XP 45
MAX. 	-40 to +150 °C	-40 to +150 °C	-15 to +200 °C
	Screwed connections		
APPROVALS	FDA 21 CFR 177.2600; 3-A® Sanitary Standards Class II; EC Regulation 1935/2004 and 2023/2006; USP Ch. 87 and Ch. 88 – Class VI – 121 °C; NSF 51; ADI-free	FDA 21 CFR 177.2600; 3-A® Sanitary Standards Class II; EC Regulation 1935/2004 and 2023/2006; USP Ch. 87 and Ch. 88 – Class VI – 121 °C; ADI-free	FDA 21 CFR 177.2600; 3-A® Sanitary Standards Class I; EC Regulation 1935/2004 and 2023/2006; ADI-free

## COVER SEALS

### Cover seal PU 82 (internal sealing), PU 83 (external sealing)

One-piece, double-acting compact seal made of TPU for static sealing (internal or external sealing).

MATERIAL	95 AU V142	93 AU V167
 MAX.	-30 to +110 °C	-20 to +110 °C
 MAX.	60 MPa	60 MPa
	Mobile cranes, construction machinery, industrial trucks, forestry equipment, injection molding machines	






PU82

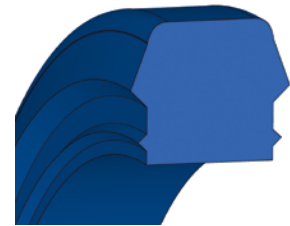


PU83

### Merkel Stirromatic SRC

One-piece compact seal made of polyurethane for static sealing, axially sealing.





MATERIAL	95 AU V142	93 AU V167
 MAX.	-30 to +110 °C	-20 to +110 °C
 MAX.	80 MPa	80 MPa
	Hydraulic hammers, hydraulic control devices	

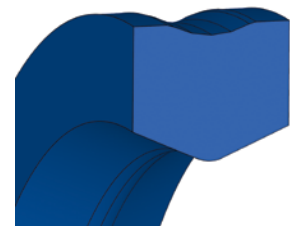


SRC

### Merkel Pinmatic

One-piece, double-acting compact seal made of polyurethane for sealing pivot bolts, internal sealing.

MATERIAL	95 AU V142
 MAX.	-30 to +100 °C
 MAX.	0.2 m/s
 MAX.	2 MPa
	Knee levers, bearing and pivot bolts, injection molding machines



PINMATIC