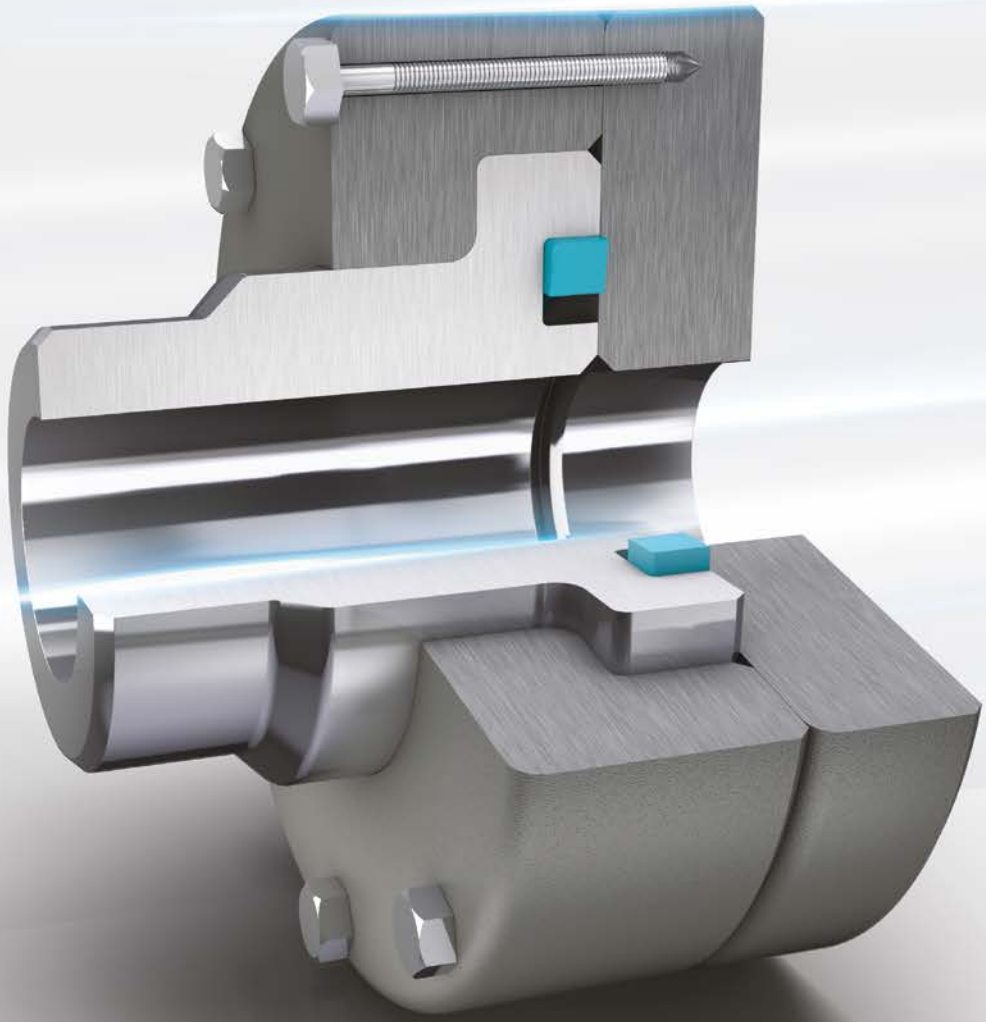
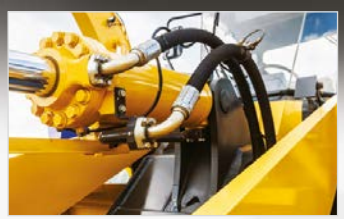
Kantseal





YOUR PARTNER FOR SEALING TECHNOLOGY

Your Partner for Sealing Technology

Trelleborg Sealing Solutions is a major international developer, manufacturer and supplier of seals, bearings and molded components in polymers. We are uniquely placed to offer dedicated design and development from our market-leading product and material portfolio: a one-stop-shop providing the best in elastomer, silicone, thermoplastic, PTFE and composite technologies for applications in aerospace, industrial and automotive industries.

With 50 years of experience, Trelleborg Sealing Solutions engineers support customers with design, prototyping, production, test and installation using state-of-the-art design tools. An international network of over 80 facilities worldwide includes over 20 manufacturing sites, strategically-positioned research and development centers, including materials and development laboratories and locations specializing in design and applications.

Developing and formulating materials in-house, we utilize the resource of our material database, including over 2,000 proprietary compounds and a range of unique products. Trelleborg Sealing Solutions fulfills challenging service requirements, supplying standard parts in volume or a single custom-manufactured component, through our integrated logistical support, which effectively delivers over 40,000 sealing products to customers worldwide.

Trelleborg Sealing Solutions facilities are certified according to current market-related quality standards. In addition to the established ISO 9001 standard, our facilities are certified to environmental, health and safety standards, as well as specific customer specifications. These certifications are in many cases prerequisites, allowing us to comply to all market segment requirements.

ISO 9001

Contents

Introduction

The Kantseal is a good alternative to the O-Ring as an axial static seal in applications requiring higher gap extrusion resistance and minimal deformation of the cross-section.

Their application and handling is comparable with those of O-Rings. It is used as a static seal so that the square form remains practically constant even under high pressures.

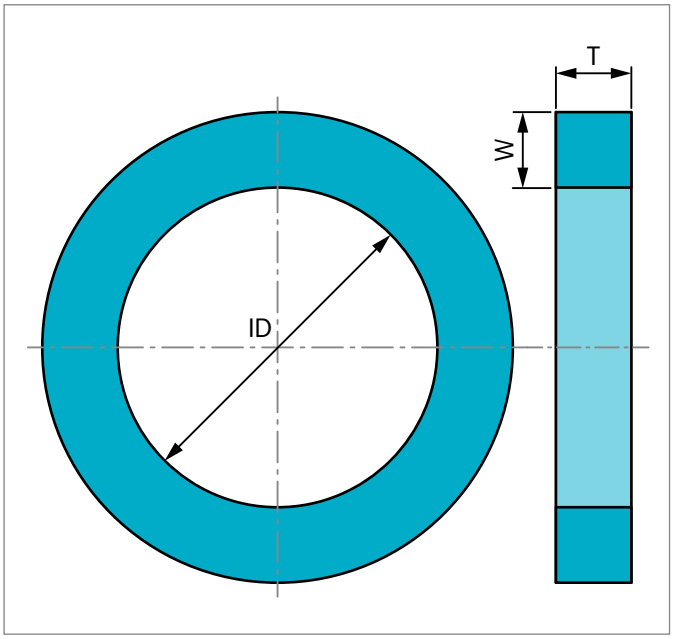


Figure 1: Kantseal dimensioning

ADVANTAGES

- High resistance to gap extrusion
- Minimum mechanical deformation of the cross-section
- Outstanding sealing behavior over long periods
- Low compression set
- No twisting in the groove
- No relative movements during pressure cycles
- Dimensionally stable under pressure
- No additional Back-up Ring required
- No parting line or flash on the seal
- Long service life
- High leak tightness

APPLICATION EXAMPLES

- Flanges, valves, plates and locks

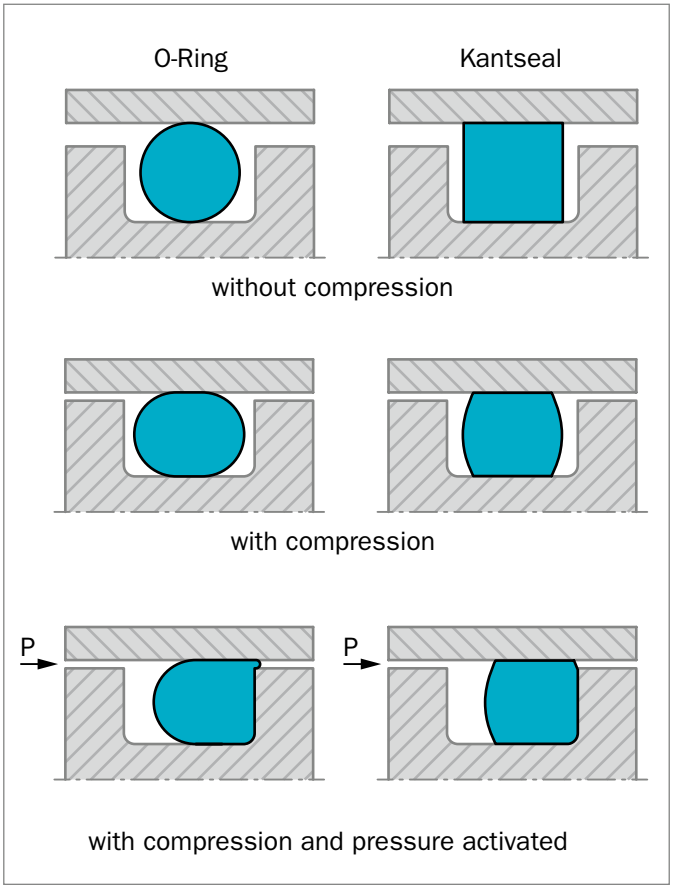


Figure 2: Installation comparison - O-Ring/Kantseal

OPERATING CONDITIONS

Pressure:	Up to 50 MPa and higher (depending on sealing gap)
Temperature:	-30 °C to +100 °C NBR 70 Shore A -25 °C to +100 °C NBR 90 Shore A -15 °C to +200 °C FKM 70 Shore A -15 °C to +200 °C FKM 90 Shore A
Media:	Depending on material selected. Oil-based hydraulic fluids, lubricating oils, water, air and other media.

IMPORTANT NOTE

The application limits for pressure and temperature given in this catalog are maximum values.
During practical applications, it should be remembered that due to the interaction of operating parameters, the maximum values must be set correspondingly lower.

Design Instructions

GROOVE DESIGN

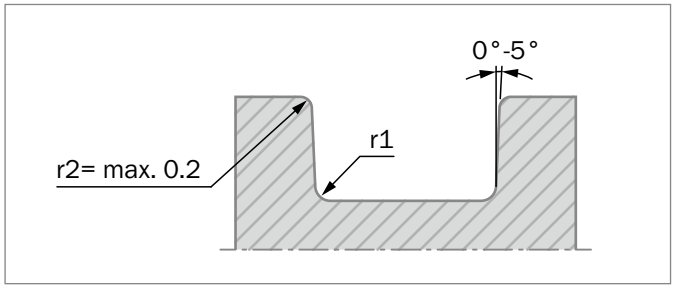


Figure 3: Groove specifications

Table 1: Surface Roughness

Type of Load	Surface	Rt µm	Rz µm	Ra µm
Axial-static	Mating surface	≤ 10.0	≤ 6.3	≤ 1.6
Axial-static	Groove surface (groove bottom, groove flanks)	≤ 16.0	≤ 6.3	≤ 1.6
Under pulsating pressures	Mating surface	≤ 6.3	≤ 6.3	≤ 1.6
Under pulsating pressures	Groove surface (groove bottom, groove flanks)	≤ 10.0	≤ 6.3	≤ 1.6

Table 2: Tolerances - Inside Diameter in mm

Inside Diameter ID	Tolerance ±
4.00 - 14.00	0.13
14.01 - 15.60	0.18
15.61 - 25.12	0.23
25.13 - 29.78	0.25
29.79 - 34.65	0.28
34.66 - 44.17	0.33
44.18 - 50.52	0.38
50.53 - 66.40	0.46
66.41 - 75.92	0.51
75.93 - 94.97	0.61
94.98 - 107.67	0.69
107.68 - 126.72	0.76
126.73 - 133.07	0.94
133.08 - 158.42	0.89
158.43 - 183.82	1.02
183.83 - 209.22	1.14
209.23 - 234.62	1.27
234.63 - 278.99	1.40
279.00 - 405.26	1.65
405.27 - 430.66	1.91
430.67 - 456.07	2.03

Table 3: Tolerances - Cross Section in mm

Cross Section W	Tolerance ±	Cross Section T	Tolerance ±
1.00 - 8.40	± 0.15	1.00 - 1.68	± 0.08
		1.69 - 8.40	± 0.10
8.41 - 10.00	± 0.21	8.41 - 10.00	± 0.15
10.01 - 12.00	± 0.25	10.01 - 12.00	± 0.20
12.01 - 14.00	± 0.28	12.01 - 14.00	± 0.22

All edges of undefined shapes with max. chamfer of -0.2; according to ISO 13715 / ISO 10135.

Materials

ELASTOMERS

Equipment manufacturers and end users expect sealing systems to operate leak-free over a long service life. Reliability is crucial to effective low maintenance-cost operations. To find the perfect sealing solution in each individual case, both material performance and seal design are critically important. One of the most used material groups for seals are the elastomers. Compounds can be chosen according to the properties required, such as elasticity or chemical resistance.

The following tables provide a summary of the various elastomer material groups. Trelleborg Sealing Solutions can offer a large number of materials within each group.

Table 4: Elastomer Materials

Designation	Trade Name*	Abbreviation		
		ISO 1629	ASTM D 1418	TSS
Acrylonitrile-Butadiene Rubber (Nitrile Rubber)	Europrene® Krynac® Nipol N® Perbunan NT Breon®	NBR	NBR	N
Hydrogenated Acrylonitrile-Butadiene Rubber	Therban® Zetpol®	HNBR	HNBR	H
Polyacrylate Rubber	Noxtite® Hytemp® Nipol AR®	ACM	ACM	A
Chloroprene Rubber	Baypren® Neoprene®	CR	CR	WC
Ethylene Propylene Diene Rubber	Dutral® Keltan® Vistalon® Buna EP®	EPDM	EPDM	E
Silicone Rubber	Elastoseal® Rhodorsil® Silastic® Silopren®	VMQ	VMQ	S
Fluorosilicone Rubber	Silastic®	FVMQ	FVMQ	F
Tetrafluorethylene-Propylene Copolymer Elastomer	Aflas®	FEPM	TFE/P**	WT
Butyl Rubber	Esso Butyl®	IIR	IIR	WI
Styrene-Butadiene Rubber	Buna S® Europrene® Polysar S®	SBR	SBR	WB
Natural Rubber		NR	WR	WR
Fluorocarbon Rubber	Dai-El® Fluorel® Tecnoflon® Viton®	FKM	FKM	V

Table continues on next page

Designation	Trade Name*	Abbreviation		
		ISO 1629	ASTM D 1418	TSS
Perfluoro Rubber	Isolast® Kalrez®	FFKM	FFKM	J
Polyester Urethane Polyether Urethane	Zurcon® Adiprene® Pellethan® Vulcollan® Desmopan®	AU, EU	AU, EU	WU, Z
Chlorosulphonated Polyethylene Rubber	Hypalon®	CSM	CSM	WM
Polysulphide Elastomer	Thiokol®	-	TWT	WY
Epichlorohydrin Elastomer	Hydrin®	-	-	WO

* Selection of registered trade names
** Abbreviation not yet standardized.
ASTM = American Society for Testing and Materials
ISO = International Organisation for Standardization

Table 5: Important Synthetic Rubber Groupings and their Abbreviations

Chemical name	Abbreviation	
	ISO 1629	ASTM D 1418
M - Group (saturated carbon molecules in main macro-molecule-chain)		
Polyacrylate Rubber	AC**M**	AC**M**
Ethylene Acrylate Rubber	AE**M**	
Chlorosulfonated Polyethylene Rubber	CS**M**	CS**M**
Ethylene Propylene Diene Rubber	EPD**M**	EPD**M**
Ethylene Propylene Rubber	EP**M**	EP**M**
Fluorocarbon Rubber	FK**M**	FK**M**
Perfluoro Rubber	FFK**M**	FFK**M**
O - Group (with oxygen molecules in the main macro-molecule chain)		
Epichlorohydrin Rubber	C**O**	C**O**
Epichlorohydrin Copolymer Rubber	EC**O**	EC**O**
R - Group (unsaturated hydrogene carbon chain)		
Chloroprene Rubber	C**R**	C**R**
Butyl Rubber	II**R**	II**R**
Nitrile Butadiene Rubber	NB**R**	NB**R**
Natural Rubber	N**R**	N**R**
Styrene Butadiene Rubber	SB**R**	SB**R**
Hydrogenated Nitrile Butadiene Rubber	HNB**R**	HNB**R**
Q - Group (with silicone in the main chain)		
Fluorosilicone Rubber	FVMQ	FVMQ
Methyl Vinyl Silicone Rubber	VMQ	VMQ
U - Group (with carbon, oxygen and nitrogen in the main chain)		
Polyester Urethane	A**U**	A**U**
Polyether Urethane	E**U**	E**U**

APPLICATION PARAMETERS OF ELASTOMERS

Elastomers, as all other organic chemicals, have limited use. External influences such as media, oxygen or ozone, as well as pressure and temperature, will affect the material properties and therefore their sealing capability.

Elastomers can swell, shrink or harden and develop cracks or even tears. Figure 4 and Figure 5 illustrate the performance of various elastomers under different application parameters.

ELASTOMER HEAT RESISTANCE / SWELLING IN OIL

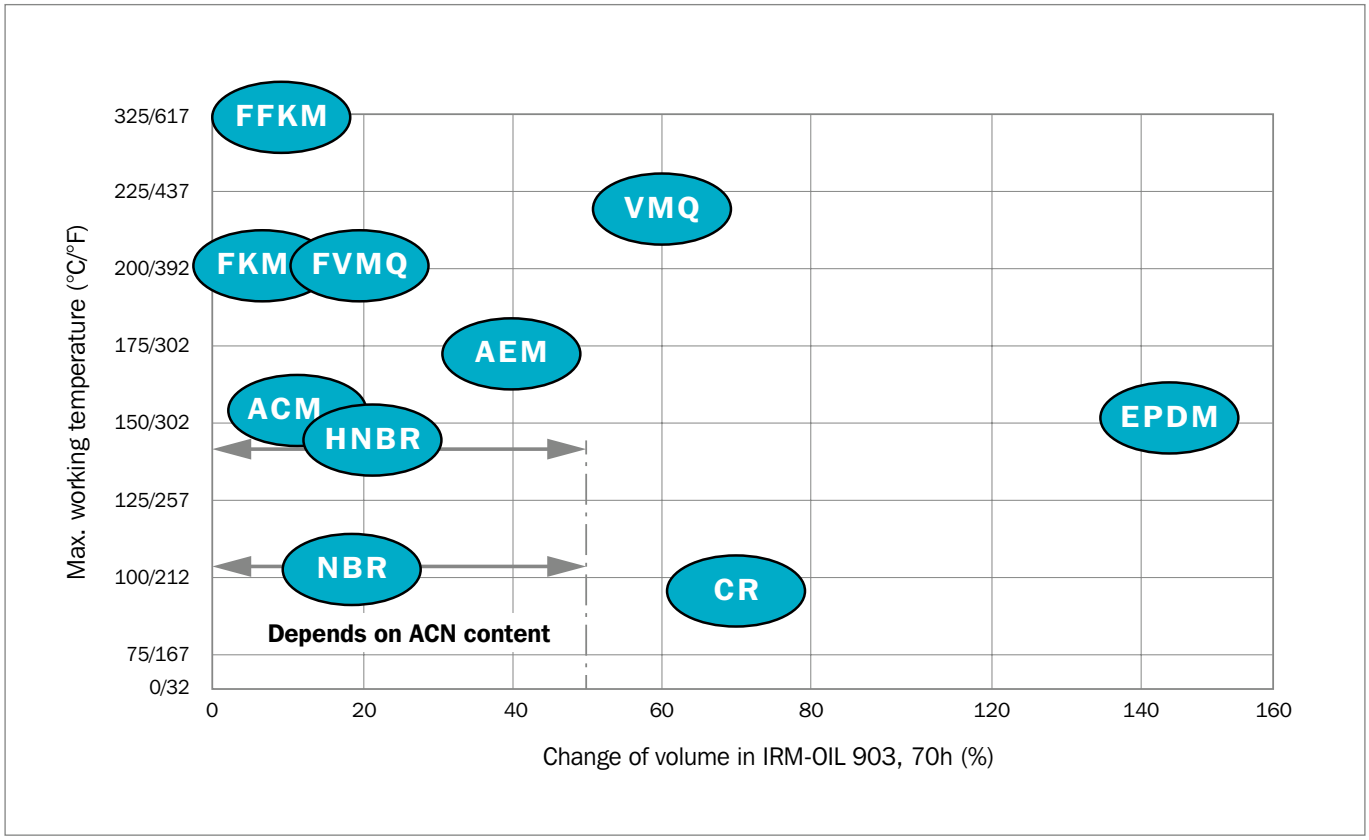


Figure 4: Change of volume in IRM-Oil 903 (old ASTM-Oil No 3)

TEMPERATURE RANGE

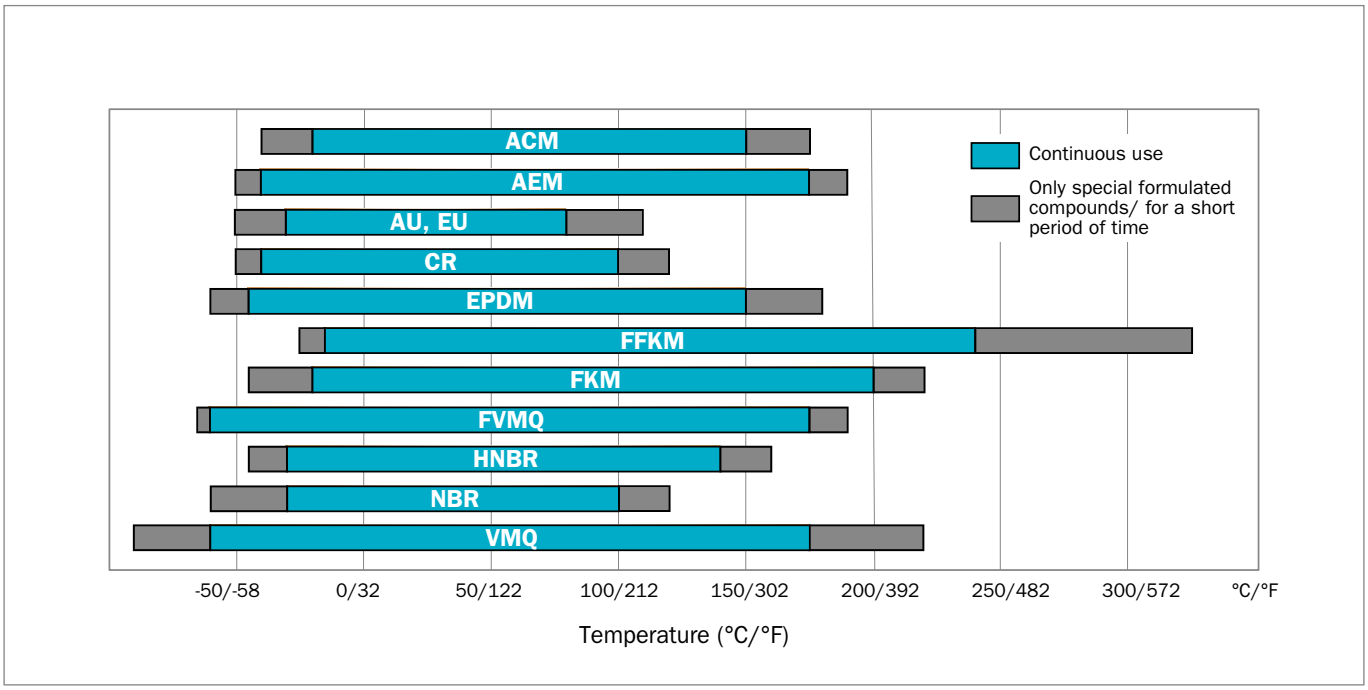


Figure 5: Temperature ranges of various elastomers. Temperature ranges only apply when used with compatible media.

Table 6: General Field of Application

Material and Properties	Applications	Operating Temperature			
		Normal		Short period	
		°C	°F	°C	°F
ACM (Polyacrylate Rubber) - Excellent resistance to ozone, weathering and hot air, although it shows only a medium physical strength - Low elasticity - Relatively limited low temperature capability	ACM is used in automotive applications which require special resistance to lubricants containing many additives (incl. sulfur) at high temperatures	-20 to +150 (special types -35 to +150)	-4 to +302 (special types -31 to +302)	up to +175	up to +347
CR (Chloroprene Rubber) - Good resistance to ozone, weathering, chemicals and aging - Good non-flammability - Good mechanical properties and cold flexibility.	CR is used in sealing applications involving refrigerants, outdoor applications and in the glue industry	-35 to +90 (special types -55 to +90)	-31 to +194 (special types -67 to +194)	up to +120	up to +248
EPDM (Ethylene Propylene Diene Rubber) - Good heat, ozone and aging resistance - High levels of elasticity - Good low temperature behavior - Good insulating properties.	EPDM can often be found in applications with brake fluids (based on glycol) and hot water	Peroxide cured EPDM Types			
		-45 to +150	-49 to +302	up to +175	up to +347
		Sulfur cured EPDM Types			
		-45 to +130	-49 to +266	up to +150	up to +302

Table continues on next page

Material and Properties	Applications	Operating Temperature			
		Normal		Short period	
		°C	°F	°C	°F
FFKM (Perfluoro Rubber) - Broad chemical resistance like PTFE - Good heat resistance - Low swelling with almost all media	FFKM is used in chemical and process industries and in all applications with either aggressive environments or high temperatures	-25 to +240	-13 to +464	up to +325	up to +617
FKM (Fluorocarbon Rubber) - Non-flammability, low gas permeability - Excellent resistance to ozone, weathering and aging	FKM is also often used with mineral based oils and greases at high temperatures	-20 to +200 (special types -40 to +200)	-4 to +392 (special types -40 to +392)	up to +230	up to +446
FVMQ (Fluorosilicone Rubber) - Good heat resistance and electrical properties - Very good low temperature flexibility - Excellent resistance to weather, ozone and UV rays - FVMQ shows a significantly better chemical resistance than standard silicone especially in hydrocarbons, aromatic mineral oils, fuel and low molecular aromatic hydrocarbons e.g. benzene and toluene	FVMQ is used in aero-space and automotive applications	-50 to +175	-58 to +347	up to +200	up to +392
HNBR (Hydrogenated Nitrile Butadiene Rubber) - HNBR is made via selective hydrogenation of NBR butadiene groups - The properties of HNBR rubber depend on the ACN content which ranges between 18% and 50%, as well as on the degree of saturation - Good mechanical properties	HNBR is used with mineral based oils and greases	-30 to +140 (special types -40 to +140)	-22 to +284 (special types -40 to +284)	up to +160	up to +320
IIR (Butyl Rubber) - Very low gas and moisture permeability - Good resistance to many organic and inorganic chemicals, ozone, weathering and aging - Excellent insulating properties	IIR is used for vacuum seals and membranes	-40 to +110	-40 to +230	up to +120	up to +248
NBR (Nitrile Butadiene Rubber) - The properties of nitrile rubber depend mainly on the ACN content, which ranges between 18% and 50% - Good mechanical properties	NBR is mostly used with mineral based oils and greases	-30 to +100 (special types -60 to +90)	-22 to +212 (special types -76 to +194)	up to +120	up to +248
Polyurethane (Zurcon® Polyurethane) - Excellent elastic properties and optimum abrasion resistance - Outstanding tensile strength, low compression set - Good resistance to O_2 and O_3	Polyurethane is mostly used for pneumatic and hydraulic seals	-50 to +110	-58 to +230	-	-

Material and Properties	Applications	Operating Temperature			
		Normal		Short period	
		°C	°F	°C	°F
VMQ (Silicone Rubber) - Excellent heat resistance, cold flexibility, dielectric properties - Good resistance to weather, ozone and UV rays - Specific VMQ formulations are resistant to aliphatic engine and gear oils, water up to +100 °C (+212 °F) and high-molecular-weight chlorinated hydrocarbons	VMQ is used for seals in food and medical applications	-50 to +175	-58 to +347	up to +230	up to +446

Chemical compatibility
For the pre-selection of a suitable material group, a comprehensive chemical compatibility guide is available. This can be downloaded from our website www.tss.trelleborg.com or you can contact your local Customer Solution Center for further details.

It is important to recognize that when using this guide, the ratings shown are based on published data and immersion tests. These tests are conducted under laboratory conditions and may not adequately represent conditions in the field. Relative short term laboratory tests may not pick up all the additives and impurities which may exist in long term service applications.

Care must be taken to ensure that all aspects of the application are considered carefully before a material is selected. For example, at elevated temperatures some aggressive fluids can cause a much more marked effect on an elastomer than at room temperature.

Physical properties, as well as fluid compatibility, need to be considered. Compression set, hardness, abrasion resistance and thermal expansion can influence the suitability of a material for a particular application.

It is recommended that users conduct their own tests to confirm the suitability of the selected material for each application.

Our experienced technical staff can be consulted for further information on specific applications.

Installation Recommendations

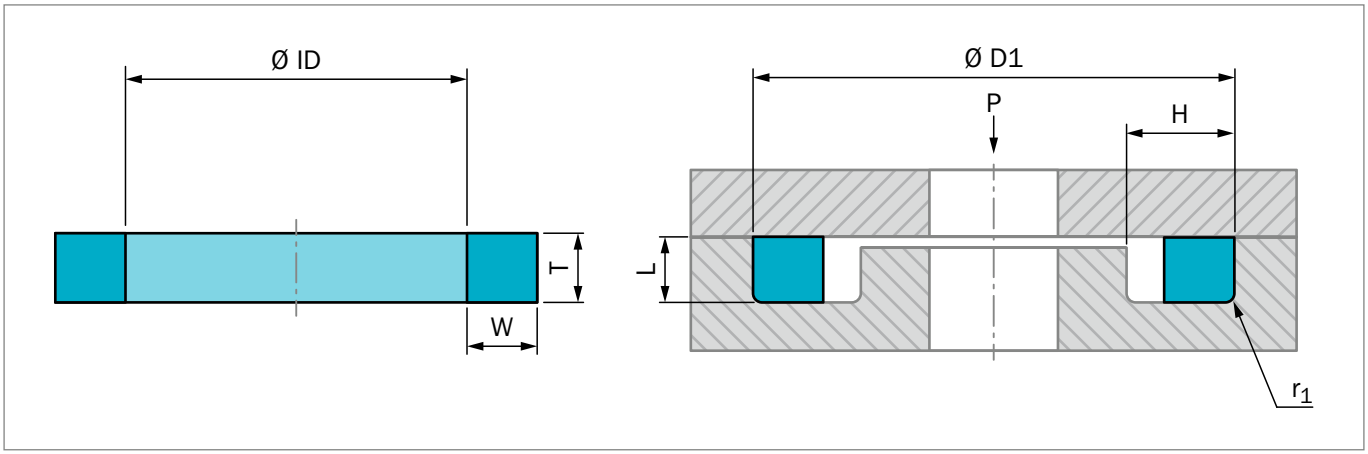
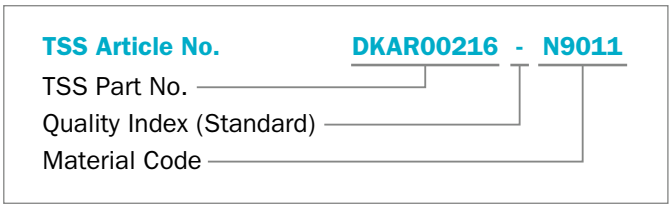


Figure 6: Installation drawing

ORDERING EXAMPLE

Dimensions:	Inside Diameter ID = 28.17 mm Cross Section W = 3.40 mm
Material:	NBR 90 Shore A
TSS Article No.:	DKAR00216-N9011



Standard Quality

If no quality requirements are specified with an order, standard quality Kantseal are supplied.
The standard quality is defined by a '-' as the 10th digit in the Kantseal article number.
A standard quality Kantseal has dimensional tolerances and surface qualities to Trelleborg Sealing Solutions standard TBS-00042.

For surface deviations ISO 2859-1:2004-01 AQL 1.0 general inspection level II, normal inspection is supplied as standard. Higher quality levels are available on request.

Table 7: Preferred Series - Metric

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	r_1 **max.**	**ID**	**W**	**T**	
7.92	2.4	1.45	0.4	4.47	1.68	1.68	DKAR00008
8.71	2.4	1.45	0.4	5.28	1.68	1.68	DKAR00009
9.53	2.4	1.45	0.4	6.07	1.68	1.68	DKAR00010
11.10	2.4	1.45	0.4	7.65	1.68	1.68	DKAR00011
12.70	2.4	1.45	0.4	9.25	1.68	1.68	DKAR00012
14.27	2.4	1.45	0.4	10.82	1.68	1.68	DKAR00013
15.88	2.4	1.45	0.4	12.42	1.68	1.68	DKAR00014

Other dimensions on request.

Table continues on next page

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	r_1 **max.**	**ID**	**W**	**T**	
17.45	2.4	1.45	0.4	14.00	1.68	1.68	DKAR00015
19.05	2.4	1.45	0.4	15.60	1.68	1.68	DKAR00016
20.62	2.4	1.45	0.4	17.17	1.68	1.68	DKAR00017
22.23	2.4	1.45	0.4	18.77	1.68	1.68	DKAR00018
23.80	2.4	1.45	0.4	20.35	1.68	1.68	DKAR00019
25.40	2.4	1.45	0.4	21.95	1.68	1.68	DKAR00020
26.97	2.4	1.45	0.4	23.52	1.68	1.68	DKAR00021
28.58	2.4	1.45	0.4	25.12	1.68	1.68	DKAR00022
30.15	2.4	1.45	0.4	26.70	1.68	1.68	DKAR00023
31.75	2.4	1.45	0.4	28.30	1.68	1.68	DKAR00024
33.32	2.4	1.45	0.4	29.87	1.68	1.68	DKAR00025
34.93	2.4	1.45	0.4	31.47	1.68	1.68	DKAR00026
36.50	2.4	1.45	0.4	33.05	1.68	1.68	DKAR00027
38.10	2.4	1.45	0.4	34.65	1.68	1.68	DKAR00028
41.28	2.4	1.45	0.4	37.82	1.68	1.68	DKAR00029
44.45	2.4	1.45	0.4	41.00	1.68	1.68	DKAR00030
47.63	2.4	1.45	0.4	44.17	1.68	1.68	DKAR00031
50.80	2.4	1.45	0.4	47.35	1.68	1.68	DKAR00032
53.98	2.4	1.45	0.4	50.52	1.68	1.68	DKAR00033
57.15	2.4	1.45	0.4	53.70	1.68	1.68	DKAR00034
60.33	2.4	1.45	0.4	56.87	1.68	1.68	DKAR00035
63.50	2.4	1.45	0.4	60.05	1.68	1.68	DKAR00036
66.68	2.4	1.45	0.4	63.22	1.68	1.68	DKAR00037
69.85	2.4	1.45	0.4	66.40	1.68	1.68	DKAR00038
73.03	2.4	1.45	0.4	69.57	1.68	1.68	DKAR00039
76.20	2.4	1.45	0.4	72.75	1.68	1.68	DKAR00040
79.38	2.4	1.45	0.4	75.92	1.68	1.68	DKAR00041
85.73	2.4	1.45	0.4	82.27	1.68	1.68	DKAR00042
92.08	2.4	1.45	0.4	88.62	1.68	1.68	DKAR00043
98.43	2.4	1.45	0.4	94.97	1.68	1.68	DKAR00044
104.78	2.4	1.45	0.4	101.32	1.68	1.68	DKAR00045
111.13	2.4	1.45	0.4	107.67	1.68	1.68	DKAR00046
117.48	2.4	1.45	0.4	114.02	1.68	1.68	DKAR00047
123.83	2.4	1.45	0.4	120.37	1.68	1.68	DKAR00048
130.18	2.4	1.45	0.4	126.72	1.68	1.68	DKAR00049
136.53	2.4	1.45	0.4	133.07	1.68	1.68	DKAR00050
9.53	3.6	2.30	0.4	4.42	2.51	2.51	DKAR00106
10.31	3.6	2.30	0.4	5.23	2.51	2.51	DKAR00107
11.10	3.6	2.30	0.4	6.02	2.51	2.51	DKAR00108
12.70	3.6	2.30	0.4	7.59	2.51	2.51	DKAR00109
14.27	3.6	2.30	0.4	9.19	2.51	2.51	DKAR00110
15.88	3.6	2.30	0.4	10.77	2.51	2.51	DKAR00111

Other dimensions on request.

Table continues on next page

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	r_1 **max.**	**ID**	**W**	**T**	
17.45	3.6	2.30	0.4	12.37	2.51	2.51	DKAR00112
19.05	3.6	2.30	0.4	13.94	2.51	2.51	DKAR00113
20.62	3.6	2.30	0.4	15.54	2.51	2.51	DKAR00114
22.23	3.6	2.30	0.4	17.12	2.51	2.51	DKAR00115
23.80	3.6	2.30	0.4	18.72	2.51	2.51	DKAR00116
25.40	3.6	2.30	0.4	20.29	2.51	2.51	DKAR00117
26.97	3.6	2.30	0.4	21.89	2.51	2.51	DKAR00118
28.58	3.6	2.30	0.4	23.47	2.51	2.51	DKAR00119
30.15	3.6	2.30	0.4	25.07	2.51	2.51	DKAR00120
31.75	3.6	2.30	0.4	26.64	2.51	2.51	DKAR00121
33.32	3.6	2.30	0.4	28.24	2.51	2.51	DKAR00122
34.93	3.6	2.30	0.4	29.82	2.51	2.51	DKAR00123
36.50	3.6	2.30	0.4	31.42	2.51	2.51	DKAR00124
38.10	3.6	2.30	0.4	32.99	2.51	2.51	DKAR00125
39.67	3.6	2.30	0.4	34.59	2.51	2.51	DKAR00126
41.28	3.6	2.30	0.4	36.17	2.51	2.51	DKAR00127
42.85	3.6	2.30	0.4	37.77	2.51	2.51	DKAR00128
44.45	3.6	2.30	0.4	39.34	2.51	2.51	DKAR00129
46.02	3.6	2.30	0.4	40.94	2.51	2.51	DKAR00130
47.63	3.6	2.30	0.4	42.52	2.51	2.51	DKAR00131
49.20	3.6	2.30	0.4	44.12	2.51	2.51	DKAR00132
50.80	3.6	2.30	0.4	45.69	2.51	2.51	DKAR00133
52.37	3.6	2.30	0.4	47.29	2.51	2.51	DKAR00134
53.98	3.6	2.30	0.4	48.90	2.51	2.51	DKAR00135
55.55	3.6	2.30	0.4	50.47	2.51	2.51	DKAR00136
57.15	3.6	2.30	0.4	52.07	2.51	2.51	DKAR00137
58.72	3.6	2.30	0.4	53.64	2.51	2.51	DKAR00138
60.33	3.6	2.30	0.4	55.25	2.51	2.51	DKAR00139
61.90	3.6	2.30	0.4	56.82	2.51	2.51	DKAR00140
63.50	3.6	2.30	0.4	58.42	2.51	2.51	DKAR00141
65.07	3.6	2.30	0.4	60.00	2.51	2.51	DKAR00142
66.68	3.6	2.30	0.4	61.60	2.51	2.51	DKAR00143
68.25	3.6	2.30	0.4	63.17	2.51	2.51	DKAR00144
69.85	3.6	2.30	0.4	64.77	2.51	2.51	DKAR00145
71.42	3.6	2.30	0.4	66.34	2.51	2.51	DKAR00146
73.03	3.6	2.30	0.4	67.95	2.51	2.51	DKAR00147
74.60	3.6	2.30	0.4	69.52	2.51	2.51	DKAR00148
76.20	3.6	2.30	0.4	71.12	2.51	2.51	DKAR00149
77.77	3.6	2.30	0.4	72.69	2.51	2.51	DKAR00150
80.95	3.6	2.30	0.4	75.87	2.51	2.51	DKAR00151
87.30	3.6	2.30	0.4	82.22	2.51	2.51	DKAR00152
93.65	3.6	2.30	0.4	88.57	2.51	2.51	DKAR00153

Other dimensions on request.

Table continues on next page

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	r_1 **max.**	**ID**	**W**	**T**	
100.00	3.6	2.30	0.4	94.92	2.51	2.51	DKAR00154
106.35	3.6	2.30	0.4	101.27	2.51	2.51	DKAR00155
112.70	3.6	2.30	0.4	107.62	2.51	2.51	DKAR00156
119.05	3.6	2.30	0.4	113.97	2.51	2.51	DKAR00157
125.40	3.6	2.30	0.4	120.32	2.51	2.51	DKAR00158
131.75	3.6	2.30	0.4	126.67	2.51	2.51	DKAR00159
138.10	3.6	2.30	0.4	133.02	2.51	2.51	DKAR00160
144.45	3.6	2.30	0.4	139.37	2.51	2.51	DKAR00161
150.80	3.6	2.30	0.4	145.72	2.51	2.51	DKAR00162
157.15	3.6	2.30	0.4	152.07	2.51	2.51	DKAR00163
163.50	3.6	2.30	0.4	158.42	2.51	2.51	DKAR00164
169.85	3.6	2.30	0.4	164.77	2.51	2.51	DKAR00165
176.20	3.6	2.30	0.4	171.12	2.51	2.51	DKAR00166
182.55	3.6	2.30	0.4	177.47	2.51	2.51	DKAR00167
188.90	3.6	2.30	0.4	183.82	2.51	2.51	DKAR00168
195.25	3.6	2.30	0.4	190.17	2.51	2.51	DKAR00169
201.60	3.6	2.30	0.4	196.52	2.51	2.51	DKAR00170
207.95	3.6	2.30	0.4	202.87	2.51	2.51	DKAR00171
214.30	3.6	2.30	0.4	209.22	2.51	2.51	DKAR00172
220.65	3.6	2.30	0.4	215.57	2.51	2.51	DKAR00173
227.00	3.6	2.30	0.4	221.92	2.51	2.51	DKAR00174
233.35	3.6	2.30	0.4	228.27	2.51	2.51	DKAR00175
239.70	3.6	2.00	0.4	234.62	2.51	2.51	DKAR00176
246.05	3.6	2.30	0.4	240.97	2.51	2.51	DKAR00177
252.40	3.6	2.30	0.4	247.32	2.51	2.51	DKAR00178
11.10	4.8	3.10	0.6	4.34	3.40	3.40	DKAR00201
12.70	4.8	3.10	0.6	5.94	3.40	3.40	DKAR00202
14.27	4.8	3.10	0.6	7.52	3.40	3.40	DKAR00203
15.88	4.8	3.10	0.6	9.12	3.40	3.40	DKAR00204
17.45	4.8	3.10	0.6	10.69	3.40	3.40	DKAR00205
19.05	4.8	3.10	0.6	12.29	3.40	3.40	DKAR00206
20.62	4.8	3.10	0.6	13.87	3.40	3.40	DKAR00207
22.23	4.8	3.10	0.6	15.47	3.40	3.40	DKAR00208
23.80	4.8	3.10	0.6	17.04	3.40	3.40	DKAR00209
25.40	4.8	3.10	0.6	18.64	3.40	3.40	DKAR00210
26.97	4.8	3.10	0.6	20.22	3.40	3.40	DKAR00211
28.58	4.8	3.10	0.6	21.82	3.40	3.40	DKAR00212
30.15	4.8	3.10	0.6	23.39	3.40	3.40	DKAR00213
31.75	4.8	3.10	0.6	24.99	3.40	3.40	DKAR00214
33.32	4.8	3.10	0.6	26.57	3.40	3.40	DKAR00215
34.93	4.8	3.10	0.6	28.17	3.40	3.40	DKAR00216
36.50	4.8	3.10	0.6	29.74	3.40	3.40	DKAR00217

Other dimensions on request.

Table continues on next page

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	r_1 **max.**	**ID**	**W**	**T**	
38.10	4.8	3.10	0.6	31.34	3.40	3.40	DKAR00218
39.67	4.8	3.10	0.6	32.92	3.40	3.40	DKAR00219
41.28	4.8	3.10	0.6	34.52	3.40	3.40	DKAR00220
42.85	4.8	3.10	0.6	36.09	3.40	3.40	DKAR00221
44.45	4.8	3.10	0.6	37.69	3.40	3.40	DKAR00222
47.63	4.8	3.10	0.6	40.87	3.40	3.40	DKAR00223
50.80	4.8	3.10	0.6	44.04	3.40	3.40	DKAR00224
53.98	4.8	3.10	0.6	47.22	3.40	3.40	DKAR00225
57.15	4.8	3.10	0.6	50.39	3.40	3.40	DKAR00226
60.33	4.8	3.10	0.6	53.57	3.40	3.40	DKAR00227
63.50	4.8	3.10	0.6	56.74	3.40	3.40	DKAR00228
66.68	4.8	3.10	0.6	59.92	3.40	3.40	DKAR00229
69.85	4.8	3.10	0.6	63.09	3.40	3.40	DKAR00230
73.03	4.8	3.10	0.6	66.27	3.40	3.40	DKAR00231
76.20	4.8	3.10	0.6	69.44	3.40	3.40	DKAR00232
79.38	4.8	3.10	0.6	72.62	3.40	3.40	DKAR00233
82.55	4.8	3.10	0.6	75.79	3.40	3.40	DKAR00234
85.73	4.8	3.10	0.6	78.97	3.40	3.40	DKAR00235
88.90	4.8	3.10	0.6	82.14	3.40	3.40	DKAR00236
92.08	4.8	3.10	0.6	85.32	3.40	3.40	DKAR00237
95.25	4.8	3.10	0.6	88.49	3.40	3.40	DKAR00238
98.43	4.8	3.10	0.6	91.67	3.40	3.40	DKAR00239
101.60	4.8	3.10	0.6	94.84	3.40	3.40	DKAR00240
104.78	4.8	3.10	0.6	98.02	3.40	3.40	DKAR00241
107.95	4.8	3.10	0.6	101.19	3.40	3.40	DKAR00242
111.13	4.8	3.10	0.6	104.37	3.40	3.40	DKAR00243
114.30	4.8	3.10	0.6	107.54	3.40	3.40	DKAR00244
117.48	4.8	3.10	0.6	110.72	3.40	3.40	DKAR00245
120.65	4.8	3.10	0.6	113.89	3.40	3.40	DKAR00246
123.83	4.8	3.10	0.6	117.07	3.40	3.40	DKAR00247
127.00	4.8	3.10	0.6	120.24	3.40	3.40	DKAR00248
130.18	4.8	3.10	0.6	123.42	3.40	3.40	DKAR00249
133.35	4.8	3.10	0.6	126.59	3.40	3.40	DKAR00250
136.53	4.8	3.10	0.6	129.77	3.40	3.40	DKAR00251
139.70	4.8	3.10	0.6	132.94	3.40	3.40	DKAR00252
142.88	4.8	3.10	0.6	136.12	3.40	3.40	DKAR00253
146.05	4.8	3.10	0.6	139.29	3.40	3.40	DKAR00254
149.23	4.8	3.10	0.6	142.47	3.40	3.40	DKAR00255
153.40	4.8	3.10	0.6	145.64	3.40	3.40	DKAR00256
155.58	4.8	3.10	0.6	148.82	3.40	3.40	DKAR00257
158.75	4.8	3.10	0.6	151.99	3.40	3.40	DKAR00258
165.10	4.8	3.10	0.6	158.34	3.40	3.40	DKAR00259

Other dimensions on request.

Table continues on next page

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	r_1 **max.**	**ID**	**W**	**T**	
171.45	4.8	3.10	0.6	164.69	3.40	3.40	DKAR00260
177.80	4.8	3.10	0.6	171.04	3.40	3.40	DKAR00261
184.15	4.8	3.10	0.6	177.39	3.40	3.40	DKAR00262
190.50	4.8	3.10	0.6	183.74	3.40	3.40	DKAR00263
196.85	4.8	3.10	0.6	190.09	3.40	3.40	DKAR00264
203.20	4.8	3.10	0.6	196.44	3.40	3.40	DKAR00265
209.55	4.8	3.10	0.6	202.79	3.40	3.40	DKAR00266
215.90	4.8	3.10	0.6	209.14	3.40	3.40	DKAR00267
222.25	4.8	3.10	0.6	215.49	3.40	3.40	DKAR00268
228.60	4.8	3.10	0.6	221.84	3.40	3.40	DKAR00269
234.95	4.8	3.10	0.6	228.19	3.40	3.40	DKAR00270
241.30	4.8	3.10	0.6	234.54	3.40	3.40	DKAR00271
247.65	4.8	3.10	0.6	240.89	3.40	3.40	DKAR00272
254.00	4.8	3.10	0.6	247.24	3.40	3.40	DKAR00273
260.35	4.8	3.10	0.6	253.59	3.40	3.40	DKAR00274
273.05	4.8	3.10	0.6	266.29	3.40	3.40	DKAR00275
285.75	4.8	3.10	0.6	278.99	3.40	3.40	DKAR00276
298.45	4.8	3.10	0.6	291.69	3.40	3.40	DKAR00277
311.15	4.8	3.10	0.6	304.39	3.40	3.40	DKAR00278
336.55	4.8	3.10	0.6	329.79	3.40	3.40	DKAR00279
361.95	4.8	3.10	0.6	355.19	3.40	3.40	DKAR00280
387.35	4.8	3.10	0.6	380.59	3.40	3.40	DKAR00281
412.75	4.8	3.10	0.6	405.26	3.40	3.40	DKAR00282
438.15	4.8	3.10	0.6	430.66	3.40	3.40	DKAR00283
463.55	4.8	3.10	0.6	456.06	3.40	3.40	DKAR00284
20.62	7.1	4.75	0.8	10.46	5.16	5.16	DKAR00309
22.23	7.1	4.75	0.8	12.07	5.16	5.16	DKAR00310
23.80	7.1	4.75	0.8	13.64	5.16	5.16	DKAR00311
25.40	7.1	4.75	0.8	15.24	5.16	5.16	DKAR00312
26.97	7.1	4.75	0.8	16.81	5.16	5.16	DKAR00313
28.58	7.1	4.75	0.8	18.42	5.16	5.16	DKAR00314
30.15	7.1	4.75	0.8	19.99	5.16	5.16	DKAR00315
31.75	7.1	4.75	0.8	21.59	5.16	5.16	DKAR00316
33.32	7.1	4.75	0.8	23.16	5.16	5.16	DKAR00317
34.93	7.1	4.75	0.8	24.77	5.16	5.16	DKAR00318
36.50	7.1	4.75	0.8	26.34	5.16	5.16	DKAR00319
38.10	7.1	4.75	0.8	27.94	5.16	5.16	DKAR00320
39.67	7.1	4.75	0.8	29.51	5.16	5.16	DKAR00321
41.28	7.1	4.75	0.8	31.12	5.16	5.16	DKAR00322
42.85	7.1	4.75	0.8	32.69	5.16	5.16	DKAR00323
44.45	7.1	4.75	0.8	34.29	5.16	5.16	DKAR00324
47.63	7.1	4.75	0.8	37.47	5.16	5.16	DKAR00325

Other dimensions on request.

Table continues on next page

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	r_1 **max.**	**ID**	**W**	**T**	
50.80	7.1	4.75	0.8	40.64	5.16	5.16	DKAR00326
53.98	7.1	4.75	0.8	43.82	5.16	5.16	DKAR00327
57.15	7.1	4.75	0.8	46.99	5.16	5.16	DKAR00328
60.33	7.1	4.75	0.8	50.17	5.16	5.16	DKAR00329
63.50	7.1	4.75	0.8	53.34	5.16	5.16	DKAR00330
66.68	7.1	4.75	0.8	56.52	5.16	5.16	DKAR00331
69.85	7.1	4.75	0.8	59.69	5.16	5.16	DKAR00332
73.03	7.1	4.75	0.8	62.87	5.16	5.16	DKAR00333
76.20	7.1	4.75	0.8	66.04	5.16	5.16	DKAR00334
79.38	7.1	4.75	0.8	69.22	5.16	5.16	DKAR00335
82.55	7.1	4.75	0.8	72.39	5.16	5.16	DKAR00336
85.73	7.1	4.75	0.8	75.57	5.16	5.16	DKAR00337
88.90	7.1	4.75	0.8	78.74	5.16	5.16	DKAR00338
92.08	7.1	4.75	0.8	81.92	5.16	5.16	DKAR00339
95.25	7.1	4.75	0.8	85.09	5.16	5.16	DKAR00340
98.43	7.1	4.75	0.8	88.27	5.16	5.16	DKAR00341
101.60	7.1	4.75	0.8	91.44	5.16	5.16	DKAR00342
104.78	7.1	4.75	0.8	94.62	5.16	5.16	DKAR00343
107.95	7.1	4.75	0.8	97.79	5.16	5.16	DKAR00344
111.13	7.1	4.75	0.8	100.97	5.16	5.16	DKAR00345
114.30	7.1	4.75	0.8	104.14	5.16	5.16	DKAR00346
117.48	7.1	4.75	0.8	107.32	5.16	5.16	DKAR00347
120.65	7.1	4.75	0.8	110.49	5.16	5.16	DKAR00348
123.83	7.1	4.75	0.8	113.67	5.16	5.16	DKAR00349
127.00	7.1	4.75	0.8	116.84	5.16	5.16	DKAR00350
130.18	7.1	4.75	0.8	120.02	5.16	5.16	DKAR00351
133.35	7.1	4.75	0.8	123.19	5.16	5.16	DKAR00352
136.53	7.1	4.75	0.8	126.37	5.16	5.16	DKAR00353
139.70	7.1	4.75	0.8	129.54	5.16	5.16	DKAR00354
142.88	7.1	4.75	0.8	132.72	5.16	5.16	DKAR00355
146.05	7.1	4.75	0.8	135.89	5.16	5.16	DKAR00356
149.23	7.1	4.75	0.8	139.07	5.16	5.16	DKAR00357
152.40	7.1	4.75	0.8	142.24	5.16	5.16	DKAR00358
155.58	7.1	4.75	0.8	145.42	5.16	5.16	DKAR00359
158.75	7.1	4.75	0.8	148.59	5.16	5.16	DKAR00360
161.93	7.1	4.75	0.8	151.77	5.16	5.16	DKAR00361
168.28	7.1	4.75	0.8	158.12	5.16	5.16	DKAR00362
174.63	7.1	4.75	0.8	164.47	5.16	5.16	DKAR00363
180.98	7.1	4.75	0.8	170.82	5.16	5.16	DKAR00364
187.33	7.1	4.75	0.8	177.17	5.16	5.16	DKAR00365
193.68	7.1	4.75	0.8	183.52	5.16	5.16	DKAR00366
200.03	7.1	4.75	0.8	189.87	5.16	5.16	DKAR00367

Other dimensions on request.

Table continues on next page

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	r_1 **max.**	**ID**	**W**	**T**	
206.38	7.1	4.75	0.8	196.22	5.16	5.16	DKAR00368
212.73	7.1	4.75	0.8	202.57	5.16	5.16	DKAR00369
219.08	7.1	4.75	0.8	208.92	5.16	5.16	DKAR00370
225.43	7.1	4.75	0.8	215.27	5.16	5.16	DKAR00371
231.78	7.1	4.75	0.8	221.62	5.16	5.16	DKAR00372
238.13	7.1	4.75	0.8	227.97	5.16	5.16	DKAR00373
244.48	7.1	4.75	0.8	234.32	5.16	5.16	DKAR00374
250.83	7.1	4.75	0.8	240.67	5.16	5.16	DKAR00375
257.18	7.1	4.75	0.8	247.02	5.16	5.16	DKAR00376
263.53	7.1	4.75	0.8	253.37	5.16	5.16	DKAR00377
276.23	7.1	4.75	0.8	266.07	5.16	5.16	DKAR00378
288.93	7.1	4.75	0.8	278.77	5.16	5.16	DKAR00379
301.63	7.1	4.75	0.8	291.47	5.16	5.16	DKAR00380
314.33	7.1	4.75	0.8	304.17	5.16	5.16	DKAR00381
339.73	7.1	4.75	0.8	329.57	5.16	5.16	DKAR00382
365.13	7.1	4.75	0.8	354.97	5.16	5.16	DKAR00383
390.53	7.1	4.75	0.8	380.37	5.16	5.16	DKAR00384
415.93	7.1	4.75	0.8	405.27	5.16	5.16	DKAR00385
441.33	7.1	4.75	0.8	430.67	5.16	5.16	DKAR00386
466.73	7.1	4.75	0.8	456.07	5.16	5.16	DKAR00387
127.00	9.5	6.10	0.8	113.67	6.73	6.73	DKAR00425
130.18	9.5	6.10	0.8	116.84	6.73	6.73	DKAR00426
133.35	9.5	6.10	0.8	120.02	6.73	6.73	DKAR00427
136.53	9.5	6.10	0.8	123.19	6.73	6.73	DKAR00428
139.70	9.5	6.10	0.8	126.37	6.73	6.73	DKAR00429
142.88	9.5	6.10	0.8	129.54	6.73	6.73	DKAR00430
146.05	9.5	6.10	0.8	132.72	6.73	6.73	DKAR00431
149.23	9.5	6.10	0.8	135.89	6.73	6.73	DKAR00432
152.40	9.5	6.10	0.8	139.07	6.73	6.73	DKAR00433
155.58	9.5	6.10	0.8	142.24	6.73	6.73	DKAR00434
158.75	9.5	6.10	0.8	145.42	6.73	6.73	DKAR00435
161.93	9.5	6.10	0.8	148.59	6.73	6.73	DKAR00436
165.10	9.5	6.10	0.8	151.77	6.73	6.73	DKAR00437
171.45	9.5	6.10	0.8	158.12	6.73	6.73	DKAR00438
177.80	9.5	6.10	0.8	164.47	6.73	6.73	DKAR00439
184.15	9.5	6.10	0.8	170.82	6.73	6.73	DKAR00440
190.50	9.5	6.10	0.8	177.17	6.73	6.73	DKAR00441
196.85	9.5	6.10	0.8	183.52	6.73	6.73	DKAR00442
203.20	9.5	6.10	0.8	189.87	6.73	6.73	DKAR00443
209.55	9.5	6.10	0.8	196.22	6.73	6.73	DKAR00444
215.90	9.5	6.10	0.8	202.57	6.73	6.73	DKAR00445
228.60	9.5	6.10	0.8	215.27	6.73	6.73	DKAR00446

Other dimensions on request.

Table continues on next page

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	r_1 max.	ID	W	T	
241.30	9.5	6.10	0.8	227.97	6.73	6.73	DKAR00447
254.00	9.5	6.10	0.8	240.67	6.73	6.73	DKAR00448
266.70	9.5	6.10	0.8	253.37	6.73	6.73	DKAR00449
279.40	9.5	6.10	0.8	266.07	6.73	6.73	DKAR00450
292.10	9.5	6.10	0.8	278.77	6.73	6.73	DKAR00451
304.80	9.5	6.10	0.8	291.47	6.73	6.73	DKAR00452
317.50	9.5	6.10	0.8	304.17	6.73	6.73	DKAR00453
330.20	9.5	6.10	0.8	316.87	6.73	6.73	DKAR00454
342.90	9.5	6.10	0.8	329.57	6.73	6.73	DKAR00455
355.60	9.5	6.10	0.8	342.27	6.73	6.73	DKAR00456
368.30	9.5	6.10	0.8	354.97	6.73	6.73	DKAR00457
381.00	9.5	6.10	0.8	367.67	6.73	6.73	DKAR00458
393.70	9.5	6.10	0.8	380.37	6.73	6.73	DKAR00459
406.40	9.5	6.10	0.8	393.07	6.73	6.73	DKAR00460
419.10	9.5	6.10	0.8	405.27	6.73	6.73	DKAR00461
431.80	9.5	6.10	0.8	417.97	6.73	6.73	DKAR00462
444.50	9.5	6.10	0.8	430.67	6.73	6.73	DKAR00463
457.20	9.5	6.10	0.8	443.37	6.73	6.73	DKAR00464
469.90	9.5	6.10	0.8	456.07	6.73	6.73	DKAR00465

Other dimensions on request.

Table 8: Preferred Series - Inch

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.008	**L** -0.002	r_1 max.	ID	W	T	
0.312	0.094	0.057	0.016	0.176	0.066	0.066	DKAR00008
0.343	0.094	0.057	0.016	0.208	0.066	0.066	DKAR00009
0.375	0.094	0.057	0.016	0.239	0.066	0.066	DKAR00010
0.437	0.094	0.057	0.016	0.301	0.066	0.066	DKAR00011
0.500	0.094	0.057	0.016	0.364	0.066	0.066	DKAR00012
0.562	0.094	0.057	0.016	0.426	0.066	0.066	DKAR00013
0.625	0.094	0.057	0.016	0.489	0.066	0.066	DKAR00014
0.687	0.094	0.057	0.016	0.551	0.066	0.066	DKAR00015
0.750	0.094	0.057	0.016	0.614	0.066	0.066	DKAR00016
0.812	0.094	0.057	0.016	0.676	0.066	0.066	DKAR00017
0.875	0.094	0.057	0.016	0.739	0.066	0.066	DKAR00018
0.937	0.094	0.057	0.016	0.801	0.066	0.066	DKAR00019
1.000	0.094	0.057	0.016	0.864	0.066	0.066	DKAR00020
1.062	0.094	0.057	0.016	0.926	0.066	0.066	DKAR00021
1.125	0.094	0.057	0.016	0.989	0.066	0.066	DKAR00022
1.187	0.094	0.057	0.016	1.051	0.066	0.066	DKAR00023

Other dimensions on request.

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.008	**L** -0.002	r_1 **max.**	**ID**	**W**	**T**	
1.250	0.094	0.057	0.016	1.114	0.066	0.066	DKAR00024
1.312	0.094	0.057	0.016	1.176	0.066	0.066	DKAR00025
1.375	0.094	0.057	0.016	1.239	0.066	0.066	DKAR00026
1.437	0.094	0.057	0.016	1.301	0.066	0.066	DKAR00027
1.500	0.094	0.057	0.016	1.364	0.066	0.066	DKAR00028
1.625	0.094	0.057	0.016	1.489	0.066	0.066	DKAR00029
1.750	0.094	0.057	0.016	1.614	0.066	0.066	DKAR00030
1.875	0.094	0.057	0.016	1.739	0.066	0.066	DKAR00031
2.000	0.094	0.057	0.016	1.864	0.066	0.066	DKAR00032
2.125	0.094	0.057	0.016	1.989	0.066	0.066	DKAR00033
2.250	0.094	0.057	0.016	2.114	0.066	0.066	DKAR00034
2.375	0.094	0.057	0.016	2.239	0.066	0.066	DKAR00035
2.500	0.094	0.057	0.016	2.364	0.066	0.066	DKAR00036
2.625	0.094	0.057	0.016	2.489	0.066	0.066	DKAR00037
2.750	0.094	0.057	0.016	2.614	0.066	0.066	DKAR00038
2.875	0.094	0.057	0.016	2.739	0.066	0.066	DKAR00039
3.000	0.094	0.057	0.016	2.864	0.066	0.066	DKAR00040
3.125	0.094	0.057	0.016	2.989	0.066	0.066	DKAR00041
3.375	0.094	0.057	0.016	3.239	0.066	0.066	DKAR00042
3.625	0.094	0.057	0.016	3.489	0.066	0.066	DKAR00043
3.875	0.094	0.057	0.016	3.739	0.066	0.066	DKAR00044
4.125	0.094	0.057	0.016	3.989	0.066	0.066	DKAR00045
4.375	0.094	0.057	0.016	4.239	0.066	0.066	DKAR00046
4.625	0.094	0.057	0.016	4.489	0.066	0.066	DKAR00047
4.875	0.094	0.057	0.016	4.739	0.066	0.066	DKAR00048
5.125	0.094	0.057	0.016	4.989	0.066	0.066	DKAR00049
5.375	0.094	0.057	0.016	5.239	0.066	0.066	DKAR00050
0.375	0.142	0.091	0.016	0.174	0.099	0.099	DKAR00106
0.406	0.142	0.091	0.016	0.206	0.099	0.099	DKAR00107
0.437	0.142	0.091	0.016	0.237	0.099	0.099	DKAR00108
0.500	0.142	0.091	0.016	0.299	0.099	0.099	DKAR00109
0.562	0.142	0.091	0.016	0.362	0.099	0.099	DKAR00110
0.625	0.142	0.091	0.016	0.424	0.099	0.099	DKAR00111
0.687	0.142	0.091	0.016	0.487	0.099	0.099	DKAR00112
0.750	0.142	0.091	0.016	0.549	0.099	0.099	DKAR00113
0.812	0.142	0.091	0.016	0.612	0.099	0.099	DKAR00114
0.875	0.142	0.091	0.016	0.674	0.099	0.099	DKAR00115
0.937	0.142	0.091	0.016	0.737	0.099	0.099	DKAR00116
1.000	0.142	0.091	0.016	0.799	0.099	0.099	DKAR00117
1.062	0.142	0.091	0.016	0.862	0.099	0.099	DKAR00118
1.125	0.142	0.091	0.016	0.924	0.099	0.099	DKAR00119
1.187	0.142	0.091	0.016	0.987	0.099	0.099	DKAR00120

Other dimensions on request.

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.008	**L** -0.002	r_1 **max.**	**ID**	**W**	**T**	
1.250	0.142	0.091	0.016	1.049	0.099	0.099	DKAR00121
1.312	0.142	0.091	0.016	1.112	0.099	0.099	DKAR00122
1.375	0.142	0.091	0.016	1.174	0.099	0.099	DKAR00123
1.437	0.142	0.091	0.016	1.237	0.099	0.099	DKAR00124
1.500	0.142	0.091	0.016	1.299	0.099	0.099	DKAR00125
1.562	0.142	0.091	0.016	1.362	0.099	0.099	DKAR00126
1.625	0.142	0.091	0.016	1.424	0.099	0.099	DKAR00127
1.687	0.142	0.091	0.016	1.487	0.099	0.099	DKAR00128
1.750	0.142	0.091	0.016	1.549	0.099	0.099	DKAR00129
1.812	0.142	0.091	0.016	1.612	0.099	0.099	DKAR00130
1.875	0.142	0.091	0.016	1.674	0.099	0.099	DKAR00131
1.937	0.142	0.091	0.016	1.737	0.099	0.099	DKAR00132
2.000	0.142	0.091	0.016	1.799	0.099	0.099	DKAR00133
2.062	0.142	0.091	0.016	1.862	0.099	0.099	DKAR00134
2.125	0.142	0.091	0.016	1.925	0.099	0.099	DKAR00135
2.187	0.142	0.091	0.016	1.987	0.099	0.099	DKAR00136
2.250	0.142	0.091	0.016	2.050	0.099	0.099	DKAR00137
2.312	0.142	0.091	0.016	2.112	0.099	0.099	DKAR00138
2.375	0.142	0.091	0.016	2.175	0.099	0.099	DKAR00139
2.437	0.142	0.091	0.016	2.237	0.099	0.099	DKAR00140
2.500	0.142	0.091	0.016	2.300	0.099	0.099	DKAR00141
2.562	0.142	0.091	0.016	2.362	0.099	0.099	DKAR00142
2.625	0.142	0.091	0.016	2.425	0.099	0.099	DKAR00143
2.687	0.142	0.091	0.016	2.487	0.099	0.099	DKAR00144
2.750	0.142	0.091	0.016	2.550	0.099	0.099	DKAR00145
2.812	0.142	0.091	0.016	2.612	0.099	0.099	DKAR00146
2.875	0.142	0.091	0.016	2.675	0.099	0.099	DKAR00147
2.937	0.142	0.091	0.016	2.737	0.099	0.099	DKAR00148
3.000	0.142	0.091	0.016	2.800	0.099	0.099	DKAR00149
3.062	0.142	0.091	0.016	2.862	0.099	0.099	DKAR00150
3.187	0.142	0.091	0.016	2.987	0.099	0.099	DKAR00151
3.437	0.142	0.091	0.016	3.237	0.099	0.099	DKAR00152
3.687	0.142	0.091	0.016	3.487	0.099	0.099	DKAR00153
3.937	0.142	0.091	0.016	3.737	0.099	0.099	DKAR00154
4.187	0.142	0.091	0.016	3.987	0.099	0.099	DKAR00155
4.437	0.142	0.091	0.016	4.237	0.099	0.099	DKAR00156
4.687	0.142	0.091	0.016	4.487	0.099	0.099	DKAR00157
4.937	0.142	0.091	0.016	4.737	0.099	0.099	DKAR00158
5.187	0.142	0.091	0.016	4.987	0.099	0.099	DKAR00159
5.437	0.142	0.091	0.016	5.237	0.099	0.099	DKAR00160
5.687	0.142	0.091	0.016	5.487	0.099	0.099	DKAR00161
5.937	0.142	0.091	0.016	5.737	0.099	0.099	DKAR00162

Other dimensions on request.

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.008	**L** -0.002	r_1 **max.**	**ID**	**W**	**T**	
6.187	0.142	0.091	0.016	5.987	0.099	0.099	DKAR00163
6.437	0.142	0.091	0.016	6.237	0.099	0.099	DKAR00164
6.687	0.142	0.091	0.016	6.487	0.099	0.099	DKAR00165
6.937	0.142	0.091	0.016	6.737	0.099	0.099	DKAR00166
7.187	0.142	0.091	0.016	6.987	0.099	0.099	DKAR00167
7.437	0.142	0.091	0.016	7.237	0.099	0.099	DKAR00168
7.687	0.142	0.091	0.016	7.487	0.099	0.099	DKAR00169
7.937	0.142	0.091	0.016	7.737	0.099	0.099	DKAR00170
8.187	0.142	0.091	0.016	7.987	0.099	0.099	DKAR00171
8.437	0.142	0.091	0.016	8.237	0.099	0.099	DKAR00172
8.687	0.142	0.091	0.016	8.487	0.099	0.099	DKAR00173
8.937	0.142	0.091	0.016	8.737	0.099	0.099	DKAR00174
9.187	0.142	0.091	0.016	8.987	0.099	0.099	DKAR00175
9.437	0.142	0.079	0.016	9.237	0.099	0.099	DKAR00176
9.687	0.142	0.091	0.016	9.487	0.099	0.099	DKAR00177
9.937	0.142	0.091	0.016	9.737	0.099	0.099	DKAR00178
0.437	0.189	0.122	0.024	0.171	0.134	0.134	DKAR00201
0.500	0.189	0.122	0.024	0.234	0.134	0.134	DKAR00202
0.562	0.189	0.122	0.024	0.296	0.134	0.134	DKAR00203
0.625	0.189	0.122	0.024	0.359	0.134	0.134	DKAR00204
0.687	0.189	0.122	0.024	0.421	0.134	0.134	DKAR00205
0.750	0.189	0.122	0.024	0.484	0.134	0.134	DKAR00206
0.812	0.189	0.122	0.024	0.546	0.134	0.134	DKAR00207
0.875	0.189	0.122	0.024	0.609	0.134	0.134	DKAR00208
0.937	0.189	0.122	0.024	0.671	0.134	0.134	DKAR00209
1.000	0.189	0.122	0.024	0.734	0.134	0.134	DKAR00210
1.062	0.189	0.122	0.024	0.796	0.134	0.134	DKAR00211
1.125	0.189	0.122	0.024	0.859	0.134	0.134	DKAR00212
1.187	0.189	0.122	0.024	0.921	0.134	0.134	DKAR00213
1.250	0.189	0.122	0.024	0.984	0.134	0.134	DKAR00214
1.312	0.189	0.122	0.024	1.046	0.134	0.134	DKAR00215
1.375	0.189	0.122	0.024	1.109	0.134	0.134	DKAR00216
1.437	0.189	0.122	0.024	1.171	0.134	0.134	DKAR00217
1.500	0.189	0.122	0.024	1.234	0.134	0.134	DKAR00218
1.562	0.189	0.122	0.024	1.296	0.134	0.134	DKAR00219
1.625	0.189	0.122	0.024	1.359	0.134	0.134	DKAR00220
1.687	0.189	0.122	0.024	1.421	0.134	0.134	DKAR00221
1.750	0.189	0.122	0.024	1.484	0.134	0.134	DKAR00222
1.875	0.189	0.122	0.024	1.609	0.134	0.134	DKAR00223
2.000	0.189	0.122	0.024	1.734	0.134	0.134	DKAR00224
2.125	0.189	0.122	0.024	1.859	0.134	0.134	DKAR00225
2.250	0.189	0.122	0.024	1.984	0.134	0.134	DKAR00226

Other dimensions on request.

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.008	**L** -0.002	r_1 **max.**	**ID**	**W**	**T**	
2.375	0.189	0.122	0.024	2.109	0.134	0.134	DKAR00227
2.500	0.189	0.122	0.024	2.234	0.134	0.134	DKAR00228
2.625	0.189	0.122	0.024	2.359	0.134	0.134	DKAR00229
2.750	0.189	0.122	0.024	2.484	0.134	0.134	DKAR00230
2.875	0.189	0.122	0.024	2.609	0.134	0.134	DKAR00231
3.000	0.189	0.122	0.024	2.734	0.134	0.134	DKAR00232
3.125	0.189	0.122	0.024	2.859	0.134	0.134	DKAR00233
3.250	0.189	0.122	0.024	2.984	0.134	0.134	DKAR00234
3.375	0.189	0.122	0.024	3.109	0.134	0.134	DKAR00235
3.500	0.189	0.122	0.024	3.234	0.134	0.134	DKAR00236
3.625	0.189	0.122	0.024	3.359	0.134	0.134	DKAR00237
3.750	0.189	0.122	0.024	3.484	0.134	0.134	DKAR00238
3.875	0.189	0.122	0.024	3.609	0.134	0.134	DKAR00239
4.000	0.189	0.122	0.024	3.734	0.134	0.134	DKAR00240
4.125	0.189	0.122	0.024	3.859	0.134	0.134	DKAR00241
4.250	0.189	0.122	0.024	3.984	0.134	0.134	DKAR00242
4.375	0.189	0.122	0.024	4.109	0.134	0.134	DKAR00243
4.500	0.189	0.122	0.024	4.234	0.134	0.134	DKAR00244
4.625	0.189	0.122	0.024	4.359	0.134	0.134	DKAR00245
4.750	0.189	0.122	0.024	4.484	0.134	0.134	DKAR00246
4.875	0.189	0.122	0.024	4.609	0.134	0.134	DKAR00247
5.000	0.189	0.122	0.024	4.734	0.134	0.134	DKAR00248
5.125	0.189	0.122	0.024	4.859	0.134	0.134	DKAR00249
5.250	0.189	0.122	0.024	4.984	0.134	0.134	DKAR00250
5.375	0.189	0.122	0.024	5.109	0.134	0.134	DKAR00251
5.500	0.189	0.122	0.024	5.234	0.134	0.134	DKAR00252
5.625	0.189	0.122	0.024	5.359	0.134	0.134	DKAR00253
5.750	0.189	0.122	0.024	5.484	0.134	0.134	DKAR00254
5.875	0.189	0.122	0.024	5.609	0.134	0.134	DKAR00255
6.039	0.189	0.122	0.024	5.734	0.134	0.134	DKAR00256
6.125	0.189	0.122	0.024	5.859	0.134	0.134	DKAR00257
6.250	0.189	0.122	0.024	5.984	0.134	0.134	DKAR00258
6.500	0.189	0.122	0.024	6.234	0.134	0.134	DKAR00259
6.750	0.189	0.122	0.024	6.484	0.134	0.134	DKAR00260
7.000	0.189	0.122	0.024	6.734	0.134	0.134	DKAR00261
7.250	0.189	0.122	0.024	6.984	0.134	0.134	DKAR00262
7.500	0.189	0.122	0.024	7.234	0.134	0.134	DKAR00263
7.750	0.189	0.122	0.024	7.484	0.134	0.134	DKAR00264
8.000	0.189	0.122	0.024	7.734	0.134	0.134	DKAR00265
8.250	0.189	0.122	0.024	7.984	0.134	0.134	DKAR00266
8.500	0.189	0.122	0.024	8.234	0.134	0.134	DKAR00267
8.750	0.189	0.122	0.024	8.484	0.134	0.134	DKAR00268

Other dimensions on request.

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.008	**L** -0.002	r_1 **max.**	**ID**	**W**	**T**	
9.000	0.189	0.122	0.024	8.734	0.134	0.134	DKAR00269
9.250	0.189	0.122	0.024	8.984	0.134	0.134	DKAR00270
9.500	0.189	0.122	0.024	9.234	0.134	0.134	DKAR00271
9.750	0.189	0.122	0.024	9.484	0.134	0.134	DKAR00272
10.000	0.189	0.122	0.024	9.734	0.134	0.134	DKAR00273
10.250	0.189	0.122	0.024	9.984	0.134	0.134	DKAR00274
10.750	0.189	0.122	0.024	10.484	0.134	0.134	DKAR00275
11.250	0.189	0.122	0.024	10.984	0.134	0.134	DKAR00276
11.750	0.189	0.122	0.024	11.484	0.134	0.134	DKAR00277
12.250	0.189	0.122	0.024	11.984	0.134	0.134	DKAR00278
13.250	0.189	0.122	0.024	12.984	0.134	0.134	DKAR00279
14.250	0.189	0.122	0.024	13.984	0.134	0.134	DKAR00280
15.250	0.189	0.122	0.024	14.984	0.134	0.134	DKAR00281
16.250	0.189	0.122	0.024	15.955	0.134	0.134	DKAR00282
17.250	0.189	0.122	0.024	16.955	0.134	0.134	DKAR00283
18.250	0.189	0.122	0.024	17.955	0.134	0.134	DKAR00284
0.812	0.280	0.187	0.031	0.412	0.203	0.203	DKAR00309
0.875	0.280	0.187	0.031	0.475	0.203	0.203	DKAR00310
0.937	0.280	0.187	0.031	0.537	0.203	0.203	DKAR00311
1.000	0.280	0.187	0.031	0.600	0.203	0.203	DKAR00312
1.062	0.280	0.187	0.031	0.662	0.203	0.203	DKAR00313
1.125	0.280	0.187	0.031	0.725	0.203	0.203	DKAR00314
1.187	0.280	0.187	0.031	0.787	0.203	0.203	DKAR00315
1.250	0.280	0.187	0.031	0.850	0.203	0.203	DKAR00316
1.312	0.280	0.187	0.031	0.912	0.203	0.203	DKAR00317
1.375	0.280	0.187	0.031	0.975	0.203	0.203	DKAR00318
1.437	0.280	0.187	0.031	1.037	0.203	0.203	DKAR00319
1.500	0.280	0.187	0.031	1.100	0.203	0.203	DKAR00320
1.562	0.280	0.187	0.031	1.162	0.203	0.203	DKAR00321
1.625	0.280	0.187	0.031	1.225	0.203	0.203	DKAR00322
1.687	0.280	0.187	0.031	1.287	0.203	0.203	DKAR00323
1.750	0.280	0.187	0.031	1.350	0.203	0.203	DKAR00324
1.875	0.280	0.187	0.031	1.475	0.203	0.203	DKAR00325
2.000	0.280	0.187	0.031	1.600	0.203	0.203	DKAR00326
2.125	0.280	0.187	0.031	1.725	0.203	0.203	DKAR00327
2.250	0.280	0.187	0.031	1.850	0.203	0.203	DKAR00328
2.375	0.280	0.187	0.031	1.975	0.203	0.203	DKAR00329
2.500	0.280	0.187	0.031	2.100	0.203	0.203	DKAR00330
2.625	0.280	0.187	0.031	2.225	0.203	0.203	DKAR00331
2.750	0.280	0.187	0.031	2.350	0.203	0.203	DKAR00332
2.875	0.280	0.187	0.031	2.475	0.203	0.203	DKAR00333
3.000	0.280	0.187	0.031	2.600	0.203	0.203	DKAR00334

Other dimensions on request.

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.008	**L** -0.002	r_1 **max.**	**ID**	**W**	**T**	
3.125	0.280	0.187	0.031	2.725	0.203	0.203	DKAR00335
3.250	0.280	0.187	0.031	2.850	0.203	0.203	DKAR00336
3.375	0.280	0.187	0.031	2.975	0.203	0.203	DKAR00337
3.500	0.280	0.187	0.031	3.100	0.203	0.203	DKAR00338
3.625	0.280	0.187	0.031	3.225	0.203	0.203	DKAR00339
3.750	0.280	0.187	0.031	3.350	0.203	0.203	DKAR00340
3.875	0.280	0.187	0.031	3.475	0.203	0.203	DKAR00341
4.000	0.280	0.187	0.031	3.600	0.203	0.203	DKAR00342
4.125	0.280	0.187	0.031	3.725	0.203	0.203	DKAR00343
4.250	0.280	0.187	0.031	3.850	0.203	0.203	DKAR00344
4.375	0.280	0.187	0.031	3.975	0.203	0.203	DKAR00345
4.500	0.280	0.187	0.031	4.100	0.203	0.203	DKAR00346
4.625	0.280	0.187	0.031	4.225	0.203	0.203	DKAR00347
4.750	0.280	0.187	0.031	4.350	0.203	0.203	DKAR00348
4.875	0.280	0.187	0.031	4.475	0.203	0.203	DKAR00349
5.000	0.280	0.187	0.031	4.600	0.203	0.203	DKAR00350
5.125	0.280	0.187	0.031	4.725	0.203	0.203	DKAR00351
5.250	0.280	0.187	0.031	4.850	0.203	0.203	DKAR00352
5.375	0.280	0.187	0.031	4.975	0.203	0.203	DKAR00353
5.500	0.280	0.187	0.031	5.100	0.203	0.203	DKAR00354
5.625	0.280	0.187	0.031	5.225	0.203	0.203	DKAR00355
5.750	0.280	0.187	0.031	5.350	0.203	0.203	DKAR00356
5.875	0.280	0.187	0.031	5.475	0.203	0.203	DKAR00357
6.000	0.280	0.187	0.031	5.600	0.203	0.203	DKAR00358
6.125	0.280	0.187	0.031	5.725	0.203	0.203	DKAR00359
6.250	0.280	0.187	0.031	5.850	0.203	0.203	DKAR00360
6.375	0.280	0.187	0.031	5.975	0.203	0.203	DKAR00361
6.625	0.280	0.187	0.031	6.225	0.203	0.203	DKAR00362
6.875	0.280	0.187	0.031	6.475	0.203	0.203	DKAR00363
7.125	0.280	0.187	0.031	6.725	0.203	0.203	DKAR00364
7.375	0.280	0.187	0.031	6.975	0.203	0.203	DKAR00365
7.625	0.280	0.187	0.031	7.225	0.203	0.203	DKAR00366
7.875	0.280	0.187	0.031	7.475	0.203	0.203	DKAR00367
8.125	0.280	0.187	0.031	7.725	0.203	0.203	DKAR00368
8.375	0.280	0.187	0.031	7.975	0.203	0.203	DKAR00369
8.625	0.280	0.187	0.031	8.225	0.203	0.203	DKAR00370
8.875	0.280	0.187	0.031	8.475	0.203	0.203	DKAR00371
9.125	0.280	0.187	0.031	8.725	0.203	0.203	DKAR00372
9.375	0.280	0.187	0.031	8.975	0.203	0.203	DKAR00373
9.625	0.280	0.187	0.031	9.225	0.203	0.203	DKAR00374
9.875	0.280	0.187	0.031	9.475	0.203	0.203	DKAR00375
10.125	0.280	0.187	0.031	9.725	0.203	0.203	DKAR00376

Other dimensions on request.

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.008	**L** -0.002	r_1 **max.**	**ID**	**W**	**T**	
10.375	0.280	0.187	0.031	9.975	0.203	0.203	DKAR00377
10.875	0.280	0.187	0.031	10.475	0.203	0.203	DKAR00378
11.375	0.280	0.187	0.031	10.975	0.203	0.203	DKAR00379
11.875	0.280	0.187	0.031	11.475	0.203	0.203	DKAR00380
12.375	0.280	0.187	0.031	11.975	0.203	0.203	DKAR00381
13.375	0.280	0.187	0.031	12.975	0.203	0.203	DKAR00382
14.375	0.280	0.187	0.031	13.975	0.203	0.203	DKAR00383
15.375	0.280	0.187	0.031	14.975	0.203	0.203	DKAR00384
16.375	0.280	0.187	0.031	15.956	0.203	0.203	DKAR00385
17.375	0.280	0.187	0.031	16.956	0.203	0.203	DKAR00386
18.375	0.280	0.187	0.031	17.956	0.203	0.203	DKAR00387
5.000	0.374	0.240	0.031	4.475	0.266	0.266	DKAR00425
5.125	0.374	0.240	0.031	4.600	0.266	0.266	DKAR00426
5.250	0.374	0.240	0.031	4.725	0.266	0.266	DKAR00427
5.375	0.374	0.240	0.031	4.850	0.266	0.266	DKAR00428
5.500	0.374	0.240	0.031	4.975	0.266	0.266	DKAR00429
5.625	0.374	0.240	0.031	5.100	0.266	0.266	DKAR00430
5.750	0.374	0.240	0.031	5.225	0.266	0.266	DKAR00431
5.875	0.374	0.240	0.031	5.350	0.266	0.266	DKAR00432
6.000	0.374	0.240	0.031	5.475	0.266	0.266	DKAR00433
6.125	0.374	0.240	0.031	5.600	0.266	0.266	DKAR00434
6.250	0.374	0.240	0.031	5.725	0.266	0.266	DKAR00435
6.375	0.374	0.240	0.031	5.850	0.266	0.266	DKAR00436
6.500	0.374	0.240	0.031	5.975	0.266	0.266	DKAR00437
6.750	0.374	0.240	0.031	6.225	0.266	0.266	DKAR00438
7.000	0.374	0.240	0.031	6.475	0.266	0.266	DKAR00439
7.250	0.374	0.240	0.031	6.725	0.266	0.266	DKAR00440
7.500	0.374	0.240	0.031	6.975	0.266	0.266	DKAR00441
7.750	0.374	0.240	0.031	7.225	0.266	0.266	DKAR00442
8.000	0.374	0.240	0.031	7.475	0.266	0.266	DKAR00443
8.250	0.374	0.240	0.031	7.725	0.266	0.266	DKAR00444
8.500	0.374	0.240	0.031	7.975	0.266	0.266	DKAR00445
9.000	0.374	0.240	0.031	8.475	0.266	0.266	DKAR00446
9.500	0.374	0.240	0.031	8.975	0.266	0.266	DKAR00447
10.000	0.374	0.240	0.031	9.475	0.266	0.266	DKAR00448
10.500	0.374	0.240	0.031	9.975	0.266	0.266	DKAR00449
11.000	0.374	0.240	0.031	10.475	0.266	0.266	DKAR00450
11.500	0.374	0.240	0.031	10.975	0.266	0.266	DKAR00451
12.000	0.374	0.240	0.031	11.475	0.266	0.266	DKAR00452
12.500	0.374	0.240	0.031	11.975	0.266	0.266	DKAR00453
13.000	0.374	0.240	0.031	12.475	0.266	0.266	DKAR00454
13.500	0.374	0.240	0.031	12.975	0.266	0.266	DKAR00455

Other dimensions on request.

Groove Dimensions			Radius	Ring Dimensions			TSS Part No.
D1 H11	**H** +0.008	**L** -0.002	r_1 **max.**	**ID**	**W**	**T**	
14.000	0.374	0.240	0.031	13.475	0.266	0.266	DKAR00456
14.500	0.374	0.240	0.031	13.975	0.266	0.266	DKAR00457
15.000	0.374	0.240	0.031	14.475	0.266	0.266	DKAR00458
15.500	0.374	0.240	0.031	14.975	0.266	0.266	DKAR00459
16.000	0.374	0.240	0.031	15.475	0.266	0.266	DKAR00460
16.500	0.374	0.240	0.031	15.956	0.266	0.266	DKAR00461
17.000	0.374	0.240	0.031	16.456	0.266	0.266	DKAR00462
17.500	0.374	0.240	0.031	16.956	0.266	0.266	DKAR00463
18.000	0.374	0.240	0.031	17.456	0.266	0.266	DKAR00464
18.500	0.374	0.240	0.031	17.956	0.266	0.266	DKAR00465

Other dimensions on request.

General Quality Criteria

The cost-effective use of seals and bearings is highly influenced by the quality criteria applied in production. Seals and bearings from Trelleborg Sealing Solutions are continuously monitored according to strict quality standards from material acquisition through to delivery.

Production facilities are certified according to relevant quality management system standards. Depending on the requirements of the customer or market and in addition to the current ISO 9001, these locations may have further certifications: IATF 16949 for Automotive customers, EN/AS 9100 for Aerospace customers, ISO 13485 for Healthcare & Medical customers and ISO 29001 for Oil & Gas customers. This enables us to provide all market segments with the required quality standards.

Our quality policy is consistently controlled by strict procedures and guidelines which are implemented within all areas of the company.

All testing of materials and products is performed in accordance with accepted test standards and specifications, e.g. random sample testing in accordance with ISO 2859-1 AQL 1.0 general inspection level II, normal inspection.

Inspection specifications correspond to standards applicable to individual product groups (e.g. for O-Rings: ISO 3601).

Guidelines for the Storage of Polymer Products Based on ISO 2230

Many polymer products and components are stored for long periods of time before being put into service, so it is important they are stored in conditions that minimize unwanted changes in properties. Such changes may result from degradation, in which case they may include excessive hardening, softening, cracking, crazing and other surface effects. Other changes may be caused by deformation, contamination or mechanical damage.

Packaging
Unless otherwise specified in the appropriate product specification, rubber products should be enclosed in individual sealed envelopes. The packaging should be carried out in an atmosphere in which the relative humidity is less than 70%, or if polyurethanes are being packed, less than 65%. Where there is serious risk of ingress of moisture (e.g. rubber-metal-bonded parts), aluminum foil/paper/polyethylene laminate or other similar means of protection should be used to ensure protection from ingress of moisture.

Temperature
The preferred storage temperature for elastomer parts is +15 °C (+59 °F) and should not exceed +25 °C (+77 °F). The products should be stored away from direct sources of heat such as boilers, radiators and direct sunlight. If the storage temperature is below +15 °C (+59 °F), care should be exercised during handling of stored products, as they may have stiffened and have become susceptible to distortion if not handled carefully.

Humidity
The relative humidity should be such that, given in the variations of temperature in storage, condensation does not occur. In all cases, the relative humidity of the atmosphere in storage should be less than 70%, or if polyurethanes are being stored, less than 65%.

Light
Rubber should be protected from light sources, in particular direct sunlight or intense light having a high ultra-violet content.
It is advisable that any windows of storage rooms be covered with a red or orange coating or screen.

Radiation
Precautions should be taken to protect stored products from all sources of ionizing radiation likely to cause damage to the products.

Ozone
Ozone has a particularly harmful effect on rubber. Storage rooms should not contain any equipment that is capable of generating ozone, such as mercury vapor lamps or high voltage electrical equipment giving rise to electric sparks or electrical discharges. Combustion gases and organic vapors should also be excluded, as they may give rise to ozone via photo-chemical processes. When equipment such as a fork-lift truck is used to handle large rubber products, care needs to be taken to ensure
this equipment is not a source of pollution that may affect the rubber. Combustion gases should be considered separately. While they are responsible for generating ground-level ozone, they may also contain unburned fuel which, by condensing on rubber products, can cause additional deterioration.

Deformation
Rubber should be stored free from tension, compressive stresses or other causes of deformation. Where products are packaged in a strain-free condition, they should be stored in their original packaging. In case of doubt, the manufacturer's advice should be sought. It is advisable that rings of large internal diameter are formed into three equal loops so as to avoid creasing or twisting. It is not possible to achieve this condition by forming just two loops.

Contact with liquids and semi-liquid materials
Rubber should not be allowed to come into contact with liquid or semi-liquid materials (for example, petrol, greases, acids, disinfectants, cleaning fluids) or their vapors at any time during storage, unless these materials are by design an integral part of the product or the manufacturer's packaging. When rubber products are received coated with their operational media, they should be stored in this condition.

Contact with metals
Certain metals and their alloys (in particular, copper and manganese) are known to have harmful effects on some rubbers. Rubber should not be stored in contact with such metals except when bonded to them. They should be protected by wrapping in, or by separation with, a suitable material, e.g. paper or polyethylene.

Contact with dusting powder
Dusting powders should only be used for the packaging of rubber items in order to prevent adhesion. In such cases, the minimum quantity of powder to prevent adhesion should be used. Any powder used should be free from any constituent that would have a harmful effect on the rubber or the subsequent application of the rubber.

Contact between different products
Contact between products made from rubbers of different compositions should be avoided. This includes products of the same type but differing in color.

Rubber-to-metal bonded products
The metal part of rubber-to-metal bonded products should not come into contact with the rubber of other products. Preservative used on the metal should be of a type that it will not adversely affect the rubber or the bond to such an extent that it does not comply with the product specification.

Storage life
This is the maximum period of time that a rubber product, appropriately packaged, may be stored. After this time the product is regarded as unserviceable for the purposes for which it was originally manufactured. The storage life of a rubber product is influenced by its shape and size as well as its composition. Thick products usually undergo slower changes through degradation than thinner ones.

Initial storage period
This is the maximum period, starting from the time of manufacture, for which a rubber product, appropriately packaged, may be stored under specified conditions before a sample needs to be inspected or re-tested.

Extension storage period
This is the period for which a rubber product, appropriately packaged, may be stored after the initial storage period, before further inspection and re-testing is necessary.

Assembly
These are products or components containing more than one element, one or more of which is made of rubber. Generally it is not recommended to store elastomeric products in an assembled condition. If it is necessary to do so, the units should be checked more often. The inspection interval depends on the design and geometry of the components.

Inspection before extension storage
Before any items are to be stored for an extension period, representative samples of each type should be selected for inspection at the end of the appropriate initial storage period. Inspection should be in accordance with the relevant product specification.

Visual inspection
Inspect each of the items for the following:
1. Permanent distortions, such as creases or flats.
2. Mechanical damage, such as cuts, tears, abraded areas or delaminated plies.
3. Surface cracking when viewed under a microscope at x10 magnification.
4. Changes in surface condition, such as hardening, softening or tackiness.

Assessment at the end of the initial period
If, following the visual inspection procedure the items are not satisfactory, they should not be stored for an extended period. If the items are satisfactory and are stored for an extended period a record should be kept of the date initial storage began as well as the date the extended storage period began. Items stored for an extended period should be inspected and tested at, or before, the expiry of the extension storage period before they are put into service or stored for a further extended period.

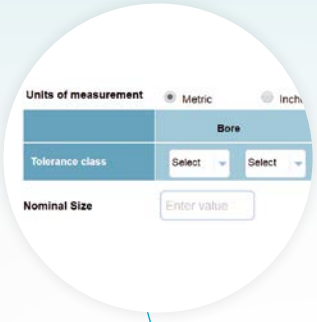
Table 9: Initial and Extension Storage Periods for unassembled Components

Material Group	Initial Storage Period	Extension Storage Period
AU, EU, NR, SBR	5 years	2 years
ACM, AEM, CR, ECO, HNBR, IIR, NBR	7 years	3 years
CSM, EPDM, FKM, VMQ, FVMQ	10 years	5 years
FFKM e.g. Isolast®	20 years	5 years
Zurcon®	10 years	5 years
PTFE	unlimited	

Note 1: If the storage temperature is over or under +25 °C (+77 °F) this will influence the storage time. Storage at +10 °C (+50 °F) higher will reduce the storage time by about 50%. Storage at +10 °C (+50 °F) lower will increase the storage time by around 100%.

Note 2: In application areas such as aerospace, the storage periods can differ from this specification. These specific storage conditions have to be agreed between the supplier and the buyer.

Design Support & Engineering Tools



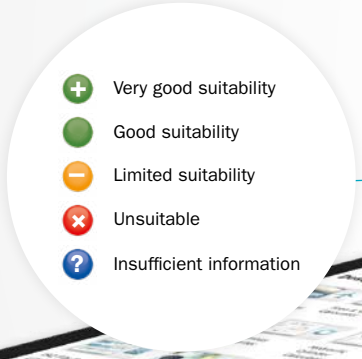
ONLINE TOOLS MAKE LIFE EASIER

Trelleborg Sealing Solutions has developed a number of online tools that make the working life of an engineer specifying seals easier. All these industry-leading tools are available free-of-charge from the Trelleborg Sealing Solutions website at www.trelleborg.com/seals. To use these advanced services all you have to do is register on the Members Area.

There is also a continually increasing range of innovative engineering apps available for smartphones, both for iOS and Android devices. Just search for "Trelleborg" in the App Store or GooglePlay to find the tools to optimize your daily productivity.

Materials Search and Chemical Compatibility Check

These two programs allow you to find out the compatibility of sealing materials with hundreds of different media and help identify the most suitable material for your application.



Sealing Solutions Configurator

The Sealing Solutions Configurator is the first tool of its kind offered by any seal supplier. It allows engineers to identify a proven sealing solution for their specific application in just four easy steps.

Technical Proposals Online

Enhance your communication with Trelleborg Sealing Solutions with the Technical Proposals Online tool. Instantly access all your proposed solutions anywhere at any time and benefit from quicker dialog with our sealing specialists.

ISO Fits & Tolerances

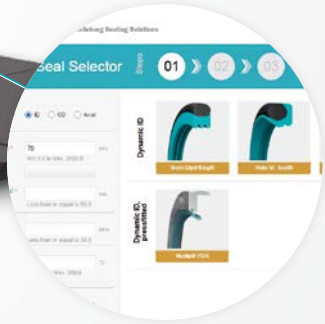
Our Fits & Tolerances Calculator allows you to easily determine type of fits using the tolerances according to DIN ISO 286. In addition, upon entering the nominal diameter the tool calculates lower and upper limit deviations plus the maximum and minimum interferences dependent on the selected tolerance classes for bore and shaft.

Versatile CAD Service

The CAD download functionality provides thousands of drawings of a wide range of seals. It gives the option of 2- or 3-dimensional files in a range of formats to suit most commonly used CAD systems.

Hydraulic System Calculator

Hydraulic System Calculator helps you design a solution around the cylinder which may involve motor, pump, orifice and pipe calculations. The application is in compliance with ISO 3320, ISO 3321 & ISO 4393.



Rotary Seal Selector

The Rotary Seal Selector allows you to search through the wide range of rotary seals and materials available based on application conditions and offers detailed information on installation and seal capabilities.

O-Ring Calculator

An industry-leading tool, the easy to use O-Ring calculator includes sizing capabilities, compression forces, design parameter recommendations and complete measurements. Results and comments may be printed, shared or filed as PDF.

Discover our design support and engineering tools at **www.trelleborg.com/seals**

Mobile Tools & Apps

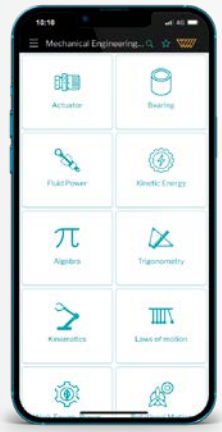
We understand the needs of engineers on the go. Check out our latest mobile tools and apps, ranging from an O-Ring calculator to unit and hardness converters. Just search for "Trelleborg" in the App Store or Google Play to find the tools to optimize your daily productivity.

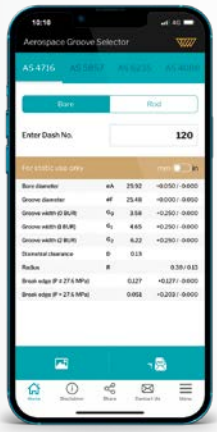
Android App on **Google Play**

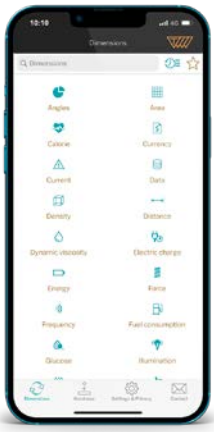
MANY MORE APPS available

Available on the **APP STORE**

Discover our wide range of mobile tools and apps at **www.trelleborg.com/seals**







ISO Fits & Tolerances

Simply enter the nominal diameter and select the tolerance classes for bore and shaft to find the complete ISO fits definition. It contains all relevant values, including type of fit, with handy graphs to illustrate the classes by bore and shaft. The results of this application are based on DIN ISO 286.

Mechanical Engineering Calculator

A useful app containing over 250 formula calculators in 16 categories, with more being added with every update. Categories include the fields of mathematics, physics and mechanical engineering.

Aerospace Groove Selector

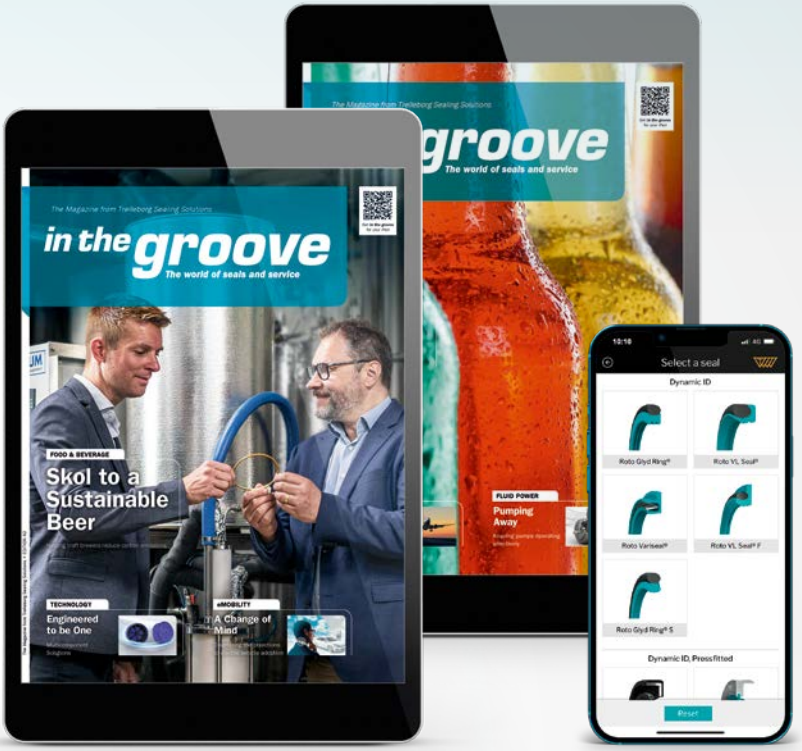
This app covers five of the most important SAE Aerospace groove standards for hydraulic systems, making it quick and easy to find the size of grooves and hardware needed. Includes dimensions for AS4716 Rev B, AS5857 Rev A, AS6235 Rev A, AS4088 Rev E and AS4832 Rev A.

Installation Instructions

Videos demonstrate the best practice methods for installing seals, providing all relevant documentation within the interface. It guides you to successful installation of Radial Oil Seals, Mechanical Face Seals and Turcon® and Zurcon® rod and piston seals.

Converter – Universal

By simply selecting the dimension and entering a value for conversion, the app offers a wide range of engineering and scientific units for each dimension. It also has other useful features like currency conversion, timezone conversion, percentage calculations, a running pace calculator and more.

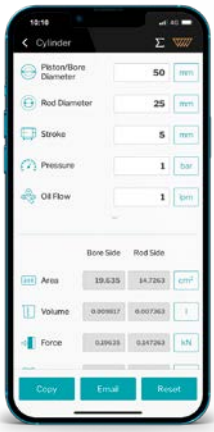


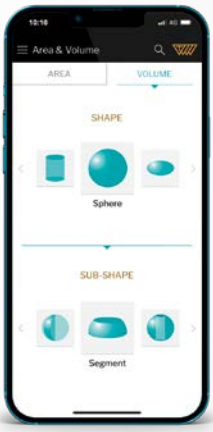
in the groove

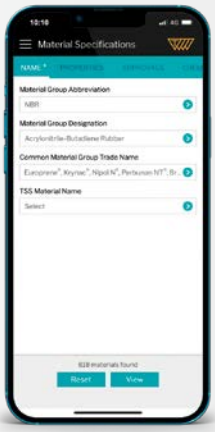
Our *in the groove* magazine provides news, technical and product information on seals, as well as insights into the markets they are used in. The magazine is also available in print and as an interactive PDF.

Rotary Seal Selector

This app is specifically for the selection of rotary seals based on application information, including size, operating parameters and the lubricant used. It also considers installation type and seal function.







O-Ring Selector

When a user enters installation specifications into the O-Ring Selector app, such as the bore or rod/shaft diameter, the app quickly calculates O-Ring and housing dimensions in both metric and inch. Standards covered are ISO 3601-1, NFT 47-502, JIS B 2401 and SMS 1586.

Hydraulic System Calculator

The Hydraulic System Calculator helps you design a solution around the cylinder, which may involve motor, pump, orifice and pipe calculations. The application is in compliance with ISO 3320, ISO 3321 and ISO 4393.

Area and Volume Calculator

Speeds up and simplifies calculating the area and volume of more than 170 geometric shapes. The app supports both metric and inch, and conveniently displays the formulas used. Fill your shape with solids or liquids, choosing from 1500 different materials to calculate the weight.

Healthcare Materials

A quick and easy overview of the compatibility of 34 materials with 35 chemical environments that are commonly encountered in the healthcare and medical industries. Select up to 20 materials and environments at once to produce a chart that rates each material from 'excellent' to 'not recommended'.

Sealing Materials Selector

Enter material specifications and required parameters, such as application temperature or hardness, to receive instant material proposals. The app features filters to limit searches based on chemical compatibility, institute approvals and product type. Data sheets can be requested from within the interface.

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative solutions accelerate performance for customers in a sustainable way.

Trelleborg Sealing Solutions is a leading developer, manufacturer and supplier of precision seals, bearings and custom-molded polymer components. It focuses on meeting the most demanding needs of aerospace, automotive and general industrial customers with innovative solutions.

WWW.TRELLEBORG.COM/SEALS

facebook.com/TrelleborgSealingSolutions
twitter.com/TrelleborgSeals
youtube.com/TrelleborgSeals
linkedin.com/company/trelleborg-sealing-solutions

If you'd like to talk to Trelleborg Sealing Solutions, find your local contact at: www.trelleborg.com/seals/worldwide

Version no. 9900069GBGA0322