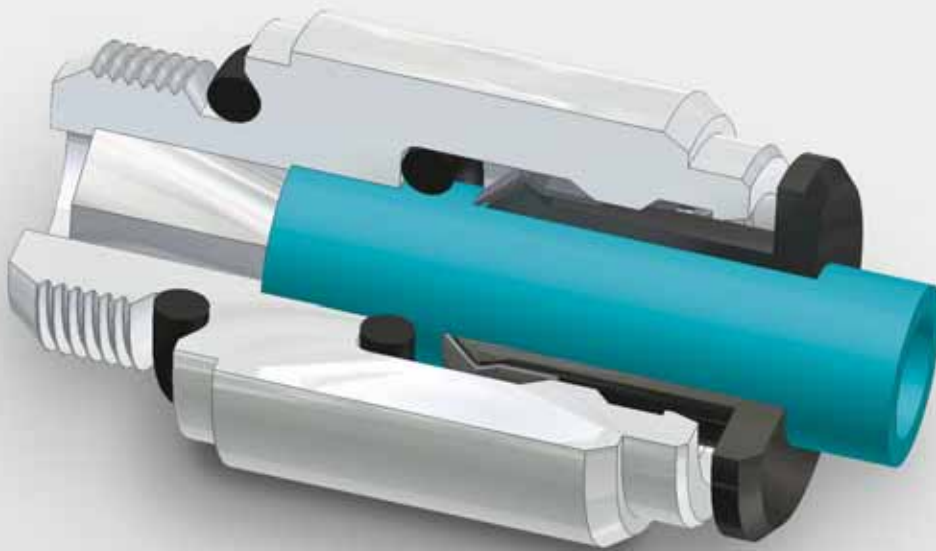


O-Rings



English



Your Partner for Sealing Technology



Your Partner for Sealing Technology

Trelleborg Sealing Solutions is a major international sealing force, 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, thermoplastic, PTFE and composite technologies for applications in aerospace, industrial, and automotive industries.

With 50-years 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 70 facilities worldwide includes 30 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.

Facilities are certified to ISO 9001:2000 and ISO/TS 16949:2002. Trelleborg Sealing Solutions is backed by the experiences and resources of one of the world's foremost experts in polymer technology, Trelleborg Group.

ISO 9001:2000

ISO/TS 16949:2002

The information in this brochure is intended to be for general reference purposes only and is not intended to be a specific recommendation for any individual application. The application limits for pressure, temperature, speed and media given are maximum values determined in laboratory conditions. In application, due to the interaction of operating parameters, maximum values may not be achieved. It is vital therefore, that customers satisfy themselves as to the suitability of product and material for each of their individual applications. Any reliance on information is therefore at the user's own risk. In no event will Trelleborg Sealing Solutions be liable for any loss, damage, claim or expense directly or indirectly arising or resulting from the use of any information provided in this brochure. While every effort is made to ensure the accuracy of information contained herewith, Trelleborg Sealing Solutions cannot warrant the accuracy or completeness of information.

To obtain the best recommendation for a specific application, please contact your local Trelleborg Sealing Solutions marketing company.

This edition supersedes all previous brochures.
This brochure or any part of it may not be reproduced without permission.

© All trademarks are the property of Trelleborg Group.
The turquoise color is a registered trademark of Trelleborg Group.
© 2008, Trelleborg Group. All rights reserved.



Content

A	General information	3
A.1	Description	3
A.2	Applications	3
A.3	Method of operation	4
B	Technical information	5
B.1	Materials	5
B.1.1	Elastomers	5
B.1.2	Application parameters of elastomers	7
B.1.3	Characteristics and inspection of elastomers	10
B.1.4	Special requirements - authorities and approvals	13
B.1.5	Standard materials	15
B.2	Design recommendations	20
B.2.1	Installation recommendations	20
B.2.2	Initial compression	21
B.2.3	Elongation - compression	22
B.2.4	Methods of installation and design of seal housing	23
C	Dimensions and product range	31
C.1	Dimensions and international standards	31
C.1.1	O-Ring range of sizes (including ordering examples and instructions at the end of the section)	31
C.1.2	O-Ring Dimensions according to AS 568 B	98
C.1.3	O-Ring dimensions for straight thread tube fitting sizes, AS 568 B	108
C.1.4	O-Ring dimensions for metric thread with conical recess according to ISO 6149	109
C.2	Tolerances of dimensions	110
C.3	O-Ring quality acceptance criteria	112
C.4	Seal set	114
D	Special O-Rings	115
D.1	Isolast® (FFKM) O-Rings	115
D.2	FEP encapsulated O-Rings	115
D.3	PTFE O-Rings	120
D.4	Polyurethane O-Rings	122
D.5	Round cord rings (butt vulcanised)	126
D.6	O-Ring surface treatments	127
E	General quality criteria and storage guidelines	127
E.1	Quality criteria	128
E.2	Storage and shelf live of polymer sealing material	128
	Index	130



O-Ring



A General information

A.1 Description

O-Rings offer the designer an efficient and economical sealing element for a wide range of static or dynamic applications.

Inexpensive production methods and its ease of use have made the O-Ring the most widely used seal.

A wide choice of elastomer materials for both standard and special applications allow the O-Ring to be used to seal practically all liquid and gaseous media.

O-Rings are vulcanised in moulds and are characterised by their circular form with annular cross section. The dimensions of the O-Ring are defined by the inside diameter d_1 and the cross section d_2 (Figure 1).

Cross sections of approx. 0.35 to 40 mm and inside diameters up to 5,000 mm and more are available.

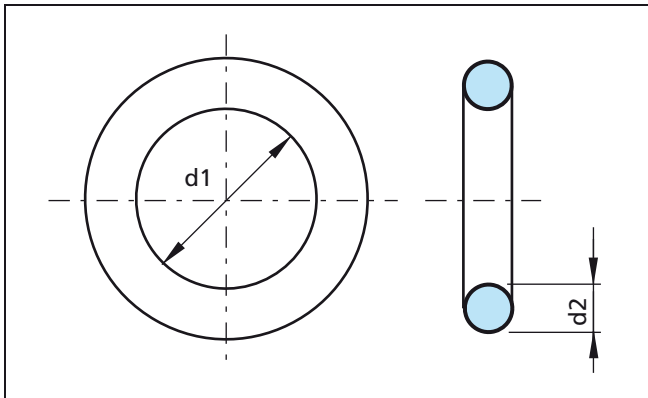


Figure 1 O-Ring dimensioning

Advantages

Compared with other sealing elements, the O-Ring has a wide range of advantages:

- Simple, one piece groove design reduces hardware and design costs
- Compact design allows smaller hardware
- Easy, foolproof installation reduces risk
- Applicable to a wide range of sealing problems, static, dynamic, single or double acting
- Wide compound choice for compatibility with most fluids
- Ex stock availability of many sizes worldwide for easy maintenance and repair.

A.2 Applications

O-Rings are used as sealing elements or as energising elements for hydraulic slipper seals and wipers and thus cover a large number of fields of application. There are no fields of industry where the O-Ring is not used. From an individual seal for repairs or maintenance to a quality assured application in aerospace, automotive or general engineering. The O-Ring is used predominantly for static sealing applications:

- As a radial static seal, e.g. for bushings, covers, pipes, cylinders
- As an axial static seal, e.g. for flanges, plates, caps.

O-Rings in dynamic applications are recommended **only for moderate service conditions**. They are limited by the speed and the pressure against which they are to seal:

- For low duty sealing of reciprocating pistons, rods, plungers, etc.
- For sealing of slowly pivoting, rotating or spiral movements on shafts, spindles, rotary transmission leadthroughs, etc.



A.3 Method of operation

O-Rings are double-acting sealing elements. The initial squeeze, which acts in a radial or axial direction depending on the installation, gives the O-Ring its initial sealing capability. These forces are superimposed by the system pressure to create the total sealing force which increases as the system pressure increases (Figure 2).

Under pressure, the O-Ring behaves in a similar way to a fluid with high surface tension. The pressure is transmitted uniformly to all directions.

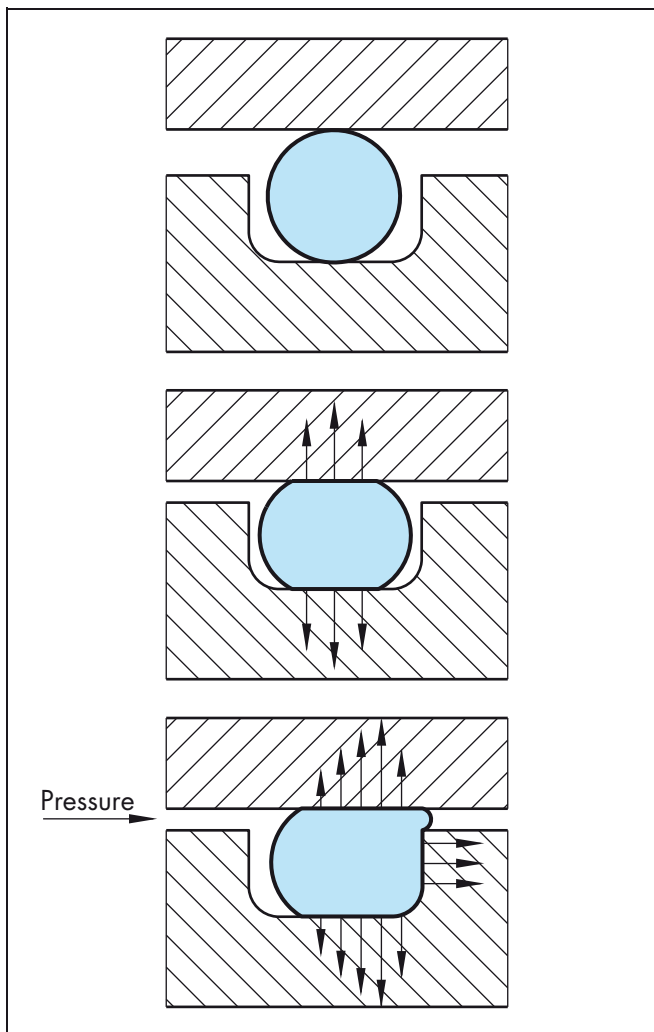


Figure 2 O-Ring sealing forces with and without system pressure



B Technical information

B.1 Materials

B.1.1 Elastomers

Equipment manufacturers and end users expect sealing systems to operate leak free and to maintain 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 main used material

groups for sealings are the elastomers. They show good properties like elasticity or good chemical compatibility.

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.

If no particular specifications are given for the material, standard NBR (Nitrile Rubber) in 70 Shore A will be supplied (see chapter "B.1.5 Standard materials").

Table I Elastomers

Designation	Trade Name*	Abbreviation		
		ISO 1629	ASTM 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	Noxtime® 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
Tetrafluoroethylene-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
Perfluoro Rubber	Isolast® Kalrez®	FFKM	FFKM	J
Polyester Urethane Polyether Urethane	Zurcon® Adiprene® Pellethan® Vulcollan® Desmopan®	AU EU	AU EU	WU WU

* Selection of registered trade names

** Abbreviation not yet standardised.

ASTM = American Society for Testing and Materials
ISO = International Organisation for Standardisation



O-Ring

Designation	Trade Name*	Abbreviation		
		ISO 1629	ASTM 1418	TSS
Chlorosulphonated Polyethylene Rubber	Hypalon®	CSM	CSM	WM
Polysulphide Elastomer	Thiokol®	-	TWT	WY
Epichlorohydrin Elastomer	Hydrin®	-	-	WO

* Selection of registered trade names

** Abbreviation not yet standardised.

ASTM = American Society for Testing and Materials

ISO = International Organisation for Standardisation

Table II The most important types of synthetic rubber, their grouping and abbreviations

Chemical name	Abbreviation	
	DIN / ISO 1629	ASTM D - 1418
M - Group (saturated carbon molecules in main macro-molecule-chain) - Polyacrylate Rubber - Ethylene Acrylate Rubber - Chlorosulphonated Polyethylene Rubber - Ethylene Propylene Diene Rubber - Ethylene Propylene Rubber - Fluorocarbon Rubber - Perfluoro Rubber	ACM AEM CSM EPDM EPM FKM FFKM	ACM CSM EPDM EPM FKM FFKM
O - Group (with oxygen molecules in the main macro-molecule chain) - Epichlorohydrin Rubber - Epichlorohydrin Copolymer Rubber	CO ECO	CO ECO
R - Group (unsaturated hydrogen carbon chain) - Chloroprene Rubber - Butyl Rubber - Nitrile Butadiene Rubber - Natural Rubber - Styrene Butadiene Rubber - Hydrogenated Nitrile Butadiene Rubber	CR IIR NBR NR SBR HNBR	CR IIR NBR NR SBR HNBR
Q - Group (with Silicone in the main chain) - Fluorosilicone Rubber - Methyl Vinyl Silicone Rubber	FVMQ VMQ	FVMQ VMQ
U - Group (with carbon, oxygen and nitrogen in the main chain) - Polyester Urethane - Polyether Urethane	AU EU	AU EU



B.1.2 Application parameters of elastomers

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

Elastomers will amongst others swell, shrink or harden and develop cracks or even tears. The following information illustrates the different application parameters.

Elastomer heat resistance / swelling in oil

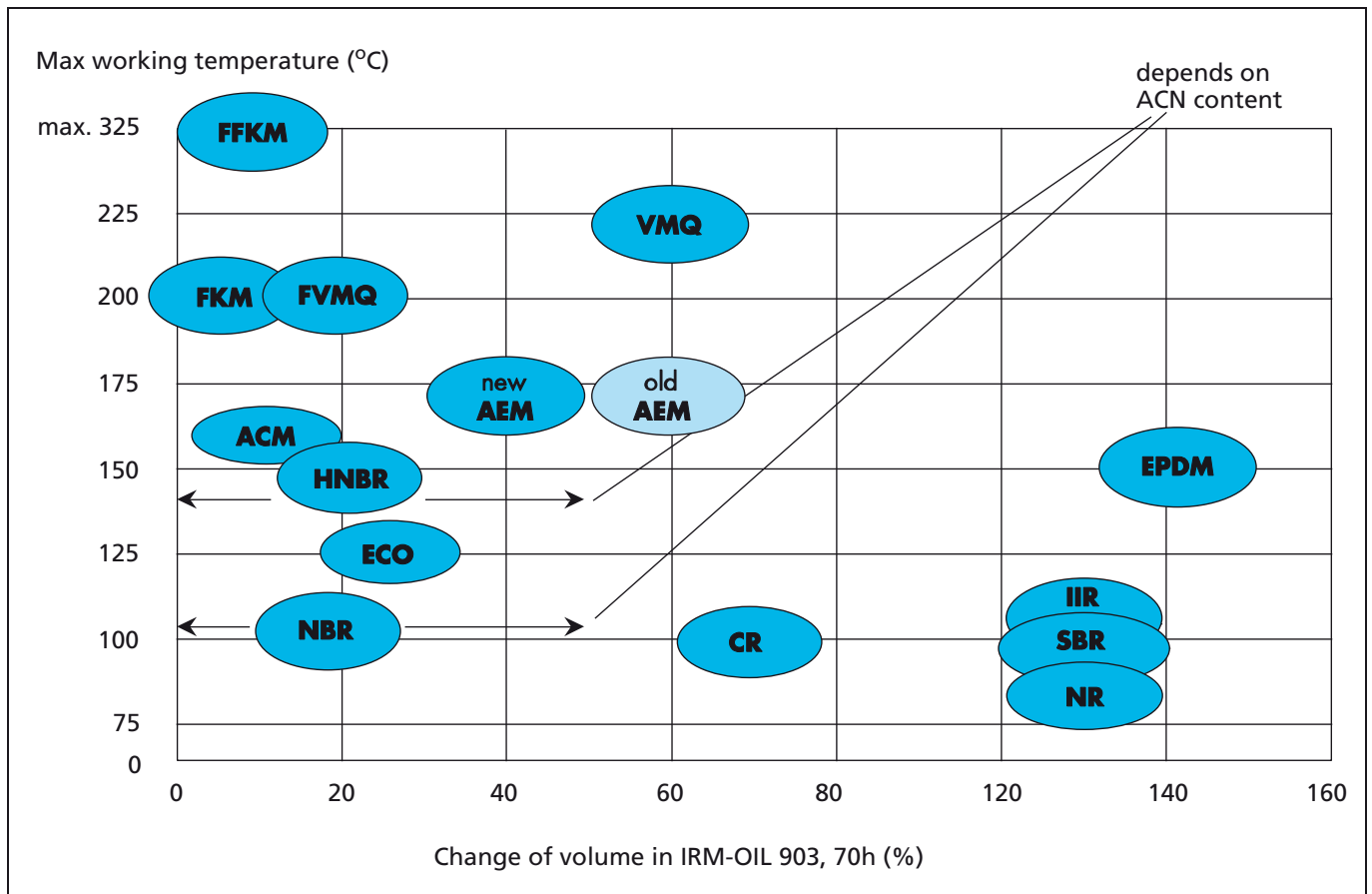


Figure 3 Change of volume in IRM-Oil 903 (old ASTM-Oil No 3)



O-Ring

Temperature range

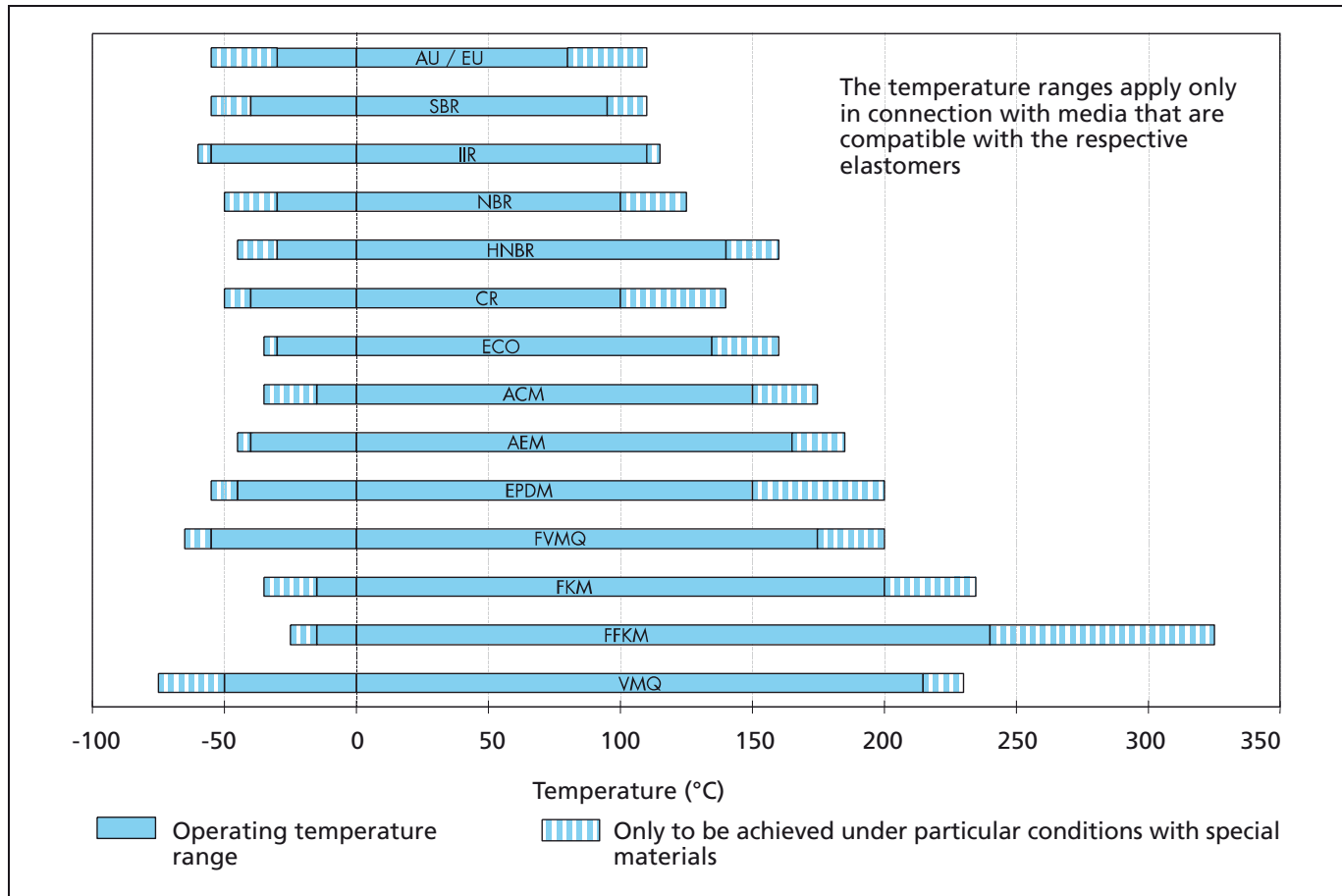


Figure 4 Temperature range of various elastomers

General field of application

Elastomer materials are used to cover a large number of fields of application. Details regarding resistance in special media are shown in chapter "Chemical compatibility", page 9.

The various elastomers can be characterised as follows:

NBR (Nitrile Butadiene Rubber):

The properties of the Nitrile Rubber depend mainly on the ACN content which ranges between 18% and 50%. In general they show good mechanical properties. The operating temperatures range between -30°C and +100°C (for a short period of time up to +120°C). Suitable formulated NBR can be used down to -60°C. NBR is mostly used with mineral based oils and greases.

FKM (Fluorocarbon Rubber)

Depending on structure and fluorine content FKM materials can differ with regards to their chemical resistance and cold-flexibility.

FKM is known especially for its non-flammability, low gas permeability and excellent resistance to ozone, weathering and aging.

The operating temperatures of the Fluorocarbon Rubber range between -20°C and +200°C (for a short period of time up to +230°C). Suitable formulated FKM can be used down to -35°C. FKM is also often used with mineral based oils and greases at high temperatures.

EPDM (Ethylene Propylene Diene Rubber)

EPDM shows good heat, ozone and aging resistance. In addition they also exhibit high levels of elasticity, good low temperature behaviour as well as good insulating properties.

The operating temperatures of applications for EPDM range between -45°C and +150°C (for a short period of time up to +175°C). With sulphur cured types the range is reduced to -45°C and +120°C (for short period of time up to +150°C).

EPDM can often be found in applications with brake fluids (based on glycol) and hot water.



HNBR (Hydrogenated Nitrile Butadiene Rubber)

HNBR is made via selective hydrogenation of the NBR butadiene groups. The properties of the HNBR rubber depend on the ACN content which ranges between 18% and 50% as well as on the degree of saturation. HNBR shows good mechanical properties. The operating temperature of HNBR ranges between -30°C and +140°C (for a short period of time up to +160°C) in contact with mineral oils and greases. Special types can be used down to -40°C.

VMQ (Silicone Rubber)

VMQ shows excellent heat resistance, cold flexibility, dielectric properties and especially good resistance to weather, ozone and UV rays. Specific VMQ formulations are resistant to aliphatic engine and gear oils, water up to +100°C and high-molecular chlorinated hydrocarbons. The temperature range is between -60°C and +200°C (temporary up to +230°C).

FVMQ (Fluorosilicone Rubber)

FVMQ has a good heat resistance, very good low temperature flexibility, good electrical properties and excellent resistance to weather, ozone and UV rays. FVMQ shows a significant better chemical resistance than standard Silicone especially in hydrocarbons, aromatic mineral oils, fuel and low molecular aromatic hydrocarbons e.g. Benzene and Toluene. The temperature range is between -55°C and +175°C (temporary up to +200°C).

CR (Chloroprene Rubber)

In general the CR materials show relatively good resistances to ozone, weathering, chemicals and aging. Also they show good non-flammability, good mechanical properties and cold flexibility. The operating temperatures range between -40°C and +100°C (for a short period of time up to +120°C). Special types can be used down to -55°C. CR materials are found in sealing applications such as refrigerants, for outdoor applications and in the glue industry.

ACM (Polyacrylate Rubber)

ACM shows excellent resistance to ozone, weathering and hot air, although it shows only a medium physical strength, low elasticity and a relatively limited low temperature capability. The operating temperatures range from -20°C and +150°C (for a short period of time up to +175°C). Special types can be used down to -35°C. ACM-materials are mainly used in automotive applications which require special resistance to lubricants containing many additives (incl. sulphur) at high temperatures.

FFKM (Perfluoro Rubber)

Perfluoroelastomers show broad chemical resistance similar to PTFE as well as good heat resistance. They show low swelling with almost all media. Depending on the material the operating temperatures range between -25°C and +240°C. Special types can be used up to +325°C. Applications for FFKM can be mostly found in the chemical and process industries and in all applications with either aggressive environments or high temperatures.

Polyurethane (Zurcon® Polyurethane)

Polyurethanes are an exceptionally complex material group. They are individually designed and fit various applications' needs. Therefore it is not possible to unify the materials' properties. Zurcon® polyurethane materials from Trelleborg Sealing Solutions are customized to appropriate applications and stand out due to their excellent elastic properties and optimum abrasion resistance. Outstanding tensile strength, low compression set and good resistance to O₂ and O₃ are further significant characteristics. Depending on the individual Zurcon® polyurethane type the application temperature range from below -50°C up to +110°C, temporary even higher, is feasible.

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 Trelleborg Sealing Solutions company for further details.

It is important to recognise that when using this guide, the ratings shown are based on published data and immersion tests. These tests are conducted under laboratory conditions predominantly at room temperature and may not represent adequately the 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.



B.1.3 Characteristics and inspection of elastomers

Hardness

One of the most often named properties regarding Polymer materials is hardness. Even so the values can be quite misleading.

Hardness is the resistance of a body against penetration of an even harder body - of a standard shape defined pressure.

There are two procedures for hardness tests regarding test samples and finished parts made out of elastomer material:

1. Shore A/D
according to ISO 868 / ISO 7619 / DIN 53 505 / ASTM D 2240
Measurement for test samples
2. Durometer IRHD (International Rubber Hardness Degree) according to ISO 48 / ASTM 1414 and 1415
Measurement of test samples and finished parts

The hardness scale has a range of 0 (softest) to 100 (hardest). The measured values depend on the elastic qualities of the elastomers, especially on the tensile strength.

The test should be carried out at temperatures of $23 \pm 2^\circ\text{C}$ - not earlier than 16 hours after the last vulcanisation process (manufacturing stage). If other temperatures are being used this should be mentioned in the test report.

Tests should only be carried out with samples which have not been previously stressed mechanically.

Hardness tests according to Shore A / D

The hardness test device Shore A (indenter with pyramid base) is a sensible application in the hardness range 10 to 90. Samples with a larger hardness should be tested with the device Shore D (indenter with spike).

Test specimen:

Diameter min. 30 mm

Thickness min. 6 mm

Upper and lower sides smooth and flat

When thin material is being tested it can be layered providing minimal sample thickness is achieved by a maximum of 3 layers. All layers must be at minimum 2 mm thick.

The measurement is done at three different places at a defined distance and time.

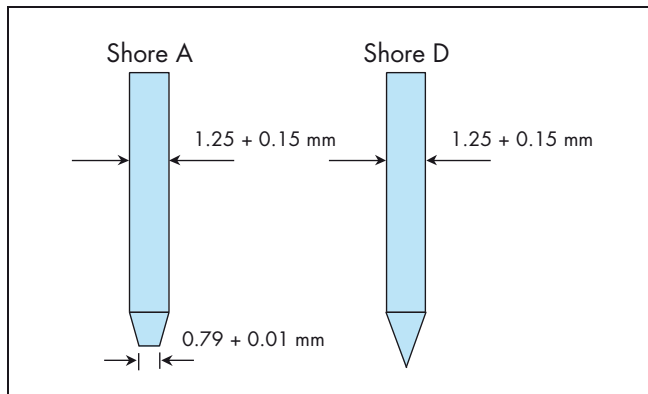


Figure 5 Indentor according to Shore A / D

Hardness test according to IRHD

The test of the Durometer according to IRHD is used with test samples as well as with finished goods.

The thickness of the test material has to be adjusted according to the range of hardness. According to ISO 48 there are two hardness ranges.

- Soft: 10 to 35 IRHD ⇒ Sample thickness 10 to 15 mm / procedure "L"
- Normal: over 35 IRHD ⇒ Sample thickness 8 to 10 mm / procedure "N"
- Sample thickness 1.5 to 2.5 mm / procedure "M"

The hardness determined with finished parts or samples usually vary in hardness determined from specimen samples, especially those with a curved surface.

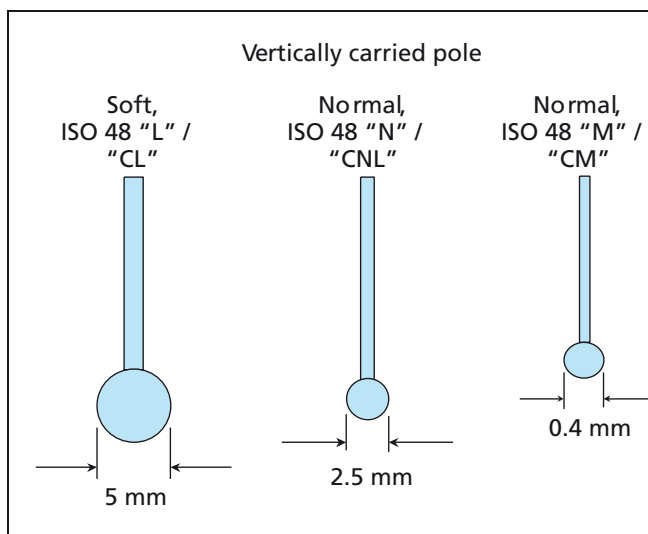


Figure 6 Indentor according to IRHD



Influencing parameters on the hardness test for polymer materials

Various sample thicknesses and geometries as well as various tests can show different hardness values even though the same materials have been used.

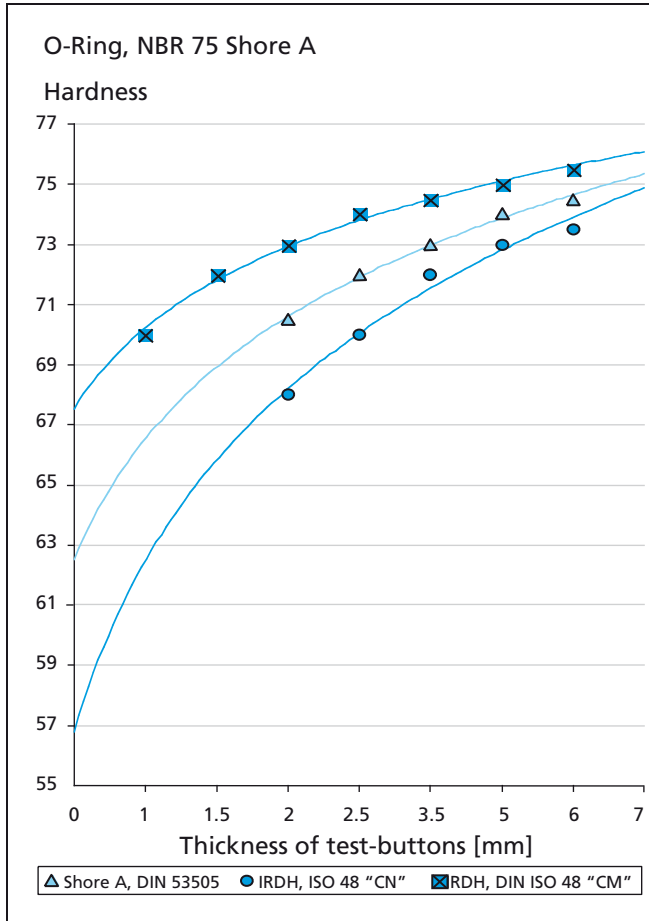


Figure 7 Ranges of hardness depending on sample thickness and test method

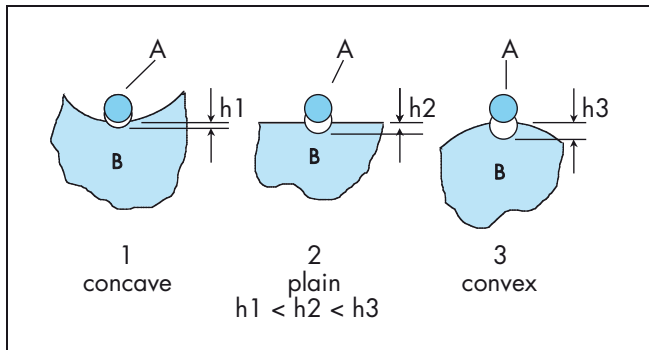


Figure 8 Range of hardness depending on surface geometry for the equivalent material characteristics.

With equivalent material characteristics of the elastomer sample B, the indenter penetrates the deepest at the surface 3 (convex) and therefore establishes the softest area.

As the concave geometry (3) has a stronger effect on smaller width O-Rings, the tolerances on hardness for widths under 2.0 mm should be increased up to +5 / -8 IRHD.

Compression set

An important parameter regarding the sealing capability is the compression set (CS) of the O-Ring material. Elastomers when under compression show aside from an elastic element also a permanent plastic deformation (Figure 9).

The compression set is determined in accordance with ISO 815 as follows:

- Standard test piece: Cylindrical disc, diameter 13 mm and height 6 mm
- Deformation: 25%
- Tension release time: 30 minutes

$$CS = \frac{h_0 - h_2}{h_0 - h_1} \cdot 100(\%)$$

- Where h_0 = Original height (cross section d_2)
- h_1 = Height in the compressed state
- h_2 = Height after tension release

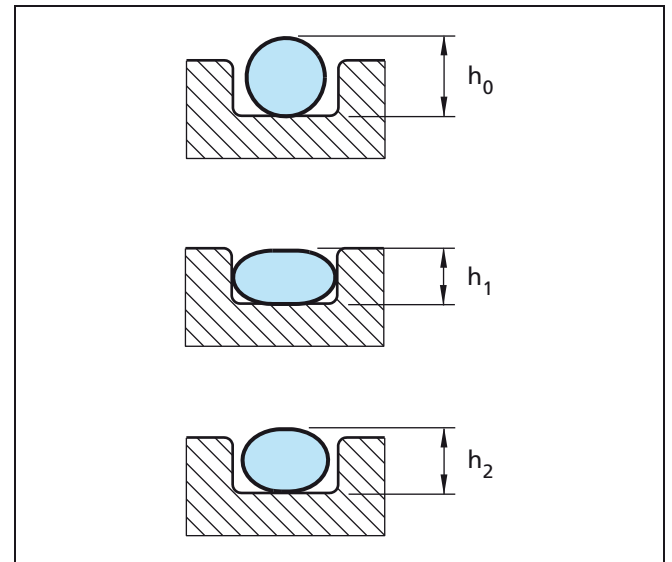


Figure 9 Illustration of the compression set



O-Ring

The accuracy of the measured value depends on:

- Test sample thickness
- Deformation
- Measurement deviations

Therefore the values which have been identified with the test sample cannot be transferred onto the finished part. The result of the measured finished parts are strongly influenced by geometrics and measurements as well as the measuring accuracy of the test equipment.

The following illustration shows the influence of various measuring deviations (in mm) in respect to the established compression set CS depending on the cross section of the measured O-Rings.

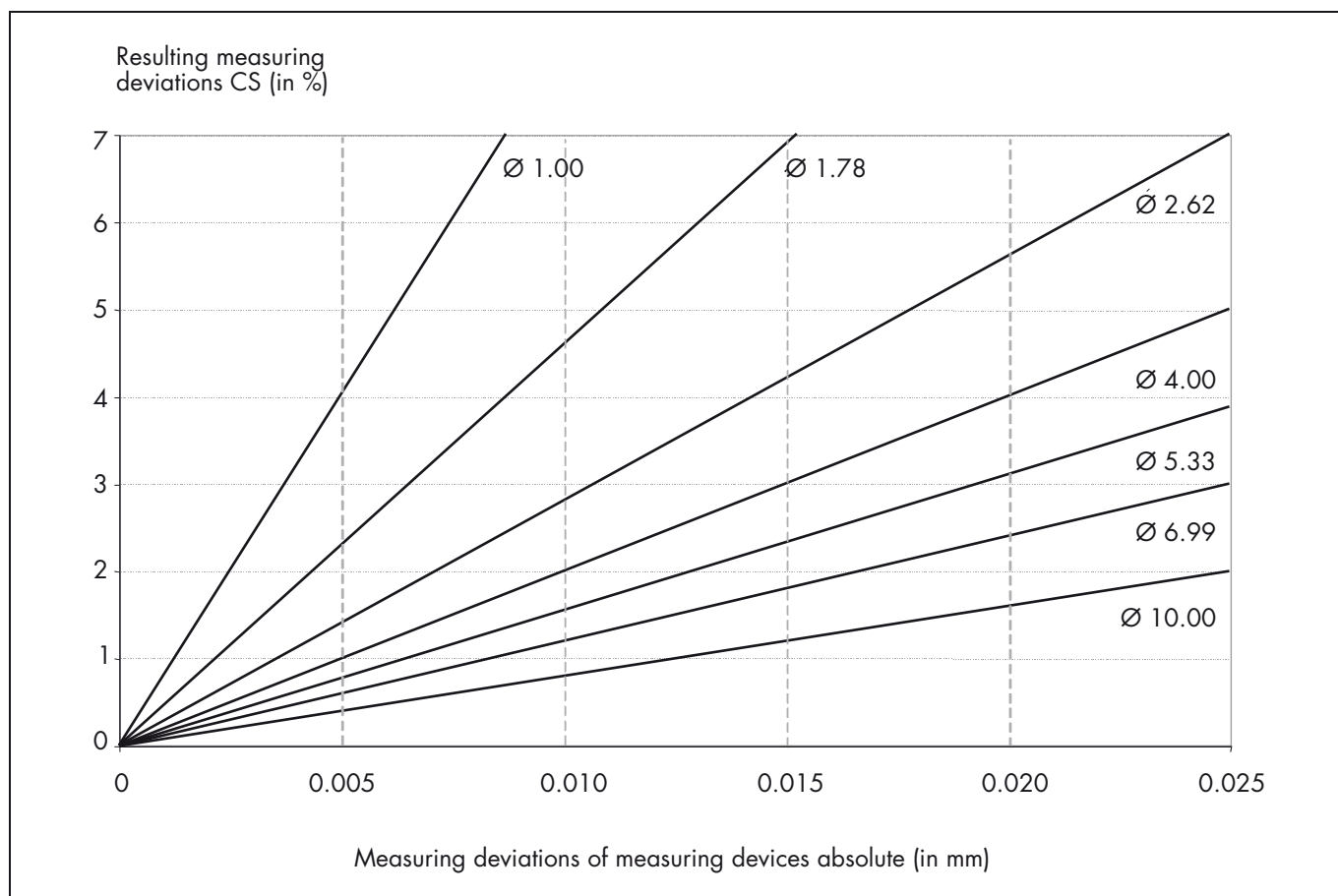


Figure 10 Measuring deviations CS depending on O-Ring cross section and measuring accuracy of the test equipment (schematic illustration)



B.1.4 Special requirements - authorities and approvals

Seals often have to meet the highest performance standards and the most stringent of environment and safety demands.

Also official authorities and associations make great demands on seals or materials which are to be used in

their industries. This is often the case if seals are used for water or gas applications.

The following table shows common authorities and their requirements.

Table IV Authorities and approvals

Approval / Examination Certificate / Guideline	Application	Criteria / Standards	Tests / Examinations / Contents	Authorities / Associations	Institutes / Laboratories
ACS Licensing	Polymers exposed to drinking water	French Standard AFNOR XP P41-250, part 1-3 Synoptic Paper 1226	- Analysis of dispensing according "Synoptic Documents" - Storage test (microbe analysis)	ACS (Accréditation de conformité sanitaire)	3 certified test laboratories in France: Paris / Vandoeuvre / Lille
BAM recommendation	Seals for the use in gas or oxygen fittings	- reactive behaviour with lubricants - limits for pressure and temperature (DIN 4060) - seals and components		BAM (Bundesanstalt für Materialforschung und -prüfung)	BAM, Berlin
BfR Recommendation (former: BgVV)	Polymers exposed to food	BfR Guidelines ("Polymers exposed to food") various paragraphs, depending on the application of the seal	- Chemical and physical tests - Biological tests - Sterilisation tests - Taste tests	BfR (Bundesanstalt für Risikobewertung)	BAM, Berlin HY (Hygiene-Institut, Gelsenkirchen)
DVGW Release for Gas	Seals for gas services and gas applications	EN 549 EN 682		DVGW, Bonn (Deutscher Verein des Gas- und Wasserfaches e.V.)	Test Laboratory for Gas, Karlsruhe, MPA NRW, Dortmund
DVGW Release for drinking water	Seals for processing storage and distribution of drinking water	BfR Guidelines ("Polymers exposed to food")	Various classifications and tests - depending on the application	DVGW, Bonn (Deutscher Verein des Gas- und Wasserfaches e.V.)	Environmental Hygiene Institute, Gelsenkirchen TZW, Karlsruhe
DVGW W270 recommendation	Materials exposed to drinking water	DVGW, worksheet W 270	Microbiological testing: reproduction of microorganisms on materials	DVGW, Bonn (Deutscher Verein des Gas- und Wasserfaches e.V.)	TZW, Karlsruhe HY (Hygiene Institution), Gelsenkirchen
FDA guideline	Materials for food and pharmaceutical	"White List" (Register of permitted dispensing components), e.g. according to 21. CFR Part 177.2600	- Component test according "White List" - Extended for foods containing water or oil - Extraction test for polar / non polar solvents	FDA (Food and Drug Administration)	In house or external laboratories
International Military Releases	Applications for military devices	Various military specifications and standards depending on the application	- Depending on application and specification		Various test laboratories
KTW certificate	Polymers exposed to drinking water, Cold- warm- and hot water	BfR Guidelines ("Polymers exposed to food") part 1.3.13	- Extraction test - Odour- and taste test - Register of permitted components	DVGW, Bonn (Deutscher Verein des Gas- und Wasserfaches e.V.)	Environmental Hygiene Institute, Gelsenkirchen TZW, Karlsruhe BAM, Berlin



O-Ring

Approval / Examination Certificate / Guideline	Application	Criteria / Standards	Tests / Examinations / Contents	Authorities / Associations	Institutes / Laboratories
NSF Release	Food and Sanitary	NSF Standard criteria	Depending on application: <ul style="list-style-type: none">- Test of components- Test of component group- Physical and chemical Material tests- Toxicological and micro biological tests	NSF (National Sanitation Foundation)	NSF, USA UL, USA
UL Listing	Application of seals for electrical equipment + appliances	UL-guidelines	<ul style="list-style-type: none">- Chemical comparability test- Additional tests depending on application	UL (Under-writers Laboratory)	Underwriters laboratory in USA/England
USP examination	For medical and pharmaceutical use	Different specifications: USP 26 et seqq., chapter 87, 88, Class I to VI,...	Depending on specification: <ul style="list-style-type: none">- intracutaneous reactive tests- systemic Injections- muscle implantations	USP (United States Pharmacopeia, USA)	Different test laboratories
WRAS Release (former: WRC)	Polymers exposed to drinking water	British Standard BS 6920 BS 2494	<ul style="list-style-type: none">- Dispensing test- Microbe test- Extraction test- Hot water test	WRAS (Water Regulations Advisory Scheme)	Various accredited test laboratories in England
18-03 3-A Sanitary	Food Products	18-03 3-A Sanitary Standards for multiple-use rubber and rubber-like materials used as product contact surfaces in dairy equipment	Chemical and physical properties acc. to Class I to III	Organisations: LAFIS, IAFP, USPHS, EHEDG, DIC	Various laboratories



B.1.5 Standard materials

The following tables show the physical properties of Trelleborg Sealing Solutions standard materials. They concern minimum values. That means that a standard material meets at least the given values. Many of the

Trelleborg Sealing Solutions materials (even when defined as standard) have better physical properties.

Table V Material specification for standard NBR

			NBR 70 Shore A	NBR 80 Shore A	NBR 90 Shore A	
Hardness		DIN 53 505 ASTM D 2240	Shore A	70 ± 5	80 ± 5	90 ± 5
Tensile strength		DIN 53 504 ASTM D 412	MPa N/mm ²	> 14	> 12	> 10
Elongation at break		DIN 53 504 ASTM D 412	%	> 200	> 150	> 100
Compression set	24h / 100 °C	DIN ISO 815B ASTM D 395B	%	< 25	< 30	< 30
Heat aging	72h / 100 °C	DIN 53 508 ASTM D 573				
Change of hardness			Shore A	max +8	max +8	max +8
Change of tensile strength			%	max -25	max -25	max -30
Change of elongation at break			%	max -25	max -25	max -30
Resistance in ASTM-OIL # 1	72h / 100 °C	DIN 53 521 ASTM D 471				
Change of hardness			Shore A	max +6	max +6	max +6
Change of volume			%	max -8	max -8	max -8
Resistance in ASTM-OIL # 3	72h / 100 °C	DIN 53 521 ASTM D 471				
Change of hardness			Shore A	max -10	max -10	max -10
Change of volume			%	max +15	max +15	max +15
Temperature range	Maximum and minimum operating temperatures depend on the specific application criteria.			-30 °C to +100 °C	-25 °C to +100 °C	-25 °C to +100 °C



O-Ring

Table VI Material specification for standard EPDM

				EPDM 70 Shore A sulphur cured	EPDM 70 Shore A peroxide cured	EPDM 75 Shore A peroxide cured
Hardness		DIN 53 505 ASTM D 2240	Shore A	70 ± 5	70 ± 5	75 ± 5
Tensile strength		DIN 53 504 ASTM D 412	MPa N/mm ²	> 10	> 10	> 10
Elongation at break		DIN 53 504 ASTM D 412	%	> 150	> 125	> 125
Compression set	24h / 100 °C	DIN ISO 815B ASTM D 395B	%	< 20		
	24h / 150 °C		%		< 30	< 30
Heat aging	72h / 100 °C	DIN 53 508 ASTM D 573		x		
	72h / 150 °C				x	x
Change of hardness			Shore A	max +10	max +10	max +10
Change of tensile strength			%	max -10	max -20	max -20
Change of elongation at break			%	max -20	max -20	max -20
Resistance in water	72h / 100 °C	DIN 53 521 ASTM D 471				
Change of hardness			Shore A	max -10	max -3	max -3
Change of volume			%	max +10	max +3	max +3
Temperature range Maximum and minimum operating temperatures depend on the specific application criteria.				-45 °C to +120 °C	-45 °C to +140 °C	-45 °C to +140 °C

Table VII Material specification for standard Silicone

				Silicone 60 Shore A	Silicone 70 Shore A
Hardness		DIN 53 505 ASTM D 2240	Shore A	60 ± 5	70 ± 5
Tensile strength		DIN 53 504 ASTM D 412	MPa N/mm ²	> 5	> 5
Elongation at break		DIN 53 504 ASTM D 412	%	> 100	> 100
Compression set	24h / 175 °C	DIN ISO 815B ASTM D 395B	%	< 35	< 35
Heat aging	72h / 225 °C	DIN 53 508 ASTM D 573			
Change of hardness			Shore A	max +15	max +15
Change of tensile strength			%	max -40	max -40
Change of elongation at break		%	max -40	max -40	
Resistance in ASTM-Oil # 1	72h / 100 °C	DIN 53 521 ASTM D 471			
Change of hardness			Shore A	max -10	max -10
Change of volume			%	max +20	max +20
Temperature range Maximum and minimum operating temperatures depend on the specific application criteria.				-55 °C to +200 °C	-55 °C to +200 °C



Table VIII Material specification for standard FKM

			FKM 70 Shore A	FKM 75 Shore A	FKM 80 Shore A	FKM 90 Shore A	
Hardness	DIN 53 505 ASTM D 2240	Shore A	70 ± 5	75 ± 5	80 ± 5	90 ± 5	
Tensile strength	DIN 53 504 ASTM D 412	MPa N/mm ²	> 10	> 10	> 10	> 10	
Elongation at break	DIN 53 504 ASTM D 412	%	> 125	> 125	> 120	> 100	
Compression set	24h / 175 °C	DIN ISO 815B ASTM D 395B	%	< 20	< 20	< 20	
Heat aging	72h / 250 °C	DIN 53 508 ASTM D 573					
Change of hardness			Shore A	max +10	max +10	max +10	max +10
Change of tensile strength			%	max -25	max -25	max -25	max -25
Change of elongation at break			%	max -25	max -25	max -25	max -25
Resistance in ASTM-Oil # 3	72h / 150 °C	DIN 53 521 ASTM D 471					
Change of hardness			Shore A	max -5	max -5	max -5	max -5
Change of volume			%	max +5	max +5	max +5	max +5
Resistance in ASTM-FUEL C	72h / RT	DIN 53 521 ASTM D 471					
Change of hardness			Shore A	max -5	max -5	max -5	max -5
Change of volume			%	max +10	max +10	max +10	max +10
Temperature range	Maximum and minimum operating temperatures depend on the specific application criteria.		-18 °C to +200 °C	-18 °C to +200 °C	-18 °C to +200 °C	-15 °C to +200 °C	



O-Ring

Table IX Material specification for standard HNBR

			HNBR 70 Shore A partially saturated	HNBR 75 Shore A partially saturated	
Hardness		DIN 53 505 ASTM D 2240	Shore A	70 ± 5	75 ± 5
Tensile strength		DIN 53 504 ASTM D 412	MPa N/mm ²	> 15	> 15
Elongation at break		DIN 53 504 ASTM D 412	%	> 250	> 250
Compression set	24h / 125 °C	DIN ISO 815B ASTM D 395B	%	< 35	< 35
Heat aging	72h / 150 °C	DIN 53 508 ASTM D 573			
Change of hardness			Shore A	max +10	max +10
Change of tensile strength			%	max -30	max -30
Change of elongation at break			%	max -30	max -30
Resistance in ASTM-Oil # 1	72h / 150 °C	DIN 53 521 ASTM D 471			
Change of hardness			Shore A	max +10	max +10
Change of volume			%	max -10	max -10
Resistance in ASTM-Oil # 3	72h / 150 °C	DIN 53 521 ASTM D 471			
Change of hardness			Shore A	max -15	max -15
Change of volume			%	max +20	max +20
Temperature range	Maximum and minimum operating temperatures depend on the specific application criteria.			-30 °C to +130 °C	-30 °C to +130 °C

Trelleborg Sealing Solutions offers various materials, which provide additional advantages, in addition to the standard materials previously described. The advantages include a wide range of available molds, special operating temperature range, special media resistance and institutional approvals for the portable water, pharmaceutical and beverage industries.

The following table shows preferred materials, which are characterized by their wide spectrum of use. They can be used for standard applications as well as for special industrial applications.

Table X Preferred materials

Material Type	Hardness Shore A (± 5)	Color	Operating temperature range	Material code	Description
NBR Nitrile Butadiene Rubber	70	black	-30 °C to +100 °C	N7083	Preferable for sizes acc. to AS 568 B , preferably used for energizing elements, good overall performance
			-50 °C to +100 °C	N7T40	"Polar", extremely good low temperature properties , preferably used for static applications in mineral oil and for energizing elements, preferable for sizes acc. to AS 568 B
			-30 °C to +100 °C	N7003	Preferable for metric sizes, good overall performance, wide range of molds available
			-30 °C to +100 °C	N7024	Good overall performance, preferable for large quantities
	-30 °C to +100 °C	N7027	Preferable for potable water applications: KTW, ACS, NSF61, NSF51, DIN EN 549: 0 °C / 80 °C, W270, FDA , also suitable for use in gas applications		
90	black	-25 °C to +100 °C	N9002	Good overall performance, wide range of molds available	



Material Type	Hardness Shore A (± 5)	Color	Operating temperature range	Material code	Description
HNBR Hydrogenated Nitrile Butadiene Rubber	70	black	-30 °C to +140 °C	H7671	Good overall performance, wide range of molds available
			-35 °C to +140 °C	H7503	Wide range of operating temperature , good resistance to mineral oil, good overall performance
FKM Fluorocarbon Rubber	70	green	-20 °C to +200 °C	V70GA	Preferable for sizes acc. to AS 568 B , preferably used for energizing elements, good overall performance, DVGW, BAM
			-18 °C to +200 °C	V70G2	Preferable for sizes acc. to AS 568 B , good overall performance
	75	black	-20 °C to +200 °C	VC009	Preferable for sizes acc. to BS 4518 (metric), standard FKM
			-18 °C to +200 °C	V80G2	Good overall performance, wide range of molds available
	80	black	-18 °C to +200 °C	V8003	Good overall performance, wide range of molds available
			-20 °C to +200 °C	V8605	For pharmaceutical and food and beverage industries, FDA
	90	green	-15 °C to +200 °C	V90G1	Good overall performance, wide range of molds available
		black	-15 °C to +200 °C	V9670	Good overall performance, wide range of molds available
EPDM Ethylene Propylene Diene Rubber	70	black	-45 °C to +150 °C	E7502	Peroxide cured, for pharmaceutical and food and beverage industries, KTW, WRAS, FDA, USP Class VI, USP 26 , plasticizer content < 3 %
			-45 °C to +125 °C	E7002	Sulfur cured , standard EPDM, wide range of molds available
			-45 °C to +140 °C	E7515	Peroxide cured , standard EPDM, wide range of molds available
			-45 °C to +150 °C	E7T41	Peroxide cured, extremely low compression set in hot water and steam. Excellent resistance to ozone, can be used in contact with copper and brass
			-45 °C to +140 °C	E7518	Peroxide cured, preferable for the use in potable water: KTW, WRAS, FDA, NSF61, NSF51, W270, W534, EN 681, ACS, USP Class VI, USP 26 , plasticizer content < 1 %
VMQ Methyl Vinyl Silicon Rubber	60	red	-50 °C to +200 °C	S60R1	Good overall performance, wide range of molds available
	70	red	-50 °C to +200 °C	S70R2	Sulfur cured , good overall performance, wide range of molds available

The stated operating temperatures exclude any kind of load. Actual operating temperatures may differ depending on media and load type.

At time of publication the information contained in this literature, including availability or institutional approvals, is believed to be correct and accurate.

Further materials are available on request.



B.2 Design recommendations

The following design recommendations cannot be used for the special Isolast® materials. Please use the Isolast® brochure or contact our specialists for further details.

B.2.1 Installation recommendations

General recommendations

Before starting installation, check the following points:

- Lead-in chamfers made according to drawing?
- Bores deburred and edges rounded?
- Machining residues, e.g. chips, dirt and foreign particles, removed?
- Screw thread tips covered?
- Seals and components greased or oiled?
Ensure media compatibility with the elastomer material. Trelleborg Sealing Solutions recommends to use the fluid to be sealed.
- Do not use lubricants with solid additives, e.g. molybdenum disulphide or zinc sulphide.

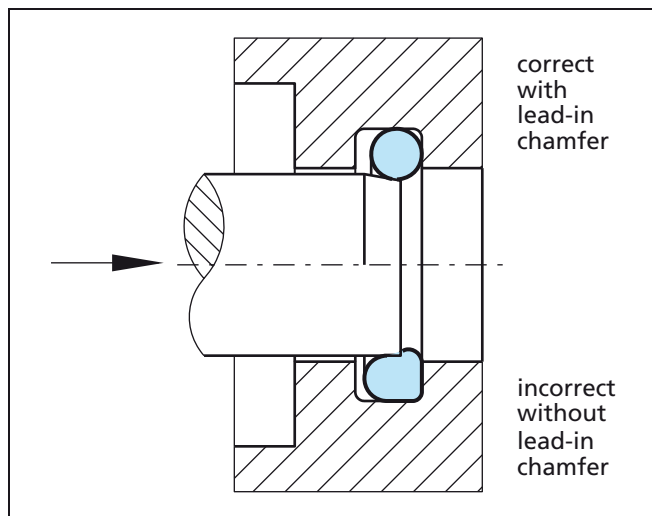


Figure 11 Rod installation with O-Ring

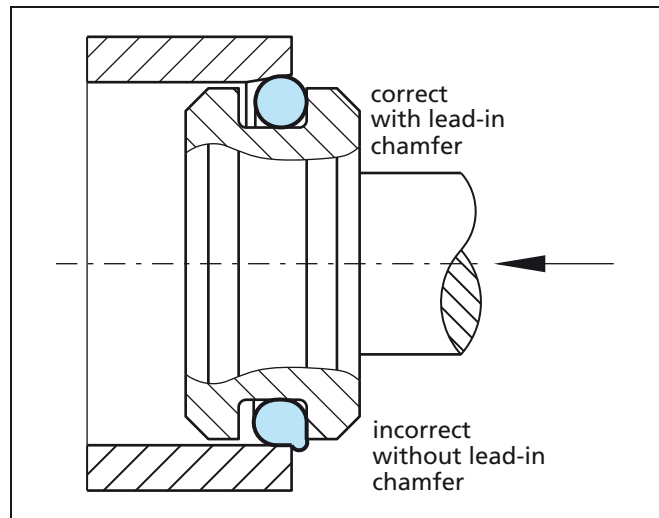


Figure 12 Piston installation with O-Ring

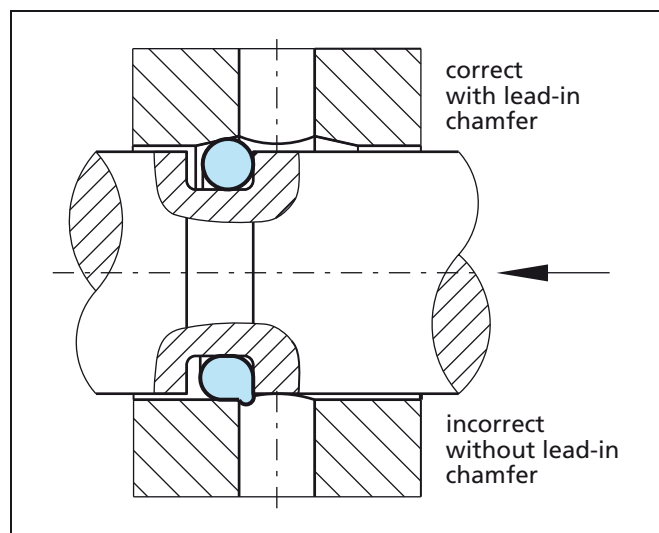


Figure 13 O-Ring installation over transverse bores

Manual installation

- Use tools without sharp edges!
- Ensure that the O-Ring is not twisted, use installation aids to assist correct positioning
- Use installation aids wherever possible
- Do not over stretch O-Rings
- Do not stretch O-Rings made out of cord at the joint.



Installation over threads, splines etc.

Should the O-Ring have to be stretched over threads, splines, keyways etc., then an assembly mandrel is essential. This mandrel can either be manufactured in a soft metal or a plastic material obviously without burrs or sharp edges.

Automatic installation

Automatic O-Ring installation requires good preparation. The surfaces of the O-Rings are frequently treated by several methods (see chapter "O-Ring friction reduced"). This offers a number of benefits during installation by

- Reducing the installation forces
- Non-stick effects, easy removal

The handling and installation of dimensionally unstable components requires a great deal of experience. Reliable automated installation thus demands special handling and packing of the O-Rings.

Please ask our specialists for further details.

B.2.2 Initial compression

An initial compression (squeeze) of the O-Ring in the groove is essential to ensure its function as a primary or secondary sealing element (Figure 14). It serves to:

- Achieve the initial sealing capability
- Bridge production tolerances
- Assure defined frictional forces
- Compensate for the compression set
- Compensate for wear

Depending on the application, the following values apply for the initial squeeze as a proportion of the cross section (d_2):

Dynamic applications: 6 to 20%
 Static applications: 15 to 30%

The design of the grooves can be based on the guide values for the initial squeeze shown in the diagrams in Figure 15 and 16. These take into account the relationship between loads and cross sections according to ISO 3601-2 (version 1987).

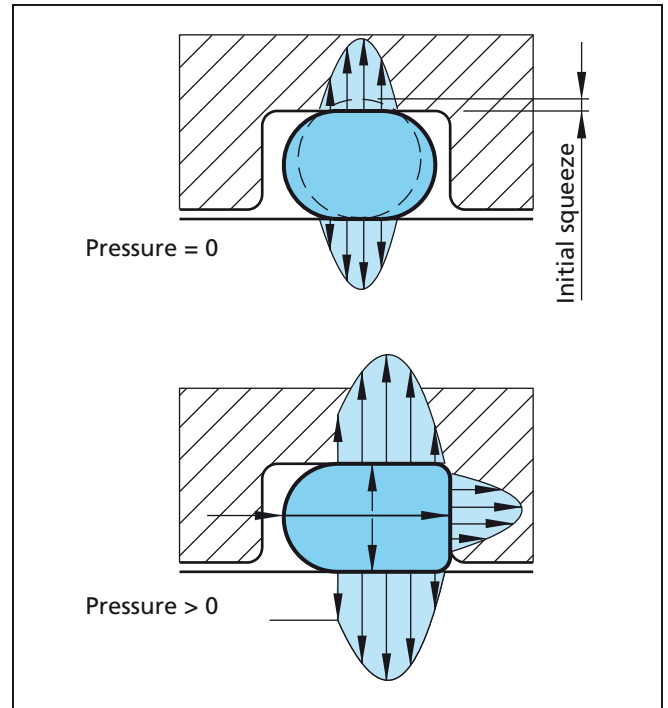


Figure 14 O-Ring contact pressure installed and under service pressure

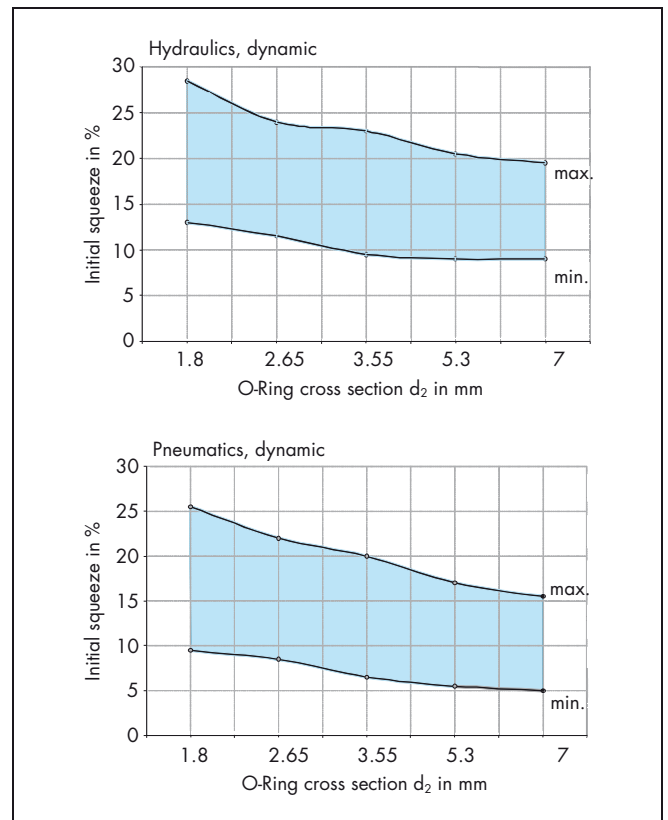


Figure 15 Permissible range of initial squeeze as a function of cross section, radial dynamic

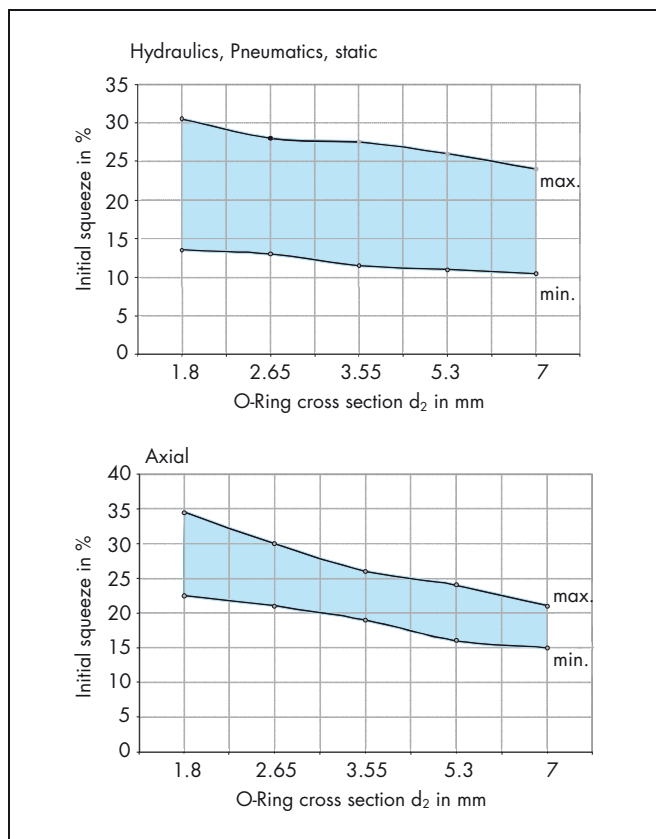


Figure 16 Permissible range of Initial squeeze as a function of cross section, radial static and axial

Compression forces

The deformation forces vary depending on the extent of the initial squeeze and the Shore hardness. Figure 17 shows the specific compression force per cm of the seal circumference as a function of the cross section.

The compression forces shown can be used to estimate the total force to be applied for static installation of O-Rings.

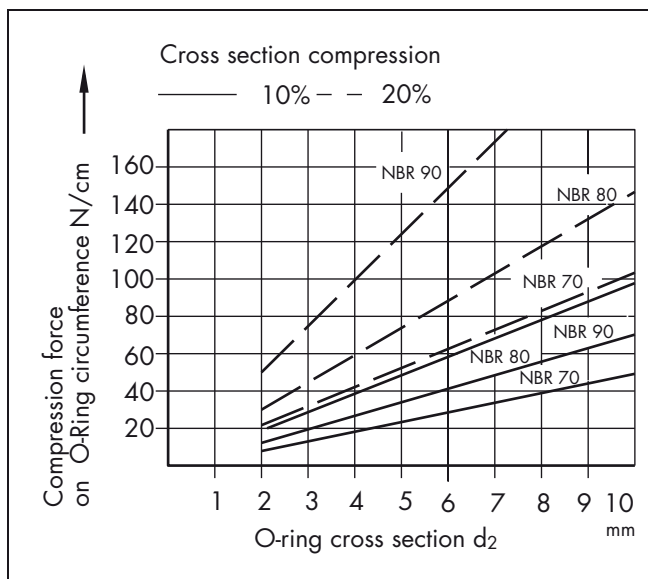


Figure 17 Compression forces on the O-Ring circumference depending on the material

B.2.3 Elongation - compression

With a radial sealing configuration, the O-Ring in an internal groove - "outside sealing" - should be stretched over the diameter of the groove. Maximum elongation in the installed state is 6% for O-Rings with an inner diameter > 50 mm and 8% for O-Rings with an inner diameter < 50 mm.

With external grooves - "inside sealing" - the O-Ring is preferably compressed along its circumference. The maximum circumferential compression in the installed state is 3%.

Exceeding these values will result in too large increase or decrease in the O-Ring cross section. Consequently this can effect the service life of the seal.

The reduction in cross section diameter (d_2) can be calculated as

$$Reduction_{max} = \frac{d_{2min}}{10} \cdot \sqrt{6 \cdot \left(\frac{d_{3max} - d_{1min}}{d_{1min}} \right)}$$

with d_{1min} = minimum inside diameter of the O-Ring
 d_{2min} = minimum cross section of the O-Ring
 d_{3max} = maximum housing diameter

but for approximation it can be assumed, in percentage, to be half the amount of stretch. An elongation of 1% corresponds to a reduction of the cross section (d_2) of approx. 0.5%.



B.2.4 Methods of installation and design of seal housing

Methods of installation

O-Rings can be used in components in a wide variety of ways.

During the design stage installation must be taken into consideration. In order to avoid damage during installation it should not be necessary to pass the O-Ring over edges or bores. When long sliding movements are involved, the seal seat should be recessed, if possible, or the O-Rings arranged so that they only have to travel short distances during installation to reduce risk of twisting.

Radial installation (static and dynamic)

Inner sealing

The O-Ring size should be selected so that the inside diameter d_1 has the smallest possible deviation from the diameter to be sealed d_5 (Figure 18).

Outer sealing.

The O-Ring size should be selected so that the inside diameter d_1 is equal to or smaller than groove diameter d_3 (Figure 18).

Axial installation, (static)

During axial-static installation, the direction of the pressure should be taken into consideration when choosing the O-Ring size (Figure 19). With internal pressure the O-Ring should be chosen so that the outside diameter of the O-Ring is approx. 1 to 2% larger than the outer groove diameter d_7 . With external pressure the O-Ring is chosen approx. 1 to 3% smaller than the inner groove diameter d_8 .

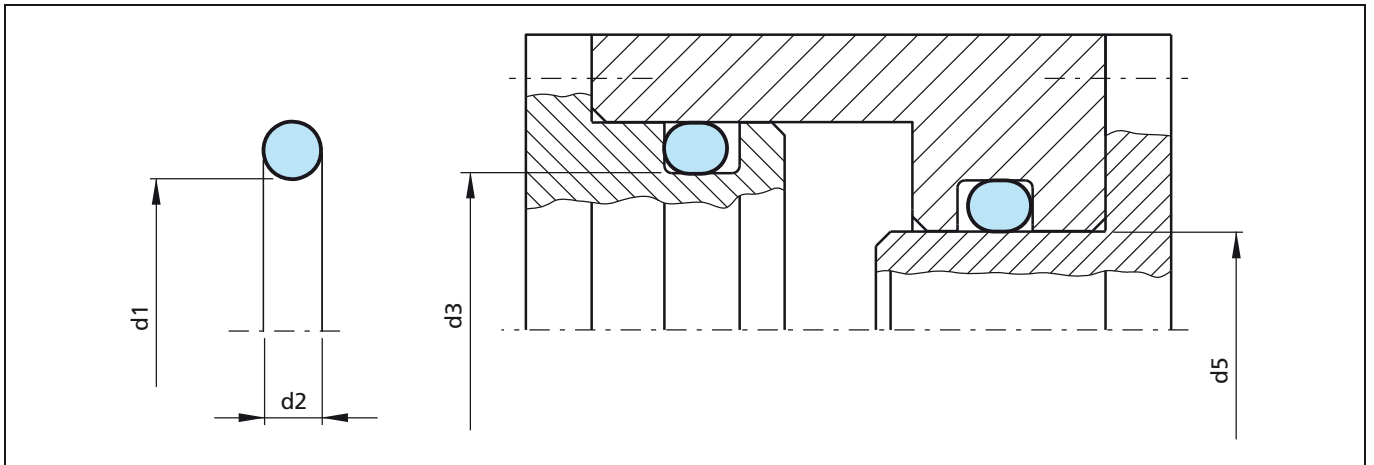


Figure 18 Radial installation, static and dynamic

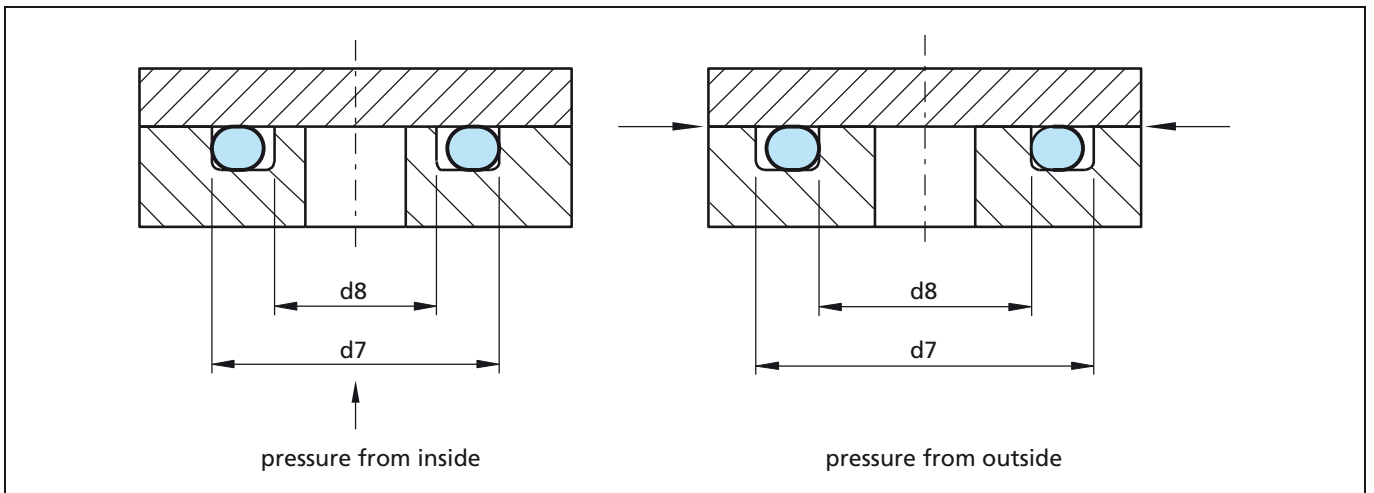


Figure 19 Axial installation, static



O-Ring as a rotary seal

In some applications, e.g. with short running periods, the O-Ring can also be used as a rotary seal for sealing shafts. In this case, the following points should be observed:

In order to be able to function as a rotary seal, O-Rings must be installed in accordance with specific guidelines, the rotary seal principle.

The rotary seal principle is based on the fact that an elongated elastomer ring contracts when heated (Joule effect). With the normal design criteria the O-Ring inside diameter d_1 will be slightly smaller than the shaft diameter, and the heat generated by friction would cause the ring to contract even more. This results in a higher pressure on the rotating shaft so that a lubricating film is prevented from forming under the seal and even higher friction occurs. The result would be increased wear and a premature failure of the seal.

Using the rotary seal principle, this is prevented by the seal ring being selected so that its inside diameter is approximately 2 to 5% larger than the shaft diameter to be sealed. The installation in the groove means that the seal ring is compressed radially and is pressed against the shaft by the groove diameter. The seal ring is thus slightly corrugated in the groove, a fact which helps to improve the lubrication.

Special materials are available for rotary seal applications. Trelleborg Sealing Solutions does not recommend the use of O-Rings as rotary seals. Please contact your local Trelleborg Sealing Solutions company for further details.

Technical data

O-Rings can be used in a wide range of applications. Temperature, pressure and media determine the choice of appropriate materials. In order to be able to assess the suitability of the O-Ring as a sealing element for a given application, the interaction of all the operating parameters have to be taken into consideration.

Working Pressure

Static application

- up to 5 MPa for O-Rings with inside diameter > 50 mm without Back-up Ring
 - up to 10 MPa for O-Rings with inside diameter < 50 mm without Back-up Ring (depends on the material, the cross section and the clearance)
 - up to 40 MPa with Back-up Ring
 - up to 250 MPa with special Back-up Ring
- Please note the permissible extrusion gaps.

Dynamic application

- Reciprocating up to 5 MPa without Back-up Ring
- Higher pressures with Back-up Ring

Speed

Reciprocating up to 0.5 m/s

Rotating up to 0.5 m/s

Depending on material and application.

Temperature

From -60 °C to +325 °C

Depending on material and media resistance.

When assessing the application criteria, the peak and continuous operating temperature and the running period must be taken into consideration. For rotating applications the temperature increase due to frictional heat must be taken into account.

Media

With the wide range of the available materials, each with different properties, it is possible to seal against practically all liquids, gases and chemicals. Please note when selecting the most suitable material the information in chapter "B.1 Materials", and in our O-Ring Material Guide.



Groove design / Groove dimensions Lead-in chamfers

Correct design can help to eliminate possible sources of damage and seal failure from the outset.

Since O-Ring are squeezed during installation, lead-in chamfers and rounded edges must be provided (Figure 20 and 21).

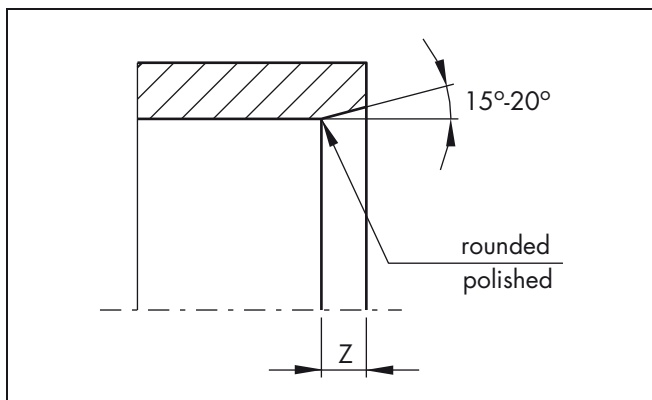


Figure 20 Lead-in chamfers for bores, tubes

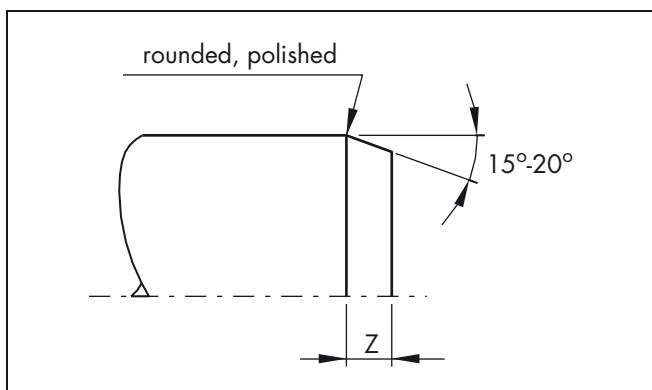


Figure 21 Lead-in chamfers for shafts, rods

The minimum length of the lead-in chamfer is listed in table XI as a function of the cross section d_2 .

Table XI Lead-in chamfers

Lead-in chamfers length Z min.		O-Ring cross section d_2
15°	20°	
2.5	1.5	up to 1.78 1.80
3.0	2.0	up to 2.62 2.65
3.5	2.5	up to 3.53 3.55
4.5	3.5	up to 5.33 5.30
5.0	4.0	up to 7.00
6.0	4.5	above 7.00

The surface roughness of a lead-in chamfer is:
 $R_z \leq 6.3 \mu\text{m}$ $R_a \leq 0.8 \mu\text{m}$

Radial clearance

The tolerances given in table XV and the maximum permissible radial clearance S (extrusion gap) given in the table XII must be maintained.

If the clearance is too large, there is a risk of seal extrusion which can result in the destruction of the O-Ring (Figure 22).

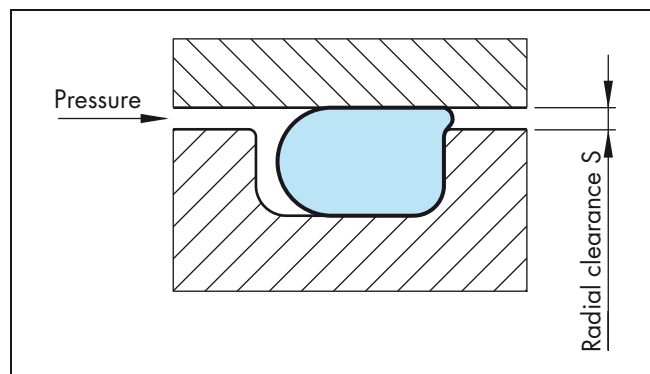


Figure 22 Radial clearance "S"

The permissible radial clearance S between the sealed parts depends on the system pressure, the cross section and the hardness of the O-Ring.

Table XII contains recommendations for the permissible clearance S as a function of O-Ring cross section and shore hardness. The table is valid for elastomeric materials with the exception of polyurethane and FEP encapsulated O-Rings.

For pressure above 5 MPa for O-Rings with Inside diameter > 50 mm and above 10 MPa for O-Rings with Inside diameter < 50 mm we recommend the use of Back-up Rings.



O-Ring

Table XII Radial clearance S

O-Ring cross section d_2	up to 2	2 - 3	3 - 5	5 - 7	above 7
O-Rings with hardness of 70 Shore A					
Pressure MPa	Radial clearance S				
≤ 3.50	0.08	0.09	0.10	0.13	0.15
≤ 7.00	0.05	0.07	0.08	0.09	0.10
≤ 10.50	0.03	0.04	0.05	0.07	0.08
O-Rings with hardness of 90 Shore A					
Pressure MPa	Radial clearance S				
≤ 3.50	0.13	0.15	0.20	0.23	0.25
≤ 7.00	0.10	0.13	0.15	0.18	0.20
≤ 10.50	0.07	0.09	0.10	0.13	0.15
≤ 14.00	0.05	0.07	0.08	0.09	0.10
≤ 17.50	0.04	0.05	0.07	0.08	0.09
≤ 21.00	0.03	0.04	0.05	0.07	0.08
≤ 35.00	0.02	0.03	0.03	0.04	0.04

These values assume that the parts are fitted concentrically to one another and do not expand under pressure. If this is not the case, the clearance should be kept correspondingly smaller.

For static applications we recommend a fit of H8/f7.

O-Rings made from polyurethane can bridge larger clearances thanks to their high extrusion resistance and greater dimensional stability. See also chapter "Polyurethane O-Rings".

Surfaces

Under pressure, elastomers adapt to irregular surfaces. For gas or liquid tight joints, however, certain minimum demands must be made on the surface quality of the surfaces to be sealed.

Fundamentally grooves, scratches, pit marks, concentric or spiral machining scores, etc. are not permissible. Higher demands must be placed on dynamic mating surfaces than on static surfaces.

At present no uniform definitions exist for describing the mating surfaces. In practice, the specification of the R_a value is not sufficient to permit an assessment of the surface quality. Our recommendations therefore contain amongst others various terms and definitions in accordance with DIN 4768 and DIN EN ISO 4287.

Table XIII Surface finish

Type of Load	Surface	$R_t \mu\text{m}$	$R_z \mu\text{m}$	$R_a \mu\text{m}$
Radial-dynamic	Mating surface * (bore, rod, shaft)	1.0 - 2.5	0.63 - 1.6	0.1 - 0.4
	groove flanks, groove diameter	≤ 10.0	≤ 6.3	≤ 1.6
Radial-static Axial-static	Mating surface groove flanks, groove diameter	≤ 10.0 ≤ 16.0	≤ 6.3	≤ 1.6
	For pulsating pressures Mating surface groove flanks, groove diameter	≤ 6.3 ≤ 10.0	≤ 6.3	≤ 0.8 ≤ 1.6

* spiral-free grinding

The above is for guidance only and covers the majority of sealing applications. However Trelleborg Sealing Solutions should be consulted in areas of particular concern.



Trapezoidal groove

The trapezoidal (dovetail) groove should only be used in special cases, e.g. overhead installation, in order to retain the O-Ring (Figure 23). The installation dimensions are summarised in table XIV. The trapezoidal groove is only recommended for O-Ring cross section from 3.53 mm. The inside diameter of the O-Ring results from the mean groove diameter minus the cross section.

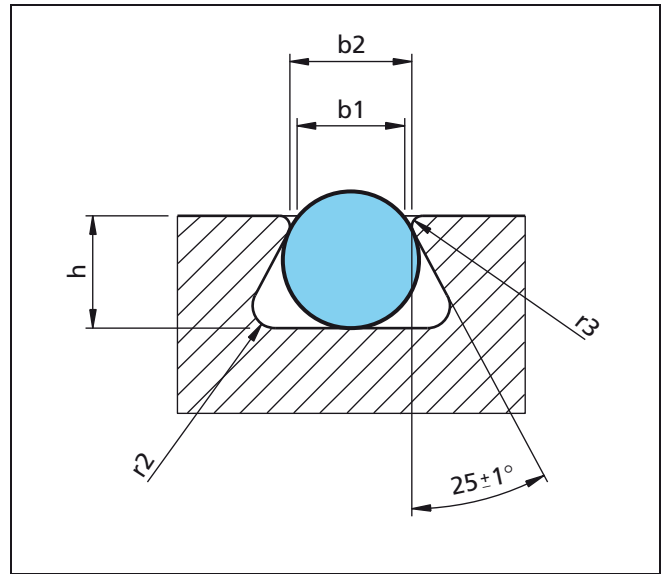


Figure 23 Installation in trapezoidal groove

Table XIV Installation dimensions for trapezoidal groove

O-Ring cross section d2	Groove dimensions				
	Groove width b1 ±0.05	Groove width b2 ±0.05	Groove depth h ±0.05	Radius (max.)	
				r3	r2
3.53 3.55	2.90	3.20	2.90	0.25	0.80
4.00	3.40	3.70	3.20	0.25	0.80
5.00	4.30	4.60	4.20	0.25	0.80
5.33 5.30	4.60	4.90	4.60	0.25	0.80
5.70	4.75	5.25	4.80	0.40	0.80
6.00	5.05	5.55	5.10	0.40	0.80
7.00	6.00	6.50	6.00	0.40	1.60
8.00	6.85	7.45	6.90	0.50	1.60
8.40	7.25	7.85	7.30	0.50	1.60

Rectangular groove

A rectangular groove is preferred for all new designs. Designs with bevelled groove flanks up to 5° are permissible. If Back-up Rings are used, straight groove flanks are necessary.

To reduce risk of extrusion the radius r ideally should not exceed the maximum permissible radial clearance S (see table XII).

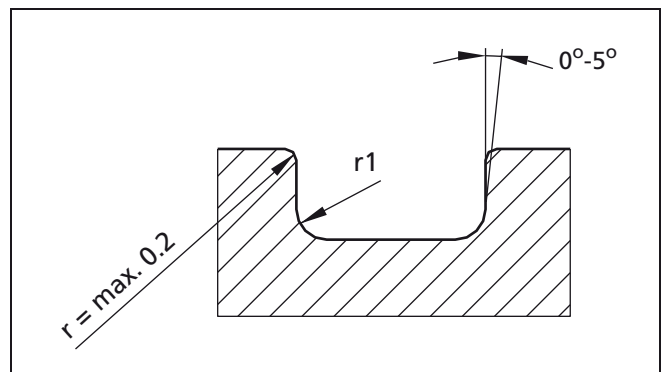


Figure 24 Groove specifications



O-Ring

Installation recommendations

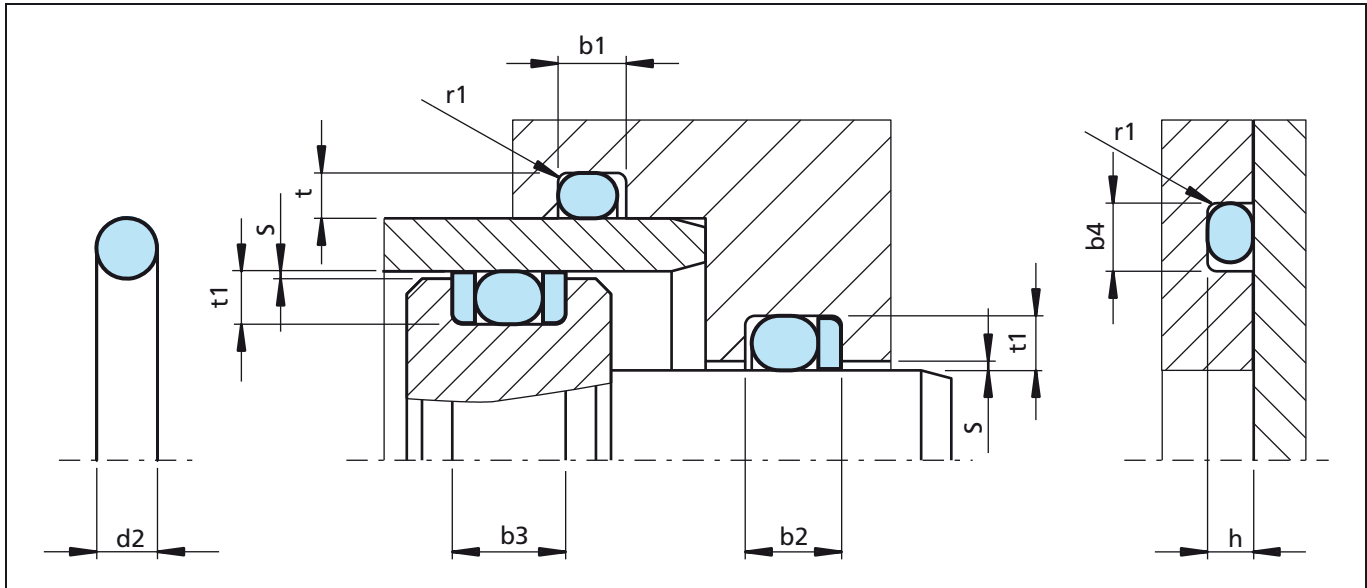


Figure 25 Installation drawing

Radial clearance, see chapter "Design Recommendations", page .

Surface specifications, see chapter "Design Recommendations", page .

Groove width b2 and b3: When using Back-up Rings the groove is to be widened by the corresponding Back-up Ring thickness (b2: one Back-up Ring, b3:two Back-up Rings).

Table XV Installation dimensions

Cross section d2	Radial installation			Axial installation		Radius ¹⁾ r1± 0.2
	Groove depth		Groove width b1 +0.2	Groove depth h +0.05	Groove width b4 +0.2	
	Dynamic t1 +0.05	Static t +0.05				
0.50	-	0.35	0.80	0.35	0.80	0.20
0.74	-	0.50	1.00	0.50	1.00	0.20
1.00	-	0.70	1.40	0.70	1.40	0.20
1.02	-	0.70	1.40	0.70	1.40	0.20
1.20	-	0.85	1.70	0.85	1.70	0.20
1.25	-	0.90	1.70	0.90	1.80	0.20
1.27	-	0.90	1.70	0.90	1.80	0.20
1.30	-	0.95	1.80	0.95	1.80	0.20
1.42	-	1.05	1.90	1.05	2.00	0.30
1.50	1.25	1.10	2.00	1.10	2.10	0.30
1.52	1.25	1.10	2.00	1.10	2.10	0.30
1.60	1.30	1.20	2.10	1.20	2.20	0.30
1.63	1.30	1.20	2.10	1.20	2.20	0.30
1.78*	1.45	1.30	2.40	1.30	2.60	0.30
1.80	1.45	1.30	2.40	1.30	2.60	0.30
1.83	1.50	1.35	2.50	1.35	2.60	0.30



Cross section d2	Radial installation			Axial installation		Radius ¹⁾ r1± 0.2
	Groove depth		Groove width	Groove depth	Groove width	
	Dynamic t1 +0.05	Static t +0.05	b1 +0.2	h +0.05	b4 +0.2	
1.90	1.55	1.40	2.60	1.40	2.70	0.30
1.98	1.65	1.50	2.70	1.50	2.80	0.30
2.00	1.65	1.50	2.70	1.50	2.80	0.30
2.08	1.75	1.55	2.80	1.55	2.90	0.30
2.10	1.75	1.55	2.80	1.55	2.90	0.30
2.20	1.85	1.60	3.00	1.60	3.00	0.30
2.26	1.90	1.70	3.00	1.70	3.10	0.30
2.30	1.95	1.75	3.10	1.75	3.10	0.30
2.34	1.95	1.75	3.10	1.75	3.10	0.30
2.40	2.05	1.80	3.20	1.80	3.30	0.30
2.46	2.10	1.85	3.30	1.85	3.40	0.30
2.50	2.15	1.90	3.30	1.85	3.40	0.30
2.62*	2.25	2.00	3.60	2.00	3.80	0.30
2.65	2.25	2.00	3.60	2.00	3.80	0.30
2.70	2.30	2.05	3.60	2.05	3.80	0.30
2.80	2.40	2.10	3.70	2.10	3.90	0.60
2.92	2.50	2.20	3.90	2.20	4.00	0.60
2.95	2.50	2.20	3.90	2.20	4.00	0.60
3.00	2.60	2.30	4.00	2.30	4.00	0.60
3.10	2.70	2.40	4.10	2.40	4.10	0.60
3.50	3.05	2.65	4.60	2.65	4.70	0.60
3.53*	3.10	2.70	4.80	2.70	5.00	0.60
3.55	3.10	2.70	4.80	2.70	5.00	0.60
3.60	3.15	2.80	4.80	2.80	5.10	0.60
4.00	3.50	3.10	5.20	3.10	5.30	0.60
4.50	4.00	3.50	5.80	3.50	5.90	0.60
5.00	4.40	4.00	6.60	4.00	6.70	0.60
5.30	4.70	4.30	7.10	4.30	7.30	0.60
5.33*	4.70	4.30	7.10	4.30	7.30	0.60
5.50	4.80	4.50	7.10	4.50	7.30	0.60
5.70	5.00	4.60	7.20	4.60	7.40	0.60
6.00	5.30	4.90	7.40	4.90	7.60	0.60
6.50	5.70	5.40	8.00	5.40	8.20	1.00
6.99*	6.10	5.80	9.50	5.80	9.70	1.00
7.00	6.10	5.80	9.50	5.80	9.70	1.00
7.50	6.60	6.30	9.70	6.30	9.90	1.00
8.00	7.10	6.70	9.80	6.70	10.00	1.00
8.40	7.50	7.10	10.00	7.10	10.30	1.00
9.00	8.10	7.70	10.60	7.70	10.90	1.50
9.50	8.60	8.20	11.00	8.20	11.40	1.50



O-Ring

Cross section d2	Radial installation			Axial installation		Radius ¹⁾
	Groove depth		Groove width	Groove depth	Groove width	
	Dynamic t1 +0.05	Static t +0.05	b1 +0.2	h +0.05	b4 +0.2	r1 ± 0.2
10.00	9.10	8.60	11.60	8.60	12.00	2.00
12.00	11.00	10.60	13.50	10.60	14.00	2.00

 * Preferred sizes

1) If a Back-up Ring is used the recommended radius r1 should always be $r1=0.25 \pm 0.2\text{mm}$.

The given installation dimensions cannot be used for FFKM materials (Isolast[®]). Please use the Isolast[®] brochure or contact our specialists for further details.



C Dimensions and product range

C.1 Dimensions and international standards

C.1.1 O-Ring range of sizes

The following table provides a summary of available O-Ring dimensions, TSS part numbers and valid standards.

The table represents a guide to common dimensions with or without a valid standard and makes no claim to be exhaustive. The complete range of sizes is more extensive. Special dimensions are also available on request. Please contact our specialists for further details.

For the given dimensions moulds generally exist. Due to different shrinkage factors of various materials, it may not be possible to process certain materials with the existing moulds.

To guarantee a high and constant quality level it might be necessary to produce new or additional moulds with the corresponding costs.

At the time of publication O-Ring moulds for the dimensions according to AS 568 B (ORAR . . .) exist for standard NBR 70 Shore A and standard FKM 70 Shore A. Subject to alterations.

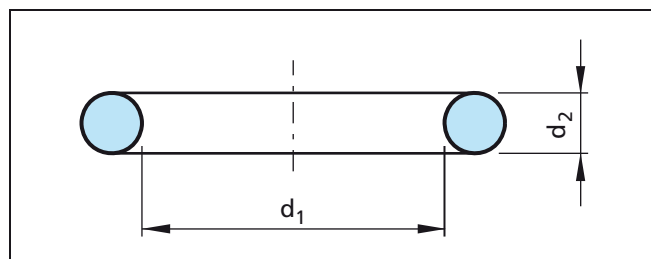


Figure 26 O-Ring dimensions

Ordering example 1

O-Ring, metric 40 x 3

Dimensions: Inside diameter = 40.0 mm
Cross section = 3.0 mm

Material: NBR 70
(Nitrile-Butadiene Rubber
70 Shore A)

TSS Article No.	OR3004000	-	N7
TSS Art. - Group			
Cross section x 10			
Inside diameter x 100			
Quality Index (Standard)			
Material code (Standard)			

O-Ring dimensions and TSS part numbers see tables XVI to XIX.

Material codes (elastomer type) for standard product order see table I (last column).

The required Shore hardness must be given with the order.

Ordering example 2

O-Ring, American Standard AS 568 B, ref. 149

Dimensions: Inside diameter = 71.12 mm
Cross section = 2.62 mm

Material: FKM 80
(Fluorocarbon Rubber
80 Shore A)

TSS Article No.	ORAR00149	-	V8
TSS Art. - Group			
Standard AS 568 B			
Part No. (Dash-No.)			
Quality Index (Standard)			
Material code (Standard)			

When a special material is required the exact five-digit Trelleborg Sealing Solutions material code must be given with the order. In this respect please refer to the information provided in Table X Preferred materials or contact your local Trelleborg Sealing Solutions company.



O-Ring

Table XVI Dimensions / TSS part numbers

Inside diameter d_1	Cross section d_2	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
0.50	1.00	OR1000050										
0.74	1.02	ORAR00001	001	x								
1.00	1.50	OR1500100										
1.07	1.27	ORAR00002		002	x							
1.20	1.00	OR1000120										
1.24	2.62	ORAR00102	102	x								
1.42	1.52	ORAR00003	003	x								
1.50	1.00	OR1000150										
1.50	1.50	OR1500150										
1.78	1.02	ORAR90212	004	x								
1.78	1.78	ORAR00004										
1.80	1.00	OR1000180										
1.80	1.20	OR1200180										
1.80	1.80	ORIA00180			x				x			
2.00	1.00	OR1000200										
2.00	1.50	OR1500200	103									
2.00	1.80	ORIA00200			x					x		
2.06	2.62	ORAR00103			x							
2.20	1.00	OR1000220										
2.24	1.80	ORIA00224			x				x			
2.40	1.90	OR1900240								R0		
2.50	1.00	OR1000250										
2.50	1.20	OR1200250										
2.50	1.30	OR1300250										
2.50	1.50	OR1500250										
2.50	1.60	OR1600250										
2.50	1.80	ORIA00250			x				x			
2.57	1.78	ORAR00005	005	x								
2.60	1.00	OR1000260										
2.60	1.20	OR1200260										
2.60	1.30	OR1300260										
2.60	1.90	OR1900260								R1		
2.70	1.60	OR1600270										
2.80	1.60	OR1600280										
2.80	1.80	ORIA00280			x				x			
2.80	1.90	OR1900280						P3				



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
2.84	2.62	ORAR00104	104	x									
2.90	1.78	ORAR00006	006	x									
3.00	1.00	OR1000300											
3.00	1.50	OR1500300											
3.00	2.00	OR2000300											
3.00	2.40	OR2400300											
3.00	2.70	OR2700300											
3.00	3.00	OR3000300											
3.10	1.60	OR1600310				x							x
3.15	1.80	ORIA00315			x				x				
3.20	1.60	OR1600320											
3.20	1.80	ORIA00320											
3.20	2.50	OR2500320											
3.30	1.00	OR1000330											
3.30	1.50	OR1500330											
3.30	2.40	OR2400330				x							x
3.40	1.90	OR1900340								R2			
3.50	1.00	OR1000350											
3.50	1.20	OR1200350											
3.50	1.50	OR1500350											
3.50	2.00	OR2000350											
3.55	1.80	ORIA00355			x				x				
3.60	2.40	OR2400360											x
3.63	2.62	ORAR00105	105	x									
3.68	1.78	ORAR00007	007	x									
3.70	1.90	OR1900370											
3.80	1.50	OR1500380											
3.80	1.90	OR1900380						P4					
3.90	1.80	ORIA00390											
4.00	1.00	OR1000400											
4.00	1.20	OR1200400											
4.00	1.50	OR1500400											
4.00	1.80	ORIA00400			x				x				
4.00	2.00	OR2000400											
4.00	2.50	OR2500400											
4.00	3.00	OR3000400											



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
4.00	4.00	OR4000400											
4.10	1.60	OR1600410				x							x
4.20	1.90	OR1900420								R3			
4.30	2.40	OR2400430											x
4.34	3.53	ORAR00201	201	x									
4.42	2.62	ORAR00106	106	x									
4.47	1.78	ORAR00008	008	x									
4.50	1.00	OR1000450											
4.50	1.50	OR1500450											
4.50	2.00	OR2000450											
4.50	2.50	OR2500450											
4.60	2.00	OR2000460											
4.60	2.40	OR2400460											x
4.70	1.00	OR1000470											
4.70	1.42	ORAR00901	901	x									
4.80	1.80	ORIA00480											
4.80	1.90	OR1900480						P5					
4.87	1.80	ORIA00487			x				x				
4.90	1.90	OR1900490								R4			
5.00	1.00	OR1000500											
5.00	1.20	OR1200500											
5.00	1.50	OR1500500											
5.00	1.80	ORIA00500			x				x				
5.00	2.00	OR2000500											
5.00	2.50	OR2500500											
5.00	3.00	OR3000500											
5.00	5.00	OR5000500											
5.10	1.60	OR1600510				x							x
5.15	1.80	ORIA00515			x				x				
5.23	2.62	ORAR00107	107	x									
5.28	1.78	ORAR00009	009	x									
5.30	1.80	ORIA00530			x				x				
5.30	2.40	OR2400530				x							x
5.50	1.00	OR1000550											
5.50	1.50	OR1500550											
5.50	1.60	OR1600550											



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
5.50	2.00	OR2000550											
5.60	1.80	ORIA00560			x					x			
5.60	2.40	OR2400560											x
5.70	1.90	OR1900570									R5		
5.80	1.90	OR1900580						P6					
5.94	3.53	ORAR00202	202	x									
6.00	1.00	OR1000600											
6.00	1.50	OR1500600											
6.00	1.80	ORIA00600			x					x			
6.00	2.00	OR2000600											
6.00	2.20	OR2200600											
6.00	2.50	OR2500600											
6.00	3.00	OR3000600											
6.02	2.62	ORAR00108	108	x									
6.07	1.63	ORAR00902	902	x									
6.07	1.78	ORAR00010	010	x									
6.10	1.60	OR1600610				x						x	x
6.30	1.80	ORIA00630			x					x			
6.30	2.40	OR2400630				x							x
6.40	1.90	OR1900640									R5A		
6.50	1.50	OR1500650											
6.50	1.60	OR1600650											
6.50	2.00	OR2000650											
6.50	3.00	OR3000650											
6.50	5.00	OR5000650											
6.60	1.60	OR1600660											
6.60	2.40	OR2400660											x
6.70	1.80	ORIA00670			x					x			
6.80	1.90	OR1900680						P7					
6.90	1.80	ORIA00690			x					x			
7.00	1.00	OR1000700											
7.00	1.20	OR1200700											
7.00	1.30	OR1300700											
7.00	1.50	OR1500700											
7.00	1.80	ORIA00700											
7.00	2.00	OR2000700											



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
7.00	2.50	OR2500700										
7.00	3.00	OR3000700										
7.00	4.00	OR4000700										
7.10	1.60	OR1600710				x						x
7.10	1.80	ORIA00710			x				x			
7.20	1.90	OR1900720								R6		
7.30	2.40	OR2400730					x					x
7.50	1.50	OR1500750										
7.50	1.80	ORIA00750			x				x			
7.50	2.00	OR2000750										
7.50	2.50	OR2500750										
7.52	3.53	ORAR00203	203	x								
7.59	2.62	ORAR00109	109	x								
7.60	2.40	OR2400760										x
7.65	1.63	ORAR00903	903	x								
7.65	1.78	ORAR00011	011	x								
7.80	1.90	OR1900780						P8				
8.00	1.00	OR1000800										
8.00	1.50	OR1500800										
8.00	1.60	OR1600800										
8.00	1.80	ORIA00800			x				x			
8.00	1.90	OR1900800								R6A		
8.00	2.00	OR2000800										
8.00	2.20	OR2200800										
8.00	2.40	OR2400800										
8.00	2.50	OR2500800										
8.00	3.00	OR3000800										
8.00	3.50	OR3500800										
8.00	4.00	OR4000800										
8.00	4.50	OR4500800										
8.00	5.00	OR5000800										
8.10	1.60	OR1600810					x				x	x
8.30	2.40	OR2400830						x				x
8.50	1.00	OR1000850										
8.50	1.50	OR1500850										
8.50	1.80	ORIA00850			x				x			



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
8.50	2.00	OR2000850										
8.50	2.50	OR2500850										
8.50	3.00	OR3000850										
8.60	2.40	OR2400860										x
8.75	1.80	ORIA00875			x				x			
8.80	1.90	OR1900880					P9					
8.90	1.90	OR1900890								R7		
8.90	2.70	OR2700890								R8		
8.92	1.83	ORAR00904	904	x								
9.00	1.00	OR1000900										
9.00	1.20	OR1200900										
9.00	1.50	OR1500900										
9.00	1.80	ORIA00900			x				x			
9.00	2.00	OR2000900										
9.00	2.50	OR2500900										
9.00	3.00	OR3000900										
9.00	4.00	OR4000900										
9.00	4.50	OR4500900										
9.00	6.00	OR6000900										
9.10	1.60	OR1600910				x						x
9.12	3.53	ORAR00204	204	x								
9.19	2.62	ORAR00110	110	x								
9.25	1.78	ORAR00012	012	x								
9.30	2.20	OR2200930									x	
9.30	2.40	OR2400930				x						x
9.50	1.00	OR1000950										
9.50	1.50	OR1500950										
9.50	1.60	OR1600950										
9.50	1.80	ORIA00950			x				x			
9.50	2.00	OR2000950										
9.50	2.50	OR2500950										
9.50	3.00	OR3000950										
9.60	2.40	OR2400960										x
9.80	1.90	OR1900980						P10				
9.80	2.40	OR2400980						P10A				
10.00	1.00	OR1001000										



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
10.00	1.50	OR1501000											
10.00	1.80	ORIA01000			x				x				
10.00	2.00	OR2001000											
10.00	2.40	OR2401000											
10.00	2.50	OR2501000											
10.00	3.00	OR3001000											
10.00	3.50	OR3501000											
10.00	4.00	OR4001000											
10.00	5.00	OR5001000											
10.10	1.60	OR1601010				x							x
10.30	2.40	OR2401030				x							x
10.46	5.33	ORAR00309	309	x									
10.50	1.50	OR1501050											
10.50	2.70	OR2701050								R9			
10.52	1.83	ORAR00905	905	x									
10.60	1.80	ORIA01060			x				x				
10.60	2.40	OR2401060											x
10.69	3.53	ORAR00205	205	x									
10.77	2.62	ORAR00111	111	x									
10.80	2.40	OR2401080						P11					
10.82	1.78	ORAR00013	013	x									
11.00	1.00	OR1001100											
11.00	1.50	OR1501100											
11.00	2.00	OR2001100											
11.00	2.40	OR2401100						P11.2					
11.00	2.50	OR2501100											
11.00	3.00	OR3001100											
11.00	3.50	OR3501100											
11.00	4.00	OR4001100											
11.10	1.60	OR1601110				x							x
11.20	1.80	ORIA01120			x				x				
11.30	2.20	OR2201130									x		
11.30	2.40	OR2401130				x							x
11.60	2.40	OR2401160											x
11.80	1.80	ORIA01180			x				x				
11.80	2.40	OR2401180						P12					



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
11.89	1.98	ORAR00906	906	x								
12.00	1.00	OR1001200										
12.00	1.50	OR1501200										
12.00	2.00	OR2001200										
12.00	2.50	OR2501200										
12.00	3.00	OR3001200										
12.00	4.00	OR4001200										
12.00	4.50	OR4501200										
12.00	5.00	OR5001200										
12.07	5.33	ORAR00310	310	x								
12.10	1.60	OR1601210				x						x
12.10	2.70	OR2701210								R10		
12.29	3.53	ORAR00206	206	x								
12.30	2.40	OR2401230					x					x
12.37	2.62	ORAR00112	112	x								
12.42	1.78	ORAR00014	014	x								
12.50	1.50	OR1501250										
12.50	1.80	ORIA01250				x				x		
12.50	2.00	OR2001250										
12.50	2.50	OR2501250										
12.60	2.40	OR2401260										x
13.00	1.00	OR1001300										
13.00	1.50	OR1501300										
13.00	2.00	OR2001300										
13.00	2.50	OR2501300										
13.00	3.00	OR3001300										
13.00	3.50	OR3501300										
13.00	4.00	OR4001300										
13.10	1.60	OR1601310				x						x
13.20	1.80	ORIA01320			x				x			
13.30	2.20	OR2201330									x	
13.30	2.40	OR2401330				x						x
13.46	2.08	ORAR00907	907	x								
13.60	2.40	OR2401360										x
13.60	2.70	OR2701360								R11		
13.64	5.33	ORAR00311	311	x								



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
13.80	2.40	OR2401380					P14					
13.87	3.53	ORAR00207	207	x								
13.94	2.62	ORAR00113	113	x								
14.00	1.00	OR1001400										
14.00	1.50	OR1501400										
14.00	1.60	OR1601400										
14.00	1.78	ORAR00015	015	x								
14.00	1.80	ORIA01400			x				x			
14.00	2.00	OR2001400										
14.00	2.40	OR2401400										
14.00	2.50	OR2501400										
14.00	2.65	ORIB01400			x				x			
14.00	2.70	OR2701400										
14.00	3.00	OR3001400										
14.00	4.00	OR4001400										
14.00	5.00	OR5001400										
14.10	1.60	OR1601410				x						x
14.30	2.40	OR2401430				x						x
14.80	2.40	OR2401480					P15					x
15.00	1.00	OR1001500										
15.00	1.50	OR1501500										
15.00	1.80	ORIA01500			x				x			
15.00	2.00	OR2001500										
15.00	2.50	OR2501500										
15.00	2.65	ORIB01500			x				x			
15.00	3.00	OR3001500										
15.00	3.50	OR3501500										
15.00	4.00	OR4001500										
15.00	5.00	OR5001500										
15.00	6.00	OR6001500										
15.00	7.00	OR7001500										
15.10	1.60	OR1601510				x						x
15.10	2.70	OR2701510							R12			
15.24	5.33	ORAR00312	312	x								
15.30	2.20	OR2201530								x		
15.30	2.40	OR2401530				x						x



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
15.47	3.53	ORAR00208	208	x									
15.54	2.62	ORAR00114	114	x									
15.60	1.78	ORAR00016	016	x									
15.60	2.40	OR2401560						P16					x
15.80	2.40	OR2401580											
16.00	1.00	OR1001600											
16.00	1.50	OR1501600											
16.00	1.80	ORIA01600			x				x				
16.00	2.00	OR2001600											
16.00	2.50	OR2501600											
16.00	2.65	ORIB01600			x				x				
16.00	3.00	OR3001600											
16.00	3.50	OR3501600											
16.00	4.00	OR4001600											
16.00	4.50	OR4501600											
16.00	5.00	OR5001600											
16.10	1.60	OR1601610				x							x
16.30	2.40	OR2401630					x						x
16.36	2.20	ORAR00908	908	x									
16.81	5.33	ORAR00313	313	x									
16.90	2.70	OR2701690								R13			
17.00	1.00	OR1001700											
17.00	1.50	OR1501700											
17.00	1.80	ORIA01700			x				x				
17.00	2.00	OR2001700											
17.00	2.50	OR2501700											
17.00	2.65	ORIB01700			x				x				
17.00	3.00	OR3001700											
17.00	3.50	OR3501700											
17.00	4.00	OR4001700											
17.00	5.00	OR5001700											
17.04	3.53	ORAR00209	209	x									
17.10	1.60	OR1601710				x							x
17.12	2.62	ORAR00115	115	x									
17.17	1.78	ORAR00017	017	x									
17.20	3.00	OR3001720										x	



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
17.30	2.20	OR2201730										
17.30	2.40	OR2401730				x					x	
17.60	2.40	OR2401760										x
17.80	2.40	OR2401780					P18					
17.93	2.46	ORAR00909	909	x								
18.00	1.00	OR1001800										
18.00	1.50	OR1501800										
18.00	2.00	OR2001800										
18.00	2.50	OR2501800										
18.00	2.65	ORIB01800			x				x			
18.00	3.00	OR3001800										
18.00	3.50	OR3501800										
18.00	3.55	ORIC01800			x				x			
18.00	4.00	OR4001800										
18.00	4.50	OR4501800										
18.00	5.00	OR5001800										
18.10	1.60	OR1601810				x						x
18.20	3.00	OR3001820										x
18.30	2.40	OR2401830										x
18.30	3.60	OR3601830							R15			
18.40	2.70	OR2701840							R14			
18.42	5.33	ORAR00314	314	x								
18.60	2.40	OR2401860										x
18.64	3.53	ORAR00210	210	x								
18.72	2.62	ORAR00116	116	x								
18.77	1.78	ORAR00018	018	x								
19.00	1.00	OR1001900										
19.00	1.50	OR1501900										
19.00	1.80	ORIA01900										
19.00	2.00	OR2001900										
19.00	2.50	OR2501900										
19.00	2.65	ORIB01900			x				x			
19.00	3.50	OR3501900										
19.00	3.55	ORIC01900			x				x			
19.00	4.00	OR4001900										
19.00	5.00	OR5001900										



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
19.00	6.00	OR6001900										
19.10	1.60	OR1601910				x						x
19.18	2.46	ORAR00910	910	x								
19.20	3.00	OR3001920				x						x
19.30	2.20	OR2201930								x		
19.30	2.40	OR2401930										x
19.50	3.00	OR3001950										x
19.60	2.40	OR2401960										x
19.80	2.40	OR2401980					P20					
19.80	3.60	OR3601980								R16		
19.99	5.33	ORAR00315	315	x								
20.00	1.00	OR1002000										
20.00	1.30	OR1302000										
20.00	1.50	OR1502000										
20.00	2.00	OR2002000										
20.00	2.50	OR2502000										
20.00	2.65	ORIB02000			x				x			
20.00	3.00	OR3002000										
20.00	3.50	OR3502000										
20.00	3.55	ORIC02000			x				x			
20.00	4.00	OR4002000										
20.00	4.50	OR4502000										
20.00	5.00	OR5002000										
20.00	6.00	OR6002000										
20.10	1.60	OR1602010										x
20.20	3.00	OR3002020										x
20.22	3.53	ORAR00211	211	x								
20.29	2.62	ORAR00117	117	x								
20.30	2.40	OR2402030										x
20.35	1.78	ORAR00019	019	x								
20.60	2.40	OR2402060										x
20.80	2.40	OR2402080						P21				
21.00	2.00	OR2002100										
21.00	2.50	OR2502100										
21.00	3.00	OR3002100										
21.00	4.00	OR4002100										



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
21.00	6.00	OR6002100										
21.10	1.60	OR1602110										x
21.20	2.65	ORIB02120			x				x			
21.20	3.00	OR3002120										x
21.20	3.55	ORIC02120			x				x			
21.30	2.40	OR2402130										
21.30	3.60	OR3602130								R17		
21.50	3.00	OR3002150										x
21.59	5.33	ORAR00316	316	x								
21.60	2.40	OR2402160										x
21.70	3.50	OR3502170						P22A				
21.80	2.40	OR2402180						P22				
21.82	3.53	ORAR00212	212	x								
21.89	2.62	ORAR00118	118	x								
21.92	2.95	ORAR00911	911	x								
21.95	1.78	ORAR00020	020	x								
22.00	1.00	OR1002200										
22.00	1.30	OR1302200										
22.00	1.50	OR1502200										
22.00	2.00	OR2002200										
22.00	2.50	OR2502200										
22.00	3.00	OR3002200										
22.00	3.50	OR3502200										
22.00	4.00	OR4002200										
22.00	4.50	OR4502200										
22.00	5.00	OR5002200										
22.00	6.00	OR6002200										
22.10	1.60	OR1602210				x						x
22.10	3.50	OR3502210						P22.4				
22.20	3.00	OR3002220				x						x
22.30	2.40	OR2402230										x
22.40	2.65	ORIB02240			x				x			
22.40	3.55	ORIC02240			x				x			
22.50	3.00	OR3002250										x
23.00	1.00	OR1002300										
23.00	1.50	OR1502300										



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
23.00	2.00	OR2002300											
23.00	2.50	OR2502300											
23.00	3.00	OR3002300											
23.00	3.60	OR3602300								R18			
23.00	4.00	OR4002300											
23.00	5.00	OR5002300											
23.00	5.50	OR5502300											
23.00	6.00	OR6002300											
23.16	5.33	ORAR00317	317	x									
23.30	2.40	OR2402330											x
23.39	3.53	ORAR00213	213	x									
23.47	2.62	ORAR00119	119	x									
23.47	2.95	ORAR00912	912	x									
23.52	1.78	ORAR00021	021	x									
23.60	2.65	ORIB02360			x					x			
23.60	2.90	OR2902360										x	
23.60	3.55	ORIC02360			x					x			
23.70	3.50	OR3502370						P24					
24.00	1.00	OR1002400											
24.00	1.50	OR1502400											
24.00	2.00	OR2002400											
24.00	2.50	OR2502400											
24.00	3.00	OR3002400											
24.00	3.50	OR3502400											
24.00	4.00	OR4002400											
24.00	5.00	OR5002400											
24.00	6.00	OR6002400											
24.20	3.00	OR3002420				x							x
24.40	3.10	OR3102440						G25					
24.50	3.00	OR3002450											x
24.60	2.40	OR2402460											x
24.60	3.60	OR3602460								R19			
24.70	3.50	OR3502470						P25					
24.77	5.33	ORAR00318	318	x									
24.99	3.53	ORAR00214	214	x									
25.00	1.00	OR1002500											



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
25.00	1.50	OR1502500											
25.00	2.00	OR2002500											
25.00	2.50	OR2502500											
25.00	2.65	ORIB02500			x				x				
25.00	3.00	OR3002500											
25.00	3.55	ORIC02500			x				x				
25.00	4.00	OR4002500											
25.00	4.50	OR4502500											
25.00	5.00	OR5002500											
25.00	6.00	OR6002500											
25.04	2.95	ORAR00913	913	x									
25.07	2.62	ORAR00120	120	x									
25.10	1.60	OR1602510				x							x
25.12	1.78	ORAR00022	022	x									
25.20	3.00	OR3002520											x
25.20	3.50	OR3502520						P25.5					
25.30	2.40	OR2402530											x
25.50	3.00	OR3002550											x
25.70	3.50	OR3502570						P26					
25.80	2.65	ORIB02580			x				x				
25.80	3.55	ORIC02580			x				x				
26.00	1.00	OR1002600											
26.00	1.50	OR1502600											
26.00	2.00	OR2002600											
26.00	2.50	OR2502600											
26.00	3.50	OR3502600											
26.00	4.00	OR4002600											
26.00	5.00	OR5002600											
26.00	6.00	OR6002600											
26.20	3.00	OR3002620					x						x
26.20	3.60	OR3602620								R20			
26.34	5.33	ORAR00319	319	x									
26.50	3.00	OR3002650											x
26.57	3.53	ORAR00215	215	x									
26.62	2.95	ORAR00914	914	x									
26.64	2.62	ORAR00121	121	x									



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard											
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518			
26.70	1.78	ORAR00023	023	x										
27.00	1.50	OR1502700												
27.00	2.00	OR2002700												
27.00	2.50	OR2502700												
27.00	3.00	OR3002700												
27.00	4.00	OR4002700												
27.00	4.50	OR4502700												
27.00	5.00	OR5002700												
27.00	6.00	OR6002700												
27.10	1.60	OR1602710				x							x	
27.30	2.40	OR2402730											x	
27.50	3.00	OR3002750											x	
27.60	2.40	OR2402760											x	
27.70	3.50	OR3502770						P28						
27.80	3.60	OR3602780							R21					
27.94	5.33	ORAR00320	320	x										
28.00	1.00	OR1002800												
28.00	1.50	OR1502800												
28.00	2.00	OR2002800												
28.00	2.50	OR2502800												
28.00	2.65	ORIB02800			x				x					
28.00	3.00	OR3002800												
28.00	3.55	ORIC02800			x				x					
28.00	4.00	OR4002800												
28.00	5.00	OR5002800												
28.00	6.00	OR6002800												
28.17	3.53	ORAR00216	216	x										
28.24	2.62	ORAR00122			122	x								
28.30	1.78	ORAR00024			024	x								
28.70	3.50	OR3502870						P29						
29.00	1.50	OR1502900												
29.00	2.00	OR2002900												
29.00	2.50	OR2502900												
29.00	3.00	OR3002900												
29.00	3.50	OR3502900												
29.00	5.00	OR5002900												



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
29.10	1.60	OR1602910				x						x
29.20	3.00	OR3002920				x						x
29.20	3.50	OR3502920						P29.5				
29.30	3.60	OR3602930								R22		
29.40	3.10	OR3102940						G30				
29.50	1.50	OR1502950										
29.50	3.00	OR3002950										x
29.50	4.50	OR4502950										
29.51	5.33	ORAR00321	321	x								
29.60	2.40	OR2402960										x
29.60	2.90	OR2902960									x	
29.70	3.50	OR3502970						P30				
29.74	2.95	ORAR00916	916	x								
29.74	3.53	ORAR00217	217	x								
29.82	2.62	ORAR00123	123	x								
29.87	1.78	ORAR00025	025	x								
30.00	1.00	OR1003000										
30.00	1.50	OR1503000										
30.00	2.00	OR2003000										
30.00	2.50	OR2503000										
30.00	2.65	ORIB03000				x				x		
30.00	3.00	OR3003000										
30.00	3.50	OR3503000										
30.00	3.55	ORIC03000				x				x		
30.00	4.00	OR4003000										
30.00	4.50	OR4503000										
30.00	5.00	OR5003000										
30.00	6.00	OR6003000										
30.00	7.00	ORIE03000										
30.20	3.00	OR3003020										x
30.30	2.40	OR2403030										x
30.70	3.50	OR3503070						P31				
30.80	3.60	OR3603080								R23		
31.00	1.50	OR1503100										
31.00	2.00	OR2003100										
31.00	2.50	OR2503100										



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
31.00	3.00	OR3003100										
31.00	3.50	OR3503100										
31.00	4.00	OR4003100										
31.12	5.33	ORAR00322	322				P31.5					
31.20	3.00	OR3003120										x
31.20	3.50	OR3503120										
31.34	3.53	ORAR00218	218	x								
31.42	2.62	ORAR00124	124	x								
31.47	1.78	ORAR00026	026	x								
31.50	2.65	ORIB03150			x			x				
31.50	3.00	OR3003150										x
31.50	3.55	ORIC03150			x			x				
31.60	2.40	OR2403160										x
31.70	3.50	OR3503170					P32					
32.00	1.00	OR1003200										
32.00	1.50	OR1503200										
32.00	2.00	OR2003200										
32.00	2.50	OR2503200										
32.00	3.00	OR3003200										
32.00	3.50	OR3503200										
32.00	4.00	OR4003200										
32.00	5.00	OR5003200										
32.10	1.60	OR1603210				x						x
32.20	3.00	OR3003220				x						x
32.50	2.65	ORIB03250			x			x				
32.50	3.00	OR3003250										x
32.50	3.55	ORIC03250			x			x				
32.50	3.60	OR3603250							R24			
32.69	5.33	ORAR00323	323	x								
32.92	3.53	ORAR00219	219	x								
32.99	2.62	ORAR00125	125	x								
33.00	1.50	OR1503300										
33.00	2.00	OR2003300										
33.00	2.50	OR2503300										
33.00	3.00	OR3003300										
33.00	3.50	OR3503300										



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
33.00	4.00	OR4003300										
33.05	1.78	ORAR00027	027	x								
33.30	2.40	OR2403330										x
33.50	2.65	ORIB03350			x				x			
33.50	3.55	ORIC03350			x				x			
33.70	3.50	OR3503370						P34				
34.00	1.00	OR1003400										
34.00	2.00	OR2003400										
34.00	2.30	OR2303400										
34.00	2.50	OR2503400										
34.00	3.00	OR3003400										
34.00	4.00	OR4003400										
34.00	5.00	OR5003400										
34.00	6.00	OR6003400										
34.10	3.60	OR3603410								R25		
34.20	3.00	OR3003420				x						x
34.29	5.33	ORAR00324	324	x								
34.40	3.10	OR3103440						G35				
34.42	2.95	ORAR00918	918	x								
34.50	2.65	ORIB03450			x				x			
34.50	3.00	OR3003450										x
34.50	3.55	ORIC03450			x				x			
34.52	3.53	ORAR00220	220	x								
34.59	2.62	ORAR00126	126	x								
34.60	2.40	OR2403460										x
34.65	1.78	ORAR00028	028	x								
34.70	3.50	OR3503470						P35				
35.00	1.50	OR1503500										
35.00	2.00	OR2003500										
35.00	2.50	OR2503500										
35.00	3.00	OR3003500										
35.00	3.50	OR3503500										
35.00	4.00	OR4003500										
35.00	5.00	OR5003500										
35.00	6.00	OR6003500										
35.00	7.00	ORIE03500										





Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
35.10	1.60	OR1603510				x						x
35.20	3.00	OR3003520										x
35.20	3.50	OR3503520					P35.5					
35.20	5.70	OR5703520										x
35.50	2.65	ORIB03550			x			x				
35.50	3.00	OR3003550										x
35.50	3.55	ORIC03550			x			x				
35.60	2.40	OR2403560										x
35.60	3.60	OR3603560							R26			
35.70	3.50	OR3503570					P36					
36.00	1.50	OR1503600										
36.00	2.00	OR2003600										
36.00	2.50	OR2503600										
36.00	3.00	OR3003600										
36.00	4.00	OR4003600										
36.00	4.50	OR4503600										
36.00	5.00	OR5003600										
36.00	6.00	OR6003600										
36.09	3.53	ORAR00221	221	x								
36.17	2.62	ORAR00127	127	x								
36.20	3.00	OR3003620				x						x
36.20	5.70	OR5703620										x
36.50	2.65	ORIB03650			x			x				
36.50	3.55	ORIC03650			x			x				
37.00	2.00	OR2003700										
37.00	2.50	OR2503700										
37.00	3.00	OR3003700										
37.00	3.50	OR3503700										
37.10	1.60	OR1603710				x						x
37.20	3.00	OR3003720										x
37.20	5.70	OR5703720										x
37.30	3.60	OR3603730							R27			
37.47	3.00	ORAR00920	920	x								
37.47	5.33	ORAR00325	325	x						R28		
37.50	2.65	ORIB03750			x			x				
37.50	3.00	OR3003750										x



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard								
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518
37.50	3.55	ORIC03750			x				x		
37.60	2.40	OR2403760									x
37.69	3.53	ORAR00222	222	x							
37.70	3.50	OR3503770					P38				
37.77	2.62	ORAR00128	128	x							
37.82	1.78	ORAR00029	029	x							
38.00	1.00	OR1003800									
38.00	1.50	OR1503800									
38.00	2.00	OR2003800									
38.00	2.50	OR2503800									
38.00	3.00	OR3003800									
38.00	3.50	OR3503800									
38.00	4.00	OR4003800									
38.00	4.50	OR4503800									
38.00	5.00	OR5003800									
38.00	6.00	OR6003800									
38.00	7.00	ORIE03800									
38.60	2.90	OR2903860								x	
38.70	2.65	ORIB03870			x				x		
38.70	3.50	OR3503870					P39				
38.70	3.55	ORIC03870			x				x		
39.00	1.50	OR1503900									
39.00	2.00	OR2003900									
39.00	2.50	OR2503900									
39.00	3.00	OR3003900									
39.00	4.00	OR4003900									
39.00	5.50	OR5503900									
39.20	3.00	OR3003920				x					x
39.20	5.70	OR5703920									x
39.34	2.62	ORAR00129	129	x							
39.40	3.10	OR3103940					G40				
39.50	3.00	OR3003950									x
39.60	2.40	OR2403960									x
39.70	3.50	OR3503970					P40				
40.00	1.00	OR1004000									
40.00	1.50	OR1504000									

O-Ring



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
40.00	2.00	OR2004000										
40.00	2.50	OR2504000										
40.00	3.00	OR3004000										
40.00	3.50	OR3504000										
40.00	3.55	ORIC04000			x				x			
40.00	4.00	OR4004000										
40.00	4.50	OR4504000										
40.00	5.00	OR5004000										
40.00	5.30	ORID04000			x				x			
40.00	5.50	OR5504000										
40.00	6.00	OR6004000										
40.00	7.00	ORIE04000										
40.00	7.50	OR7504000										
40.20	3.00	OR3004020										x
40.64	5.33	ORAR00326	326	x						R29		
40.70	3.50	OR3504070					P41					
40.87	3.53	ORAR00223	223	x								
40.94	2.62	ORAR00130	130	x								
41.00	1.78	ORAR00030	030	x								
41.00	2.00	OR2004100										
41.00	3.00	OR3004100										
41.00	4.00	OR4004100										
41.00	7.50	OR7504100										
41.20	3.55	ORIC04120			x				x			
41.20	5.30	ORID04120			x				x			
41.20	5.70	OR5704120										x
41.50	3.00	OR3004150										x
41.60	2.40	OR2404160										x
41.70	3.50	OR3504170					P42					
42.00	1.00	OR1004200										
42.00	1.50	OR1504200										
42.00	2.00	OR2004200										
42.00	2.50	OR2504200										
42.00	3.00	OR3004200										
42.00	3.50	OR3504200										
42.00	4.00	OR4004200										



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
42.00	4.50	OR4504200										
42.00	5.00	OR5004200										
42.00	6.00	OR6004200										
42.20	3.00	OR3004220				x						x
42.50	3.55	ORIC04250			x				x			x
42.50	5.30	ORID04250			x				x			
42.52	2.62	ORAR00131	131	x								
43.00	1.60	OR1604300										
43.00	2.00	OR2004300										
43.00	2.50	OR2504300										
43.00	3.00	OR3004300										
43.00	3.50	OR3504300										
43.00	6.00	OR6004300										
43.69	3.00	ORAR00924	924	x				P44				
43.70	3.50	OR3504370										
43.70	3.55	ORIC04370			x				x			
43.70	5.30	ORID04370			x				x			
43.82	5.33	ORAR00327	327	x						R30		
44.00	2.00	OR2004400										
44.00	2.50	OR2504400										
44.00	3.00	OR3004400										
44.00	4.00	OR4004400										
44.00	4.50	OR4504400										
44.00	5.00	OR5004400										
44.00	6.00	OR6004400										
44.04	3.53	ORAR00224	224	x								
44.12	2.62	ORAR00132	132	x								
44.17	1.78	ORAR00031	031	x								
44.20	3.00	OR3004420				x						x
44.30	5.70	OR5704420				x						x
44.40	3.10	OR3104440						G45				
44.50	3.00	OR3004450										x
44.60	2.40	OR2404460										x
44.60	2.90	OR2904460									x	
44.70	3.50	OR3504470						P45				
45.00	1.00	OR1004500										



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
45.00	1.50	OR1504500											
45.00	2.00	OR2004500											
45.00	2.50	OR2504500											
45.00	3.00	OR3004500											
45.00	3.50	OR3504500											
45.00	3.55	ORIC04500			x				x				
45.00	4.00	OR4004500											
45.00	4.50	OR4504500											
45.00	5.00	OR5004500											
45.00	5.30	ORID04500			x				x				
45.00	5.50	OR5504500											
45.00	6.00	OR6004500											
45.00	7.00	ORIE04500											
45.20	3.00	OR3004520											x
45.30	5.70	OR5704530											x
45.60	2.40	OR2404560											x
45.69	2.62	ORAR00133	133	x									
45.70	3.50	OR3504570						P46					
46.00	2.00	OR2004600											
46.00	2.50	OR2504600											
46.00	3.00	OR3004600											
46.00	3.50	OR3504600											
46.00	4.00	OR4004600											
46.00	4.50	OR4504600											
46.00	5.00	OR5004600											
46.00	6.00	OR6004600											
46.20	3.00	OR3004620											x
46.20	3.55	ORIC04620			x				x				
46.20	5.30	ORID04620			x				x				
46.99	5.33	ORAR00328	328	x						R31			
47.00	2.00	OR2004700											
47.00	2.50	OR2504700											
47.00	3.00	OR3004700											
47.00	4.00	OR4004700											
47.00	5.00	OR5004700											
47.20	5.70	OR5704720											



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard											
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518			
47.22	3.53	ORAR00225	225	x										
47.29	2.62	ORAR00134	134	x										
47.30	5.70	OR5704730												x
47.35	1.78	ORAR00032	032	x										
47.50	3.55	ORIC04750			x				x					
47.50	5.30	ORID04750			x				x					
47.60	2.40	OR2404760												x
47.60	5.70	OR5704760						P48A						
47.70	3.50	OR3504770						P47						
48.00	1.00	OR1004800												
48.00	1.50	OR1504800												
48.00	2.00	OR2004800												
48.00	2.50	OR2504800												
48.00	3.00	OR3004800												
48.00	4.00	OR4004800												
48.00	4.50	OR4504800												
48.00	5.00	OR5004800												
48.00	6.00	OR6004800												
48.00	7.00	ORIE04800												
48.70	3.50	OR3504870						P49						
48.70	3.55	ORIC04870			x				x					
48.70	5.30	ORID04870			x				x					
48.90	2.62	ORAR00135	135	x										
49.00	1.50	OR1504900												
49.00	2.50	OR2504900												
49.00	3.00	OR3004900												
49.00	3.50	OR3504900												
49.00	4.00	OR4004900												
49.20	5.70	OR5704920				x								x
49.40	3.10	OR3104940						G50						
49.50	3.00	OR3004950					x							x
49.60	2.40	OR2404960												x
49.60	5.70	OR5704960						P50A						
49.70	3.50	OR3504970						P50						
50.00	1.50	OR1505000												
50.00	2.00	OR2005000												



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
50.00	2.50	OR2505000											
50.00	3.00	OR3005000											
50.00	3.55	ORIC05000			x					x			
50.00	4.00	OR4005000											
50.00	4.50	OR4505000											
50.00	5.00	OR5005000											
50.00	5.30	ORID05000			x					x			
50.00	5.50	OR5505000											
50.00	6.00	OR6005000											
50.00	6.50	OR6505000											
50.00	7.00	ORIE05000											
50.17	5.33	ORAR00329	329	x							R32		
50.20	3.00	OR3005020											x
50.39	3.53	ORAR00226	226	x									
50.47	2.62	ORAR00136	136	x									
50.52	1.78	ORAR00033	033	x									
51.00	2.50	OR2505100											
51.00	3.00	OR3005100											
51.00	4.00	OR4005100											
51.00	4.50	OR4505100											
51.00	5.50	OR5505100											
51.20	5.70	OR5705120											x
51.50	1.50	OR1505150											
51.50	3.55	ORIC05150			x					x			
51.50	5.30	ORID05150			x					x			
51.60	2.40	OR2405160											x
51.60	5.70	OR5705160						P52					
52.00	1.50	OR1505200											
52.00	2.00	OR2005200											
52.00	2.50	OR2505200											
52.00	3.00	OR3005200											
52.00	3.50	OR3505200											
52.00	4.00	OR4005200											
52.00	5.00	OR5005200											
52.00	6.00	OR6005200											
52.07	2.62	ORAR00137	137	x									



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
55.00	3.50	OR3505500										
55.00	4.00	OR4005500										
55.00	5.00	OR5005500										
55.00	6.00	OR6005500										
55.20	3.00	OR3005520										x
55.25	2.62	ORAR00139	139	x								
55.30	5.70	OR5705530										x
55.50	3.00	OR3005550										x
55.60	2.40	OR2405560										x
55.60	5.70	OR5705560					P56					x
56.00	2.00	OR2005600										
56.00	2.50	OR2505600										
56.00	3.00	OR3005600										
56.00	3.55	ORIC05600			x				x			
56.00	4.00	OR4005600										
56.00	4.50	OR4505600										
56.00	5.20	OR5205600										
56.00	5.30	ORID05600			x				x			
56.20	3.00	OR3005620										x
56.52	5.33	ORAR00331	331	x						R34		
56.60	2.90	OR2905660									x	
56.74	3.53	ORAR00228	228	x								
56.82	2.62	ORAR00140	140	x								
56.87	1.78	ORAR00035	035	x								
57.00	1.50	OR1505700										
57.00	2.00	OR2005700										
57.00	2.50	OR2505700										
57.00	3.00	OR3005700										
57.00	4.00	OR4005700										
57.00	4.50	OR4505700										
57.00	8.00	OR8005700										
57.20	3.00	OR3005720										x
57.20	5.70	OR5705720										
57.30	5.70	OR5705730										x
57.50	3.00	OR3005750										x
57.60	2.40	OR2405760										x



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard								
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518
57.60	5.70	OR5705760					P58				
58.00	2.00	OR2005800									
58.00	2.50	OR2505800									
58.00	3.00	OR3005800									
58.00	3.55	ORIC05800			x			x			
58.00	4.00	OR4005800									
58.00	5.00	OR5005800									
58.00	5.30	ORID05800			x			x			
58.00	5.50	OR5505800									
58.00	6.00	OR6005800									
58.00	7.00	ORIE05800									
58.42	2.62	ORAR00141	141	x							
58.60	2.40	OR2405860									x
59.00	1.50	OR1505900									
59.00	2.50	OR2505900									
59.00	3.00	OR3005900									
59.20	5.70	OR5705920				x					
59.30	5.70	OR5705930									x
59.36	3.00	ORAR00932	932	x							
59.40	3.10	OR3105940					G60				
59.50	3.00	OR3005950				x					x
59.60	2.40	OR2405960									x
59.60	5.70	OR5705960					P60				
59.69	5.33	ORAR00332	332	x					R35		
59.92	3.53	ORAR00229	229	x							
59.99	2.62	ORAR00142	142	x							
60.00	1.50	OR1506000									
60.00	2.00	OR2006000									
60.00	2.50	OR2506000									
60.00	3.00	OR3006000									
60.00	3.50	OR3506000									
60.00	3.55	ORIC06000			x			x			
60.00	4.00	OR4006000									
60.00	4.50	OR4506000									
60.00	5.00	OR5006000									
60.00	5.30	ORID06000			x			x			



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
60.00	6.00	OR6006000											
60.00	7.00	ORIE06000											
60.05	1.78	ORAR00036	036	x									
60.50	3.00	OR3006050											x
61.00	5.00	OR5006100											
61.20	5.70	OR5706120											
61.30	5.70	OR5706130											x
61.50	3.55	ORIC06150			x				x				
61.50	5.30	ORID06150			x				x				
61.60	2.40	OR2406160											x
61.60	2.62	ORAR00143	143	x									
61.60	5.70	OR5706160						P62					
62.00	1.50	OR1506200											
62.00	2.00	OR2006200											
62.00	2.50	OR2506200											
62.00	3.00	OR3006200											
62.00	4.00	OR4006200											
62.00	5.00	OR5006200											
62.00	6.00	OR6006200											
62.20	3.00	OR3006220											x
62.20	5.70	OR5706220											
62.30	5.70	OR5706230											x
62.60	2.40	OR2406260											x
62.60	5.70	OR5706260						P63					
62.87	5.33	ORAR00333	333	x						R36			
63.00	1.50	OR1506300											
63.00	2.00	OR2006300											
63.00	2.50	OR2506300											
63.00	3.00	OR3006300											
63.00	3.55	ORIC06300			x				x				
63.00	4.00	OR4006300											
63.00	4.50	OR4506300											
63.00	5.00	OR5006300											
63.00	5.30	ORID06300			x				x				
63.00	7.00	ORIE06300											
63.09	3.53	ORAR00230	230	x									



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
63.17	2.62	ORAR00144	144	x									
63.22	1.78	ORAR00037	037	x									
64.00	3.00	OR3006400											
64.00	3.50	OR3506400											
64.00	4.00	OR4006400											
64.00	5.00	OR5006400											
64.00	6.00	OR6006400											
64.20	5.70	OR5706420				x							
64.30	5.70	OR5706430											x
64.40	3.10	OR3106440						G65					
64.50	3.00	OR3006450				x							x
64.60	2.40	OR2406460											x
64.60	5.70	OR5706460						P65					
64.77	2.62	ORAR00145	145	x									
65.00	1.50	OR1506500											
65.00	2.00	OR2006500											
65.00	2.50	OR2506500											
65.00	3.00	OR3006500											
65.00	3.50	OR3506500											
65.00	3.55	ORIC06500			x				x				
65.00	4.00	OR4006500											
65.00	4.50	OR4506500											
65.00	5.00	OR5006500											
65.00	5.30	ORID06500			x				x				
65.00	5.50	OR5506500											
66.00	2.00	OR2006600											
66.00	3.00	OR3006600											
66.00	5.00	OR5006600											
66.04	5.33	ORAR00334	334	x						R37			
66.27	3.53	ORAR00231	231	x									
66.34	2.62	ORAR00146	146	x									
66.40	1.78	ORAR00038	038	x									
66.60	5.70	OR5706660						P67					
67.00	1.50	OR1506700											
67.00	2.00	OR2006700											
67.00	2.50	OR2506700											



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
67.00	3.00	OR3006700										
67.00	3.55	ORIC06700			x				x			
67.00	4.00	OR4006700										
67.00	5.30	ORID06700			x				x			
67.20	3.00	OR3006720										
67.20	5.70	OR5706720										
67.30	5.70	OR5706730										x
67.60	2.40	OR2406760										x
67.95	2.62	ORAR00147	147	x								
68.00	2.00	OR2006800										
68.00	2.50	OR2506800										
68.00	3.00	OR3006800										
68.00	4.00	OR4006800										
68.00	5.00	OR5006800										
68.00	5.50	OR5506800										
68.00	6.00	OR6006800										
68.00	7.00	ORIE06800										
69.00	1.50	OR1506900										
69.00	3.00	OR3006900										
69.00	3.55	ORIC06900			x				x			
69.00	4.50	OR4506900										
69.00	5.30	ORID06900			x				x			
69.00	6.00	OR6006900										
69.20	5.70	OR5706920				x						
69.22	5.33	ORAR00335	335	x						R38		
69.30	5.70	OR5706930										x
69.40	3.10	OR3106940						G70				
69.44	3.53	ORAR00232	232	x								
69.50	3.00	OR3006950				x						x
69.52	2.62	ORAR00148	148	x								
69.57	1.78	ORAR00039	039	x								
69.60	2.40	OR2406960										x
69.60	5.70	OR5706960						P70				
70.00	2.00	OR2007000										
70.00	2.50	OR2507000										
70.00	3.00	OR3007000										



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
70.00	4.00	OR4007000										
70.00	4.50	OR4507000										
70.00	5.00	OR5007000										
70.00	5.50	OR5507000										
70.00	6.00	OR6007000										
70.00	7.00	ORIE07000										
70.60	5.70	OR5707060					P71					
71.00	2.00	OR2007100										
71.00	3.00	OR3007100										
71.00	3.55	ORIC07100			x			x				
71.00	5.30	ORID07100			x			x				
71.12	2.62	ORAR00149	149	x								
71.20	5.70	OR5707120										
71.30	5.70	OR5707130										x
71.50	1.50	OR1507150										
72.00	2.00	OR2007200										
72.00	2.50	OR2507200										
72.00	3.00	OR3007200										
72.00	4.00	OR4007200										
72.00	5.00	OR5007200										
72.00	5.50	OR5507200										
72.00	7.00	ORIE07200										
72.30	5.70	OR5707230										x
72.39	5.33	ORAR00336	336	x					R39			
72.62	3.53	ORAR00233	233	x								
72.69	2.62	ORAR00150	150	x								
72.75	1.78	ORAR00040	040	x								
73.00	2.00	OR2007300										
73.00	2.50	OR2507300										
73.00	3.00	OR3007300										
73.00	3.55	ORIC07300			x			x				
73.00	5.00	OR5007300										
73.00	5.30	ORID07300			x			x				
74.00	1.00	OR1007400										
74.00	1.50	OR1507400										
74.00	2.00	OR2007400										



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard								
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518
77.50	5.30	ORID07750			x				x		
78.00	1.50	OR1507800									
78.00	2.00	OR2007800									
78.00	3.00	OR3007800									
78.00	3.50	OR3507800									
78.00	4.00	OR4007800									
78.00	5.00	OR5007800									
78.00	6.00	OR6007800									
78.74	5.33	ORAR00338	338	x						R41	
78.97	3.53	ORAR00235	235	x							
79.00	2.00	OR2007900									
79.00	3.00	OR3007900									
79.20	5.70	OR5707920				x					
79.30	5.70	OR5707930									x
79.40	3.10	OR3107940						G80			
79.50	3.00	OR3007950									x
79.50	7.00	ORIE07950									
79.60	5.70	OR5707960						P80			
80.00	1.50	OR1508000									
80.00	2.00	OR2008000									
80.00	2.50	OR2508000									
80.00	3.00	OR3008000									
80.00	3.55	ORIC08000			x				x		
80.00	4.00	OR4008000									
80.00	4.50	OR4508000									
80.00	5.00	OR5008000									
80.00	5.30	ORID08000			x				x		
80.00	5.50	OR5508000									
80.00	6.00	OR6008000									
80.50	1.50	OR1508050									
81.00	7.00	ORIE08100									
81.30	5.70	OR5708130									x
81.92	5.33	ORAR00339	339	x						R42	
82.00	3.00	OR3008200									
82.00	4.00	OR4008200									
82.00	5.00	OR5008200									



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
82.14	3.53	ORAR00236	236	x								
82.20	5.70	OR5708220										
82.22	2.62	ORAR00152	152	x								
82.27	1.78	ORAR00042	042	x								
82.50	3.55	ORIC08250				x			x			
82.50	5.30	ORID08250				x			x			
83.00	2.00	OR2008300										
83.00	3.00	OR3008300										
84.00	2.00	OR2008400										
84.00	3.00	OR3008400										
84.00	4.00	OR4008400										
84.00	6.00	OR6008400										
84.10	5.70	OR5708410				x						
84.20	5.70	OR5708420										
84.30	5.70	OR5708430										x
84.40	3.10	OR3108440					G85					
84.50	3.00	OR3008450				x						x
84.60	5.70	OR5708460					P85					
85.00	2.00	OR2008500										
85.00	2.50	OR2508500										
85.00	3.00	OR3008500										
85.00	3.55	ORIC08500			x				x			
85.00	4.00	OR4008500										
85.00	4.50	OR4508500										
85.00	5.00	OR5008500										
85.00	5.30	ORID08500			x				x			
85.00	5.50	OR5508500										
85.00	6.00	OR6008500										
85.00	7.00	ORIE08500										
85.09	5.33	ORAR00340	340	x						R43		
85.32	3.53	ORAR00237	237	x								
85.50	2.50	OR2508550										
86.00	2.00	OR2008600										
86.00	3.00	OR3008600										
86.00	4.00	OR4008600										
86.00	4.50	OR4508600										



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
87.00	4.00	OR4008700										
87.00	5.00	OR5008700										
87.20	5.70	OR5708720										
87.30	5.70	OR5708730										x
87.50	3.55	ORIC08750			x				x			
87.50	5.30	ORID08750			x				x			
88.00	1.50	OR1508800										
88.00	3.00	OR3008800										
88.00	4.00	OR4008800										
88.00	5.00	OR5008800										
88.00	6.00	OR6008800										
88.27	5.33	ORAR00341	341	x						R44		
88.49	3.53	ORAR00238	238	x								
88.57	2.62	ORAR00153	153	x								
88.62	1.78	ORAR00043	043	x								
89.00	3.00	OR3008900										
89.00	4.50	OR4508900										
89.00	7.00	ORIE08900										
89.10	5.70	OR5708910				x						
89.30	5.70	OR5708930										x
89.40	3.10	OR3108940						G90				
89.50	3.00	OR3008950				x		P90				x
89.60	5.70	OR5708960										
90.00	1.00	OR1009000										
90.00	2.00	OR2009000										
90.00	2.50	OR2509000										
90.00	3.00	OR3009000										
90.00	3.55	ORIC09000			x				x			
90.00	4.00	OR4009000										
90.00	4.50	OR4509000										
90.00	5.00	OR5009000										
90.00	5.30	ORID09000			x				x			
90.00	5.50	OR5509000										
90.00	6.00	OR6009000										
90.00	7.00	ORIE09000										
91.44	5.33	ORAR00342	342	x						R45		



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard											
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518			
91.67	3.53	ORAR00239	239	x										
92.00	1.50	OR1509200												
92.00	3.00	OR3009200												
92.00	4.00	OR4009200												
92.00	4.50	OR4509200												
92.00	5.00	OR5009200												
92.00	5.50	OR5509200												
92.00	7.00	ORIE09200												
92.30	5.70	OR5709230											x	
92.50	3.55	ORIC09250			x				x					
92.50	5.30	ORID09250			x				x					
93.00	2.00	OR2009300												
93.00	3.00	OR3009300												
93.00	4.00	OR4009300												
93.50	4.50	OR4509350												
94.00	2.50	OR2509400												
94.00	3.00	OR3009400												
94.00	4.00	OR4009400												
94.00	5.00	OR5009400												
94.00	7.00	ORIE09400												
94.10	5.70	OR5709410				x								
94.30	5.70	OR5709430											x	
94.40	3.10	OR3109440						G95						
94.50	3.00	OR3009450				x							x	
94.60	5.70	OR5709460						P95						
94.62	5.33	ORAR00343	343	x						R46				
94.84	3.53	ORAR00240	240	x										
94.92	2.62	ORAR00154	154	x										
94.97	1.78	ORAR00044	044	x										
95.00	2.00	OR2009500												
95.00	2.50	OR2509500												
95.00	3.55	ORIC09500			x				x					
95.00	4.00	OR4009500												
95.00	4.50	OR4509500												
95.00	5.00	OR5009500												
95.00	5.30	ORID09500			x				x					



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
95.00	5.50	OR5509500										
95.00	6.00	OR6009500										
95.00	7.00	ORIE09500										
96.00	2.50	OR2509600										
96.00	3.00	OR3009600										
96.00	4.00	OR4009600										
96.00	5.00	OR5009600										
96.00	6.00	OR6009600										
96.50	6.50	OR6509650										
97.00	3.50	OR3509700										
97.00	5.00	OR5009700										
97.30	5.70	OR5709730										x
97.50	3.55	ORIC09750			x				x			
97.50	5.30	ORID09750			x				x			
97.79	5.33	ORAR00344	344	x						R47		
98.00	2.50	OR2509800										
98.00	3.00	OR3009800										
98.00	4.00	OR4009800										
98.02	3.53	ORAR00241	241	x								
99.00	3.00	OR3009900										
99.00	7.00	ORIE09900										
99.10	5.70	OR5709910				x						
99.30	5.70	OR5709930										x
99.40	3.10	OR3109940						G100				
99.50	3.00	OR3009950				x						x
99.60	5.70	OR5709960						P100				
100.00	1.00	OR1010000										
100.00	1.50	OR1510000										
100.00	2.00	OR2010000										
100.00	2.50	OR2510000										
100.00	3.00	OR3010000										
100.00	3.55	ORIC10000			x				x			
100.00	4.00	OR4010000										
100.00	5.00	OR5010000										
100.00	5.30	ORID10000			x				x			
100.00	5.50	OR5510000										



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
100.00	6.00	OR6010000											
100.00	7.00	ORIE10000											
100.00	8.00	OR8010000											
100.97	5.33	ORAR00345	345	x							R48		
101.19	3.53	ORAR00242	242	x									
101.27	2.62	ORAR00155	155	x									
101.32	1.78	ORAR00045	045	x									
101.60	5.70	OR5710160						P102					
102.00	3.00	OR3010200											
102.00	4.00	OR4010200											
103.00	2.00	OR2010300											
103.00	3.55	ORIC10300			x					x			
103.00	5.30	ORID10300			x					x			
103.00	6.00	OR6010300											
104.00	2.50	OR2510400											
104.00	3.00	OR3010400											
104.00	4.00	OR4010400											
104.00	5.00	OR5010400											
104.00	6.00	OR6010400											
104.10	5.70	OR5710410					x						
104.14	5.33	ORAR00346	346	x							R49		
104.30	5.70	OR5710430											x
104.37	3.53	ORAR00243	243	x									
104.40	3.10	OR3110440						G105					
104.50	3.00	OR3010450					x						x
104.60	5.70	OR5710460						P105					
105.00	2.00	OR2010500											
105.00	2.50	OR2510500											
105.00	3.00	OR3010500											
105.00	3.50	OR3510500											
105.00	4.00	OR4010500											
105.00	4.50	OR4510500											
105.00	5.00	OR5010500											
105.00	6.00	OR6010500											
106.00	2.00	OR2010600											
106.00	3.00	OR3010600											



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard								
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518
106.00	3.55	ORIC10600			x				x		
106.00	4.50	OR4510600									
106.00	5.30	ORID10600			x				x		
106.00	6.00	OR6010600									
106.00	7.00	ORIE10600									
107.00	2.50	OR2510700									
107.00	5.00	OR5010700									
107.32	5.33	ORAR00347	347	x						R50	
107.54	3.53	ORAR00244	244	x							
107.62	2.62	ORAR00156	156	x							
107.67	1.78	ORAR00046	046	x							
108.00	3.00	OR3010800									
108.00	4.00	OR4010800									
108.00	6.00	OR6010800									
108.00	7.00	ORIE10800									
108.80	8.40	OR8410880									
109.00	3.55	ORIC10900			x						
109.00	5.30	ORID10900			x						
109.10	5.70	OR5710910				x					
109.20	5.70	OR5710920									
109.30	5.70	OR5710930									x
109.40	3.10	OR3110940					G110				
109.50	3.00	OR3010950				x					x
109.60	5.70	OR5710960					P110				
110.00	2.00	OR2011000									
110.00	3.00	OR3011000									
110.00	3.50	OR3511000									
110.00	4.00	OR4011000									
110.00	4.50	OR4511000									
110.00	5.00	OR5011000									
110.00	5.50	OR5511000									
110.00	6.00	OR6011000									
110.00	8.00	OR8011000									
110.49	5.33	ORAR00348	348	x						R51	
110.72	3.53	ORAR00245	245	x							
111.60	5.70	OR5711160					P112				



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
112.00	1.50	OR1511200											
112.00	2.50	OR2511200											
112.00	3.00	OR3011200											
112.00	3.55	ORIC11200			x				x				
112.00	4.00	OR4011200											
112.00	5.00	OR5011200											
112.00	5.30	ORID11200			x				x				
112.00	6.00	OR6011200											
112.00	8.00	OR8011200											
113.00	3.50	OR3511300											
113.00	4.00	OR4011300											
113.67	5.33	ORAR00349	349	x							R52		
113.67	6.99	ORAR00425	425	x							R53		
113.89	3.53	ORAR00246	246	x									
113.97	2.62	ORAR00157	157	x									
114.00	3.00	OR3011400											
114.00	4.00	OR4011400											
114.00	6.00	OR6011400											
114.00	8.00	OR8011400											
114.02	1.78	ORAR00047	047	x									
114.30	5.70	OR5711430				x							x
114.40	3.10	OR3111440						G115					
114.50	3.00	OR3011450				x							x
114.60	5.70	OR5711460						P115					
115.00	2.00	OR2011500											
115.00	2.50	OR2511500											
115.00	3.00	OR3011500											
115.00	3.55	ORIC11500			x				x				
115.00	4.00	OR4011500											
115.00	4.50	OR4511500											
115.00	5.00	OR5011500											
115.00	5.30	ORID11500			x				x				
115.00	6.00	OR6011500											
115.00	7.00	ORIE11500			x				x				
116.00	3.00	OR3011600											
116.00	4.00	OR4011600											



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
116.84	5.33	ORAR00350	350	x									
116.84	6.99	ORAR00426	426	x							R54		
117.00	2.50	OR2511700											
117.00	4.00	OR4011700											
117.00	8.00	OR8011700											
117.07	3.53	ORAR00247	247	x									
118.00	2.00	OR2011800											
118.00	3.00	OR3011800											
118.00	3.55	ORIC11800			x				x				
118.00	4.00	OR4011800											
118.00	4.50	OR4511800											
118.00	5.00	OR5011800											
118.00	5.30	ORID11800			x				x				
118.00	6.00	OR6011800											
119.00	3.00	OR3011900											
119.30	5.70	OR5711930				x							x
119.40	3.10	OR3111940						G120					
119.50	3.00	OR3011950				x							x
119.60	5.70	OR5711960						P120					
120.00	2.00	OR2012000											
120.00	2.50	OR2512000											
120.00	3.00	OR3012000											
120.00	3.50	OR3512000											
120.00	4.00	OR4012000											
120.00	4.50	OR4512000											
120.00	5.00	OR5012000											
120.00	6.00	OR6012000											
120.02	5.33	ORAR00351	351	x							R55		
120.02	6.99	ORAR00427	427	x									
120.24	3.53	ORAR00248	248	x									
120.32	2.62	ORAR00158	158	x									
120.37	1.78	ORAR00048	048	x									
122.00	2.00	OR2012200											
122.00	3.00	OR3012200											
122.00	3.55	ORIC12200			x				x				
122.00	4.00	OR4012200											



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard								
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518
122.00	5.30	ORID12200			x				x		
123.00	6.00	OR6012300									
123.19	5.33	ORAR00352	352	x							
123.19	6.99	ORAR00428	428	x						R56	
123.42	3.53	ORAR00249	249	x							
124.00	4.00	OR4012400									
124.00	4.50	OR4512400									
124.30	5.70	OR5712430				x					x
124.40	3.10	OR3112440					G125				
124.50	3.00	OR3012450				x					x
124.60	5.70	OR5712460					P125				
125.00	2.00	OR2012500									
125.00	2.50	OR2512500									
125.00	3.00	OR3012500									
125.00	3.50	OR3512500									
125.00	3.55	ORIC12500			x				x		
125.00	4.00	OR4012500									
125.00	5.00	OR5012500									
125.00	5.30	ORID12500			x				x		
125.00	6.00	OR6012500									
125.00	8.00	OR8012500									
126.00	4.00	OR4012600									
126.00	4.50	OR4512600									
126.37	5.33	ORAR00353	353	x							
126.37	6.99	ORAR00429	429	x						R57	
126.59	3.53	ORAR00250	250	x							
126.67	2.62	ORAR00159	159	x							
126.72	1.78	ORAR00049	049	x							
127.00	4.00	OR4012700									
127.00	5.00	OR5012700									
128.00	2.00	OR2012800									
128.00	2.50	OR2512800									
128.00	3.00	OR3012800									
128.00	3.55	ORIC12800			x				x		
128.00	5.30	ORID12800			x				x		
128.00	6.00	OR6012800									



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
129.00	4.00	OR4012900											
129.30	5.70	OR5712930				x							x
129.40	3.10	OR3112940						G130					
129.50	3.00	OR3012950				x							x
129.54	5.33	ORAR00354	354	x									
129.54	6.99	ORAR00430	430	x						R58			
129.60	5.70	OR5712960						P130					
129.77	3.53	ORAR00251	251	x									
130.00	2.00	OR2013000											
130.00	2.50	OR2513000											
130.00	3.00	OR3013000											
130.00	4.00	OR4013000											
130.00	4.50	OR4513000											
130.00	5.00	OR5013000											
130.00	5.50	OR5513000											
130.00	6.00	OR6013000											
130.00	7.50	OR7513000											
131.50	4.50	OR4513150											
131.60	5.70	OR5713160						P132					
132.00	2.00	OR2013200											
132.00	3.00	OR3013200											
132.00	3.55	ORIC13200			x				x				
132.00	4.00	OR4013200											
132.00	5.00	OR5013200											
132.00	5.30	ORID13200			x				x				
132.00	8.00	OR8013200											
132.72	5.33	ORAR00355	355	x									
132.72	6.99	ORAR00431	431	x						R59			
132.94	3.53	ORAR00252	252	x									
133.00	4.00	OR4013300		x									
133.02	2.62	ORAR00160	160	x									
133.07	1.78	ORAR00050	050	x									
134.00	3.00	OR3013400											
134.00	4.00	OR4013400											
134.00	5.00	OR5013400											
134.30	5.70	OR5713430				x							x



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard								
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518
134.40	3.10	OR3113440					G135				
134.50	3.00	OR3013450				x					x
135.00	2.00	OR2013500									
135.00	2.50	OR2513500									
135.00	3.00	OR3013500									
135.00	4.00	OR4013500									
135.00	5.00	OR5013500									
135.00	6.00	OR6013500					P135				
135.60	5.70	OR5713560									
135.89	5.33	ORAR00356	356	x							
135.89	6.99	ORAR00432	432	x					R60		
136.00	3.55	ORIC13600			x				x		
136.00	5.30	ORID13600			x				x		
136.00	8.00	OR8013600									
136.12	3.53	ORAR00253	253	x							
138.00	3.00	OR3013800									
138.00	5.00	OR5013800									
138.00	6.00	OR6013800									
139.07	5.33	ORAR00357	357	x							
139.07	6.99	ORAR00433	433	x					R61		
139.29	3.53	ORAR00254	254	x							
139.30	5.70	OR5713930				x					x
139.37	2.62	ORAR00161	161	x							
139.40	3.10	OR3113940					G140				
139.50	3.00	OR3013950				x					x
139.60	5.70	OR5713960					P140				
140.00	2.00	OR2014000									
140.00	2.50	OR2514000									
140.00	3.00	OR3014000									
140.00	3.55	ORIC14000			x				x		
140.00	4.00	OR4014000									
140.00	4.50	OR4514000									
140.00	5.00	OR5014000									
140.00	5.30	ORID14000			x				x		
142.00	4.00	OR4014200									
142.00	6.00	OR6014200									



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
142.24	5.33	ORAR00358	358	x									
142.24	6.99	ORAR00434	434	x							R62		
142.47	3.53	ORAR00255	255	x									
143.00	2.00	OR2014300											
144.00	4.00	OR4014400											
144.00	5.00	OR5014400											
144.00	8.00	OR8014400											
144.10	8.40	OR8414410				x							x
144.30	5.70	OR5714430				x							x
144.40	3.10	OR3114440						G145					
144.50	3.00	OR3014450					x						x
144.60	5.70	OR5714460						P145					
145.00	2.50	OR2514500											
145.00	3.55	ORIC14500			x				x				
145.00	4.00	OR4014500											
145.00	4.50	OR4514500											
145.00	5.30	ORID14500			x				x				
145.00	6.00	OR6014500											
145.42	5.33	ORAR00359	359	x									
145.42	6.99	ORAR00435	435	x							R63		
145.64	3.53	ORAR00256	256	x									
145.72	2.62	ORAR00162	162	x									
146.00	2.00	OR2014600											
146.00	3.00	OR3014600											
146.00	4.00	OR4014600											
148.00	4.00	OR4014800											
148.00	6.00	OR6014800											
148.59	5.33	ORAR00360	360	x									
148.59	6.99	ORAR00436	436	x							R64		
148.82	3.53	ORAR00257	257	x									
149.00	3.00	OR3014900											
149.00	5.00	OR5014900											
149.10	8.40	OR8414910				x							x
149.20	5.70	OR5714920											
149.30	5.70	OR5714930						G150					x
149.50	3.00	OR3014950											x



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
149.50	8.40	OR8414950					P150A					
149.60	5.70	OR5714960					P150					
150.00	2.00	OR2015000										
150.00	2.50	OR2515000										
150.00	3.00	OR3015000										
150.00	3.55	ORIC15000			x				x			
150.00	4.00	OR4015000										
150.00	4.50	OR4515000										
150.00	5.00	OR5015000										
150.00	5.30	ORID15000			x				x			
150.00	6.00	OR6015000										
150.00	8.00	OR8015000										
151.77	5.33	ORAR00361	361	x								
151.77	6.99	ORAR00437	437	x						R65		
151.99	3.53	ORAR00258	258	x								
152.00	7.50	OR7515200										
152.07	2.62	ORAR00163	163	x								
153.00	4.50	OR4515300										
153.00	6.00	OR6015300										
153.50	1.60	OR1615350										
154.00	3.00	OR3015400										
154.10	8.40	OR8415410				x						x
154.30	5.70	OR5715430					G155					x
154.50	3.00	OR3015450										x
154.50	8.40	OR8415450					P155					
155.00	2.50	OR2515500										
155.00	3.00	OR3015500										
155.00	3.55	ORIC15500			x				x			
155.00	4.00	OR4015500										
155.00	4.50	OR4515500										
155.00	5.00	OR5015500										
155.00	5.30	ORID15500			x				x			
155.00	8.00	OR8015500										
155.60	6.99	ORA415560										x
156.00	2.00	OR2015600										
156.00	2.50	OR2515600										



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
156.00	3.00	OR3015600											
156.00	4.00	OR4015600											
157.00	3.00	OR3015700											
158.00	5.00	OR5015800											
158.00	6.00	OR6015800											
158.12	5.33	ORAR00362	362	x									
158.12	6.99	ORAR00438	438	x						R66			
158.34	3.53	ORAR00259	259	x									
158.42	2.62	ORAR00164	164	x									
159.10	8.40	OR8415910					x						x
159.30	5.70	OR5715930					x	G160					x
159.50	3.00	OR3015950											x
159.50	8.40	OR8415950						P160					
160.00	2.00	OR2016000											
160.00	2.50	OR2516000											
160.00	3.00	OR3016000											
160.00	3.55	ORIC16000				x				x			
160.00	4.00	OR4016000											
160.00	4.50	OR4516000											
160.00	5.00	OR5016000											
160.00	5.30	ORID16000				x				x			
160.00	6.00	OR6016000											
160.00	8.00	OR8016000											
162.00	3.00	OR3016200											
164.00	3.00	OR3016400											
164.00	4.00	OR4016400											
164.00	5.00	OR5016400											
164.10	8.40	OR8416410					x						x
164.30	5.70	OR5716430					x	G165					x
164.47	5.33	ORAR00363	363	x									
164.47	6.99	ORAR00439	439	x						R67			
164.50	3.00	OR3016450											x
164.50	8.40	OR8416450						P165					
164.69	3.53	ORAR00260	260	x									
164.77	2.62	ORAR00165	165	x									
165.00	2.00	OR2016500											



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
165.00	2.50	OR2516500										
165.00	3.00	OR3016500										
165.00	3.55	ORIC16500			x				x			
165.00	4.00	OR4016500										
165.00	4.50	OR4516500										
165.00	5.00	OR5016500										
165.00	5.30	ORID16500			x				x			
165.00	6.00	OR6016500										
165.00	8.00	OR8016500										
166.00	6.00	OR6016600										
166.00	8.00	OR8016600										
167.00	2.50	OR2516700										
168.00	4.00	OR4016800										
168.00	5.00	OR5016800										
169.10	8.40	OR8416910				x						x
169.30	5.70	OR5716930				x	G170					x
169.50	3.00	OR3016950										x
169.50	8.40	OR8416950					P170					
170.00	2.00	OR2017000										
170.00	2.50	OR2517000										
170.00	3.00	OR3017000										
170.00	3.50	OR3517000										
170.00	3.55	ORIC17000			x				x			
170.00	4.00	OR4017000										
170.00	5.00	OR5017000										
170.00	5.30	ORID17000			x				x			
170.00	6.00	OR6017000										
170.00	8.00	OR8017000										
170.82	5.33	ORAR00364	364	x								
170.82	6.99	ORAR00440	440	x					R68			
171.04	3.53	ORAR00261	261	x								
171.12	2.62	ORAR00166	166	x								
172.00	4.00	OR4017200										
172.00	6.00	OR6017200										
174.00	3.00	OR3017400										
174.10	8.40	OR8417410				x						x



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard								
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518
174.30	5.70	OR5717430				x	G175				x
174.50	3.00	OR3017450									x
174.50	8.40	OR8417450					P175				
175.00	2.00	OR2017500									
175.00	3.55	ORIC17500			x			x			
175.00	4.00	OR4017500									
175.00	5.00	OR5017500									
175.00	5.30	ORID17500			x			x			
175.00	6.00	OR6017500									
175.00	7.00	ORIE17500			x						
175.00	8.00	OR8017500									
177.17	5.33	ORAR00365	365	x							
177.17	6.99	ORAR00441	441	x							
177.39	3.53	ORAR00262	262	x							
177.47	2.62	ORAR00167	167	x							
179.10	8.40	OR8417910									x
179.30	5.70	OR5717930				x					x
179.50	3.00	OR3017950									x
183.52	5.33	ORAR00366	366	x							
183.52	6.99	ORAR00442	442	x							
183.74	3.53	ORAR00263	263	x							
183.82	2.62	ORAR00168	168	x							
184.10	8.40	OR8418410				x					x
184.30	5.70	OR5718430				x					x
184.50	3.00	OR3018450									x
189.10	8.40	OR8418910				x					x
189.30	5.70	OR5718930				x					x
189.50	3.00	OR3018950									x
189.87	5.33	ORAR00367	367	x							
189.87	6.99	ORAR00443	443	x							
190.09	3.53	ORAR00264	264	x							
190.17	2.62	ORAR00169	169	x							
194.10	8.40	OR8419410									x
194.30	5.70	OR5719430				x					x
194.50	3.00	OR3019450									x
196.22	5.33	ORAR00368	368	x							



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
196.22	6.99	ORAR00444	444	x								
196.44	3.53	ORAR00265	265	x								
196.52	2.62	ORAR00170	170	x								
199.10	8.40	OR8419910				x						x
199.30	5.70	OR5719930				x						x
199.50	3.00	OR3019950										x
202.57	5.33	ORAR00369	369	x								
202.57	6.99	ORAR00445	445	x								
202.79	3.53	ORAR00266	266	x								
202.87	2.62	ORAR00171	171	x								
204.30	5.70	OR5720430				x						
208.92	5.33	ORAR00370	370	x								
209.10	8.40	OR8420910				x						x
209.14	3.53	ORAR00267	267	x								
209.22	2.62	ORAR00172	172	x								
209.30	5.70	OR5720930				x						x
209.50	3.00	OR3020950										x
210.00	4.00	OR4021000										
210.00	5.00	OR5021000										
210.00	6.50	OR6521000										
210.00	7.00	ORIE21000										
210.00	8.00	OR8021000										
212.00	2.50	OR2521200										
212.00	5.30	ORID21200			x				x			
212.00	6.00	OR6021200										
212.00	7.00	ORIE21200			x				x			
213.00	3.00	OR3021300										
213.00	7.00	ORIE21300										
214.00	5.00	OR5021400										
214.50	8.40	OR8421450						P215				
215.00	3.00	OR3021500										
215.00	5.00	OR5021500										
215.00	8.00	OR8021500										
215.27	5.33	ORAR00371	371	x								
215.27	6.99	ORAR00446	446	x						R74		
215.49	3.53	ORAR00268	268	x								



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
215.57	2.62	ORAR00173	173	x									
216.00	2.00	OR2021600											
216.00	4.00	OR4021600											
217.00	5.00	OR5021700											
218.00	5.30	ORID21800			x				x				
218.00	6.00	OR6021800											
218.00	7.00	ORIE21800			x				x				
218.50	4.50	OR4521850											
219.10	8.40	OR8421910				x							x
219.30	5.70	OR5721930				x		G220					
219.50	3.00	OR3021950											x
219.50	8.40	OR8421950						P220					
220.00	2.00	OR2022000											
220.00	3.00	OR3022000											
220.00	4.00	OR4022000											
220.00	5.00	OR5022000											
220.00	7.00	ORIE22000											
220.00	8.00	OR8022000											
221.62	5.33	ORAR00372	372	x									
221.84	3.53	ORAR00269	269	x									
221.92	2.62	ORAR00174	174	x									
222.00	4.00	OR4022200											
224.00	5.30	ORID22400			x				x				
224.00	7.00	ORIE22400			x				x				
224.50	8.40	OR8422450						P225					
225.00	3.00	OR3022500											
225.00	4.00	OR4022500											
225.00	5.00	OR5022500											
225.00	6.00	OR6022500											
225.00	7.00	ORIE22500											
225.00	8.00	OR8022500											
226.00	6.00	OR6022600											
227.97	5.33	ORAR00373	373	x									
227.97	6.99	ORAR00447	447	x							R75		
228.00	4.00	OR4022800											
228.00	7.00	ORIE22800											



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
228.19	3.53	ORAR00270	270	x								
228.27	2.62	ORAR00175	175	x								
229.00	6.00	OR6022900										
229.10	8.40	OR8422910				x						x
229.30	5.70	OR5722930				x	G230					x
229.50	8.40	OR8422950					P230					
230.00	2.00	OR2023000										
230.00	3.00	OR3023000										
230.00	4.00	OR4023000										
230.00	5.00	OR5023000										
230.00	5.30	ORID23000			x				x			
230.00	7.00	ORIE23000			x				x			
230.00	8.00	OR8023000										
233.00	3.00	OR3023300										
234.10	8.40	OR8423410										x
234.32	5.33	ORAR00374	374	x								
234.50	8.40	OR8423450					P235					
234.54	3.53	ORAR00271	271	x								
234.62	2.62	ORAR00176	176	x								
235.00	4.00	OR4023500										
235.00	5.00	OR5023500										
235.00	6.00	OR6023500										
235.00	7.00	ORIE23500										
235.00	8.00	OR8023500										
236.00	5.30	ORID23600			x				x			
236.00	7.00	ORIE23600			x				x			
238.00	2.00	OR2023800										
238.00	4.00	OR4023800										
238.00	5.00	OR5023800										
238.00	8.00	OR8023800										
239.10	8.40	OR8423910				x						x
239.30	5.70	OR5723930				x	G240					x
239.50	3.00	OR3023950										x
239.50	8.40	OR8423950					P240					
240.00	3.00	OR3024000										
240.00	4.00	OR4024000										



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
240.00	5.00	OR5024000										
240.00	6.00	OR6024000										
240.67	5.33	ORAR00375	375	x								
240.67	6.99	ORAR00448	448	x						R76		
240.89	3.53	ORAR00272	272	x								
240.97	2.62	ORAR00177	177	x								
242.00	5.00	OR5024200										
242.00	6.00	OR6024200										
242.00	8.00	OR8024200										
243.00	5.30	ORID24300			x				x			
243.00	7.00	ORIE24300			x				x			
244.00	2.00	OR2024400										
244.00	7.00	ORIE24400										
244.50	3.00	OR3024450										x
244.50	8.40	OR8424450						P245				
245.00	3.00	OR3024500										
245.00	5.00	OR5024500										
246.00	4.00	OR4024600										
247.00	6.00	OR6024700										
247.00	7.00	ORIE24700										
247.02	5.33	ORAR00376	376	x								
247.24	3.53	ORAR00273	273	x								
247.32	2.62	ORAR00178	178	x								
248.00	5.00	OR5024800										
249.10	8.40	OR8424910				x						x
249.30	5.70	OR5724930				x		G250				x
249.50	3.00	OR3024950										x
249.50	8.40	OR8424950						P250				
250.00	3.00	OR3025000										
250.00	3.55	ORIC25000										
250.00	4.00	OR4025000										
250.00	5.00	OR5025000										
250.00	6.00	OR6025000										
250.00	7.00	ORIE25000			x				x			
250.00	8.00	OR8025000										
253.37	5.33	ORAR00377	377	x								



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
253.37	6.99	ORAR00449	449	x						R77		
253.59	3.53	ORAR00274	274	x								
254.00	3.00	OR3025400										
254.50	8.40	OR8425450						P255				
255.00	2.00	OR2025500										
255.00	3.00	OR3025500										
255.00	4.00	OR4025500										
255.00	5.00	OR5025500										
258.00	5.30	ORID25800			x				x			
258.00	6.00	OR6025800										
258.00	7.00	ORIE25800			x				x			
259.10	8.40	OR8425910										
259.30	5.70	OR5725930				x		G260				x
259.50	8.40	OR8425950						P260				
260.00	2.50	OR2526000										
260.00	3.00	OR3026000										
260.00	4.00	OR4026000										
260.00	5.00	OR5026000										
260.00	6.00	OR6026000										
260.00	7.00	ORIE26000										
260.00	8.00	OR8026000										
262.00	2.00	OR2026200										
262.00	4.00	OR4026200										
264.50	8.40	OR8426450						P265				
265.00	3.00	OR3026500										
265.00	4.00	OR4026500										
265.00	5.00	OR5026500										
265.00	5.30	ORID26500			x				x			
265.00	6.50	OR6526500										
265.00	7.00	ORIE26500			x				x			
265.00	8.00	OR8026500										
266.00	6.00	OR6026600										
266.07	5.33	ORAR00378	378	x								
266.07	6.99	ORAR00450	450	x						R78		
266.29	3.53	ORAR00275	275	x								
267.00	4.50	OR4526700										



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
268.80	8.40	OR8426880										
269.00	2.50	OR2526900										
269.30	5.70	OR5726930				x	G270					
269.50	8.40	OR8426950					P270					
270.00	2.50	OR2527000										
270.00	3.00	OR3027000										
270.00	4.00	OR4027000										
270.00	5.00	OR5027000										
270.00	6.00	OR6027000										
270.00	8.00	OR8027000										
272.00	4.00	OR4027200			x				x			
272.00	5.30	ORID27200										
272.00	7.00	ORIE27200			x				x			
274.00	2.00	OR2027400										
274.00	3.00	OR3027400										
274.00	6.50	OR6527400										
274.50	8.40	OR8427450					P275					
275.00	4.00	OR4027500										
275.00	5.00	OR5027500										
276.00	2.00	OR2027600										
278.77	5.33	ORAR00379	379	x								
278.77	6.99	ORAR00451	451	x						R79		
278.99	3.53	ORAR00276	276	x								
279.10	8.40	OR8427910										
279.30	5.70	OR5727930				x	G280					x
279.50	8.40	OR8427950					P280					
280.00	2.50	OR2528000										
280.00	3.00	OR3028000										
280.00	4.00	OR4028000										
280.00	5.00	OR5028000										
280.00	5.30	ORID28000			x				x			
280.00	6.00	OR6028000										
280.00	7.00	ORIE28000			x				x			
280.00	8.00	OR8028000										
282.00	4.00	OR4028200										
284.50	8.40	OR8428450					P285					

O-Ring



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
285.00	3.00	OR3028500										
285.00	4.00	OR4028500										
285.00	5.00	OR5028500										
285.10	7.00	ORIE28510										
288.00	6.00	OR6028800										
289.10	8.40	OR8428910										
289.30	5.70	OR5728930				x	G290					x
289.50	8.40	OR8428950					P290					
290.00	2.00	OR2029000										
290.00	3.00	OR3029000										
290.00	5.00	OR5029000										
290.00	5.30	ORID29000			x			x				
290.00	6.00	OR6029000										
290.00	7.00	ORIE29000			x			x				
290.00	8.00	OR8029000										
291.47	5.33	ORAR00380	380	x								
291.47	6.99	ORAR00452	452	x					R80			
291.69	3.53	ORAR00277	277	x								
292.00	4.00	OR4029200										
292.60	8.40	OR8429260										
294.00	4.00	OR4029400										
294.00	6.00	OR6029400										
294.50	8.40	OR8429450					P295					
295.00	6.00	OR6029500										
296.00	2.50	OR2529600										
297.00	4.00	OR4029700										
299.30	5.70	OR5729930				x	G300					x
299.50	8.40	OR8429950					P300					
300.00	3.00	OR3030000										
300.00	5.00	OR5030000										
300.00	5.30	ORID30000			x			x				
300.00	6.00	OR6030000										
300.00	7.00	ORIE30000			x			x				
300.00	8.00	OR8030000										
304.00	8.00	OR8030400										
304.17	5.33	ORAR00381	381	x								



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard										
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518		
304.17	6.99	ORAR00453	453	x									
304.39	3.53	ORAR00278	278	x							R81		
305.00	4.00	OR4030500											
305.00	5.00	OR5030500											
307.00	5.30	ORID30700			x				x				
307.00	7.00	ORIE30700			x				x				
309.30	5.70	OR5730930											x
310.00	3.00	OR3031000											
310.00	4.00	OR4031000											
310.00	5.00	OR5031000											
310.00	7.00	ORIE31000											
310.00	8.00	OR8031000											
314.00	8.00	OR8031400											
314.50	8.40	OR8431450						P315					
315.00	2.50	OR2531500											
315.00	4.00	OR4031500											
315.00	5.00	OR5031500											
315.00	5.30	ORID31500			x				x				
315.00	6.00	OR6031500											
315.00	7.00	ORIE31500			x				x				
316.87	6.99	ORAR00454	454	x							R82		
319.30	5.70	OR5731930					x						x
319.50	8.40	OR8431950						P320					
320.00	3.00	OR3032000											
320.00	4.00	OR4032000											
320.00	5.00	OR5032000											
320.00	6.00	OR6032000											
320.00	7.00	ORIE32000			x								
320.00	8.00	OR8032000											
324.00	4.00	OR4032400											
325.00	5.00	OR5032500											
325.00	5.30	ORID32500			x				x				
325.00	6.00	OR6032500											
325.00	7.00	ORIE32500			x				x				
329.57	5.33	ORAR00382	382	x									
329.57	6.99	ORAR00455	455	x							R83		



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard											
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518			
329.79	3.53	ORAR00279	279	x										
330.00	4.00	OR4033000												
330.00	5.00	OR5033000												
330.00	6.00	OR6033000												
330.00	7.00	ORIE33000			x									
330.00	8.00	OR8033000												
331.00	3.00	OR3033100												
333.00	4.00	OR4033300												
334.50	8.40	OR8433450					P335							
335.00	5.00	OR5033500												
335.00	5.30	ORID33500			x				x					
335.00	6.00	OR6033500												
335.00	7.00	ORIE33500			x				x					
338.00	6.00	OR6033800												
339.30	5.70	OR5733930					x						x	
339.50	8.40	OR8433950						P340						
340.00	3.50	OR3534000												
340.00	4.00	OR4034000												
340.00	5.00	OR5034000												
340.00	6.00	OR6034000												
340.00	8.00	OR8034000												
342.00	8.00	OR8034200												
342.27	6.99	ORAR00456	456	x						R84				
345.00	5.00	OR5034500												
345.00	5.30	ORID34500			x				x					
345.00	7.00	ORIE34500			x				x					
348.00	4.00	OR4034800												
348.00	6.00	OR6034800												
349.10	8.40	OR8434910												
350.00	2.50	OR2535000												
350.00	5.00	OR5035000												
350.00	6.00	OR6035000												
350.00	8.00	OR8035000												
354.50	8.40	OR8435450						P355						
354.97	5.33	ORAR00383	383	x										
354.97	6.99	ORAR00457	457	x						R85				



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
355.00	4.00	OR4035500										
355.00	5.00	OR5035500										
355.00	5.30	ORID35500			x				x			
355.00	7.00	ORIE35500			x				x			
355.19	3.53	ORAR00280	280	x								
358.00	6.00	OR6035800										
359.10	8.40	OR8435910										
359.30	5.70	OR5735930				x						x
359.50	8.40	OR8435950					P360					
360.00	4.00	OR4036000										
360.00	5.00	OR5036000										
360.00	8.00	OR8036000										
365.00	5.00	OR5036500										
365.00	5.30	ORID36500			x				x			
365.00	7.00	ORIE36500			x				x			
367.00	3.50	OR3536700										
367.00	5.00	OR5036700										
367.67	6.99	ORAR00458	458	x						R86		
368.00	2.50	OR2536800										
368.00	6.00	OR6036800										
370.00	4.00	OR4037000										
370.00	5.00	OR5037000										
372.00	8.40	OR8437200										
374.00	8.00	OR8037400										
374.50	8.40	OR8437450					P375					
375.00	5.00	OR5037500										
375.00	5.30	ORID37500			x				x			
375.00	7.00	ORIE37500			x				x			
376.00	6.00	OR6037600										
379.10	8.40	OR8437910										
379.20	5.70	OR5737920										
379.30	5.70	OR5737930				x						x
380.00	3.00	OR3038000										
380.00	4.00	OR4038000										
380.00	5.00	OR5038000										
380.00	6.00	OR6038000										



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard											
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518			
380.00	8.00	OR8038000												
380.37	5.33	ORAR00384	384	x										
380.37	6.99	ORAR00459	459	x							R87			
380.59	3.53	ORAR00281	281	x										
382.00	8.00	OR8038200												
384.50	8.40	OR8438450						P385						
385.00	5.00	OR5038500												
386.00	6.00	OR6038600												
387.00	5.30	ORID38700			x				x					
387.00	7.00	ORIE38700			x				x					
388.00	6.00	OR6038800												
388.00	7.00	ORIE38800												
389.00	8.00	OR8038900												
389.30	5.70	OR5738930												x
390.00	3.00	OR3039000												
390.00	4.00	OR4039000												
393.07	6.99	ORAR00460	460	x							R88			
394.00	6.00	OR6039400												
394.00	8.00	OR8039400												
395.00	5.00	OR5039500												
399.10	8.40	OR8439910												
399.30	5.70	OR5739930				x								x
399.50	8.40	OR8439950						P400						
400.00	2.00	OR2040000												
400.00	3.00	OR3040000												
400.00	4.00	OR4040000												
400.00	5.00	OR5040000												
400.00	5.30	ORID40000			x				x					
400.00	7.00	ORIE40000			x				x					
400.00	8.00	OR8040000												
405.26	3.53	ORAR00282	282	x										
405.26	5.33	ORAR00385	385	x										
405.26	6.99	ORAR00461	461	x										
410.00	4.00	OR4041000												
410.00	5.00	OR5041000												
410.00	6.50	OR6541000												



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard								
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518
412.00	7.00	ORIE41200			x				x		
412.00	8.00	OR8041200									
415.00	5.00	OR5041500									
417.96	6.99	ORAR00462	462	x							
419.30	5.70	OR5741930									x
420.00	4.00	OR4042000									
420.00	5.00	OR5042000									
422.00	6.00	OR6042200									
424.00	5.00	OR5042400									
425.00	4.00	OR4042500									
425.00	7.00	ORIE42500			x				x		
425.00	8.00	OR8042500									
427.00	5.00	OR5042700									
429.00	6.00	OR6042900									
430.00	4.00	OR4043000									
430.66	3.53	ORAR00283	283	x							
430.66	5.33	ORAR00386	386	x							
430.66	6.99	ORAR00463	463	x							
433.00	4.00	OR4043300									
437.00	7.00	ORIE43700			x				x		
438.00	4.00	OR4043800									
439.30	5.70	OR5743930				x					x
440.00	3.00	OR3044000									
440.00	4.00	OR4044000									
443.36	6.99	ORAR00464	464	x							
444.00	8.00	OR8044400									
445.00	5.00	OR5044500									
448.00	6.00	OR6044800									
450.00	5.00	OR5045000									
450.00	7.00	ORIE45000			x				x		
450.00	8.00	OR8045000									
451.00	7.00	ORIE45100									
456.06	3.53	ORAR00284	284	x							
456.06	5.33	ORAR00387	387	x							
456.06	6.99	ORAR00465	465	x							
459.30	5.70	OR5745930				x					x



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
460.00	4.00	OR4046000										
460.00	5.00	OR5046000										
460.00	8.00	OR8046000										
462.00	7.00	ORIE46200			x				x			
465.00	5.00	OR5046500										
465.00	9.00	OR9046500										
468.76	6.99	ORAR00466	466	x								
470.00	4.00	OR4047000										
470.00	5.00	OR5047000										
470.00	6.00	OR6047000										
470.00	8.00	OR8047000										
472.00	8.00	OR8047200										
475.00	4.00	OR4047500										
475.00	7.00	ORIE47500			x				x			
479.30	5.70	OR5747930				x						x
480.00	4.00	OR4048000										
480.00	5.00	OR5048000										
480.00	6.00	OR6048000										
480.00	8.00	OR8048000										
481.38	5.33	ORAR00388	388	x								
481.46	6.99	ORAR00467	467	x								
487.00	7.00	ORIE48700			x				x			
487.00	8.00	OR8048700										
489.20	5.70	OR5748910										
489.30	5.70	OR5748930										x
490.00	5.00	OR5049000										
490.00	8.00	OR8049000										
492.00	4.00	OR4049200										
494.16	6.99	ORAR00468	468	x								
499.30	5.70	OR5749930										x
500.00	5.00	OR5050000										
500.00	6.00	OR6050000										
500.00	7.00	ORIE50000			x				x			
500.00	8.00	OR8050000										
504.00	6.00	OR6050400										
506.78	5.33	ORAR00389	389	x								



O-Ring

Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
506.86	6.99	ORAR00469	469	x								
508.00	6.00	OR6050800										
510.00	5.00	OR5051000										
515.00	7.00	ORIE51500			x				x			
520.00	5.00	OR5052000										
525.00	8.00	OR8052500										
530.00	4.00	OR4053000										
530.00	5.00	OR5053000										
530.00	7.00	ORIE53000			x				x			
532.18	5.33	ORAR00390	390	x								
532.26	6.99	ORAR00470	470	x								
540.00	3.00	OR3054000										
540.00	4.00	OR4054000										
540.00	5.00	OR5054000										
540.00	8.00	OR8054000										
542.00	7.00	ORIE54200										
545.00	3.00	OR3054500										
545.00	7.00	ORIE54500			x				x			
549.00	6.00	OR6054900										
550.00	5.00	OR5055000										
557.58	5.33	ORAR00391	391	x								
557.66	6.99	ORAR00471	471	x								
560.00	4.00	OR4056000										
560.00	5.00	OR5056000										
560.00	6.00	OR6056000										
560.00	7.00	ORIE56000			x				x			
569.00	6.00	OR6056900										
579.00	6.00	OR6057900										
580.00	7.00	ORIE58000			x				x			
580.00	8.00	OR8058000										
582.68	5.33	ORAR00392	392	x								
582.68	6.99	ORAR00472	472	x								
585.00	4.00	OR4058500										
585.00	5.00	OR5058500										
590.00	5.00	OR5059000										
592.00	8.00	OR8059200										



Inside diameter d ₁	Cross section d ₂	TSS Part No.	Standard									
			Reference No. AS 568 B	AS 568 B / BS 1806	ISO 3601	SMS 1586	JIS B 2401	NFT47 – 501	French recommendation	ISO 6149 – 2	BS4518	
600.00	4.00	OR4060000										
600.00	5.00	OR5060000										
600.00	7.00	ORIE60000			x				x			
600.00	8.00	OR8060000										
608.08	5.33	ORAR00393	393	x								
608.08	6.99	ORAR00473	473	x								
615.00	7.00	ORIE61500			x				x			
630.00	7.00	ORIE63000			x				x			
633.48	5.33	ORAR00394	394	x								
633.48	6.99	ORAR00474	474	x								
649.00	8.40	OR8464900										
650.00	7.00	ORIE65000			x				x			
658.88	5.33	ORAR00395	395	x								
658.88	6.99	ORAR00475	475	x								
670.00	7.00	ORIE67000			x				x			
680.00	8.40	OR8468000										
715.00	8.40	OR8471500										
740.00	8.40	OR8474000										
774.10	8.40	OR8477410										
810.00	8.40	OR8481000										
845.00	8.40	OR8484500										
865.00	8.40	OR8486500										
888.00	8.40	OR8488800										
934.10	8.40	OR8493410										
959.10	8.40	OR8495910										

Further sizes on request! The given standards are valid for nominal sizes only. Tolerances, see the following pages.



O-Ring

C.1.2 O-Ring Dimensions according to AS 568 B

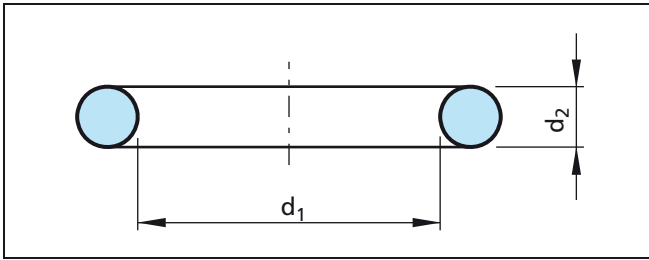


Figure 27 O-Ring dimensions

Table XVII Dimensions / TSS part numbers AS

TSS Part No.	Metric dimensions (mm)		Imperial dimensions (inch)	
	Inside diameter d_1	Cross section d_2	Inside diameter d_1	Cross section d_2
ORAR00001	0.74	1.02	.029	.040
ORAR00002	1.07	1.27	.042	.050
ORAR00003	1.42	1.52	.056	.060
ORAR00004	1.78	1.78	.070	.070
ORAR00005	2.57	1.78	.101	.070
ORAR00006	2.90	1.78	.114	.070
ORAR00007	3.68	1.78	.145	.070
ORAR00008	4.47	1.78	.176	.070
ORAR00009	5.28	1.78	.208	.070
ORAR00010	6.07	1.78	.239	.070
ORAR00011	7.65	1.78	.301	.070
ORAR00012	9.25	1.78	.364	.070
ORAR00013	10.82	1.78	.426	.070
ORAR00014	12.42	1.78	.489	.070
ORAR00015	14.00	1.78	.551	.070
ORAR00016	15.60	1.78	.614	.070
ORAR00017	17.17	1.78	.676	.070
ORAR00018	18.77	1.78	.739	.070
ORAR00019	20.35	1.78	.801	.070
ORAR00020	21.95	1.78	.864	.070
ORAR00021	23.52	1.78	.926	.070
ORAR00022	25.12	1.78	.989	.070
ORAR00023	26.70	1.78	1.051	.070
ORAR00024	28.30	1.78	1.114	.070
ORAR00025	29.87	1.78	1.176	.070
ORAR00026	31.47	1.78	1.239	.070
ORAR00027	33.05	1.78	1.301	.070



TSS Part No.	Metric dimensions (mm)		Imperial dimensions (inch)	
	Inside diameter d ₁	Cross section d ₂	Inside diameter d ₁	Cross section d ₂
ORAR00028	34.65	1.78	1.364	.070
ORAR00029	37.82	1.78	1.489	.070
ORAR00030	41.00	1.78	1.614	.070
ORAR00031	44.17	1.78	1.739	.070
ORAR00032	47.35	1.78	1.864	.070
ORAR00033	50.52	1.78	1.989	.070
ORAR00034	53.70	1.78	2.114	.070
ORAR00035	56.87	1.78	2.239	.070
ORAR00036	60.05	1.78	2.364	.070
ORAR00037	63.22	1.78	2.489	.070
ORAR00038	66.40	1.78	2.614	.070
ORAR00039	69.57	1.78	2.739	.070
ORAR00040	72.75	1.78	2.864	.070
ORAR00041	75.92	1.78	2.989	.070
ORAR00042	82.27	1.78	3.239	.070
ORAR00043	88.62	1.78	3.489	.070
ORAR00044	94.97	1.78	3.739	.070
ORAR00045	101.32	1.78	3.989	.070
ORAR00046	107.67	1.78	4.239	.070
ORAR00047	114.02	1.78	4.489	.070
ORAR00048	120.37	1.78	4.739	.070
ORAR00049	126.72	1.78	4.989	.070
ORAR00050	133.07	1.78	5.239	.070
ORAR00102	1.24	2.62	.049	.103
ORAR00103	2.06	2.62	.081	.103
ORAR00104	2.84	2.62	.112	.103
ORAR00105	3.63	2.62	.143	.103
ORAR00106	4.42	2.62	.174	.103
ORAR00107	5.23	2.62	.206	.103
ORAR00108	6.02	2.62	.237	.103
ORAR00109	7.59	2.62	.299	.103
ORAR00110	9.19	2.62	.362	.103
ORAR00111	10.77	2.62	.424	.103
ORAR00112	12.37	2.62	.487	.103
ORAR00113	13.94	2.62	.549	.103
ORAR00114	15.54	2.62	.612	.103



O-Ring

TSS Part No.	Metric dimensions (mm)		Imperial dimensions (inch)	
	Inside diameter d ₁	Cross section d ₂	Inside diameter d ₁	Cross section d ₂
ORAR00115	17.12	2.62	.674	.103
ORAR00116	18.72	2.62	.737	.103
ORAR00117	20.29	2.62	.799	.103
ORAR00118	21.89	2.62	.862	.103
ORAR00119	23.47	2.62	.924	.103
ORAR00120	25.07	2.62	.987	.103
ORAR00121	26.64	2.62	1.049	.103
ORAR00122	28.24	2.62	1.112	.103
ORAR00123	29.82	2.62	1.174	.103
ORAR00124	31.42	2.62	1.237	.103
ORAR00125	32.99	2.62	1.299	.103
ORAR00126	34.59	2.62	1.362	.103
ORAR00127	36.17	2.62	1.424	.103
ORAR00128	37.77	2.62	1.487	.103
ORAR00129	39.34	2.62	1.549	.103
ORAR00130	40.94	2.62	1.612	.103
ORAR00131	42.52	2.62	1.674	.103
ORAR00132	44.12	2.62	1.737	.103
ORAR00133	45.69	2.62	1.799	.103
ORAR00134	47.29	2.62	1.862	.103
ORAR00135	48.90	2.62	1.925	.103
ORAR00136	50.47	2.62	1.987	.103
ORAR00137	52.07	2.62	2.050	.103
ORAR00138	53.64	2.62	2.112	.103
ORAR00139	55.25	2.62	2.175	.103
ORAR00140	56.82	2.62	2.237	.103
ORAR00141	58.42	2.62	2.300	.103
ORAR00142	59.99	2.62	2.362	.103
ORAR00143	61.60	2.62	2.425	.103
ORAR00144	63.17	2.62	2.487	.103
ORAR00145	64.77	2.62	2.550	.103
ORAR00146	66.34	2.62	2.612	.103
ORAR00147	67.95	2.62	2.675	.103
ORAR00148	69.52	2.62	2.737	.103
ORAR00149	71.12	2.62	2.800	.103
ORAR00150	72.69	2.62	2.862	.103
ORAR00151	75.87	2.62	2.987	.103



TSS Part No.	Metric dimensions (mm)		Imperial dimensions (inch)	
	Inside diameter d ₁	Cross section d ₂	Inside diameter d ₁	Cross section d ₂
ORAR00152	82.22	2.62	3.237	.103
ORAR00153	88.57	2.62	3.487	.103
ORAR00154	94.92	2.62	3.737	.103
ORAR00155	101.27	2.62	3.987	.103
ORAR00156	107.62	2.62	4.237	.103
ORAR00157	113.97	2.62	4.487	.103
ORAR00158	120.32	2.62	4.737	.103
ORAR00159	126.67	2.62	4.987	.103
ORAR00160	133.02	2.62	5.237	.103
ORAR00161	139.37	2.62	5.487	.103
ORAR00162	145.72	2.62	5.737	.103
ORAR00163	152.07	2.62	5.987	.103
ORAR00164	158.42	2.62	6.237	.103
ORAR00165	164.77	2.62	6.487	.103
ORAR00166	171.12	2.62	6.737	.103
ORAR00167	177.47	2.62	6.987	.103
ORAR00168	183.82	2.62	7.237	.103
ORAR00169	190.17	2.62	7.487	.103
ORAR00170	196.52	2.62	7.737	.103
ORAR00171	202.87	2.62	7.987	.103
ORAR00172	209.22	2.62	8.237	.103
ORAR00173	215.57	2.62	8.487	.103
ORAR00174	221.92	2.62	8.737	.103
ORAR00175	228.27	2.62	8.987	.103
ORAR00176	234.62	2.62	9.237	.103
ORAR00177	240.97	2.62	9.487	.103
ORAR00178	247.32	2.62	9.737	.103
ORAR00201	4.34	3.53	.171	.139
ORAR00202	5.94	3.53	.234	.139
ORAR00203	7.52	3.53	.296	.139
ORAR00204	9.12	3.53	.359	.139
ORAR00205	10.69	3.53	.421	.139
ORAR00206	12.29	3.53	.484	.139
ORAR00207	13.87	3.53	.546	.139
ORAR00208	15.47	3.53	.609	.139
ORAR00209	17.04	3.53	.671	.139



O-Ring

TSS Part No.	Metric dimensions (mm)		Imperial dimensions (inch)	
	Inside diameter d ₁	Cross section d ₂	Inside diameter d ₁	Cross section d ₂
ORAR00210	18.64	3.53	.734	.139
ORAR00211	20.22	3.53	.796	.139
ORAR00212	21.82	3.53	.859	.139
ORAR00213	23.39	3.53	.921	.139
ORAR00214	24.99	3.53	.984	.139
ORAR00215	26.57	3.53	1.046	.139
ORAR00216	28.17	3.53	1.109	.139
ORAR00217	29.74	3.53	1.171	.139
ORAR00218	31.34	3.53	1.234	.139
ORAR00219	32.92	3.53	1.296	.139
ORAR00220	34.52	3.53	1.359	.139
ORAR00221	36.09	3.53	1.421	.139
ORAR00222	37.69	3.53	1.484	.139
ORAR00223	40.87	3.53	1.609	.139
ORAR00224	44.04	3.53	1.734	.139
ORAR00225	47.22	3.53	1.859	.139
ORAR00226	50.39	3.53	1.984	.139
ORAR00227	53.57	3.53	2.109	.139
ORAR00228	56.74	3.53	2.234	.139
ORAR00229	59.92	3.53	2.359	.139
ORAR00230	63.09	3.53	2.484	.139
ORAR00231	66.27	3.53	2.609	.139
ORAR00232	69.44	3.53	2.734	.139
ORAR00233	72.62	3.53	2.859	.139
ORAR00234	75.79	3.53	2.984	.139
ORAR00235	78.97	3.53	3.109	.139
ORAR00236	82.14	3.53	3.234	.139
ORAR00237	85.32	3.53	3.359	.139
ORAR00238	88.49	3.53	3.484	.139
ORAR00239	91.67	3.53	3.609	.139
ORAR00240	94.84	3.53	3.734	.139
ORAR00241	98.02	3.53	3.859	.139
ORAR00242	101.19	3.53	3.984	.139
ORAR00243	104.37	3.53	4.109	.139
ORAR00244	107.54	3.53	4.234	.139
ORAR00245	110.72	3.53	4.359	.139
ORAR00246	113.89	3.53	4.484	.139



TSS Part No.	Metric dimensions (mm)		Imperial dimensions (inch)	
	Inside diameter d ₁	Cross section d ₂	Inside diameter d ₁	Cross section d ₂
ORAR00247	117.07	3.53	4.609	.139
ORAR00248	120.24	3.53	4.734	.139
ORAR00249	123.42	3.53	4.859	.139
ORAR00250	126.59	3.53	4.984	.139
ORAR00251	129.77	3.53	5.109	.139
ORAR00252	132.94	3.53	5.234	.139
ORAR00253	136.12	3.53	5.359	.139
ORAR00254	139.29	3.53	5.484	.139
ORAR00255	142.47	3.53	5.609	.139
ORAR00256	145.64	3.53	5.734	.139
ORAR00257	148.82	3.53	5.859	.139
ORAR00258	151.99	3.53	5.984	.139
ORAR00259	158.34	3.53	6.234	.139
ORAR00260	164.69	3.53	6.484	.139
ORAR00261	171.04	3.53	6.734	.139
ORAR00262	177.39	3.53	6.984	.139
ORAR00263	183.74	3.53	7.234	.139
ORAR00264	190.09	3.53	7.484	.139
ORAR00265	196.44	3.53	7.734	.139
ORAR00266	202.79	3.53	7.984	.139
ORAR00267	209.14	3.53	8.234	.139
ORAR00268	215.49	3.53	8.484	.139
ORAR00269	221.84	3.53	8.734	.139
ORAR00270	228.19	3.53	8.984	.139
ORAR00271	234.54	3.53	9.234	.139
ORAR00272	240.89	3.53	9.484	.139
ORAR00273	247.24	3.53	9.734	.139
ORAR00274	253.59	3.53	9.984	.139
ORAR00275	266.29	3.53	10.484	.139
ORAR00276	278.99	3.53	10.984	.139
ORAR00277	291.69	3.53	11.484	.139
ORAR00278	304.39	3.53	11.984	.139
ORAR00279	329.79	3.53	12.984	.139
ORAR00280	355.19	3.53	13.984	.139
ORAR00281	380.59	3.53	14.984	.139
ORAR00282	405.26	3.53	15.955	.139
ORAR00283	430.66	3.53	16.955	.139



O-Ring

TSS Part No.	Metric dimensions (mm)		Imperial dimensions (inch)	
	Inside diameter d ₁	Cross section d ₂	Inside diameter d ₁	Cross section d ₂
ORAR00284	456.06	3.53	17.955	.139
ORAR00309	10.46	5.33	.412	.210
ORAR00310	12.07	5.33	.475	.210
ORAR00311	13.64	5.33	.537	.210
ORAR00312	15.24	5.33	.600	.210
ORAR00313	16.81	5.33	.662	.210
ORAR00314	18.42	5.33	.725	.210
ORAR00315	19.99	5.33	.787	.210
ORAR00316	21.59	5.33	.850	.210
ORAR00317	23.16	5.33	.912	.210
ORAR00318	24.77	5.33	.975	.210
ORAR00319	26.34	5.33	1.037	.210
ORAR00320	27.94	5.33	1.100	.210
ORAR00321	29.51	5.33	1.162	.210
ORAR00322	31.12	5.33	1.225	.210
ORAR00323	32.69	5.33	1.287	.210
ORAR00324	34.29	5.33	1.350	.210
ORAR00325	37.47	5.33	1.475	.210
ORAR00326	40.64	5.33	1.600	.210
ORAR00327	43.82	5.33	1.725	.210
ORAR00328	46.99	5.33	1.850	.210
ORAR00329	50.17	5.33	1.975	.210
ORAR00330	53.34	5.33	2.100	.210
ORAR00331	56.52	5.33	2.225	.210
ORAR00332	59.69	5.33	2.350	.210
ORAR00333	62.87	5.33	2.475	.210
ORAR00334	66.04	5.33	2.600	.210
ORAR00335	69.22	5.33	2.725	.210
ORAR00336	72.39	5.33	2.850	.210
ORAR00337	75.57	5.33	2.975	.210
ORAR00338	78.74	5.33	3.100	.210
ORAR00339	81.92	5.33	3.225	.210
ORAR00340	85.09	5.33	3.350	.210
ORAR00341	88.27	5.33	3.475	.210
ORAR00342	91.44	5.33	3.600	.210
ORAR00343	94.62	5.33	3.725	.210



TSS Part No.	Metric dimensions (mm)		Imperial dimensions (inch)	
	Inside diameter d ₁	Cross section d ₂	Inside diameter d ₁	Cross section d ₂
ORAR00344	97.79	5.33	3.850	.210
ORAR00345	100.97	5.33	3.975	.210
ORAR00346	104.14	5.33	4.100	.210
ORAR00347	107.32	5.33	4.225	.210
ORAR00348	110.49	5.33	4.350	.210
ORAR00349	113.67	5.33	4.475	.210
ORAR00350	116.84	5.33	4.600	.210
ORAR00351	120.02	5.33	4.725	.210
ORAR00352	123.19	5.33	4.850	.210
ORAR00353	126.37	5.33	4.975	.210
ORAR00354	129.54	5.33	5.100	.210
ORAR00355	132.72	5.33	5.225	.210
ORAR00356	135.89	5.33	5.350	.210
ORAR00357	139.07	5.33	5.475	.210
ORAR00358	142.24	5.33	5.600	.210
ORAR00359	145.42	5.33	5.725	.210
ORAR00360	148.59	5.33	5.850	.210
ORAR00361	151.77	5.33	5.975	.210
ORAR00362	158.12	5.33	6.225	.210
ORAR00363	164.47	5.33	6.475	.210
ORAR00364	170.82	5.33	6.725	.210
ORAR00365	177.17	5.33	6.975	.210
ORAR00366	183.52	5.33	7.225	.210
ORAR00367	189.87	5.33	7.475	.210
ORAR00368	196.22	5.33	7.725	.210
ORAR00369	202.57	5.33	7.975	.210
ORAR00370	208.92	5.33	8.225	.210
ORAR00371	215.27	5.33	8.475	.210
ORAR00372	221.62	5.33	8.725	.210
ORAR00373	227.97	5.33	8.975	.210
ORAR00374	234.32	5.33	9.225	.210
ORAR00375	240.67	5.33	9.475	.210
ORAR00376	247.02	5.33	9.725	.210
ORAR00377	253.37	5.33	9.975	.210
ORAR00378	266.07	5.33	10.475	.210
ORAR00379	278.77	5.33	10.975	.210
ORAR00380	291.47	5.33	11.475	.210



O-Ring

TSS Part No.	Metric dimensions (mm)		Imperial dimensions (inch)	
	Inside diameter d ₁	Cross section d ₂	Inside diameter d ₁	Cross section d ₂
ORAR00381	304.17	5.33	11.975	.210
ORAR00382	329.57	5.33	12.975	.210
ORAR00383	354.97	5.33	13.975	.210
ORAR00384	380.37	5.33	14.975	.210
ORAR00385	405.26	5.33	15.955	.210
ORAR00386	430.66	5.33	16.955	.210
ORAR00387	456.06	5.33	17.955	.210
ORAR00388	481.38	5.33	18.952	.210
ORAR00389	506.78	5.33	19.952	.210
ORAR00390	532.18	5.33	20.952	.210
ORAR00391	557.58	5.33	21.952	.210
ORAR00392	582.68	5.33	22.940	.210
ORAR00393	608.08	5.33	23.940	.210
ORAR00394	633.48	5.33	24.940	.210
ORAR00395	658.88	5.33	25.940	.210
ORAR00425	113.67	6.99	4.475	.275
ORAR00426	116.84	6.99	4.600	.275
ORAR00427	120.02	6.99	4.725	.275
ORAR00428	123.19	6.99	4.850	.275
ORAR00429	126.37	6.99	4.975	.275
ORAR00430	129.54	6.99	5.100	.275
ORAR00431	132.72	6.99	5.225	.275
ORAR00432	135.89	6.99	5.350	.275
ORAR00433	139.07	6.99	5.475	.275
ORAR00434	142.24	6.99	5.600	.275
ORAR00435	145.42	6.99	5.725	.275
ORAR00436	148.59	6.99	5.850	.275
ORAR00437	151.77	6.99	5.975	.275
ORAR00438	158.12	6.99	6.225	.275
ORAR00439	164.47	6.99	6.475	.275
ORAR00440	170.82	6.99	6.725	.275
ORAR00441	177.17	6.99	6.975	.275
ORAR00442	183.52	6.99	7.225	.275
ORAR00443	189.87	6.99	7.475	.275
ORAR00444	196.22	6.99	7.725	.275
ORAR00445	202.57	6.99	7.975	.275



TSS Part No.	Metric dimensions (mm)		Imperial dimensions (inch)	
	Inside diameter d ₁	Cross section d ₂	Inside diameter d ₁	Cross section d ₂
ORAR00446	215.27	6.99	8.475	.275
ORAR00447	227.97	6.99	8.975	.275
ORAR00448	240.67	6.99	9.475	.275
ORAR00449	253.37	6.99	9.975	.275
ORAR00450	266.07	6.99	10.475	.275
ORAR00451	278.77	6.99	10.975	.275
ORAR00452	291.47	6.99	11.475	.275
ORAR00453	304.17	6.99	11.975	.275
ORAR00454	316.87	6.99	12.475	.275
ORAR00455	329.57	6.99	12.975	.275
ORAR00456	342.27	6.99	13.475	.275
ORAR00457	354.97	6.99	13.975	.275
ORAR00458	367.67	6.99	14.475	.275
ORAR00459	380.37	6.99	14.975	.275
ORAR00460	393.07	6.99	15.475	.275
ORAR00461	405.26	6.99	15.955	.275
ORAR00462	417.96	6.99	16.455	.275
ORAR00463	430.66	6.99	16.955	.275
ORAR00464	443.36	6.99	17.455	.275
ORAR00465	456.06	6.99	17.955	.275
ORAR00466	468.76	6.99	18.455	.275
ORAR00467	481.46	6.99	18.955	.275
ORAR00468	494.16	6.99	19.455	.275
ORAR00469	506.86	6.99	19.955	.275
ORAR00470	532.26	6.99	20.955	.275
ORAR00471	557.66	6.99	21.955	.275
ORAR00472	582.68	6.99	22.940	.275
ORAR00473	608.08	6.99	23.940	.275
ORAR00474	633.48	6.99	24.940	.275
ORAR00475	658.88	6.99	25.940	.275



O-Ring

C.1.3 O-Ring dimensions for straight thread tube fitting sizes, AS 568 B

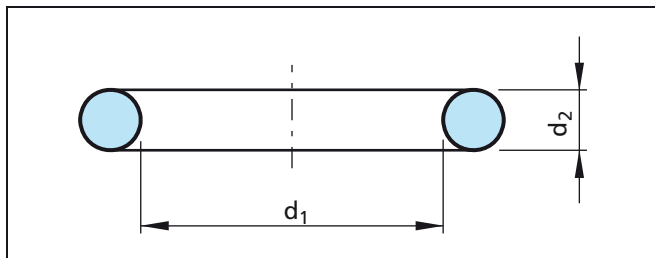


Figure 28 O-Ring dimensions

Ordering example

O-Ring according to AS 568 B

Dimensions: Inside diameter $d_1 = 23.47$ mm
 Cross section $d_2 = 2.95$ mm

Compound: NBR 70
 Nitrile-Butadiene Rubber 70 Shore A)

O-Ring dimensions and TSS part numbers see table XVIII. Material codes (elastomer type) for standard product order see table I (last column). The required Shore hardness must be given with the order.

When a special material is required the exact five-digit Trelleborg Sealing Solutions material code must be given with the order. In this respect please refer to the information provided in table X Preferred materials or contact your local Trelleborg Sealing Solutions company.

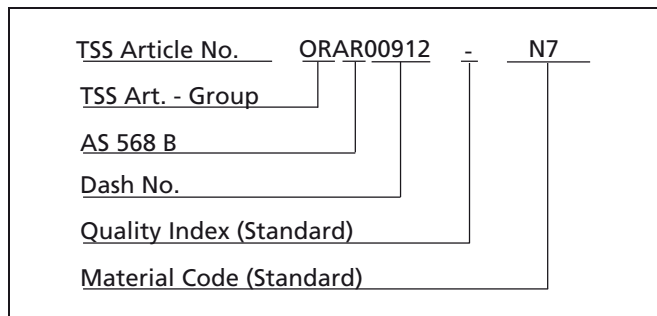


Table XVIII Dimensions / TSS part numbers

TSS Part No.	Metric dimensions (mm)		Imperial dimensions (inch)		Tube size (inch)
	Inside diameter d_1	Cross section d_2	Inside diameter d_1	Cross section d_2	Outside diameter OD
ORAR00901	4.70	1.42	.185	.056	3/32
ORAR00902	6.07	1.63	.239	.064	1/8
ORAR00903	7.65	1.63	.301	.064	3/16
ORAR00904	8.92	1.83	.351	.072	1/4
ORAR00905	10.52	1.83	.414	.072	5/16
ORAR00906	11.89	1.98	.468	.078	3/8
ORAR00907	13.46	2.08	.530	.082	7/16
ORAR00908	16.36	2.20	.644	.087	1/2
ORAR00909	17.93	2.46	.706	.097	9/16
ORAR00910	19.18	2.46	.755	.097	5/8
ORAR00911	21.92	2.95	.863	.116	11/16
ORAR00912	23.47	2.95	.924	.116	3/4
ORAR00913	25.04	2.95	.986	.116	13/16



TSS Part No.	Metric dimensions (mm)		Imperial dimensions (inch)		Tube size (inch)
	Inside diameter d_1	Cross section d_2	Inside diameter d_1	Cross section d_2	Outside diameter OD
ORAR00914	26.62	2.95	1.048	.116	7/8
ORAR00916	29.74	2.95	1.171	.116	1
ORAR00918	34.42	2.95	1.355	.116	1 1/8
ORAR00920	37.47	3.00	1.475	.118	1 1/4
ORAR00924	43.69	3.00	1.720	.118	1 1/2
ORAR00928	53.09	3.00	2.090	.118	1 3/4
ORAR00932	59.36	3.00	2.337	.118	1 3/4

C.1.4 O-Ring dimensions for metric thread with conical recess according to ISO 6149

Table XIX O-Ring dimensions for metric thread with conical recess according to ISO 6149

TSS Part No.	Metric dimensions (mm)		Thread (metric)
	Inside diameter d_1	Cross section d_2	
OR1600610	6.10	1.60	M8 x 1
OR1600810	8.10	1.60	M10 x 1
OR2200930	9.30	2.20	M12 x 1.5
OR2201130	11.30	2.20	M14 x 1.5
OR2201330	13.30	2.20	M16 x 1.5
OR2201530	15.30	2.20	M18 x 1.5
OR2201730	17.30	2.20	M20 x 1.5
OR2201930	19.30	2.20	M22 x 1.5
OR2902360	23.60	2.90	M27 x 2
OR2902960	29.60	2.90	M33 x 2
OR2903860	38.60	2.90	M42 x 2
OR2904460	44.60	2.90	M48 x 2
OR2905660	56.60	2.90	M60 x 2



C.2 Tolerances of dimensions

During vulcanisation, elastomers are subject to dimensional changes due to shrinkage. The degree of shrinkage depends on material, mould geometry and on the vulcanisation process employed.

The following tables XX and XXI show the tolerances for the inside diameter (d_1) and cross section (d_2). The tables are valid for all 70 Shore A Nitrile (NBR) elastomer materials; other materials may exhibit different dimensional tolerances if they are produced from moulds designed for NBR 70 materials. To guarantee a high and constant quality level it might be necessary to produce new or additional moulds with the corresponding costs.

Precision O-Rings with reduced tolerances are available if required - please contact your local Trelleborg Sealing Solutions company. O-Ring dimensions not included in the tables are manufactured with tolerances according to the TSS standard TBS-00024, based on ISO 3601-1:1987.

Table XX Cross section tolerances acc. to the TSS standard TBS-00024, based on ISO 3601-1:1987

Cross section d_2	Tolerances \pm
≤ 1.80	0.08
$1.80 < d_2 \leq 2.65$	0.09
$2.65 < d_2 \leq 3.55$	0.10
$3.55 < d_2 \leq 5.30$	0.11
$5.30 < d_2 \leq 7.00$	0.12
$7.00 < d_2 \leq 8.00$	0.13
$8.00 < d_2 \leq 10.00$	0.14
$10.00 < d_2 \leq 12.00$	0.15

Table XXI Tolerances for O-Ring inside diameters d_1 acc. to ISO 3601-1:1987

Inside diameter d_1	Tolerances \pm	Tolerances \pm
$d_1 \leq 2.50$	0.13	0.39
$2.50 < d_1 \leq 4.50$	0.14	0.40
$4.50 < d_1 \leq 6.30$	0.15	0.41
$6.30 < d_1 \leq 8.50$	0.16	0.42
$8.50 < d_1 \leq 10.00$	0.17	0.43
$10.00 < d_1 \leq 11.20$	0.18	0.44
$11.20 < d_1 \leq 14.00$	0.19	0.45
$14.00 < d_1 \leq 16.00$	0.20	0.46
$16.00 < d_1 \leq 18.00$	0.21	0.47
$18.00 < d_1 \leq 20.00$	0.22	0.48
$20.00 < d_1 \leq 21.00$	0.23	0.50
$21.00 < d_1 \leq 22.00$	0.24	0.51
$22.00 < d_1 \leq 23.00$	0.25	0.52
$23.00 < d_1 \leq 24.00$	0.26	0.54
$24.00 < d_1 \leq 25.00$	0.27	0.55
$25.00 < d_1 \leq 26.00$	0.28	0.56
$26.00 < d_1 \leq 27.00$	0.29	0.58
$27.00 < d_1 \leq 28.00$	0.30	0.59
$28.00 < d_1 \leq 29.00$	0.31	0.61
$29.00 < d_1 \leq 30.00$	0.32	0.63
$30.00 < d_1 \leq 31.50$	0.33	0.64
$31.50 < d_1 \leq 33.00$	0.34	0.66
$33.00 < d_1 \leq 33.50$	0.35	0.67
$33.50 < d_1 \leq 34.50$	0.36	0.69
$34.50 < d_1 \leq 35.50$	0.37	
$35.50 < d_1 \leq 36.50$	0.38	
$36.50 < d_1 \leq 37.50$		
$37.50 < d_1 \leq 38.70$		
$38.70 < d_1 \leq 40.00$		

Attention! Since November 18, 2008 the new dimension tolerances according to ISO 3601-1:2008, Class B apply to Trelleborg Sealing Solutions O-Rings. See separate attachment to this catalog. Also available as PDF file "O-Rings - Dimension Tolerances NEW 2008 (metric)" at <http://www.tss.trelleborg.com/>



Inside diameter d_1	Tolerances \pm
80.00 < d_1 ≤ 82.50	0.71
82.50 < d_1 ≤ 85.00	0.73
85.00 < d_1 ≤ 87.50	0.75
87.50 < d_1 ≤ 90.00	0.77
90.00 < d_1 ≤ 92.50	0.79
92.50 < d_1 ≤ 95.00	0.81
95.00 < d_1 ≤ 97.50	0.83
97.50 < d_1 ≤ 100.00	0.84
100.00 < d_1 ≤ 103.00	0.87
103.00 < d_1 ≤ 106.00	0.89
106.00 < d_1 ≤ 109.00	0.91
109.00 < d_1 ≤ 112.00	0.93
112.00 < d_1 ≤ 115.00	0.95
115.00 < d_1 ≤ 118.00	0.97
118.00 < d_1 ≤ 122.00	1.00
122.00 < d_1 ≤ 125.00	1.03
125.00 < d_1 ≤ 128.00	1.06
128.00 < d_1 ≤ 132.00	1.10
132.00 < d_1 ≤ 136.00	1.14
136.00 < d_1 ≤ 140.00	1.18
140.00 < d_1 ≤ 145.00	1.22
145.00 < d_1 ≤ 150.00	1.27
150.00 < d_1 ≤ 155.00	1.32
155.00 < d_1 ≤ 160.00	1.37
160.00 < d_1 ≤ 165.00	1.43
165.00 < d_1 ≤ 170.00	1.49
170.00 < d_1 ≤ 175.00	1.55
175.00 < d_1 ≤ 180.00	1.61
180.00 < d_1 ≤ 185.00	1.67
185.00 < d_1 ≤ 190.00	1.73
190.00 < d_1 ≤ 195.00	1.79
195.00 < d_1 ≤ 200.00	1.85
200.00 < d_1 ≤ 205.00	1.91
205.00 < d_1 ≤ 210.00	1.97
210.00 < d_1 ≤ 215.00	2.03
215.00 < d_1 ≤ 220.00	2.09
220.00 < d_1 ≤ 225.00	2.15
225.00 < d_1 ≤ 230.00	2.21
230.00 < d_1 ≤ 236.00	2.27
236.00 < d_1 ≤ 243.00	2.33
243.00 < d_1 ≤ 250.00	2.39
250.00 < d_1 ≤ 258.00	2.45
258.00 < d_1 ≤ 265.00	2.51

Inside diameter d_1	Tolerances \pm
265.00 < d_1 ≤ 272.00	2.02
272.00 < d_1 ≤ 280.00	2.08
280.00 < d_1 ≤ 290.00	2.14
290.00 < d_1 ≤ 300.00	2.21
300.00 < d_1 ≤ 307.00	2.25
307.00 < d_1 ≤ 315.00	2.30
315.00 < d_1 ≤ 325.00	2.35
325.00 < d_1 ≤ 335.00	2.40
335.00 < d_1 ≤ 345.00	2.45
345.00 < d_1 ≤ 355.00	2.50
355.00 < d_1 ≤ 365.00	2.55
365.00 < d_1 ≤ 375.00	2.60
375.00 < d_1 ≤ 385.00	2.65
385.00 < d_1 ≤ 395.00	2.70
395.00 < d_1 ≤ 405.00	2.75
405.00 < d_1 ≤ 415.00	2.80
415.00 < d_1 ≤ 425.00	2.85
425.00 < d_1 ≤ 435.00	2.90
435.00 < d_1 ≤ 445.00	2.95
445.00 < d_1 ≤ 455.00	3.00
455.00 < d_1 ≤ 465.00	3.05
465.00 < d_1 ≤ 475.00	3.10
475.00 < d_1 ≤ 487.00	3.15
487.00 < d_1 ≤ 500.00	3.20
500.00 < d_1 ≤ 515.00	3.25
515.00 < d_1 ≤ 530.00	3.30
530.00 < d_1 ≤ 545.00	3.35
545.00 < d_1 ≤ 560.00	3.40
560.00 < d_1 ≤ 580.00	3.45
580.00 < d_1 ≤ 600.00	3.50
600.00 < d_1 ≤ 615.00	3.55
615.00 < d_1 ≤ 630.00	3.60
630.00 < d_1 ≤ 650.00	3.65
650.00 < d_1 ≤ 670.00	3.70
$d_1 > 670.00$	approximately $\pm 0,7\%$

Attention!
 Since November 18, 2008 the new dimension tolerances according to
 ISO 3601-1:2008, Class B apply to Trelleborg Sealing Solutions O-Rings.
 See separate attachment to this catalog.
 Also available as PDF file "O-Rings - Dimension Tolerances NEW 2008
 (metric)" at <http://www.tss.trelleborg.com/>



C.3 O-Ring quality acceptance criteria

ISO 3601-3 defines permissible form and surface deviations of elastomeric O-Rings. Distinctions are made in the table between permissible flaw sizes according to type characteristics.

Type characteristic N

O-Rings falling under this characteristic meet the requirements made on a standard quality. They satisfy the demands made on static and dynamic seals.

Type characteristic S

O-Rings falling under type characteristic S are subject to exceptional demands, e.g. for safety relevant components in automobile engineering. The permissible flaw sizes are very limited. This demands a greater process technology

and stricter quality control procedures. The following tables define the form and surface deviations of Trelleborg Sealing Solutions Elastomer O-Rings for standard quality as well as for reduced tolerances. The given values are according to the TSS standard TBS-00005, based on ISO 3601-3:2005, grade N and respectively S.

If no quality requirements are specified with the order, O-Rings are supplied with standard quality according to table XXII (acc. to TSS standard TBS-00005, based on ISO 3601-3:2005, grade N).

For surface deviations ISO 2859-1:2004-01 AQL 1,0 general inspection level II is supplied as standard. Higher quality levels are available on request.

Table XXII Surface specification for O-Rings - standard

Standard				maximum acceptable limits acc. to TSS standard TBS-00005***, Grade N								
Type of defects acc. to TSS standard TBS-00005***	Schematic illustration			Cross section d ₂								
				≤0.80	≤2.25	≤3.15	≤4.50	≤6.30	≤8.40	≤10.00	≤15.00	>15.00
1. Offset		e		0.08	0.10	0.13	0.15	0.15	0.20	0.25		
2. Flash		f a		0.10	0.12	0.14	0.16	0.18	0.20	0.25	When the flash can be differentiated, it shall not exceed 0.07 mm	
3. Backrind		g h		0.18	0.27	0.36	0.53	0.70	0.90	1.20		
4. Non-fills and indentations		l m	by agreement	0.60	0.80	1.00	1.30	1.70	2.00	2.50		by agreement
5. Flow marks (radial orientation is not permitted)		j** k		0.08	0.08	0.10	0.10	0.13	0.13	0.15		
6. Area of excessive trimming (radial tool marks not allowed)		n		Trimming is allowed provided the dimension n is not reduced below the minimum diameter d ₂ for the O-Ring								
7. Foreign material		-		not permitted when viewed 2-times-magnified								
8. Straightness tolerance		-		-								
9. Roundness		-		-								
10.	The O-Ring surface shall be free from cracks, ruptures, blisters and other imperfections that are greater than the limits given in the table when inspected at 2-times-magnification with adequate illumination. The unstretched Ring is viewed.											
11.	Flow marks, non-fills and indentations within the limits given in the table shall not be allowed if a) there are more than three in any 25 mm length of circumference, b) they interconnect c) there are more than three that are separated from each other by a distance that is less than the maximum length of such imperfection											

all dimensions in mm * d₁ = Inside Diameter ** whichever is the greater *** based on ISO 3601-3:2005



Table XXIII Surface specification for O-Rings - reduced

		Reduced		maximum acceptable limits acc. to TSS standard TBS-00005***, Grade S								
Type of defects acc. to TSS standard TBS-00005***	Schematic illustration			Cross section d_2								
				≤ 0.80	≤ 2.25	≤ 3.15	≤ 4.50	≤ 6.30	≤ 8.40	≤ 10.00	≤ 15.00	$> 15,00$
1. Offset		e	by agreement	0.08	0.08	0.10	0.12	0.13	0.15	0.20	by agreement	
2. Flash		f a		0.10	0.10	0.13	0.15	0.15	0.18	0.20		When the flash can be differentiated, it shall not exceed 0.05 mm
3. Backrind		g h		0.10	0.15	0.20	0.20	0.30	0.50	0.75		
4. Non-fills and indentations		l m		0.05	0.08	0.10	0.10	0.13	0.13	0.15		
5. Flow marks (radial orientation is not permitted)		j** k		0.15	0.25	0.40	0.63	1.00	1.50	2.00		
6. Area of excessive trimming (radial tool marks not allowed)		n		0.08	0.08	0.10	0.10	0.13	0.13	0.15		
				1.50	1.50	5.00	5.00	5.00	5.00	7.00		or $0.05 \times d_1^*$
				0.05	0.05	0.05	0.05	0.05	0.08	0.08		Trimming is allowed provided the dimension n is not reduced below the minimum diameter d_2 for the O-Ring
7. Foreign material		-		not permitted when viewed 2-times-magnified								
8. Straightness tolerance		-		-								
9. Roundness		-		-								
10.	The O-Ring surface shall be free from cracks, ruptures, blisters and other imperfections that are greater than the limits given in the table when inspected at 2-times-magnification with adequate illumination. The unstretched Ring is viewed.											
11.	Flow marks, non-fills and indentations within the limits given in the table shall not be allowed if a) there are more than three in any 25 mm length of circumference, b) they interconnect c) there are more than three that are separated from each other by a distance that is less than the maximum length of such imperfection											

all dimensions in mm * d_1 = Inside Diameter ** whichever is the greater *** based on ISO 3601-3:2005



O-Ring

C.4 Seal set

The rapid availability of spare parts is very important during the servicing maintenance and repair of machines and equipment.

We offer a variety of standard ranges which are supplied in sturdy cases as a set with foam inlays.

O-Ring Set, Type A

390 O-Rings in 24 different Sizes to American Standard AS 568 B and British Standard BS 1806			
TSS Article No. ORSETAASS-N7		(NBR 70)	
Quantity	Dimensions (mm)	Quantity	Dimensions (mm)
30	2.90 x 1.78	10	18.77 x 1.78
30	3.69 x 1.78	15	9.20 x 2.62
30	4.47 x 1.78	15	10.78 x 2.62
30	5.28 x 1.78	15	12.37 x 2.62
30	6.07 x 1.78	10	17.12 x 2.62
30	7.65 x 1.78	10	18.72 x 2.62
30	9.25 x 1.78	10	20.30 x 2.62
20	10.82 x 1.78	5	18.64 x 3.53
20	12.42 x 1.78	5	20.22 x 3.53
10	14.00 x 1.78	5	21.82 x 3.53
10	15.60 x 1.78	5	23.38 x 3.53
10	17.17 x 1.78	5	24.99 x 3.53

O-Ring Set, Type B

295 O-Rings in 24 different Sizes to American Standard AS 568 B and British Standard BS 1806			
TSS Article No. ORSETBASS-N7		(NBR 70)	
Quantity	Dimensions (mm)	Quantity	Dimensions (mm)
15	20.35 x 1.78	15	34.52 x 3.53
15	21.95 x 1.78	10	36.09 x 3.53
15	25.07 x 2.62	10	37.69 x 3.53
15	26.64 x 2.62	10	40.87 x 3.53
15	28.24 x 2.62	10	44.04 x 3.53
15	29.82 x 2.62	10	47.22 x 3.53
15	31.42 x 2.62	10	50.39 x 3.53
15	32.99 x 2.62	10	37.47 x 5.33
15	34.59 x 2.62	10	40.64 x 5.33
15	29.74 x 3.53	10	43.82 x 5.33
15	31.34 x 3.53	5	46.99 x 5.33
15	32.92 x 3.53	5	50.17 x 5.33

O-Ring Set, Type C

380 O-Rings in 24 different Sizes, common Metric Sizes			
TSS Article No. ORSETCMET-N7		(NBR 70)	
Quantity	Dimensions (mm)	Quantity	Dimensions (mm)
20	4.00 x 2.00	15	10.30 x 2.40
20	6.00 x 2.00	15	11.20 x 2.40
20	8.00 x 2.00	15	12.30 x 2.40
20	10.00 x 2.00	15	13.30 x 2.40
20	12.00 x 2.00	15	14.30 x 2.40
20	3.30 x 2.40	10	10.00 x 3.00
20	4.30 x 2.40	10	12.00 x 3.00
20	5.30 x 2.40	10	14.00 x 3.00
20	6.30 x 2.40	10	16.00 x 3.00
20	7.30 x 2.40	10	18.00 x 3.00
20	8.30 x 2.40	10	19.20 x 3.00
20	9.20 x 2.40	5	20.00 x 3.00

O-Ring Set, Type D

295 O-Rings in 24 different Sizes, common Metric Sizes			
TSS Article No. ORSETDMET-N7		(NBR 70)	
Quantity	Dimensions (mm)	Quantity	Dimensions (mm)
15	18.00 x 2.00	15	35.00 x 4.00
15	20.00 x 2.00	15	38.00 x 4.00
15	25.00 x 3.00	15	40.00 x 4.00
15	26.20 x 3.00	10	42.00 x 4.00
15	28.00 x 3.00	10	45.00 x 4.00
15	29.20 x 3.00	10	46.00 x 4.00
15	32.20 x 3.00	10	48.00 x 4.00
15	34.20 x 3.00	10	35.00 x 5.00
15	36.20 x 3.00	10	40.00 x 5.00
15	30.00 x 4.00	10	45.00 x 5.00
15	32.00 x 4.00	5	48.00 x 5.00
15	34.00 x 4.00	5	50.00 x 5.00



D Special O-Rings

D.1 Isolast® (FFKM) O-Rings

Information about our Isolast® (FFKM) O-Rings are available either in our special Isolast® brochure or through your local Trelleborg Sealing Solutions company.

D.2 FEP encapsulated O-Rings

FEP encapsulated O-Rings consist of an elastomer inner ring and a seamless FEP sheath which surrounds the elastomer ring.

Similar to PTFE O-Rings FEP encapsulated O-Rings are used wherever the chemical resistance of normal elastomer O-Rings are not sufficient.

The required elasticity is provided by the elastomer ring, the chemical resistance by the seamless FEP sheath.

Advantages

- Very good chemical resistance to most liquids and chemicals, with the exception of liquid alkaline metals and some fluorine compounds
- Temperature application range from approx. -60 °C to +200 °C (depending on the material for the inner ring)
- Can be used with foodstuffs, pharmaceutical and medicinal products
- Physiologically safe and can be sterilised
- Low friction, no adhesion or stick-slip effect
- Adequate elastic behaviour for improved sealability.

Versions

- | | |
|--------------------|---------------------------------------|
| Standard versions: | Elastomer O-Ring with FEP sheath |
| Special versions: | Hollow elastomer ring with FEP sheath |

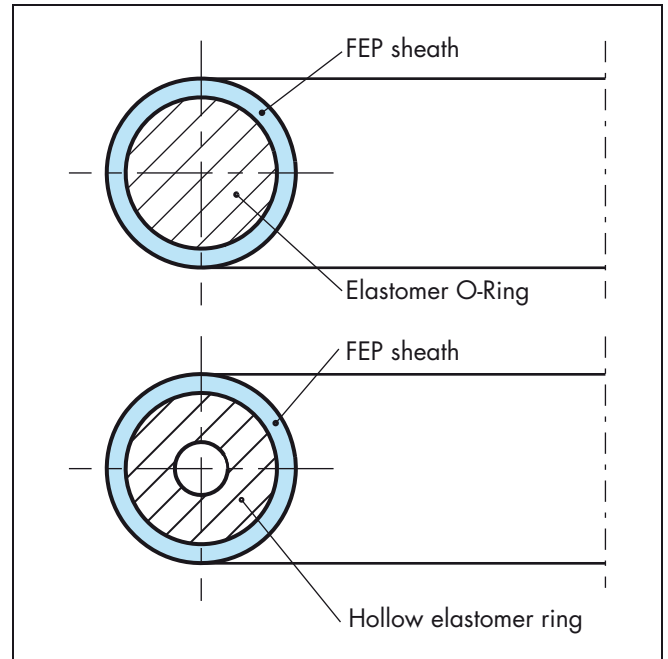


Figure 29 Different versions of FEP O-Ring

Applications

Fields of application

FEP encapsulated O-Rings are ideally suited for use in the chemical, petrochemicals, medical technology, foodstuffs, water, sewage and similar sectors of industry. A typical application for FEP encapsulated O-Rings is the sealing of valve spindles and as secondary sealing elements for mechanical seals.

FEP encapsulated O-Rings are used primarily as static seals. They are also suitable for use as sealing elements for slow switching and rotary movements.

In the chemical process industry, seals with special sealing profiles are frequently required. For such applications, we manufacture special seals for various flange cross sections either from drawings or from templates (Figure 30).

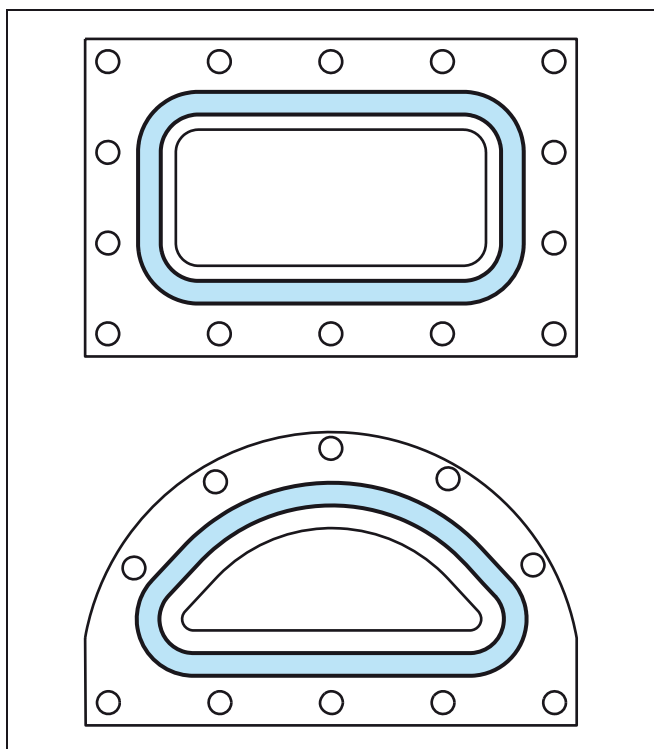


Figure 30 Seals for special flange cross sections

Technical data

Working pressure:	Up to 25 MPa
Temperature:	- 60 °C to + 200 °C - depending on the elastomer material
Media:	Practically all liquids, gases and chemicals

Materials

FEP sheath

FEP is the abbreviated designation for Tetrafluoroethylene-hexafluoropropylene. This material has similar properties to those of Polytetrafluoroethylene (PTFE). It also has a very high chemical resistance and exhibits a good resistance to abrasion.

In contrast to PTFE, however, FEP is thermoplastically mouldable. This allows the material to be processed to form flexible semifinished products, such as thin-walled hoses.

Inner ring

A choice of two materials is available for the elastomer inner rings. The choice of the material also determines the service temperature range.

- Fluoroelastomer (FKM), material code VZ00R
temperature range: - 20 °C up to + 200 °C
- Silicone elastomer (VMQ), material code SZ00R
temperature range: - 60 °C up to + 200 °C

The specified temperature ranges are limits which must always be considered in conjunction with the medium to be sealed and the working pressure. The permissible continuous operating temperatures are always lower than the upper limits.

Design recommendations

FEP encapsulated O-Rings are fully interchangeable with standard O-Ring seals. There is no need to modify the groove dimensions. The FEP sheath is relatively thin-walled.

All the specifications given in this catalogue therefore refer to the installation dimensions of elastomer O-Rings.

As a result of the FEP sheath, the O-Rings are less flexible than elastomer O-Rings. They have limited stretch and higher permanent deformation.

Split grooves are recommended, especially for outside sealing FEP encapsulated O-Rings, in order to avoid overstretching during installation.

The general information on the construction, design and surfaces given for the elastomer O-Rings applies also to FEP encapsulated O-Rings.

At higher pressures, additional concave Back-up Rings should be used.

Application in gases

Where the O-Ring is used to seal gases, the permeation rate must be taken into consideration. In this case the material of the inner ring must also have a good resistance to the medium to be sealed. The permeation rate depends on the exposed surface area, the temperature, the working pressure and the thickness of the FEP sheath.

The thickness of the FEP sheath can be found in table XXIV.



Table XXIV Thickness of the FEP sheath

O-Ring		Thickness of the FEP Sheath
Cross section d_2	Tolerance \pm	
1.78 1.80	0.10	0.20
2.62 2.65	0.10	0.30
3.53 3.55	0.12	0.38
5.34 5.30	0.25	0.50
7.00	0.38	0.50

The diagram (Figure 31) gives guide values for the permeation of different gases.

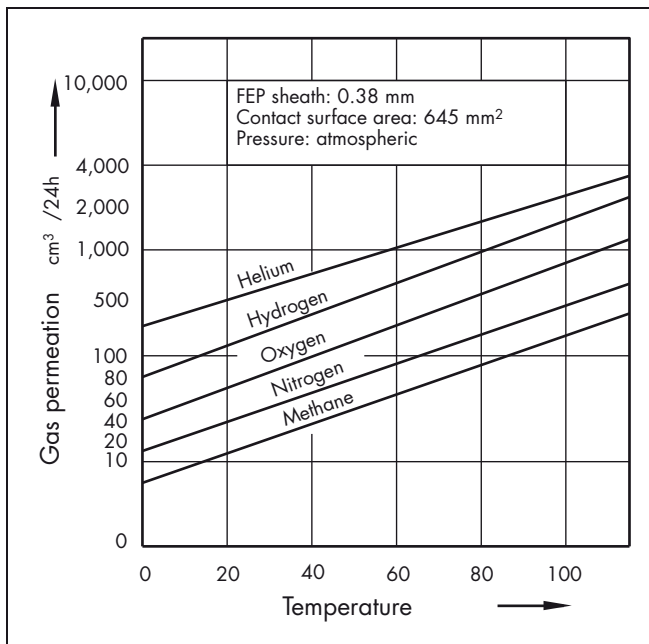


Figure 31 Gas permeation rates for FEP O-Rings

The diagram (Figure 32) gives guide values for the permeation of water vapour.

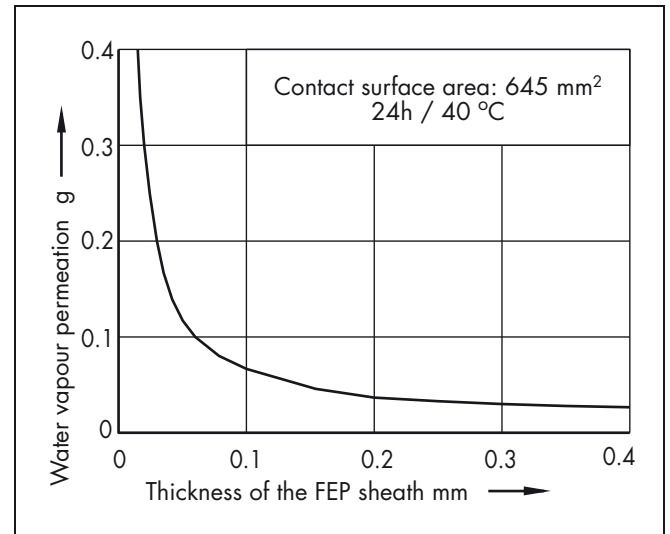


Figure 32 Water vapour permeation for FEP O-Rings

Methods of installation

The same recommendations apply to the installation of FEP encapsulated O-Rings as for standard elastomer O-Rings. It should be noted, however, that the O-Rings have only limited stretch due to the FEP sheath.

If, for design reasons, a split groove is not possible, auxiliary tools must be used for installation.

For inside sealing applications (e.g. rod), FEP encapsulated O-Rings can be installed with larger diameters without tools. On no account should the seal ring be forced into the groove (e. g. by bending), otherwise the sealing function cannot be assured.



O-Ring

Dimensions

FEP encapsulated O-Rings are available in the same sizes as the elastomer O-Rings. Table XXVI shows the smallest available inside diameters for the different cord diameters.

Table XXV Tolerances inside diameter

Inside diameter (mm)	Tolerance ID (\pm mm)
$d1 < 7.64$	not available
$7.64 \leq d1 \leq 30.00$	0.25
$30.00 < d1 \leq 130.00$	0.38
$130.00 < d1 \leq 170.00$	0.51
$170.00 < d1 \leq 380.00$	0.64
$380.00 < d1 \leq 650.00$	0.76
$650.00 < d1 \leq 1000.00$	1.52
$d1 > 1000.00$	on request

Table XXVI Smallest available sizes and cross section tolerances

O-Ring		Minimum inside diameter (mm)
Cross section (mm)	Tolerance CS (\pm mm)	
1.60	0.10	7.60
1.78		7.64
2.00		8.00
2.40		9.30
2.50		10.00
2.62		9.19
2.80		10.50
3.00		10.00
3.10	0.13	10.00
3.20		12.00
3.53		12.00
3.75		12.00
4.00		12.00
4.20	0.25	15.00
4.50		15.00
4.70		18.00
5.00		18.00
5.33		18.42
5.50		30.00
5.70		30.00

O-Ring		Minimum inside diameter (mm)
Cross section (mm)	Tolerance CS (\pm mm)	
6.00	0.38	30.00
6.30		41.00
6.50		41.00
7.00		41.00
7.50		101.60
8.00		70.00
8.40		102.00
9.00		0.51
9.50	102.00	
10.00	108.00	
10.50	127.00	
11.00	127.00	
12.00	152.40	
12.70	177.80	
13.00	254.00	
14.00	254.00	
15.00	254.00	
16.00	305.00	
18.00	422.00	
19.00	422.00	
20.00	508.00	



Ordering example

O-Ring 30 x 3, FEP sheathed

Dimensions: Inside diameter $d_1 = 30.0$ mm
Cross section $d_2 = 3.0$ mm

Material of the inner ring: Silicone Rubber (VMQ)

TSS Article No.	OF3003000	-	SZ00R
TSS Part No.			
Quality Index (Standard)			
Material Code (Standard)			

Further information see page 31

Ordering example

O-Ring, FEP sheathed

American Standard AS 568 B, ref. 356

Dimensions: Inside diameter $d_1 = 135.89$ mm
Cross section $d_2 = 5.33$ mm

Material of the inner ring: Fluorocarbon Rubber (FKM)

TSS Article No.	O FAR00356	-	VZ00R
TSS Part No.			
Quality Index (Standard)			
Material Code (Standard)			

Further information see page 31

O-Ring dimensions and TSS Part No. see Table XVI, page 32-97.

Installation dimensions, see Table XV, page 28.

Ordering can also be made according to O-Ring dimensions and material.



D.3 PTFE O-Rings

O-Rings in Polytetrafluoroethylene (PTFE) are closed, circular rings with annular cross section. The dimensions are - as with the elastomer O-Ring - characterised by the inside diameter d_1 and the cord diameter d_2 (Figure 33). PTFE O-Rings are not moulded but produced by machining. The rings can therefore be manufactured in all sizes.

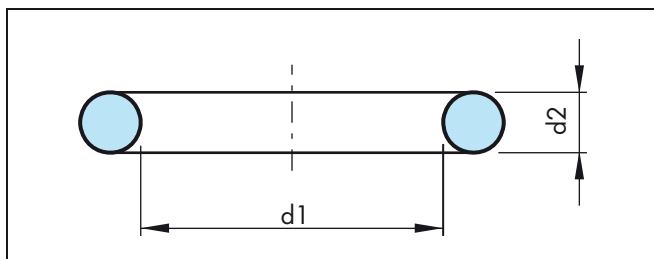


Figure 33 O-Ring dimensions

Advantages

- Very good chemical resistance, compatible with most liquids and chemicals, with the exception of liquid alkaline metals and some fluorine compounds.
- Wide temperature range from approx. $-200\text{ }^{\circ}\text{C}$ to $+260\text{ }^{\circ}\text{C}$
- Suitable for contact with foodstuffs, pharmaceutical and medicinal products
- Physiologically safe, can be sterilised
- Low friction, no adhesion
- Available for all diameters up to approx. 1,000 mm.

Applications

Fields of application

PTFE O-Rings are used wherever the chemical and thermal resistance of the normal elastomer O-Rings is no longer sufficient. These are primarily applications in the chemical industry, foodstuffs industry, pharmaceuticals and medical technology. PTFE O-Rings are used only as static seals, e.g. on flange connections, on covers, etc.

Technical data

Working pressure:	Up to 40 MPa
Temperature:	$-200\text{ }^{\circ}\text{C}$ to $+260\text{ }^{\circ}\text{C}$
Media:	Practically all liquids, gases and chemicals

Materials

Standard material: Virgin, unfilled PTFE (polytetrafluoroethylene), Material Code PT00

PTFE is a partially crystalline thermoplastic characterised by a very high chemical and thermal resistance. PTFE has the highest resistance to chemicals of all plastics and can be used for almost any application. It has a slightly limited resistance to molten alkaline metals, to elementary fluorine and to certain halogen materials.

The material undergoes no changes on exposure to ageing, light and ozone. The water absorption rate is less than 0.01%.

Design recommendations

PTFE O-Rings have low elasticity. The O-Ring size should therefore be chosen to suit the nominal diameter (rod or bore) to be sealed. Installation in axial easily accessible and radial split grooves is to be preferred.

The general information on the construction, design and surfaces given for the elastomer O-Rings applies also to PTFE O-Rings.

Methods of installation

PTFE O-Ring can only be stretched or compressed to a very limited extent during installation.

During installation, e.g. on flanges, the cold flow tendency of the thermoplastic PTFE should be taken into consideration. Under pressure, PTFE deforms plastically also in the cold state, i.e. a permanent deformation takes place. If flange seals are not tightened sufficiently to give metal/metal contact, the elastic deformation and thus the elastic tension can deteriorate.



Installation recommendations

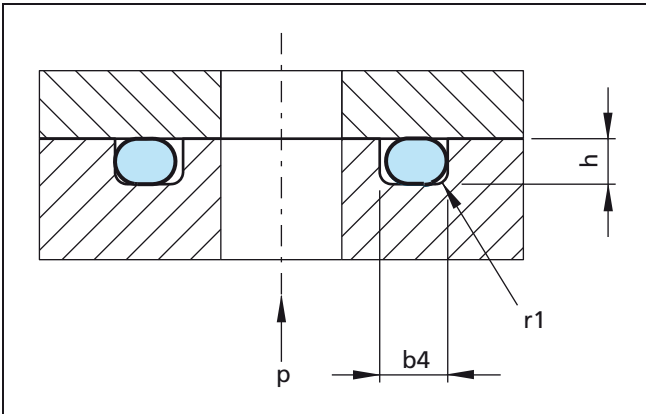


Figure 34 Axial installation, static, inside pressure

Table XXVII Installation dimensions

Cross section d_2	Groove dimensions		Radius r_1
	Groove depth $h +0.05$	Groove width $b_4 +0.1$	
1.50	1.30	1.7	0.2
1.60	1.40	1.8	0.3
1.78 1.80	1.60	2.0	0.4
2.00	1.80	2.2	0.5
2.40	2.15	2.6	0.5
2.50	2.25	2.8	0.5
2.62 2.65	2.35	2.9	0.6
3.00	2.70	3.3	0.8
3.53 3.55	3.15	3.9	1.0
4.00	3.60	4.4	1.0
5.00	4.50	5.5	1.0
5.33 5.30	4.80	5.9	1.2
5.70	5.10	6.3	1.2
6.00	5.60	6.6	1.2
7.00	6.30	7.7	1.5
8.00	7.20	8.8	1.5
8.40	7.55	9.2	2.0

Available dimensions

PTFE O-Rings are available in the same dimensions as the elastomer O-Rings. See O-Ring dimensions, page 32-97.

Ordering example

O-Ring, 40 x 3

Dimensions: Inside diameter $d_1 = 40.0$ mm
 Cross section $d_2 = 3.0$ mm

O-Ring dimensions and TSS Part No. see Table XVI, page 32-97.

Ordering can also be made according to O-Ring dimensions and material.

TSS Article No.	OR3004000	-	PT00
TSS Part No.			
Quality Index (Standard)			
Material Code (Standard)			



D.4 Polyurethane O-Rings

Polyurethane is becoming more and more widely used as a sealing material due to its exceptionally high abrasion resistance and high extrusion resistance.

The polyurethane materials from Trelleborg Sealing Solutions have a number of improved properties.

Polyurethane is therefore an ideal material for O-Rings and sealing elements.

The outstanding properties of the materials play a major role particularly in our Zurcon® materials.

Polyurethane O-Rings are available in dimensions to American Standard AS 568 B (see dimension list, table XXVIII, page 124).

The dimensions are given with the inside diameter "d₁" and the cord diameter "d₂" (Figure 35, page 123).

Advantages

The main advantages of a polyurethane material for O-Rings compared with other elastomer are the outstanding mechanical properties:

- High abrasion and wear resistance tolerates aggressive operating conditions
- High extrusion resistance allows increased pressures or extrusion gaps
- Good mechanical properties improve service life
- Low friction reduces breakout forces on start up

Applications

Fields of application

Polyurethane O-Rings are especially suited wherever O-Rings are subject to dynamic loads.

This includes for example, applications in hydraulics, pneumatics and in a wide range of other critical areas. In many cases, polyurethane O-Rings are used instead of NBR in view of their high mechanical strengths.

Due to their particularly high abrasion resistance, polyurethane O-Rings are more suitable than other materials in applications where bores have to be crossed or where frequent opening and closing is demanded, e.g. plug connectors and couplings.

Polyurethane O-Rings in 70 Shore A hardness material WU7TI can, with advance, be used in applications such as pneumatics where low compression set and low friction are essential.

Technical data

Working pressure:	Static up to approx. 60 MPa without Back-up Ring (depending on the extrusion gap) Dynamic up to 25 MPa
Speed:	Reciprocating up to ≤ 0.2 m/s
Temperature:	-45 °C up to +100 °C depending on the material
Media:	Hydraulic fluids and mineral oil-based greases and air.

Materials

The most important characteristics of these polyurethanes are:

- High tensile strength
- Low compression set
- Very good cold flexibility
- Constant shear modulus even at high temperatures
- Resistant to weathering and ageing
- High damping properties
- Low gas permeability
- Good hydrolysis resistance
- High tear propagation resistance
- Free from substances which hinder paint coverage



Polyurethane materials are resistant in:
Mineral oils and greases, oxygen, ozone.

Polyurethane compounds are not resistant in:
Esters, aromatic and chlorinated hydrocarbons,
concentrated acids and lyes.

Polyurethane O-Rings are available on request in the following grades:

Polyurethane, 70 Shore A
Material code WU7T1

Polyurethane, 92 Shore A
Material code WU9T2

Polyurethane, 93 Shore A, Zurcon®:
Material code Z22 and Z24

Polyurethane, 94 Shore A, Zurcon®:
Material code Z20

Depending on the production method Zurcon® O-Rings can have an injection point on the inside diameter. This marking is placed at a 45° angle from the flash.

Design instructions

The same design rules apply to polyurethane O-Rings as to other elastomer O-Rings, i.e. the same installation dimensions (groove depth, groove width), see Table XV, page 28.

Radial clearance

In view of the high extrusion resistance of polyurethane, larger clearances can be bridged with polyurethane O-Rings than with other elastomers, without the additional installation of Back-up Rings.

The permissible radial clearance is depending on the used material, on the O-Ring cross section and on the application properties, e. g. the temperature.

O-Ring dimensions

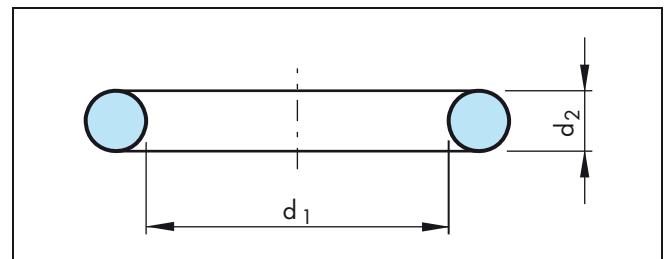


Figure 35 O-Ring dimensions

Ordering Example

O-Ring, American Standard AS 568 B, ref. 214

Dimensions: Inside diameter $d_1 = 24.99$ mm
Cross section $d_2 = 3.53$ mm

Material: Polyurethane (AU 70 Shore A)

O-Ring dimensions and TSS Part No. see table XXVIII.

Installation dimensions, see table XV, page 28.

Ordering can also be made according to O-Ring dimensions and material.

TSS Article No.	ORAR00214	-	WU7T1
TSS Part No.			
Quality Index (Standard)			
Material code (Standard)			



O-Ring

Table XXVIII Dimensions according to AS 568 B (Further sizes on request)

TSS Part No.	Inside-Ø d ₁	Cross Section d ₂
ORAR00005	2.57	1.78
ORAR00006	2.90	1.78
ORAR00008	4.47	1.78
ORAR00009	5.28	1.78
ORAR00010	6.07	1.78
ORAR00011	7.65	1.78
ORAR00012	9.25	1.78
ORAR00013	10.82	1.78
ORAR00014	12.42	1.78
ORAR00015	14.00	1.78
ORAR00017	17.17	1.78
ORAR00018	18.77	1.78
ORAR00019	20.35	1.78
ORAR00020	21.95	1.78
ORAR00022	25.12	1.78
ORAR00023	26.70	1.78
ORAR00025	29.87	1.78
ORAR00027	33.05	1.78
ORAR00029	37.82	1.78
ORAR00034	53.70	1.78
ORAR00036	60.05	1.78
ORAR00039	69.57	1.78
ORAR00040	72.75	1.78
ORAR00041	75.92	1.78
ORAR00045	101.32	1.78
ORAR00046	107.67	1.78
ORAR00047	114.02	1.78
ORAR00050	133.07	1.78
ORAR00110	9.19	2.62
ORAR00111	10.77	2.62
ORAR00112	12.37	2.62
ORAR00113	13.94	2.62
ORAR00114	15.54	2.62
ORAR00115	17.12	2.62
ORAR00116	18.72	2.62
ORAR00117	20.29	2.62

TSS Part No.	Inside-Ø d ₁	Cross Section d ₂
ORAR00118	21.89	2.62
ORAR00119	23.47	2.62
ORAR00120	25.07	2.62
ORAR00122	28.24	2.62
ORAR00124	31.42	2.62
ORAR00125	32.99	2.62
ORAR00126	34.59	2.62
ORAR00127	36.17	2.62
ORAR00128	37.77	2.62
ORAR00129	39.34	2.62
ORAR00132	44.12	2.62
ORAR00133	45.69	2.62
ORAR00134	47.29	2.62
ORAR00135	48.90	2.62
ORAR00136	50.47	2.62
ORAR00137	52.07	2.62
ORAR00138	53.64	2.62
ORAR00141	58.42	2.62
ORAR00142	59.99	2.62
ORAR00145	64.77	2.62
ORAR00146	66.34	2.62
ORAR00147	67.95	2.62
ORAR00210	18.64	3.53
ORAR00211	20.22	3.53
ORAR00213	23.39	3.53
ORAR00214	24.99	3.53
ORAR00215	26.57	3.53
ORAR00216	28.17	3.53
ORAR00217	29.74	3.53
ORAR00218	31.34	3.53
ORAR00220	34.52	3.53
ORAR00222	37.69	3.53
ORAR00224	44.04	3.53
ORAR00225	47.22	3.53
ORAR00226	50.39	3.53
ORAR00227	53.57	3.53



TSS Part No.	Inside-Ø d ₁	Cross Section d ₂
ORAR00228	56.74	3.53
ORAR00229	59.92	3.53
ORAR00230	63.09	3.53
ORAR00231	66.27	3.53
ORAR00232	69.44	3.53
ORAR00234	75.79	3.53
ORAR00235	78.97	3.53
ORAR00236	82.14	3.53
ORAR00237	85.32	3.53
ORAR00238	88.49	3.53
ORAR00239	91.67	3.53
ORAR00240	94.84	3.53
ORAR00325	37.47	5.33
ORAR00326	40.64	5.33
ORAR00327	43.82	5.33
ORAR00328	46.99	5.33
ORAR00329	50.17	5.33
ORAR00330	53.34	5.33
ORAR00331	56.52	5.33
ORAR00332	59.69	5.33
ORAR00334	66.04	5.33
ORAR00336	72.39	5.33
ORAR00337	75.57	5.33
ORAR00338	78.74	5.33
ORAR00339	81.92	5.33
ORAR00340	85.09	5.33

Tolerances based on ISO 3601. See tables XX and XXI.



D.5 Round cord rings (butt vulcanised)

Round cords are produced by extrusion. They are supplied as cut lengths. The most common materials are NBR 70 Shore A, EPDM 65 Shore A and FKM 75 Shore A. Other materials are available on request.

In contrast to mold-vulcanised O-Rings, round cord rings made from continuously extruded cord can be made up to any desired diameter.

The junction point always has poorer mechanical properties than the basic material. For this reason, round cord rings should be used with caution for dynamic applications, gaseous media or vacuum.

The O-Ring tolerances according to ISO 3601-1 (resp. TBS-00024) are applicable for the inside diameter d_1 but not for the cross section d_2 . Tolerances for the cross sections see tables below.

For the use of round cord rings in high-vacuum applications it is recommendable to use FKM. In that case the joint has to be manufactured in a special high-vacuum quality and has to be ordered accordingly. Please contact your local Trelleborg Sealing Solutions company for further details.

Table XXIX Available cross sections and valid tolerances for EPDM 70 Shore A

Cross section (mm)	Tolerance
2.00	± 0.30
2.50	
3.00	± 0.35
3.50	
4.00	
5.00	± 0.40
5.30	
5.70	
6.00	± 0.45
7.00	± 0.50
8.00	
9.00	
9.50	
10.00	
11.00	± 0.70
12.00	
13.00	
14.00	
15.00	
18.00	± 0.90
20.00	

The tolerances stated are valid for round cord rings (butt-vulcanised) only and refer to the cross section. Due to the applied pressure during the vulcanisation process the junction point can be thinner than the cord. In general this has no negative effect on the sealing function.

The article number of round cord rings starts with OV.

Table XXX Available cross sections and valid tolerances for FKM 75 Shore A

Cross section (mm)	Tolerance
1.78	+ 0.3 / - 0.1
2.00	
2.60	+ 0.3 / - 0.2
3.00	
3.50	
4.00	+ 0.4 / - 0.3
4.50	
5.00	
5.30	
5.70	
6.00	
6.50	+ 0.5 / - 0.3
7.00	
8.00	
8.40	
9.00	+ 0.6 / - 0.4
10.00	
11.00	
12.00	
14.00	
15.00	+ 0.8 / - 0.6
18.00	
20.00	



Table XXXI Available cross sections and valid tolerances for NBR 70 Shore A

Cross section (mm)	Tolerance
1.00	± 0.20
1.50	
1.78	
2.00	
2.50	
3.00	± 0.25
3.20	
3.53	
4.00	
4.75	
5.00	± 0.35
5.33	
5.70	
6.00	
6.40	
7.00	± 0.40
7.50	
8.00	
8.40	
9.00	
9.50	
10.00	
11.00	± 0.50
12.00	
12.70	
13.00	
14.00	
15.00	
16.00	
18.00	± 0.70
20.00	
22.00	
25.00	
30.00	± 0.80

D.6 O-Ring surface treatments

In many cases standard elastomeric O-Rings cannot be used without a modified surface. Friction can be one of the reasons. Also the possible contamination of the systems through extraction of material components is often not acceptable.

Therefore O-Rings can be surface-treated by special ways of cleaning, dipping, spraying or coating in order to reduce friction and adhesion, achieve permanent lubrication or facilitate installation.

Depending on the desired effect several high-quality surface treatments or coatings can be used. These are described in the following sections.

For further details regarding surface treatments, coatings and cleaning of seals please refer to the separate brochure "Friction-free Running" or contact your local Trelleborg Sealing Solutions company.



E.1 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.

Certification of our production plants in accordance with international standards QS 9000 / ISO 9000 meets the specific requirements for quality control and management of purchasing, production and marketing functions.

Our quality policy is consistently controlled by strict procedures and guidelines which are implemented within all strategic 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 2859-1:2004-01 AQL 1,0 general inspection level II.

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

Our sealing materials are produced free of chlorofluorinated hydrocarbons and carcinogenic elements.

The tenth digit of our part number defines the quality characteristics of the part. A hyphen indicates compliance with standard quality criteria outlined in this catalogue. Customer-specific requirements are indicated by a different symbol in this position. Customers who require special quality criteria should contact their local Trelleborg Sealing Solutions sales office for assistance. We have experience in meeting all Customer quality requirements.

E.2 Storage and shelf live of polymer sealing material

Seals and bearings are often stored for longer time periods. Due to wrong storage conditions the physical properties of elastomers may change during storage. Because of hardening, softening, crack initiation, breakage or other degradation they can become unusable. These types of material deterioration are the result of particular factors or a combination of factors such as deformation, high temperatures, contact with oxygen, ozone, light, humidity or other media.

A few simple precautions can help to extend shelf life of seals considerably. Basic instructions for the storage, cleaning and maintenance of elastomer sealing elements are described in international standards, such as: DIN 7716 / BS 3F68, ISO 2230 or DIN 9088

These standards provide several recommendations for the storage and the shelf life of elastomers, depending on the type of material.

The following requirements for storage of elastomers and other polymers, based on the recommendations of these standards, need to be followed to preserve the physical and chemical properties of such seals.

Heat

The storage temperature should preferably be between +5 °C and +25 °C. Direct contact with heat sources such as boilers, radiators or direct sunlight are to be avoided. During storage at low temperatures, elastomers can stiffen. Therefore the handling of seals at low temperatures must be done very carefully in order to avoid deformation or damage.

Humidity

The relative humidity in the storage area should be below 70 %. Extreme humid or extreme dry conditions are to be avoided. Condensation must not develop.

Light

Elastomer seals must be protected from light sources during storage. In particular direct sunlight and strong artificial light with an ultraviolet content shall be avoided. The original storage bags, especially plastic bags, are to be favored if they provide UV protection.

In case of strong external light exposure it is recommended to mask the windows of the storage rooms with red or orange covers or screens.

Radiation

Elastomer seals are to be stored protected from all sources of ionizing radiation likely to cause damage to the stored parts.

Oxygen and ozone

If possible elastomers should be stored in the original packaging or in airtight containers in order to protect them from circulating air.

Ozone is harmful to many sealing materials. Therefore no equipment producing ozone (i.e. mercury vapor lamps, high voltage electrical equipment, electric motors or other producers of electric sparks or electric discharges) shall be kept in the storage areas. Also combustion emissions and organic vapors should be avoided as they may produce ozone via photochemical processes.



Deformation

If possible elastomer materials should be stored free from tension, compression or other deformation. Parts delivered in a tension-free condition should remain in their original packaging.

Contact with liquids and lubricants

Elastomer seals shall not come in contact with solvents, oils, greases or any other media at any time during storage, unless so packed by the manufacturer.

Contact with metal and non-metals

Direct contact with certain metals such as manganese, iron and particularly copper and its alloys, e.g. brass, are known to have damaging effects on some rubbers. Elastomer seals shall not be stored in contact with such metals.

Because of possible transfer of plasticizers or other ingredients, rubbers shall not be stored in contact with PVC. To avoid a mix-up different rubbers should preferably be stored separately from each other.

Cleaning

If necessary, cleaning should be carried out using soap and water (demineralized water to avoid lime stains) or denatured alcohol. However water shall not come into contact with fabric reinforced components, polyurethane rubbers or metal components without anti-corrosive protection. Disinfectants or other organic solvents as well as sharp-edged objects shall not be used. The cleaned parts should be dried at room temperature and shall not be placed near heat sources.

Shelf life and shelf life control

The shelf life of seals depends to a large extent on the polymer type. When stored under the above recommended conditions the below listed shelf life for the different materials can be considered.

NR, SBR	2 years
AU, TFE/P, Thermoplastics	4 years
CR, CSM, ECO, HNBR, IIR, NBR	6 years
ACM, AEM, EPDM	8 years
FKM, FMQ, FVMQ, VMQ	10 years
FFKM, Isolast®	18 years
PTFE	unlimited

Elastomer seals need to be checked after the above periods. If the seals are OK an extension of the shelf life is possible.

Elastomer parts and components with less than 1.5 mm thickness are stronger affected by oxidation degradation even if stored under ideal conditions according to the above described. Therefore they need to be checked and tested more frequently than mentioned above.

Pre-assembled elastomer parts and seals

Generally it is not recommendable to store elastomer seals in assembled condition. If it is necessary to do so it is recommended that the units should be checked at least every six months. The maximum shelf life period a rubber component is allowed to remain assembled within a stored unit is a total of the initial period stated above and the extension period. The inspection interval will depend on the design and geometry of the unit.



O-Ring

Index

A

ACS	13
Adhesion	115, 120, 127
American Standards	31, 98
Approval	13-14
Authorities	13-14
Axial installation	23, 28

B

Back-up Rings	7, 27, 116, 123
BAM	13
BfR	13
British standard	31

C

Chemical compatibility	5, 8-9
Chemicals	7, 9, 24, 115-116, 120
Chloroprene Rubber	5-6, 9
Clearance	25-26
Compression	22
Compression set	7, 9, 15-18
Contact pressure	21

D

Design recommendations	20
DVGW	13
Dynamic service	24, 26, 122

E

Elastomers	5, 7-10, 26, 110, 123, 128
Ethylene-Propylene-Diene	5
Extrusion	7, 26-27, 122-123, 126
Extrusion gap	7, 24, 122

F

FDA	13
FEP O-Ring	115
Fluorocarbon Rubber FKM	5
Fluorosilicone Rubber FVMQ	5
Foodstuff contact	115
Form deviations	112
Friction	21, 24, 115, 120, 122, 127

G

Groove design	3, 25
---------------	-------

H

Hardness	10, 15-18
Hydrogenated Nitrile Butadiene	6, 9

I

Initial compression	21
Installation	21, 119-120, 123
Installation recommendations	20
IRHD Hardness	10
Isolast® O-Rings	20, 115

J

Japanese standard	31
Joule effect	24

K

KTW	13
-----	----

L

Lead-in chamfers	20, 25
Lead-in chamfers	7

M

Materials	13
Military standard	31

N

Nitrile Butadiene Rubber	6, 8
NSF	14

O

O-Ring sets	114
Ordering example	31, 119, 121
Oxygen	6-7, 123, 128

P

Part Number	31, 97, 124
Perfluoro Rubber	5-6, 9
Permeation	116
Polyacrylate Rubber ACM	5-6, 9
Polyurethane AU	5, 122
Polyurethane O-Rings	122-123
PTFE O-Rings	115, 120-121

Q

Quality Acceptance Criteria	112
Quality criteria	128

R

Radial installation	23
Recommendations	28
Rectangular groove	27
Rotary service	24
Roto principle	24
Round cord rings	126



S

Seal Set	114
Shelf life	128
Shore hardness	7, 31, 108
Shrinkage	31, 110
Squeeze	4, 21-22, 25
Standard materials	5, 15
Stick-slip effect	115
Storage	13, 128-129
Stretching	116
Surface finish	26
Surface treatment	127
Swedish treatment	31
Swelling	9

T

Temperature range	15-18, 116, 120
Tetrafluoroethylene Propylene	5
Tolerance ID	118
Tolerances	7, 21, 110-112, 126
Trade names	5
Trapezoidal groove	27
TSS part numbers	32

U

UL	14
----	----

V

VMQ	9
Volume Change	7

W

WRAS	14
WRC	14



O-Ring

For your Notes

Contact your local marketing company for further information:

Europe	Telephone	Americas	Telephone
AUSTRIA - Vienna <small>(ALBANIA, BOSNIA AND HERZEGOVINA, MACEDONIA, SERBIA AND MONTENEGRO, SLOVENIA)</small>	+43 (0) 1 406 47 33	AMERICAS - REGIONAL	+1 260 749 9631
BELGIUM - Dion-Valmont <small>(LUXEMBOURG)</small>	+32 (0) 10 22 57 50	BRAZIL - São Paulo	+55 11 3372 4500
BULGARIA - Sofia <small>(ROMANIA)</small>	+359 (0)2 969 95 99	CANADA - Etobicoke, ON	+1 416 213 9444
CROATIA - Zagreb	+385 (0) 1 24 56 387	MEXICO - Mexico City	+52 55 57 19 50 05
CZECH REPUBLIC - Rakovnik <small>(SLOVAKIA)</small>	+420 313 529 111	USA, East - Conshohocken, PA	+1 610 828 3209
DENMARK - Hillerød	+45 48 22 80 80	USA, Great Lakes - Fort Wayne, IN	+1 260 482 4050
FINLAND - Vantaa <small>(ESTONIA, LATVIA)</small>	+358 (0) 207 12 13 50	USA, Midwest - Lombard, IL	+1 630 268 9915
FRANCE - Maisons-Laffitte	+33 (0) 1 30 86 56 00	USA, Mountain - Broomfield, CO	+1 303 469 1357
GERMANY - Stuttgart	+49 (0) 711 7864 0	USA, Northern California - Fresno, CA	+1 559 449 6070
GREECE	+41 (0) 21 631 41 11	USA, Northwest - Portland, OR	+1 503 595 6565
HUNGARY - Budaörs	+36 (06) 23 50 21 21	USA, South - N. Charleston, SC	+1 843 747 7656
ITALY - Livorno	+39 0586 22 6111	USA, Southwest - Houston, TX	+1 713 461 3495
THE NETHERLANDS - Barendrecht	+31 (0) 10 29 22 111	USA, West - Torrance, CA	+1 310 371 1025
NORWAY - Oslo	+47 22 64 60 80		
POLAND - Warsaw <small>(LITHUANIA, UKRAINE, BELARUS)</small>	+48 (0) 22 863 30 11	Asia Pacific	Telephone
RUSSIA - Moscow	+7 495 982 39 21	ASIA PACIFIC REGIONAL	+65 6 577 1778
SPAIN - Madrid <small>(PORTUGAL)</small>	+34 (0) 91 71057 30	CHINA - Hong Kong	+852 2366 9165
SWEDEN - Jönköping	+46 (0) 36 34 15 00	CHINA - Shanghai	+86 (0) 21 6145 1830
SWITZERLAND - Crissier	+41 (0) 21 631 41 11	INDIA - Bangalore	+91 (0) 80 2245 5157
TURKEY	+41 (0) 21 631 41 11	JAPAN - Tokyo	+81 (0) 3 5633 8008
UNITED KINGDOM - Solihull <small>(EIRE)</small>	+44 (0) 121 744 1221	KOREA - Anyang	+82 (0) 31 386 3283
AFRICA REGIONAL	+41 (0) 21 631 41 11	MALAYSIA - Kuala Lumpur	+60 (0) 3 9059 6388
MIDDLE EAST REGIONAL	+41 (0) 21 631 41 11	TAIWAN - Taichung	+886 4 2382 8886
		THAILAND - Bangkok	+66 (0) 2732-2861
		SINGAPORE	
		and all other countries in Asia	+65 6 577 1778

www.tss.trelleborg.com

