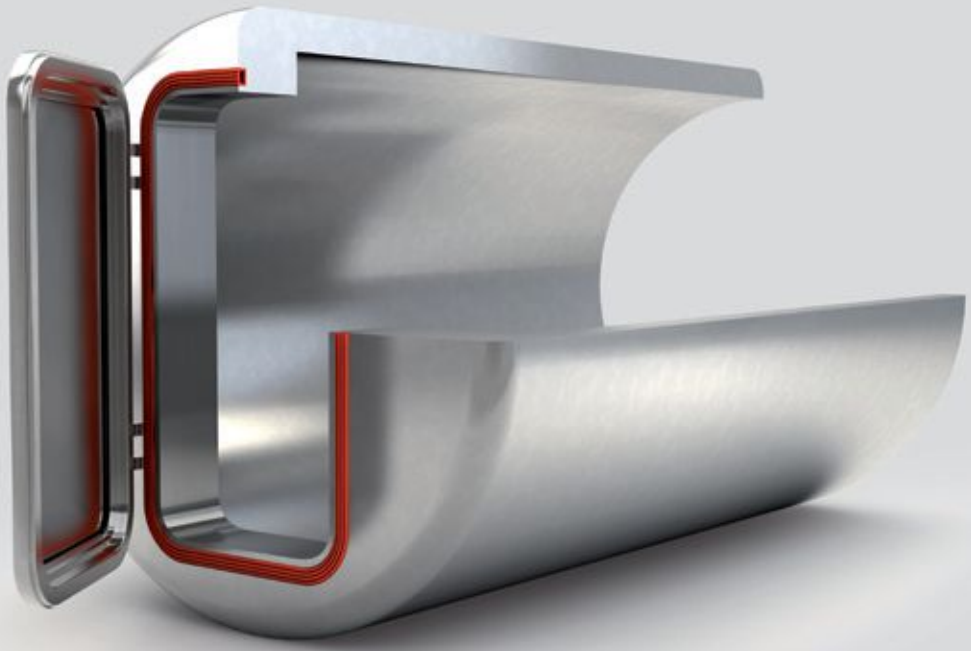
Airseal



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 of experience, Trelleborg Sealing Solutions engineers support customers with design, prototyping, production, test and installation using state-of-the-art design tools. An international network of over 70 facilities worldwide includes over 20 manufacturing sites, strategically-positioned research and development centers, including materials and development laboratories and locations specializing in design and applications.

Developing and formulating materials in-house, we utilize the resource of our material database, including over 2,000 proprietary compounds and a range of unique products.

Trelleborg Sealing Solutions fulfills challenging service requirements, supplying standard parts in volume or a single custom-manufactured component, through our integrated logistical support, which effectively delivers over 40,000 sealing products to customers worldwide.

Facilities are certified to ISO 9001:2008 and ISO/TS 16949:2009. Trelleborg Sealing Solutions is backed by the experiences and resources of one of the world's foremost experts in polymer technology: the Trelleborg Group.

ISO 9001:2008

ISO/TS 16949:2009

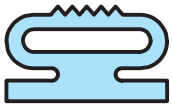
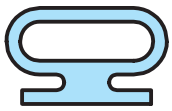
To obtain the best recommendation for a specific application, please contact your local Trelleborg Sealing Solutions marketing company.

This edition supersedes all previous brochures.

TRELLEBORG
SEALING SOLUTIONS

Contents

■ Overview of the Standard Cross Sections

Profile Geometry	Design	Dimensions, see page	Examples
	Low-pressure profile without fabric reinforcement with peaked sealing profile	14	Doors and gates, heat chambers, dam bar seals
	Low-pressure profile, fabric and non-fabric reinforced, smooth wide sealing surface, low specific surface load	16	Bulkhead seals, storage tanks, for frequent load changes
	Low-pressure profile, fabric reinforced, for large gaps, particularly pronounced sealing edge	20	Doors and gates, for high cycle rates, personnel locks
	Low-pressure profile, fabric reinforced, smooth sealing surface	22	Sluices, discharge hoppers
	Low-pressure profile, fabric reinforced, specially formed sealing edge	24	Bulkhead seals, filling hoppers
	High-pressure profile without fabric reinforcement with smooth sealing profile and grooves	26	Cockpit seals, plastics presses
	High-pressure profile without fabric reinforcement with peaked sealing profile	28	Sliding doors, autoclaves
	High-pressure profile without fabric reinforcement, excellent smooth top sealing surface	32	Doors and gates in clean environments

■ Description

Airseals are tubular elastomer seals which are activated by internal pressurization (inflatable seals). Airseals are used wherever reliable sealing of accesses to plants, containers and rooms is required. They represent a technically improved alternative to the standard contact pressure seals. A wide range of high-pressure and low-pressure seals, as well as numerous elastomer materials, offer the designer potential solutions to an enormous variety of applications. Airseals can be easily adapted to match the surface to be sealed and are therefore generally manufactured to the customer's drawings.

Trelleborg Sealing Solutions will always advise customers on their own draft designs.

Characteristics

A fundamental distinction is made between:

- High-pressure profiles
- Low-pressure profiles
- Materials with and without fabric reinforcement

The ends of seals without closed geometries can be closed off using vulcanized end plugs. These end plugs cannot be inflated, however, and this has to be taken into consideration during the seal design. Right-angled (axial) corner designs are possible with certain profiles.

Method of Operation

The profile is expanded in a predetermined direction by pressurization (inflation) with air or, in exceptional cases, with other gases and water. The sealing function is affected by the contact pressure with the mating surface.

If the profile is chambered, the groove flanks protect the Airseal from mechanical damage.

Figure 1 shows an Airseal at rest and in an activated state.

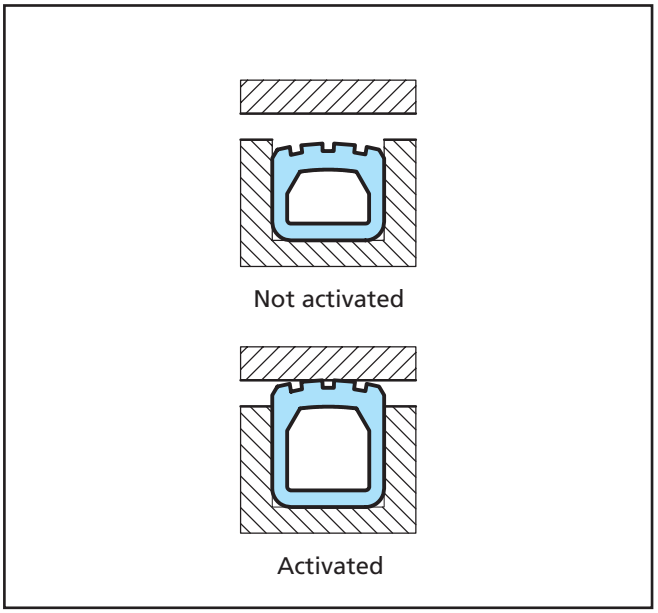


Figure 1 Airseal

Advantages

Airseals offer a large number of advantages compared with conventional contact pressure seals:

- Faster and tighter closing of large sealing surfaces, able to seal gaps with wide tolerances
- No deterioration in the sealing function over the service life
- Tight sealing at pressure and under vacuum conditions
- Automatic pressure monitoring possible
- No high demands on the flatness and surface finish of the mating surface
- High mechanical load-bearing strength owing to fabric reinforcement
- Long service life even with frequent load changes

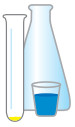
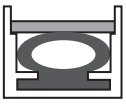
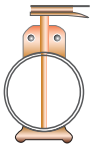
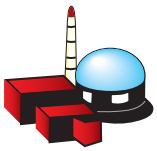
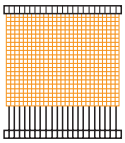
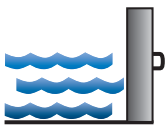
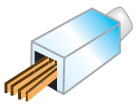
■ Applications

The range of potential applications for the Airseal is unlimited. Its use is recommended wherever frequent activation and deactivation of a static seal is demanded.

A selection of typical applications for Airseals are given below.

Trelleborg Sealing Solutions specializes in the custom design and manufacture of inflatable rubber products, seals, and other engineered elastomer products. We will carefully analyze your problem, apply our extensive technical knowledge, and follow your project through to an effective solution. Advanced compounding, molding, extruding and fabricating, along with test equipment and processes, enable us to address your most demanding needs for rubber fabrications that offer a high level of durability and reliability.

	**Powder & Bulk Solids Processing Equipment:** Mixers, blenders, screeners, dryers, chutes, hoppers, valves
	**Electronic/Wafers Semiconductor Processing:** Washers, soldering equipment, furnaces, filters, loadlocks, measuring equipment, actuators
	**Paper Machinery:** Seals for the wet end of paper machinery, doctor blade bladders, inflatable bladders for expanding mandrels for slitters and scorers
	**Conveyors:** Conveyor stops, brakes, bumpers
	**Food Processing Equipment:** Smokehouse door seals
	**Marine:** Cargo hatches, elevator platforms, maintenance or shut down seals on propeller shafts, personnel hatches

	**Transportation**: High speed trains, tailgate seals, automobile emission control test sheds
	**Medical**: Virology laboratories, cleanrooms, sterilizer
	**Aerospace/Aircraft:** Wind tunnels, jet engine test cells, bladders for bonding and clamping fixtures, door and hatch seals
	**Converting Equipment:** Access way seals
	**Robotics Material Handling:** Clamps, grips, actuators
	**Fluid Sealing:** Isolation valve seals, follower plate seals, maintenance shutdown shaft seals
	**Nuclear:** Door and hatch seals, pool gate seals, refueling seals, nozzle dam seals
	**Wineries:** Lid seals for variable capacity wine tank
	**Textile Machinery:** Pressure chambers, inflatable clamps
	**Flood Protection:** Gate and door seals
	**Wood Processing:** Drying kilns, log preparation chambers
	**Commercial Laundry Machinery:** Door seals

■ Applications in Detail

Technical Data
Airseals can be used for a wide range of applications. The seal and material selection are determined by pressure requirements, temperature and medium to be sealed.

With a good surface finish on the groove and mating surface, a dynamic vacuum of 10^{-3} Torr can be safely handled.

Internal Pressure of Airseal
The maximum permissible internal pressure is dependent on:

- Profile cross-section
- Seal gap
- Chambering
- Design

In an uninstalled state, the Airseal may be subjected to a maximum test pressure of 0.1 MPa (1 bar).

Gap Expansion Definition
The sealing gap is a major factor in the design of an inflatable product. The gap information listed for each profile assumes that the pressure differential across the seal is 0 MPa (0 bar) and the configuration is either radially expanding outward or axially expanding.
For inflation inward applications, the gap must be reduced to ensure that the seal does not wrinkle. Fabric Reinforcement profiles (more detail on page 20 to 25) are not recommended for inflation inward applications.

The illustration below demonstrates a typical sealing application and the information required in order to make the right profile choice. As a general rule, inflation pressure (P3) is 0.1-0.13 MPa (1-1.37 bar) higher than the pressure differential.

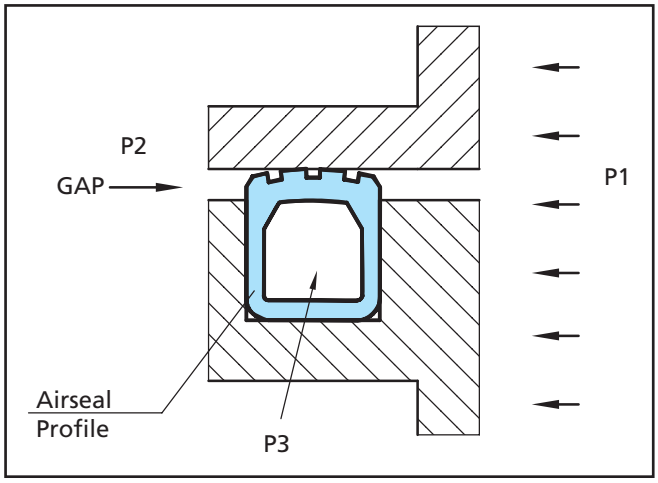


Figure 2 Pressure on Airseal

Gap = Clearance between deflated seal and opposing surface

P1 = Pressure inside equipment

P2 = Outside (atmosphere)

P3 = Inflation pressure

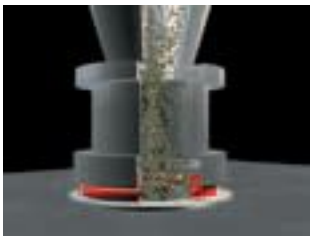
Pressure Differential = P1-P2

Example 1:
If P1 = atmosphere and P2 = atmosphere, then the pressure differential across the seal = 0 MPa (0 bar). The recommended inflation pressure for the seal would then be 0.1 MPa (1 bar). In this case, we would recommend any of our low-pressure non-reinforced profiles on page 14, 15 and 18, 19.

Example 2:
If P1 = 0.17 MPa (1.7 bar) and P2 = atmosphere, then the pressure differential across the seal = 0.17 MPa (1.7 bar). Recommended inflation pressure (P3) in this instance would then be 0.3 MPa (3 bar). For this application, we would recommend either a low-pressure fabric reinforced profile as seen on pages 16 and 17 or the high-pressure profiles on pages 26 through 29 if the gap is low.

Temperature
The temperature range depends on the seal material used. The limits lie between -60°C and +200°C (-76°F and +392°F).

Media
The media resistance is also dependent on the selected seal material. The table on page 7 shows the available materials.

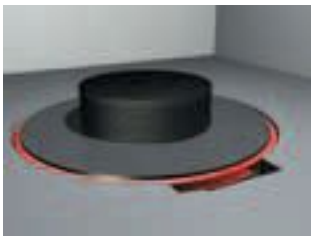


Hopper to Transfer Cart:
Airseal on the mouth of the hopper valve or metering device expands axially down to form a leak-tight seal around the fill opening in a transfer cart.

Slide Gate Valves:
Airseal provides the tightest seal possible for controlling the flow of very fine materials. The inflation and deflation of the seal is timed to coincide with the closing and opening of the slide gate.

Automobile Emission Control Test Shed Door Seals:
Airtight enclosures help automotive engineers evaluate carburetor and fuel tank vent evaporative emissions. Warmed up test vehicles are pushed into hot soak enclosures. Escaping fuel vapors are measured by instruments outside the test cells. The doors to the cells are typically sealed using the HP profile Airseal design supplied in either EPDM (EP) or Neoprene (CR)

Airtight Doors:
Airtight doors in virology laboratories, animal rooms, and decontamination areas are tightly sealed with Airseals installed around the periphery of the door to expand radially outward. This design facilitates frequent access since there is no requirement to actuate multiple dogs and there is no raised sill to obstruct personnel and equipment traffic.



Load-Lock:
Trelleborg Sealing Solutions manufactures a unique inflatable seal made of low outgassing Butyl rubber material which has been tested for vacuum service. This design provides a highly efficient and repeatable seal in the patented vacuum load-lock section of a fully automated electron beam metrology system.

Conveyor Stops/Brakes:
Airseal inflatable bladders represent two different ideal solutions to controlling and preventing jams on conveyor systems. Positioned alongside the product at the outer extremities of the conveyor belt (or rolls), they can be inflated against the product to temporarily interrupt the flow while the jam clears downstream. Alternately the bladders can be located underneath the product flow and activated to release the contact between belt and rollers, thereby interrupting flow while the jam clears.

■ Airseal Materials

Airseal is available in a wide variety of materials as noted in the table below, although the specific elastomers vary somewhat from one profile to another. If required, cross sections can be custom made using materials other than those indicated in this manual. Please note that the ratings given to the properties of the elastomers are based on Airseal compounds as they are applied to inflatable seals.

The ratings of other manufacturers may differ as the result of compounding variables and end product use. Also note that the addition of fabric reinforcing overcomes drawbacks associated with some of the relatively poor physical characteristics of silicone, fluorosilicone, fluorocarbon rubber, and nitrile.

Common Name - Base Polymer	**EPDM Rubber**	**Neo-prene**	**Nitrile or NBR or Buna-N**	**Natural Rubber**	**Butyl**	**Silicone**	**Fluoro-silicone**	**Fluoro-carbon**
Chemical Name	**Ethylene Propylene Diene Rubber**	**Chloro-prene**	**Nitrile Butadiene Rubber**	**Natural Isoprene**	**Iso-butylene Isoprene**	**Silicone**	**Fluoro-silicone**	**Fluoro-carbon**
ASTM Designation (ASTM D1418)	**EP**	**CR**	**NBR**	**NR**	**IIR**	**VMQ**	**FVMQ**	**FKM**
Tensile Strength (psi)	>2000	>2000	>2000	>2000	>2000	>1200	>1200	>1400
Hardness Range (Durometer A)	40-90	20-80	50-95	50-70	40-75	40-80	40-70	70-90
Tear Resistance	G	G	F	G	G	F	P	F
Abrasion Resistance	G to E	VG	G	E	G	P	F to P	G
Compression Set	G	G	G	E	F	VG	E	E
Resilience - Cold	G	G	G	G	P	E	G	F
Resilience - Hot	VG	VG	G	F	VG	E	E	E
Radiation Resistance	O	G	P	F to G	G	G	E	E
Impermeability to Gases	G	G	G	F	O	F	E	P
Acid Resistance								
Mild Dilute	E	E	F to G	F	E	G	E	E to VG
Strong Concentrate	VG to G	G	P to F	P	G	F - P	G	G to F
Solvent Resistance								
Aliphatic Hydrocarbons	P	F to G	E	P	P	P	G	E
Aromatic Hydrocarbons	P	P	P	P	P	P	E	E
Oxygenated (Ketones, etc)	G	P	P	E	G	P	F	F to P
Resistance To								
Swelling in Lubricating Oil	P	G	VG	P	P	P	E	O
Oil and Gasoline	P	G to F	E	P	P	F to P	G	E
Animal Oils	F	F	E	P	F	G	E	E
Water Absorption	VG	G	G	VG	VG	E	E	E
Oxidation	E	VG	G	F to P	E	E	O	O
Ozone	O	VG	F	F to P	F to G	E	O	E
Sunlight Aging	O	VG	P	F to P	VG	E	E	G
Heat Aging	VG	G	G	G to F	G	O	E	E
Low Temperature	VG	G	F to G	G	G	O	G	F
Flame	P	G	P	P	P	F	E	E
Vegetable Oils	F	G	G	P	F	P	E	E
Chlorinated Hydrocarbons	P	P	F	P	P	P to F	F	G

O = Outstanding E = Excellent VG = Very Good G = Good F = Fair P = Poor

■ Design Instructions

Selection of the seals

A wide range of applications can be covered thanks to the large number of different profile geometries available.

Airseals can be used for axial-expanding and radial-expanding applications.

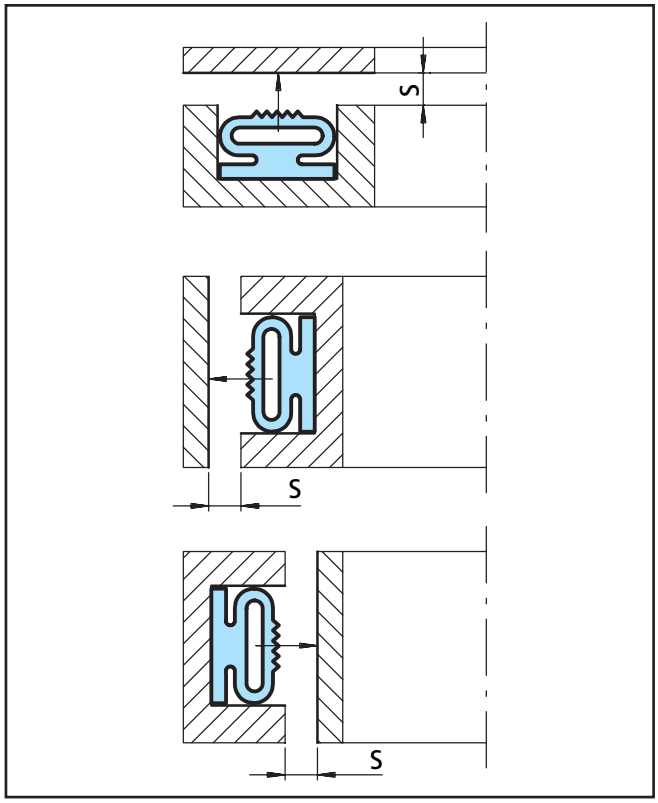


Figure 3 Installation examples

Inside diameters > 50.0 mm (1.969 inch) and seal gaps ≤ 75.0 mm (2.953 inch) can be reliably sealed with an Airseal.

Seal Gaps

The maximum permissible seal gap is specified in the dimension tables. As a general rule of thumb, the smaller the selected seal gap, the shorter the activation time for the Airseal and the smaller the axial load on the seal due to the ambient pressure.

Furthermore, small seal gaps permit higher internal pressures.

Corner Formation

The simplest and least costly corner design is the use of a radius. The corresponding minimum radii must be observed for the particular profile. The necessary information can be found in the dimension tables.

Note: The radii given in the tables apply only for VMQ seals. For all other materials, these should be increased by at least 20% in order to ensure proper functioning. Please contact your local Trelleborg Sealing Solutions marketing company for more information.

If, for design reasons, radii are not permissible, right-angled corner designs can be manufactured from fabric-reinforced profiles with a limited number of cross sections. (possible for axial sealing). Please contact your local Trelleborg Sealing Solutions marketing company for more information.

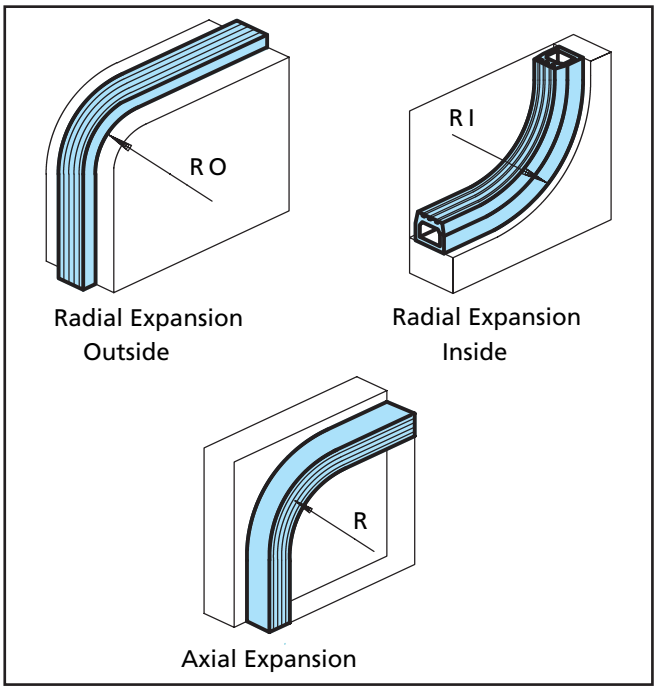


Figure 4 Design example

Surfaces

All surfaces coming into contact with the seal must be cleanly machined and have no burrs. Any weld peaks must be cleanly dressed and exhibit no unevenness.

Neither pointed nor sharp edges must be allowed to come into contact with the Airseal. The recommended surface finish for the groove and mating surface is:

Ra 0.8 to 1.6 µm (31 µin to 62 µin);
Rmax 4 to 10 µm (157 µin to 393 µin)

Position of Sealing Surface should be defined on Airseal (see Engineering Action Request, page 44).

■ Installation Recommendations

Mounting of Airseal

The high-pressure seals (HP) are installed in the groove without additional installation elements. These seal types are bonded onto the groove bottom, but the seal flank must remain free to move. We recommend the use of our “Airgrip“ adhesive.

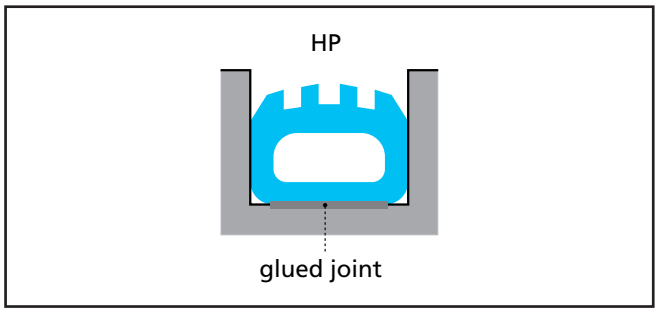


Figure 5 Installed high-pressure Airseal in groove

Low-pressure seals (LP) are generally secured mechanically with clamping elements. Figure 9 and Table 5 show the mounting elements with the corresponding installation dimensions. These can also be used for chambered installation.

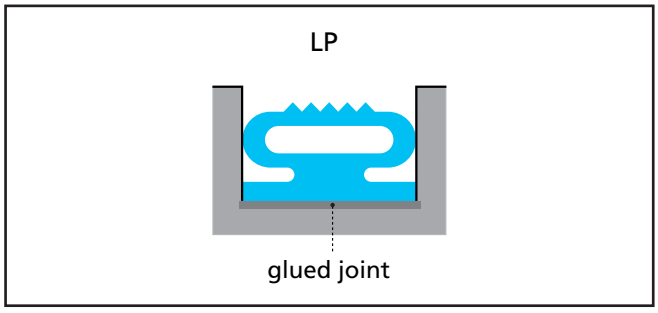


Figure 6 Installed low-pressure Airseal in groove

Note: For chambered installations the low-pressure profile must be bonded to the bottom of the groove.

Seal Installation

In order to guarantee the proper functioning of the Airseals, the sealing surface and groove must be thoroughly cleaned before installation of the seal. If the seal is to be bonded, the groove root must be degreased. Sharp or peaked tools must not be used for installation.

The Airseal must be deflated before the start of installation.

The air connection is first inserted into the bore without tightening the locknut. Non-return valves must be removed before the start of installation.

In order to guarantee the optimum seating of the Airseal in the groove, the seal must be activated immediately after insertion. Care must be taken that the mating surface is always in contact with the Airseal and that in addition, the complete high-pressure seal is chambered. During the bonding process, the Airseal must remain activated until the Airgrip adhesive has completely hardened.

Installation of the Air Connections

All threaded air connections are locked with the supplied washer and nut. During tightening of the locknut, ensure that the adhesive has hardened and the seal is not damaged. The nuts may only be tightened by hand unless the stem design has wrench flats. Wrench flats must be held securely when tightening nuts with a wrench.

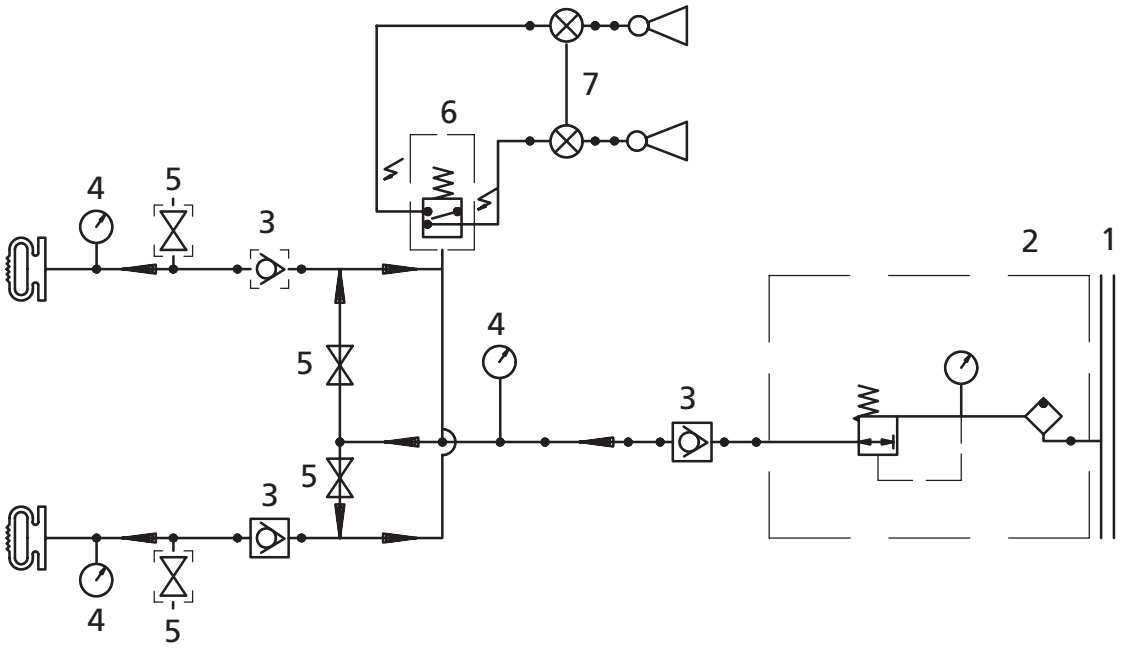
Please have a look at our special Airseal installation instructions for additional guidance.

Seal Operation

Depending on the seal material, the Airseal can be activated with air, neutral gases or water. Seals made of the materials CR, VMQ and EPDM may only be operated with oil-free air.

Note: Maximum Expansion is only possible in closed installations.

If the activation cycle of the Airseal is longer than three hours, a constant pressure supply must be assured. Any pressure fluctuations should be compensated for by using pressure regulators.



1 Air reservoir
2 Filter, pressure gauge, pressure reduction valve
3 Non-return valve
4 Pressure gauge
5 Slide valve
6 Pressure regulator
7 Alarm signal

If the seal is to be disconnected from the pressure line, it is recommended to install a pressure-drop alarm signal in the circuit.

Figure 7 Circuit diagram – Airseal

Retention System A

Stainless steel “Z-style“ clips are screwed to a flat surface. The inflatable profile is then “snaked“ between clips and held in place.

This design provides the most flexibility, but is more difficult to apply when compared to other retention options.

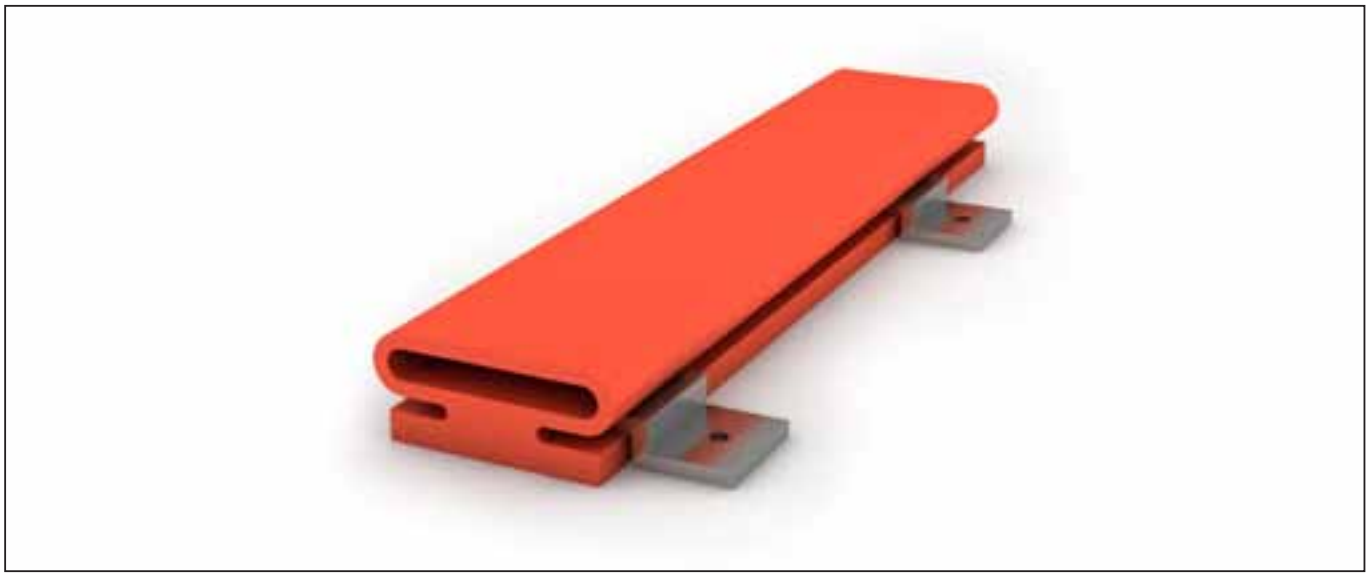


Figure 8 Retention System A

Retention System B

Bar size, structural, extruded, or fabricated steel, stainless steel or aluminum channel (supplied by others) with pins screwed into tapped holes in the flanges. The inflatable profile is then “snaked“ between the pins.

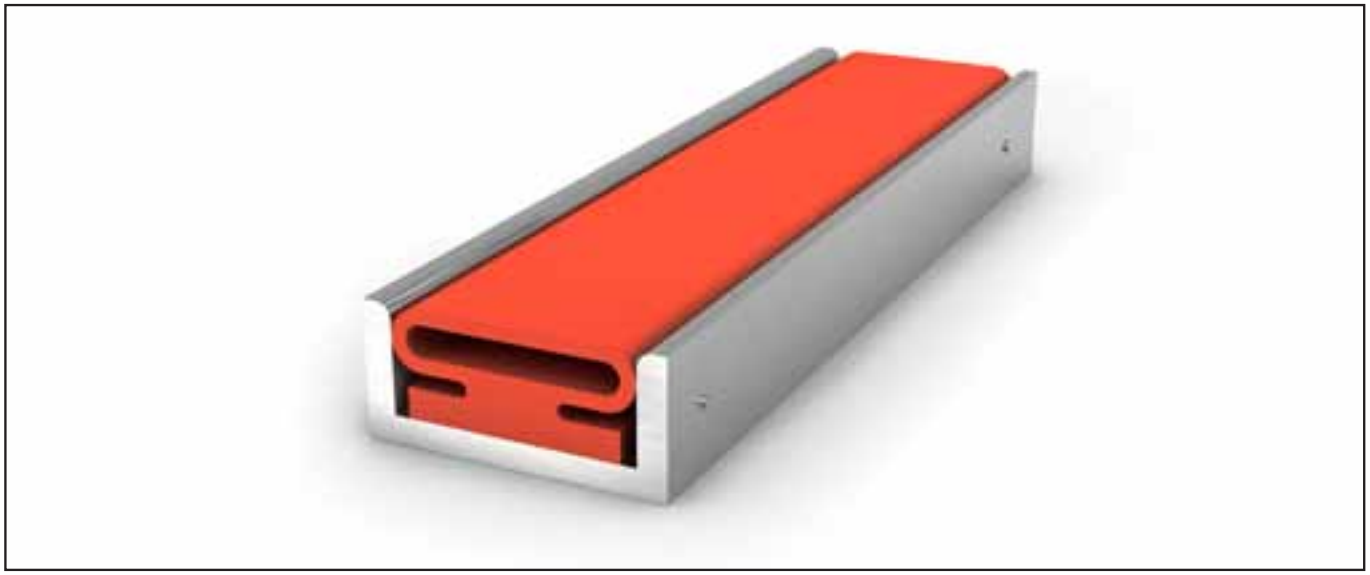


Figure 9 Retention System B

■ Rentention System – Low-Pressure Types

Installation Dimensions – METRIC

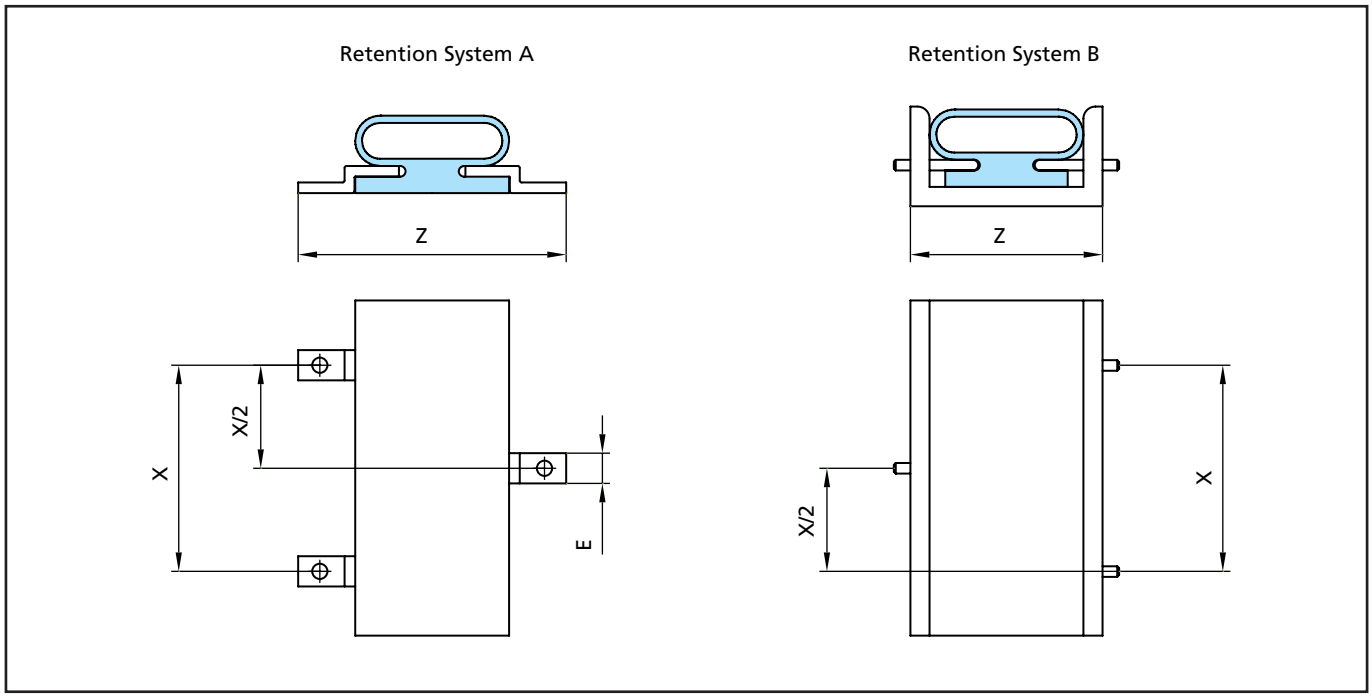


Figure 10 Retention System A + B

Table 1 Installation Dimensions of Low-Pressure Seals - METRIC Dimensions

Profile Ref. No.	Dimensions				
			Retention System A	Retention System B	
	X	X/2	Z	Z	E
535	254.00	127.00	76.20	76.20	12.70
582					
537	152.40	76.20	53.97	38.10	9.50
580					
548	381.00	190.50	85.72	101.60	12.70
583					
573	101.60	50.80	39.68	25.40	9.50
934	508.00	254.00	123.82	127.00	15.87
705					
946	250.00	125.00	92.08	–	12.70
951	150.00	75.00	55.56	–	9.50
978	127.00	63.50	44.45	38.10	9.50
717					

More types of retainer are available on request.

■ Rentention System – Low-Pressure Types

Installation Dimensions – INCH

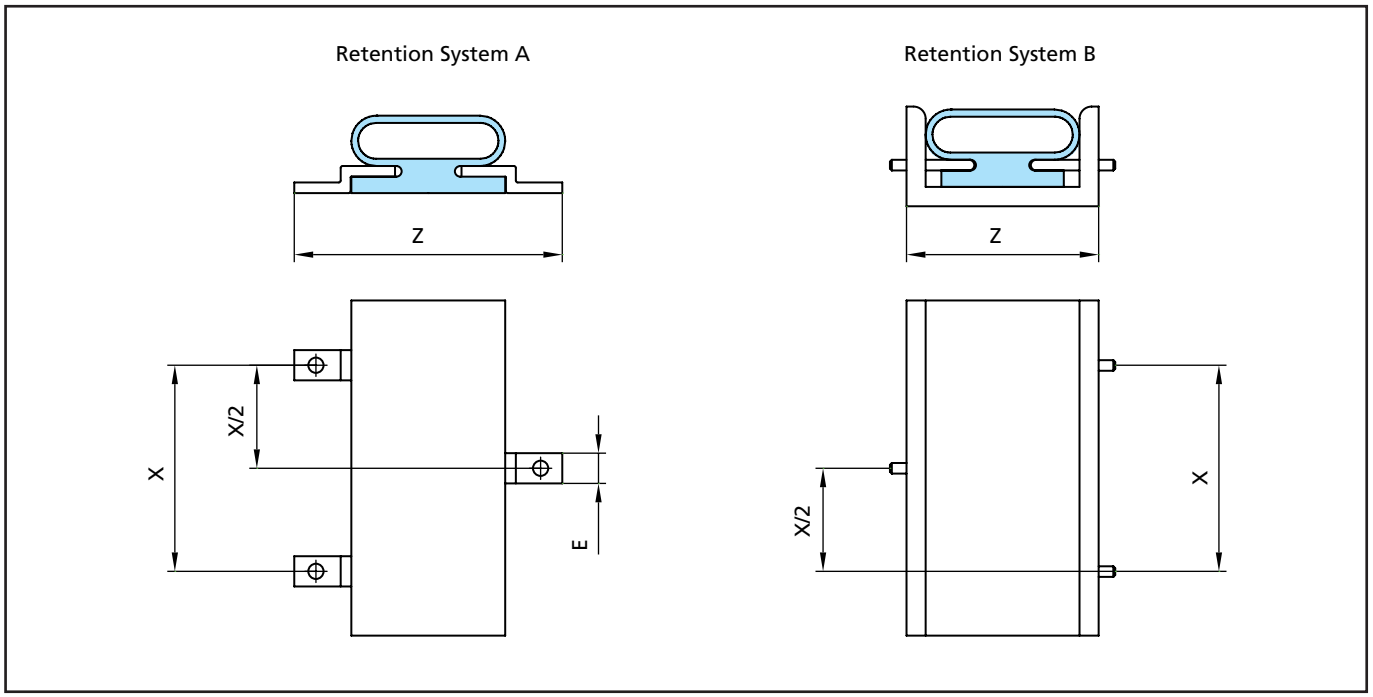


Figure 11 Retention System A + B

Table 2 Installation Dimensions of Low-Pressure Seals - INCH Dimensions

Profile Ref. No.	Dimensions				
			Retention System A	Retention System B	
	X	X/2	Z	Z	E
535	10.000	5.000	3.000	3.000	0.500
582					
537	6.000	3.000	2.125	1.500	0.375
580					
548	15.000	7.500	3.375	4.000	0.500
583					
573	4.000	2.000	1.562	1.000	0.375
934	20.000	10.000	4.875	5.000	0.625
705					
946	9.842	4.921	3.625	–	0.500
951	5.905	2.952	2.187	–	0.375
978	5.000	2.500	1.750	1.500	0.375
717					

More types of retainer are available on request.

■ Low-Pressure Types – with Peaked Sealing Profile

Without Fabric Reinforcement – METRIC Dimensions

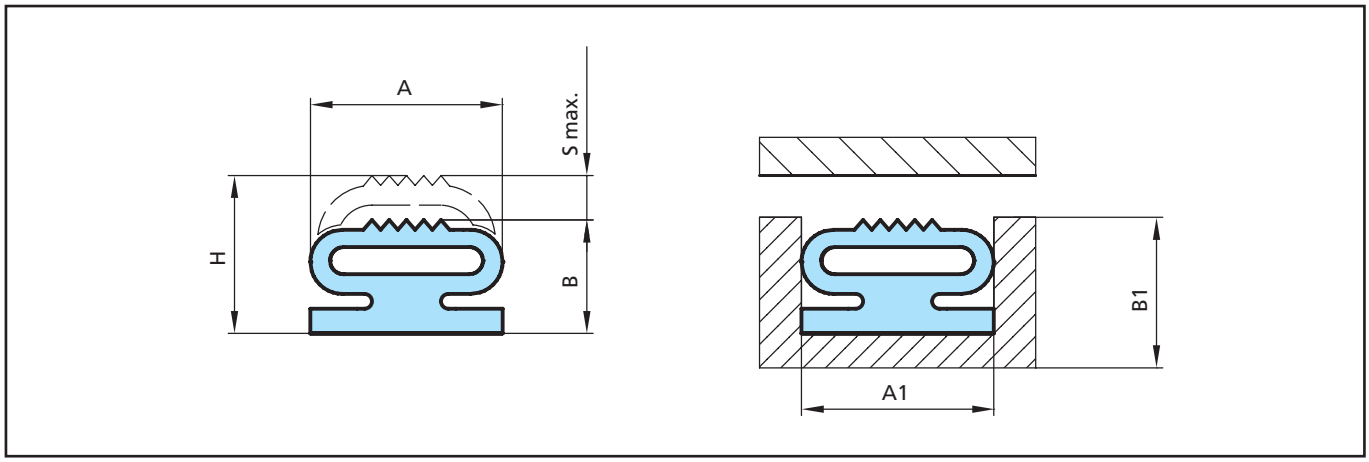


Figure 12 Low-Pressure – with peaked sealing profile

Table 3 Dimensions and Profiles Numbers – METRIC Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa**
951-5*	951-6	30.16 x 22.22	32.50	21.50	30.16	7.92	0.10
9185-5	9185-6	39.68 x 25.40	40.20	28.00	38.10	9.53	0.10
946-5*	946-6	60.32 x 34.92	62.00	36.30	53.18	15.88	0.10

* Retention system available
** Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 4 Recommended Minimum Radii in Metric Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors			
	R axial	RO	RI	AC13-Ø	AC10	AC12	AC11-Ø
951	130.05	85.60	123.70	8	M8	M8	8
9185	168.15	101.60	139.70	10	M10	M10	10
946	241.30	107.95	168.15	16	M16	M12	12

■ Low-Pressure Types – with Peaked Sealing Profile Without Fabric Reinforcement – INCH Dimensions

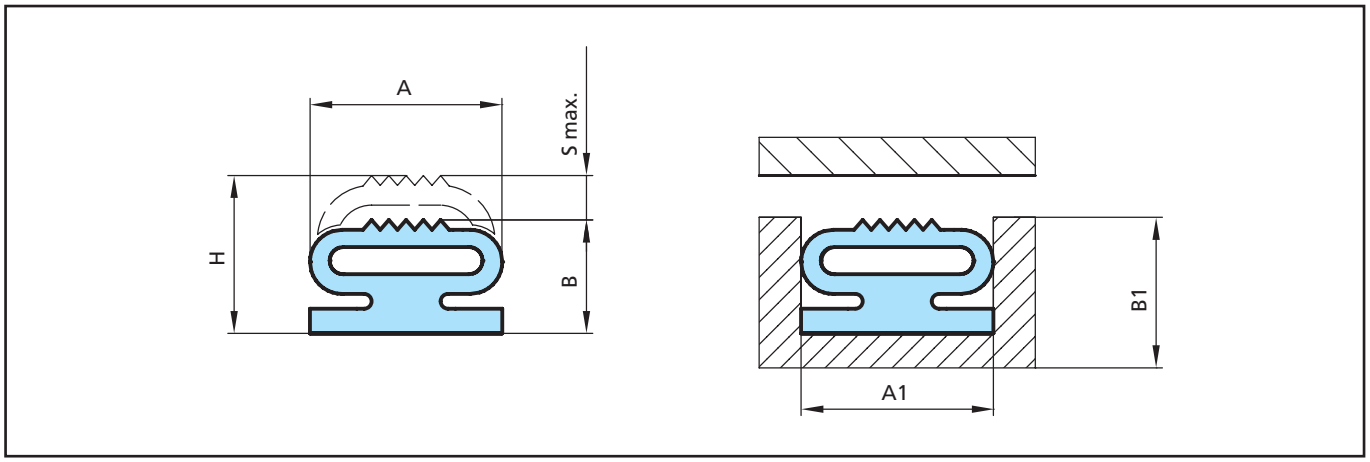


Figure 13 Low-Pressure – with peaked sealing profile

Table 5 Dimensions and Profiles Numbers – INCH Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa**
951-5*	951-6	1.187 x 0.875	1.280	0.845	1.187	0.312	0.10
9185-5	9185-6	1.562 x 1.000	1.584	1.101	1.500	0.375	0.10
946-5*	946-6	2.375 x 1.375	2.440	1.430	2.093	0.625	0.10

* Retention system available
** Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 6 Recommended Minimum Radii in Inch Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors			
	R axial	RO	RI	AC13-Ø	AC10	AC12	AC11-Ø
951	5.120	3.370	4.870	0.314	M8	M8	0.314
9185	6.620	4.000	5.500	0.393	M10	M10	0.393
946	9.500	4.250	6.620	0.629	M16	M12	0.472

■ Low-Pressure Types – with Smooth Wide Sealing Surface

With Fabric Reinforcement – METRIC Dimensions

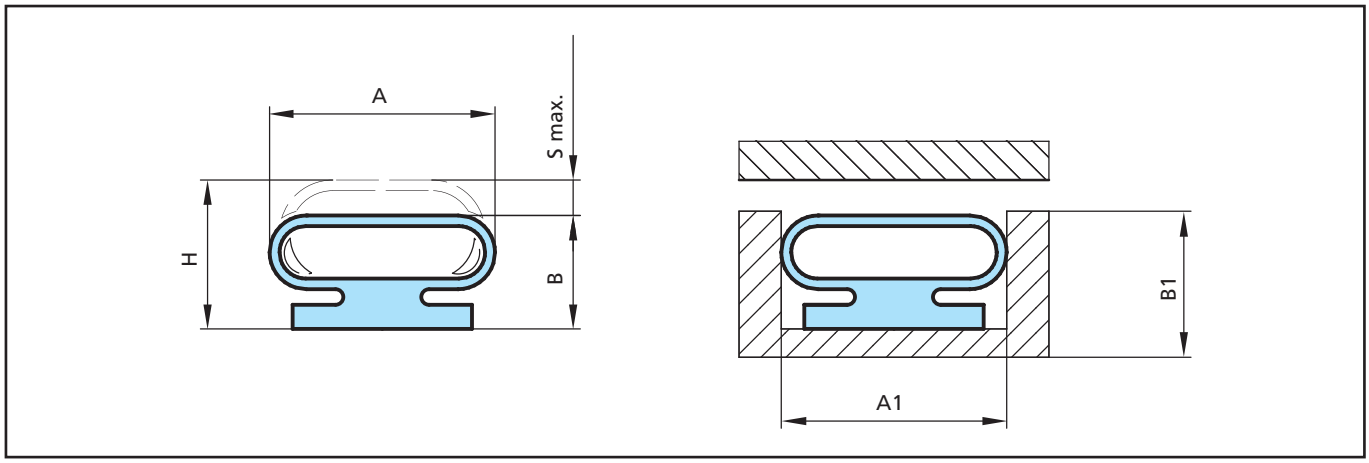


Figure 14 Low-Pressure - with smooth wide sealing surface

Table 7 Dimensions and Profile Numbers – METRIC Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa**
717-5*	717-6	25.40 x 12.70	26.40	13.70	20.64	7.92	0.17
580-5*	580-6	31.75 x 15.88	32.60	16.70	25.40	9.53	0.17
582-5*	582-6	50.80 x 22.23	51.80	23.10	41.28	19.05	0.17
583-5*	583-6	76.20 x 31.75	78.00	32.60	63.50	31.75	0.17
-	705-6*	101.60 x 41.27	103.40	42.20	85.73	38.10	0.17

* Retention system available
** Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 8 Recommended Minimum Radii in Metric Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors		
	R axial	RO	RI	AC2	AC3A	AC3B
717	63.50	76.20	127.00	X		
580	63.50	88.90	177.80	X		
582	104.65	101.60	298.45		X	X
583	152.40	139.70	317.50		X	X
705	101.60	203.20	457.20		X	X

■ Low-Pressure Types – with Smooth Wide Sealing Surface

With Fabric Reinforcement – INCH Dimensions

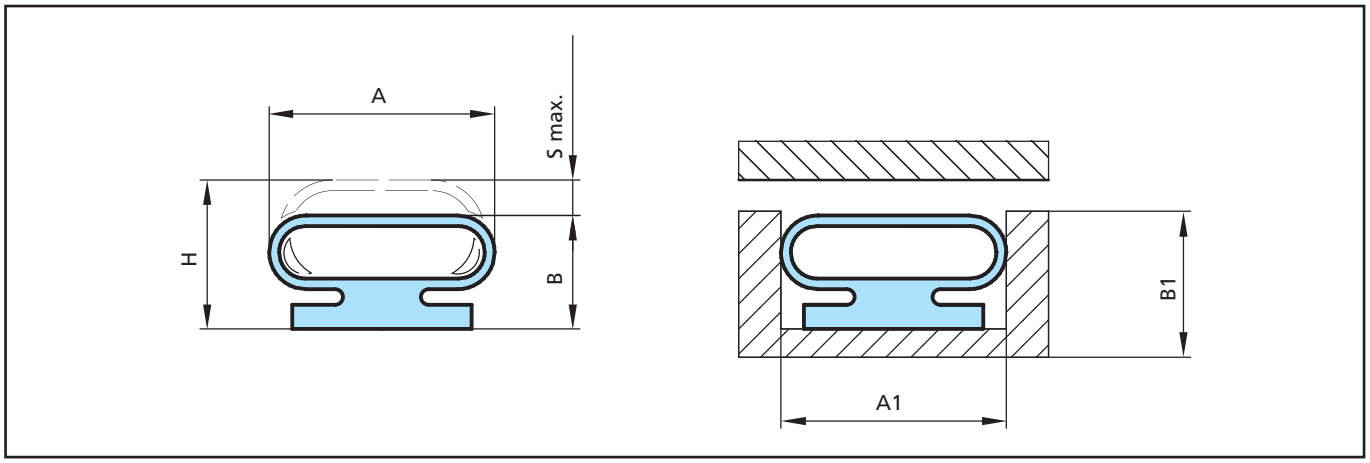


Figure 15 Low-Pressure - with smooth wide sealing surface

Table 9 Dimensions and Profile Numbers – INCH Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa**
717-5*	717-6	1.000 x 0.500	1.040	0.540	0.812	0.312	0.17
580-5*	580-6	1.250 x 0.625	1.285	0.656	1.000	0.375	0.17
582-5*	582-6	2.000 x 0.875	2.040	0.910	1.625	0.750	0.17
583-5*	583-6	3.000 x 1.250	3.070	1.285	2.500	1.250	0.17
-	705-6*	4.000 x 1.625	4.070	1.660	3.125	1.500	0.17

* Retention system available

** Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 10 Recommended Minimum Radii in Inch Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors		
	R axial	RO	RI	AC2	AC3A	AC3B
717	2.500	3.000	5.000	X		
580	2.500	3.500	7.000	X		
582	4.120	4.000	11.750		X	X
583	6.000	5.500	12.500		X	X
705	4.000	8.000	18.000		X	X

■ Low-Pressure Types – with Smooth Wide Sealing Surface

Without Fabric Reinforcement – METRIC Dimensions

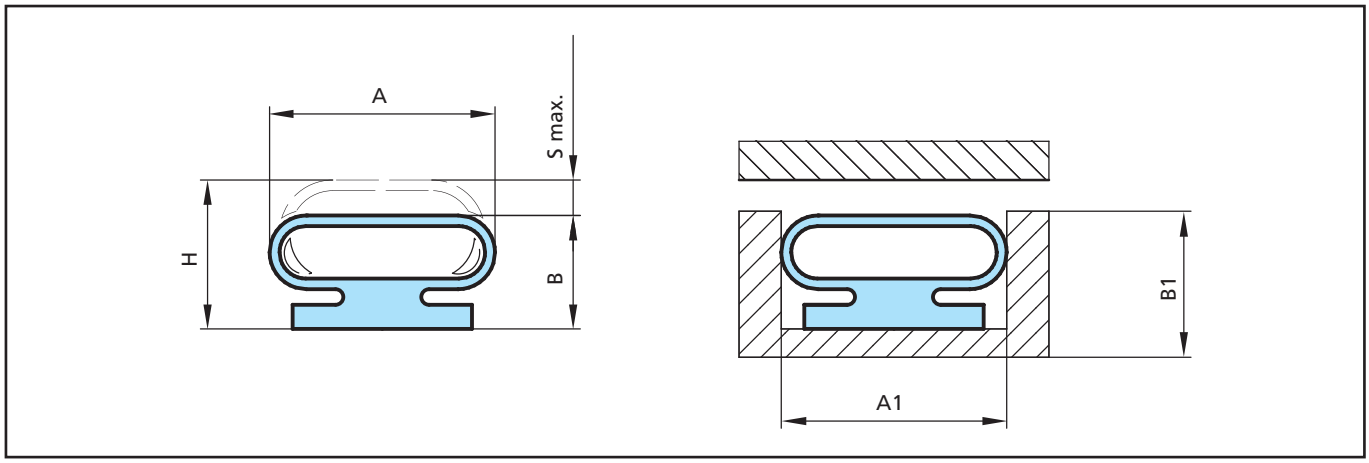


Figure 16 Low-Pressure – with smooth wide sealing surface

Table 11 Dimensions and Profile Numbers – METRIC Dimensions

Profile Ref. No.				Dimensions					
VMQ	CR	EPDM	NBR	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa**
573-5*	-	573-6	-	17.46 x 11.11	18.50	12.10	14.27	3.18	0.10
-	-	978-6*	-	25.40 x 12.70	26.90	13.70	19.05	6.35	0.10
537-5*	537-2	537-6	-	31.75 x 15.88	32.10	16.30	25.40	9.53	0.10
535-5*	535-2	535-6	535-3	50.80 x 22.23	51.10	22.40	41.28	19.05	0.10
-	548-2*	548-6	-	76.20 x 31.75	76.50	31.90	57.15	25.40	0.10
-	-	934-6*	-	101.60 x 41.27	103.40	42.20	76.20	34.93	0.10

* Retention system available

** Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 12 Recommended Minimum Radii in Metric Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors			
	R axial	RO	RI	AC1	AC4A	AC4B	AC5
573	50.80	38.10	152.40	X			
978	63.50	44.45	177.80	X			
537	76.20	50.80	203.20	X			
535	114.30	101.60	298.45	X	X	X	X
548	152.40	139.70	406.40	X	X	X	
934	101.60	203.20	457.20	X	X	X	

■ Low-Pressure Types – with Smooth Wide Sealing Surface Without Fabric Reinforcement – INCH Dimensions

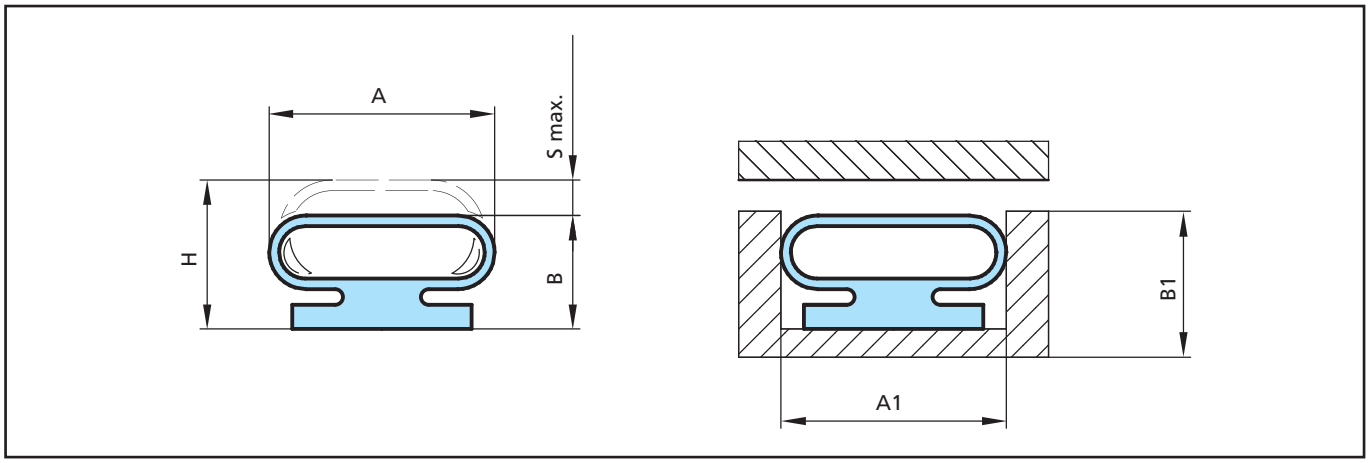


Figure 17 Low-Pressure – with smooth wide sealing surface

Table 13 Dimensions and Profile Numbers – INCH Dimensions

Profile Ref. No.				Dimensions					
VMQ	CR	EPDM	NBR	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa**
573-5*	-	573-6	-	0.687 x 0.437	0.730	0.475	0.562	0.125	0.10
-	-	978-6*	-	1.000 x 0.500	1.060	0.540	0.750	0.250	0.10
537-5*	537-2	537-6	-	1.250 x 0.625	1.265	0.642	1.000	0.375	0.10
535-5*	535-2	535-6	535-3	2.000 x 0.875	2.010	0.880	1.625	0.750	0.10
-	548-2*	548-6	-	3.000 x 1.250	3.010	1.255	2.250	1.000	0.10
-	-	934-6*	-	4.000 x 1.625	4.070	1.660	3.000	1.375	0.10

* Retention system available

** Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 14 Recommended Minimum Radii in Inch Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors			
	R axial	RO	RI	AC1	AC4A	AC4B	AC5
573	2.000	1.500	6.000	X			
978	2.500	1.750	7.000	X			
537	3.000	2.000	8.000	X			
535	4.500	4.000	11.750	X	X	X	X
548	6.000	5.500	16.000	X	X	X	
934	4.000	8.000	18.000	X	X	X	

■ Low-Pressure Types – with Particularly Pronounced Sealing Edge

With Fabric Reinforcement – METRIC Dimensions

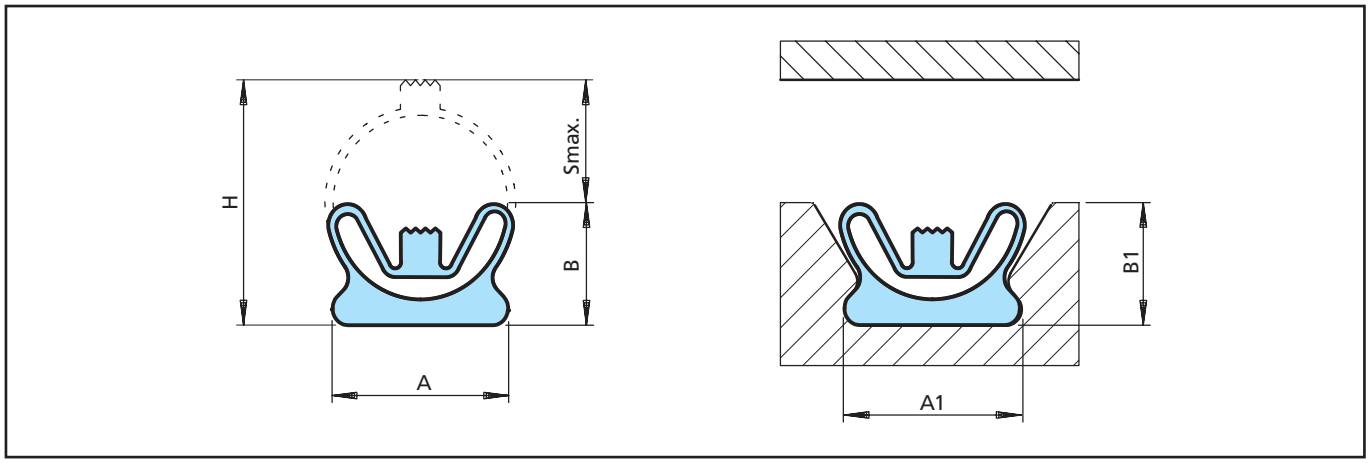


Figure 18 Low-Pressure – particularly pronounced sealing edge

Table 15 Dimensions and Profile Numbers – METRIC Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa**
599-5	599-6	15.88 x 12.70	16.30	13.10	22.23	9.53	0.10
591-5*	591-6	17.46 x 12.70	18.00	13.10	23.81	11.10	0.17
581-5*	581-6	22.22 x 15.87	22.70	16.30	28.58	12.70	0.17
-	594-6*	44.45 x 30.95	45.30	31.60	61.72	30.15	0.17

* Retention system available

** Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 16 Recommended Minimum Radii in Metric Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors	
	R axial	RO	RI	AC2	AC3A
599	47.50	127.00	203.20	X	
591	50.80	127.00	203.20	X	
581	87.12	152.40	254.00	X	
594	127.00	203.20	406.40		X

■ Low-Pressure Types - with Particularly Pronounced Sealing Edge With Fabric Reinforcement – INCH Dimensions

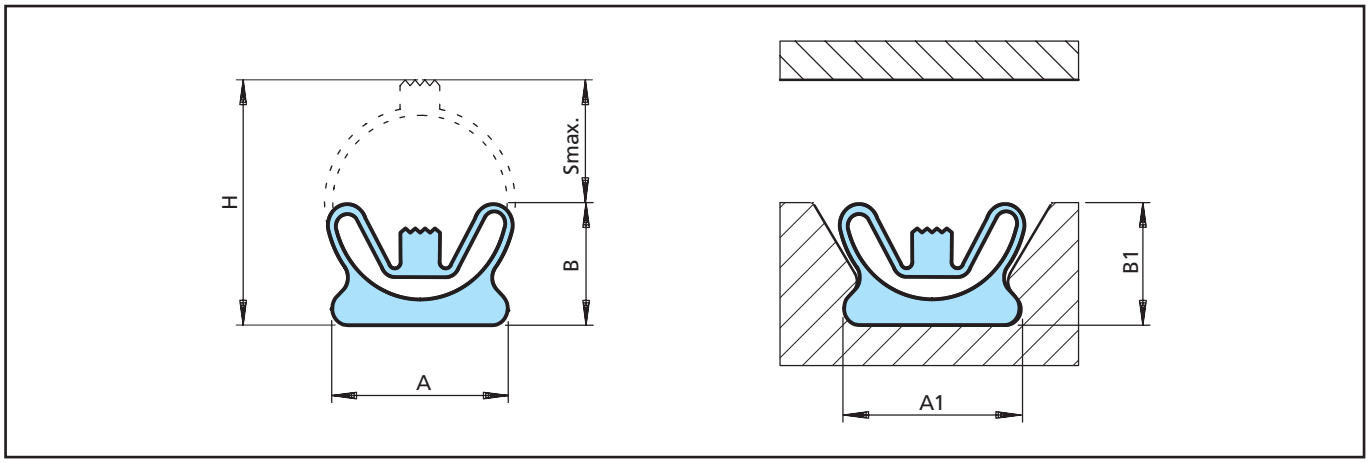


Figure 19 Low-Pressure – particularly pronounced sealing edge

Table 17 Dimensions and Profile Numbers – INCH Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa**
599-5	599-6	0.625 x 0.500	0.641	0.516	0.875	0.375	0.10
591-5*	591-6	0.687 x 0.500	0.707	0.516	0.937	0.437	0.17
581-5*	581-6	0.875 x 0.625	0.895	0.641	1.125	0.500	0.17
-	594-6*	1.750 x 1.218	1.782	1.243	2.430	1.187	0.17

* Retention system available
** Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 18 Recommended Minimum Radii in Inch Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors	
	R axial	RO	RI	AC2	AC3A
599	1.870	5.000	8.000	X	
591	2.000	5.000	8.000	X	
581	3.430	6.000	10.000	X	
594	5.000	8.000	16.000		X

■ Low-Pressure Types – with Smooth Sealing Surface

With Fabric Reinforcement – METRIC Dimensions

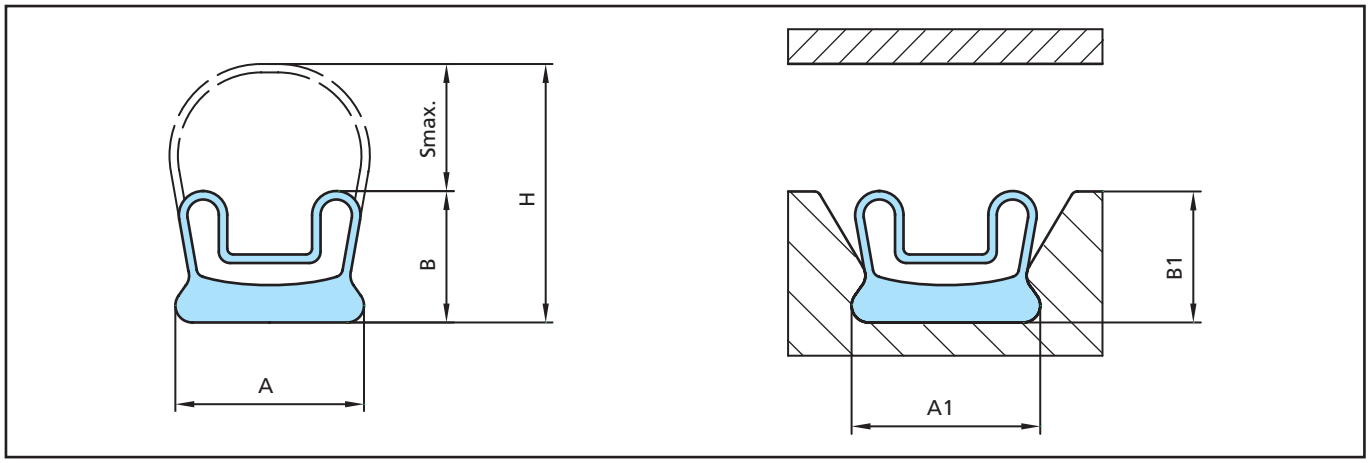


Figure 20 Low-Pressure – smooth sealing surface

Table 19 Dimensions and Profile Numbers – METRIC Dimensions

Profile Ref. No.	Dimensions					
EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa**
598-6*	17.46 x 12.70	18.00	13.10	19.05	6.35	0.17
597-6*	22.23 x 15.88	22.70	16.30	25.40	9.53	0.17
708-6*	44.45 x 30.96	45.00	32.00	51.60	20.64	0.17

* Retention system available

** Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 20 Recommended Minimum Radii in Metric Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors	
	R axial	RO	RI	AC2	AC3A
598	50.80	127.00	203.20	X	
597	87.12	152.40	254.00	X	
708	127.00	203.20	406.40		X

■ Low-Pressure Types – with Smooth Sealing Surface

With Fabric Reinforcement – INCH Dimensions

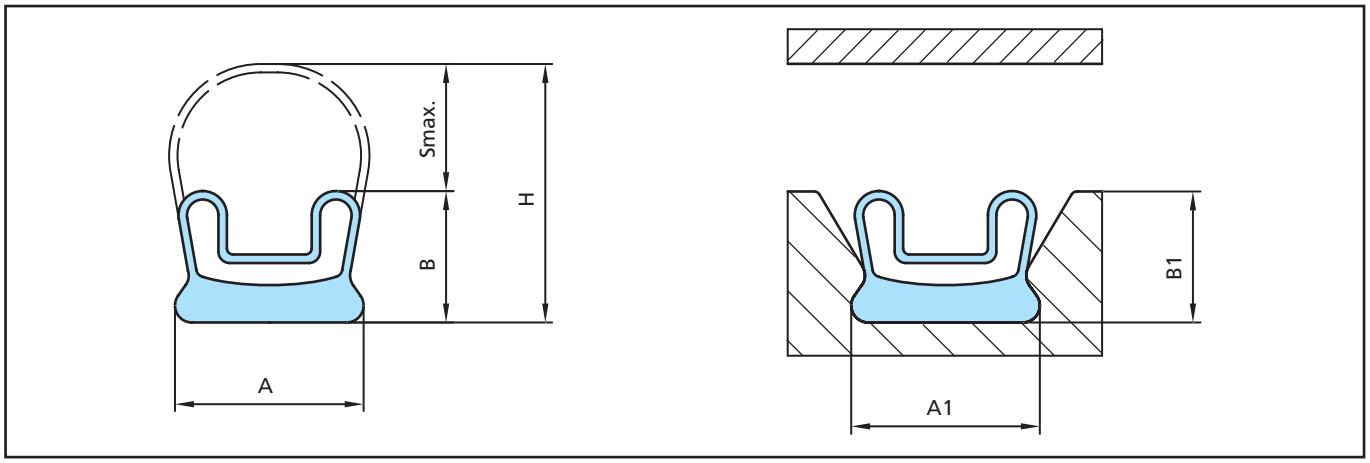


Figure 21 Low-Pressure – smooth sealing surface

Table 21 Dimensions and Profile Numbers – INCH Dimensions

Profile Ref. No.	Dimensions					
EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa**
598-6*	0.688 x 0.500	0.707	0.516	0.750	0.250	0.17
597-6*	0.875 x 0.625	0.895	0.641	1.000	0.375	0.17
708-6*	1.750 x 1.219	1.782	1.243	2.032	0.813	0.17

* Retention system available

** Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 22 Recommended Minimum Radii in Inch Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors	
	R axial	RO	RI	AC2	AC3A
598	2.000	5.000	8.000	X	
597	3.430	6.000	10.000	X	
708	5.000	8.000	16.000		X

■ Low-Pressure Types – with Specially Formed Sealing Edge

With Fabric Reinforcement – METRIC Dimensions

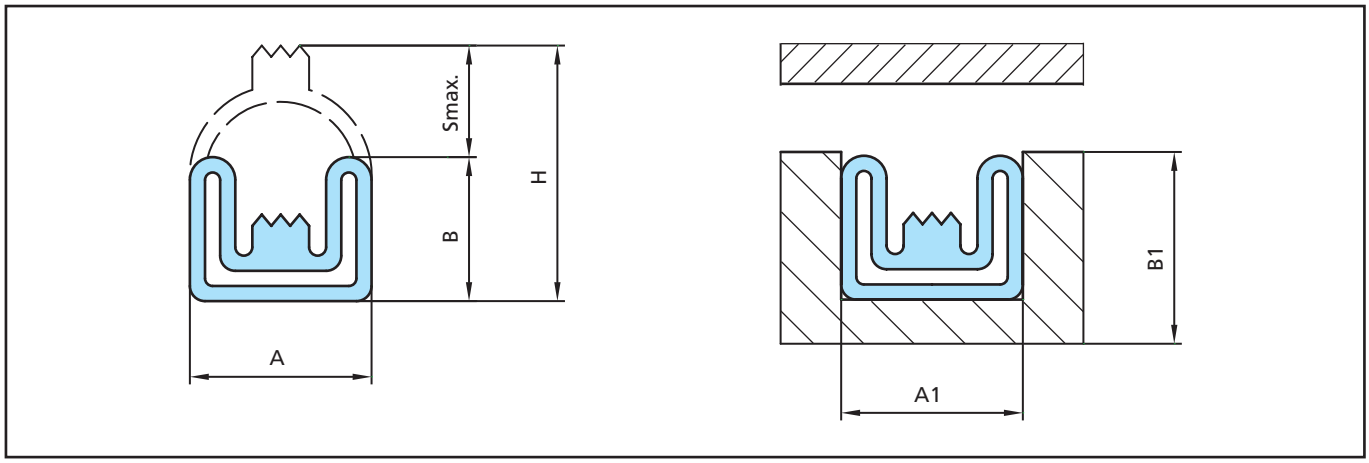


Figure 22 Low-Pressure – with specially formed sealing edge

Table 23 Dimensions and Profile Numbers – METRIC Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa*
715-5	715-6	13.72 x 11.68	14.50	12.50	21.21	9.53	0.17
707-5	707-6	16.67 x 11.11	17.00	11.40	22.23	9.40	0.17

EPDM is only available for straight seals with sealed ends in EPDM
* Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 24 Recommended Minimum Radii in Metric Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors
	R axial	RO	RI	AC2
715	22.00	101.60	177.80	X
707	66.55	101.60	177.80	X

■ Low-Pressure Types – with Specially Formed Sealing Edge

With Fabric Reinforcement – INCH Dimensions

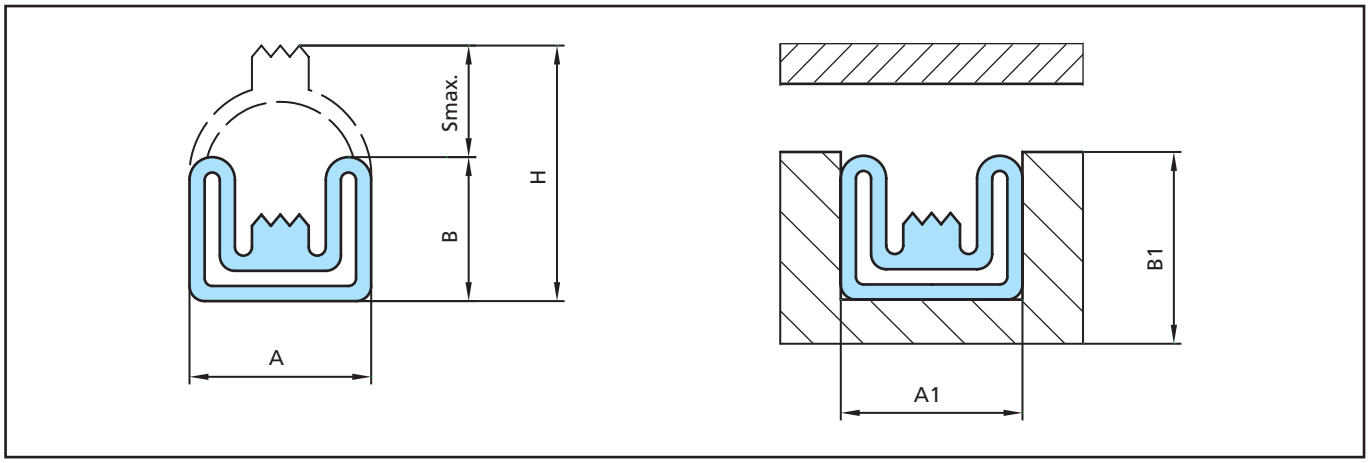


Figure 23 Low-Pressure – with specially formed sealing edge

Table 25 Dimensions and Profile Numbers – INCH Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa*
715-5	715-6	0.540 x 0.440	0.570	0.452	0.815	0.375	0.17
707-5	707-6	0.650 x 0.430	0.670	0.450	0.875	0.370	0.17

EPDM is only available for straight seals with sealed ends in EPDM

* Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 26 Recommended Minimum Radii in Inch Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors
	R axial	RO	RI	AC2
715	0.870	4.000	7.000	X
707	2.620	4.000	7.000	X

■ High-Pressure Types – with Smooth Sealing Profile and Grooves Without Fabric Reinforcement – METRIC Dimensions

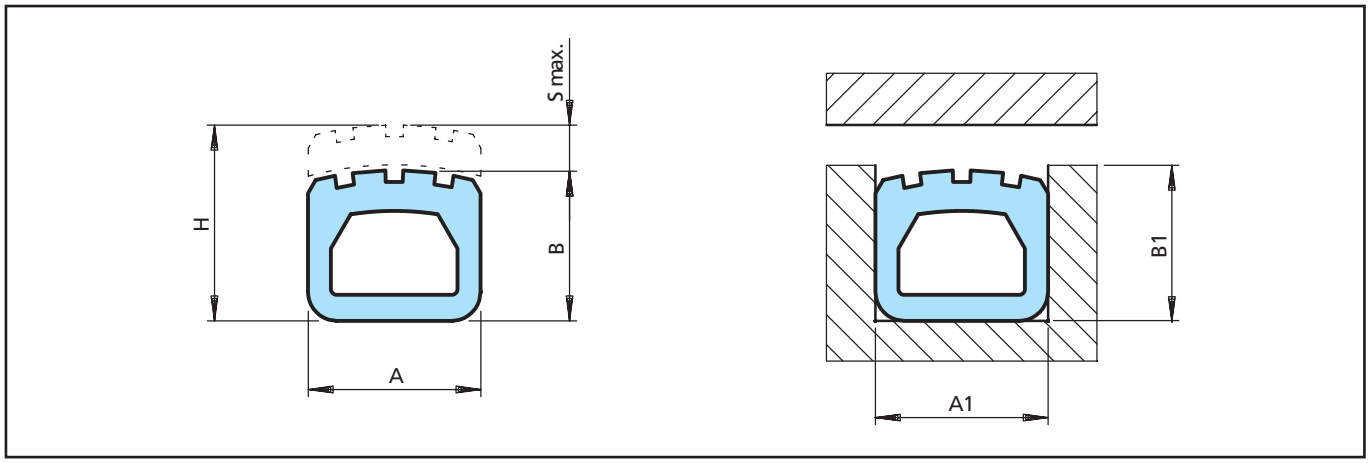


Figure 24 High-Pressure – with smooth sealing profile and grooves

Table 27 Dimensions and Profile Numbers – METRIC Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa*
15092-5	15092-6	14.00 x 10.00	15.00	10.70	13.00	3.00	0.30
950-5	950-6	16.00 x 12.00	17.00	12.80	15.00	3.00	0.30
960-5	960-6	16.00 x 18.00	16.80	19.00	21.50	3.50	0.30
955-5	955-6	22.00 x 19.00	24.00	11.70	22.50	3.50	0.30
952-5	952-6	26.00 x 19.00	27.30	20.00	23.50	4.50	0.30
949-5	-	27.00 x 21.00	29.60	22.00	26.00	5.00	0.30
972-5	972-6	35.00 x 26.00	36.30	27.30	34.00	8.00	0.30
6119-5	6119-6	35.00 x 32.00	36.30	33.30	42.00	10.00	0.30

* Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 28 Recommended Minimum Radii in Metric Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors (min. - max.)			
	R axial	RO	RI	AC13-Ø	AC10	AC12	AC11-Ø
15092	44.45	34.80	44.45	4-6	M4-M6	M6	6
950	41.15	41.15	50.80	4-8	M4-M8	M6-M8	6-8
960	21.75	53.85	82.55	4-8	M4-M8	M6-M8	6-8
955	60.20	41.15	63.50	4-8	M4-M8	M6-M8	6-8
952	67.56	60.20	85.60	4-10	M4-M10	M6-M10	6-10
949	61.00	65.00	106.00	4-10	M4-M10	M6-M10	6-10
972	83.00	70.00	101.00	4-16	M4-M16	M6-M14	6-12
6119	85.60	76.20	117.35	4-16	M4-M16	M6-M14	6-12

■ High-Pressure Types – with Smooth Sealing Profile and Grooves Without Fabric Reinforcement – INCH Dimensions

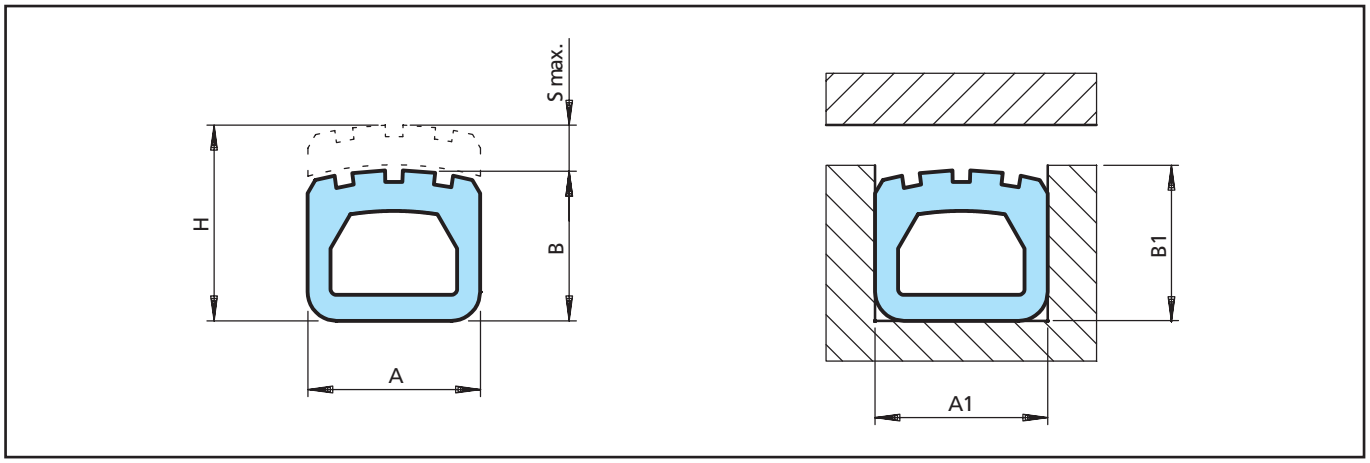


Figure 25 High-Pressure – with smooth sealing profile and grooves

Table 29 Dimensions and Profile Numbers – INCH Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa*
15092-5	15092-6	0.551 x 0.394	0.590	0.420	0.512	0.118	0.30
950-5	950-6	0.630 x 0.472	0.669	0.503	0.590	0.118	0.30
960-5	960-6	0.630 x 0.709	0.661	0.747	0.847	0.138	0.30
955-5	955-6	0.866 x 0.748	0.944	0.462	0.886	0.138	0.30
952-5	952-6	1.024 x 0.748	1.075	0.787	0.926	0.178	0.30
949-5	-	1.063 x 0.827	1.114	0.866	1.024	0.197	0.30
972-5	972-6	1.378 x 1.024	1.429	1.075	1.339	0.315	0.30
6119-5	6119-6	1.378 x 1.260	1.429	1.311	1.654	0.394	0.30

* Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 30 Recommended Minimum Radii in Inch Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors (min. - max.)			
	R axial	RO	RI	AC13-Ø	AC10	AC12	AC11-Ø
15092	1.750	1.370	1.750	0.157 - 0.236	M4-M6	M6	0.236
950	1.620	1.620	2.000	0.157 - 0.314	M4-M8	M6-M8	0.236 - 0.314
960	1.250	2.120	3.250	0.157 - 0.314	M4-M8	M6-M8	0.236 - 0.314
955	2.370	1.620	2.500	0.157 - 0.314	M4-M8	M6-M8	0.236 - 0.314
952	2.660	2.370	3.370	0.157 - 0.393	M4-M10	M6-M10	0.236 - 0.393
949	2.500	2.625	4.250	0.157 - 0.393	M4-M10	M6-M10	0.236 - 0.393
972	3.250	2.750	4.000	0.157 - 0.629	M4-M16	M6-M14	0.236 - 0.472
6119	3.370	3.000	4.620	0.157 - 0.629	M4-M16	M6-M14	0.236 - 0.472

■ High-Pressure Types – with Peaked Sealing Profile

Without Fabric Reinforcement – METRIC Dimensions

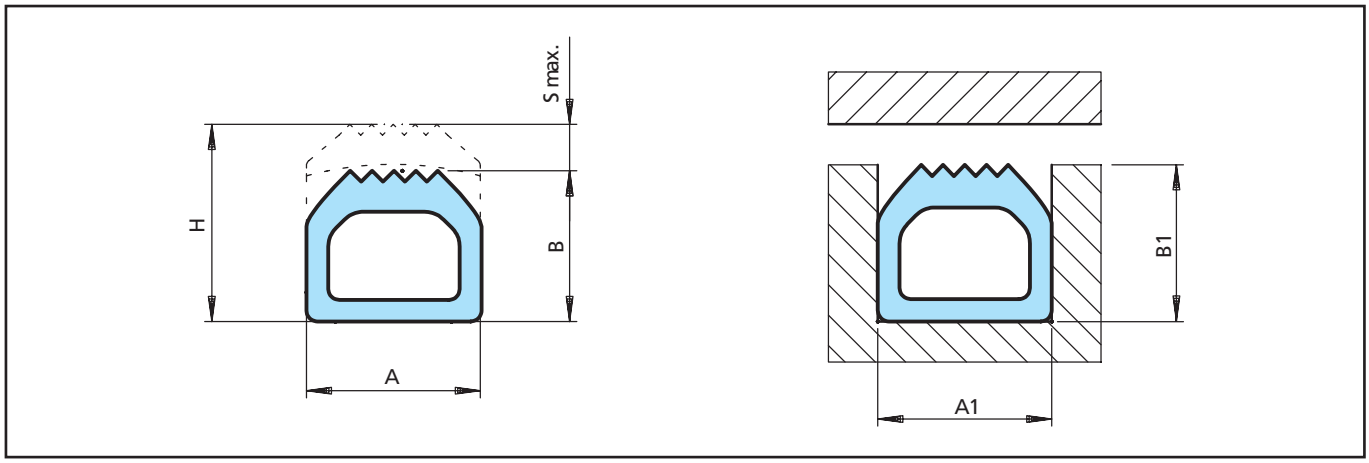


Figure 26 High-Pressure – with peaked sealing profile

Table 31 Dimensions and Profile Numbers – METRIC Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa*
973-5	973-6	6.50 x 5.00	7.10	5.60	6.50	1.50	0.30
977-5	977-6	10.00 x 8.00	10.80	8.70	10.00	2.00	0.30
971-5	971-6	16.00 x 14.00	17.00	14.80	17.51	3.50	0.30
969-5	969-6	20.00 x 20.00	21.00	21.00	21.00	4.00	0.30
970-5	970-6	21.00 x 24.00	22.00	24.80	29.00	5.00	0.30

* Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 32 Recommended Minimum Radii in Metric Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors (min. - max.)			
	R axial	RO	RI	AC13-Ø	AC10	AC12	AC11-Ø
973	19.05	22.10	25.40	4	M4	-	-
977	34.80	34.80	44.45	4-6	M4-M6	M6	4
971	41.15	41.15	53.85	4-8	M4-M8	M6-M8	6-8
969	88.90	53.85	82.55	4-8	M4-M8	M6-M8	6-8
970	38.10	53.85	95.55	4-8	M4-M8	M6-M8	6-8

■ High-Pressure Types – with Peaked Sealing Profile Without Fabric Reinforcement – INCH Dimensions

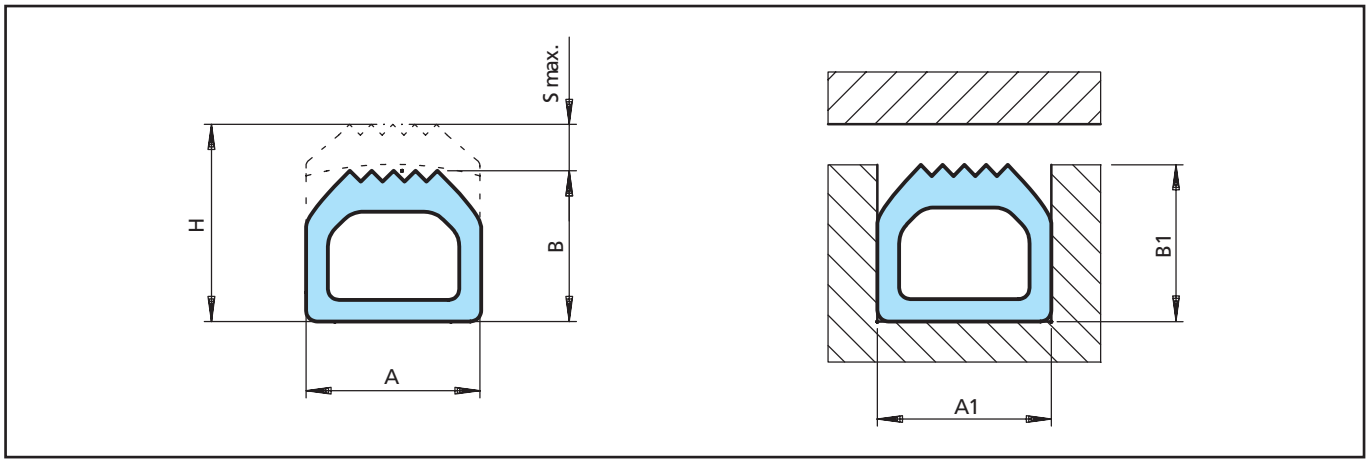


Figure 27 High-Pressure – with peaked sealing profile

Table 33 Dimensions and Profile Numbers – INCH Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa*
973-5	973-6	0.256 x 0.197	0.280	0.221	0.256	0.059	0.30
977-5	977-6	0.394 x 0.315	0.425	0.342	0.393	0.078	0.30
971-5	971-6	0.630 x 0.551	0.669	0.582	0.689	0.138	0.30
969-5	969-6	0.787 x 0.787	0.826	0.826	0.944	0.157	0.30
970-5	970-6	0.827 x 0.945	0.866	0.976	1.142	0.197	0.30

* Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 34 Recommended Minimum Radii in Inch Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors (min. - max.)			
	R axial	RO	RI	AC13-Ø	AC10	AC12	AC11-Ø
973	0.750	0.870	1.000	0.157	M4	-	-
977	1.370	1.370	1.750	0.157 - 0.236	M4-M6	M6	0.157
971	1.620	1.620	2.120	0.157 - 0.314	M4-M8	M6-M8	0.236 - 0.314
969	3.500	2.120	3.250	0.157 - 0.314	M4-M8	M6-M8	0.236 - 0.314
970	1.500	2.120	3.750	0.157 - 0.314	M4-M8	M6-M8	0.236 - 0.314

■ High Purity Inflatable Series

Trelleborg Sealing Solutions is pleased to introduce the high purity series of inflatable seals, clamps, and actuators. This product range combines the use of advanced materials with a superior profile design to create a seal (bladder) that functions well under conditions where purity, cleanliness, and reliability are required.

Features include:

Improved Sealing (Clamping/Actuating) Surface
After years of empirical testing coupled with a detailed program of experiments, our engineers have concluded that a large, continuous sealing surface will result in a better seal when compared to serrated designs. The high purity inflatable seal's flat "mesa-shaped" profile is a result of this effort. For clamping and actuating, this design also improves the force generated as more surface area directly correlates to more force.

White, FDA-Compliant, High Performance Silicone
Our chemists have developed a high quality, white, FDA-compliant* silicone able to withstand the rigors of many inflation/deflation cycles. This material has proven to be comparable to other available materials but, in addition, it is FDA compliant; a requirement for cleanroom and phamaceutical applications.

Low Outgassing**
Testing to date has shown a 91% improvement in outgassing (total peak area) when compared to our standard silicones and a 98% improvement over competition. Use of this material will decrease the chance of contaminating controlled environments with unwanted chemical compounds.

Greater Gap Coverage
Although testing is still ongoing, Trelleborg Sealing Solutions believes this type of seal will reliably cover 10% more gap than our current designs. For example, our new Profile No. 993 profile will cover a maximum gap of 3.3 mm (0.130 inch) compared to Profile No. 15092 which covers 3 mm (0.118 inch).

Easier to Clean
When strict wash down procedures are required, these profiles make it easier to clean due to its smooth sealing surface, whereas multiple serrations could create contamination issues.

* meets 21CFR 177.2000. parts c, d, and e
** detailed outgassing study available upon request

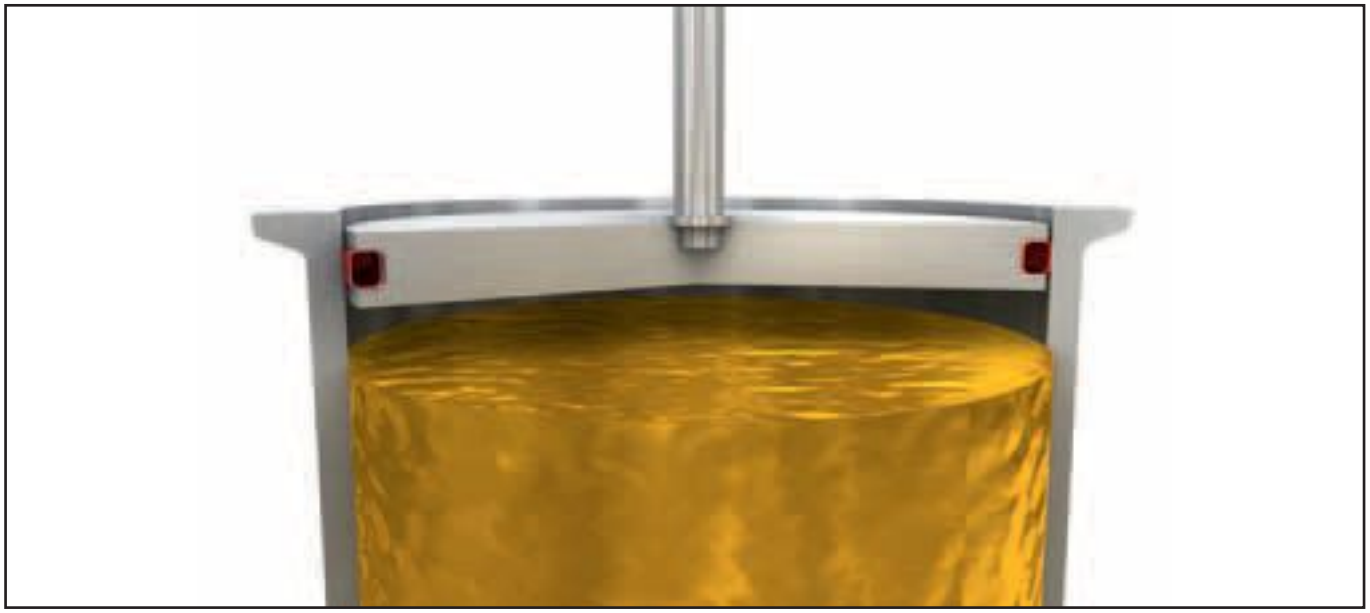


Figure 28 The Airseal expands radially outward against the inside of the drum, sealing the required gap and providing leak-tight operation under pressure.

■ High-Pressure Types – High Purity Profile

Without Fabric Reinforcement – METRIC Dimensions

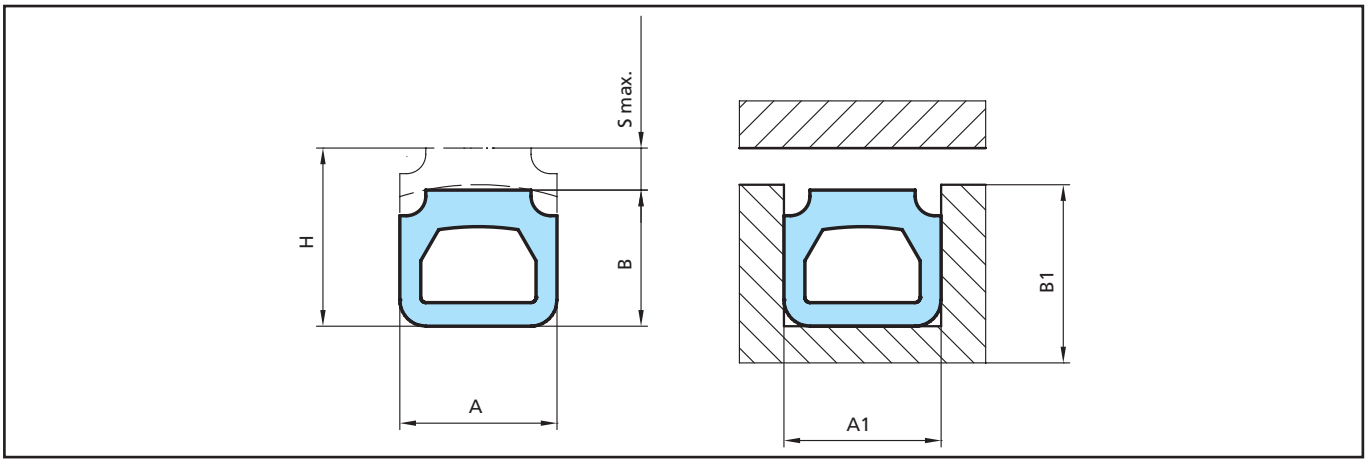


Figure 29 High-pressure profile in high purity

Table 35 Dimensions and Profile Numbers – METRIC Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa*
991-5	991-6	6.50 x 5.00	7.10	5.60	6.50	1.50	0.30
993-5	993-6	14.00 x 10.00	15.00	10.70	13.00	3.00	0.30
995-5	995-6	16.00 x 12.00	17.00	12.80	15.00	3.00	0.30
997-5	997-6	21.00 x 24.00	22.00	24.80	29.00	5.00	0.30
999-5	999-6	35.00 x 32.00	36.30	33.30	42.00	10.00	0.30

* Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 36 Recommended Minimum Radii in Metric Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors (min. - max.)			
	R axial	RO	RI	AC13-Ø	AC10	AC12	AC11-Ø
991	19.05	22.10	25.40	4	M4	-	-
993	44.45	34.80	44.45	4-6	M4-M6	M6	6
995	41.15	41.15	50.80	4-8	M4-M8	M6-M8	6-8
997	38.10	53.85	95.55	4-8	M4-M8	M6-M8	6-8
999	85.60	76.20	117.35	4-16	M4-M16	M6-M14	6-12

■ High-Pressure Types – High Purity Profile

Without Fabric Reinforcement – INCH Dimensions

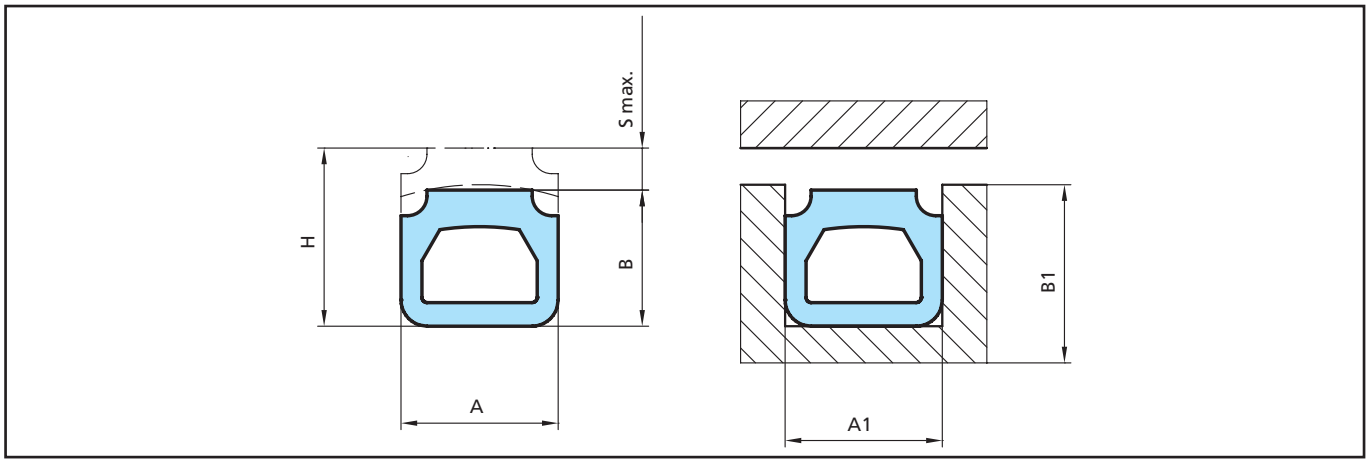


Figure 30 High-pressure profile in high purity

Table 37 Dimensions and Profile Numbers – INCH Dimensions

Profile Ref. No.		Dimensions					
VMQ	EPDM	A x B	A1	B1	H	S max.	Max. Internal Pressure Pi MPa*
991-5	991-6	0.256 x 0.197	0.280	0.221	0.256	0.059	0.30
993-5	993-6	0.551 x 0.394	0.590	0.420	0.512	0.118	0.30
995-5	995-6	0.630 x 0.472	0.669	0.503	0.590	0.118	0.30
997-5	997-6	0.827 x 0.945	0.866	0.976	1.142	0.197	0.30
999-5	999-6	1.378 x 1.260	1.429	1.311	1.654	0.394	0.30

* Higher pressures are possible dependent on application, function and material. For further details please contact your local Trelleborg Sealing Solutions marketing company.

Table 38 Recommended Minimum Radii in Inch Dimensions and Valve Connections

Profile Ref. No.	Radii			Air Connectors (min. - max.)			
	R axial	RO	RI	AC13-Ø	AC10	AC12	AC11-Ø
991	0.750	0.870	1.000	0.157	M4	-	-
993	1.750	1.370	1.750	0.157 - 0.236	M4-M6	M6	0.236
995	1.620	1.620	2.000	0.157 - 0.314	M4-M8	M6-M8	0.236 - 0.314
997	1.500	2.120	3.750	0.157 - 0.314	M4-M8	M6-M8	0.236 - 0.314
999	3.370	3.000	4.620	0.157 - 0.629	M4-M16	M6-M14	0.236 - 0.472

■ Metal Air Connections

The air connections and valves can generally only be provided on the bottom surface of the profile on Airseals. With some profiles it is possible to vulcanize the connections into the side wall. Please contact Trelleborg Sealing Solutions for standard stem designs to avoid tooling cost wherever possible.

Metal Air Connection Sizes – METRIC Dimensions

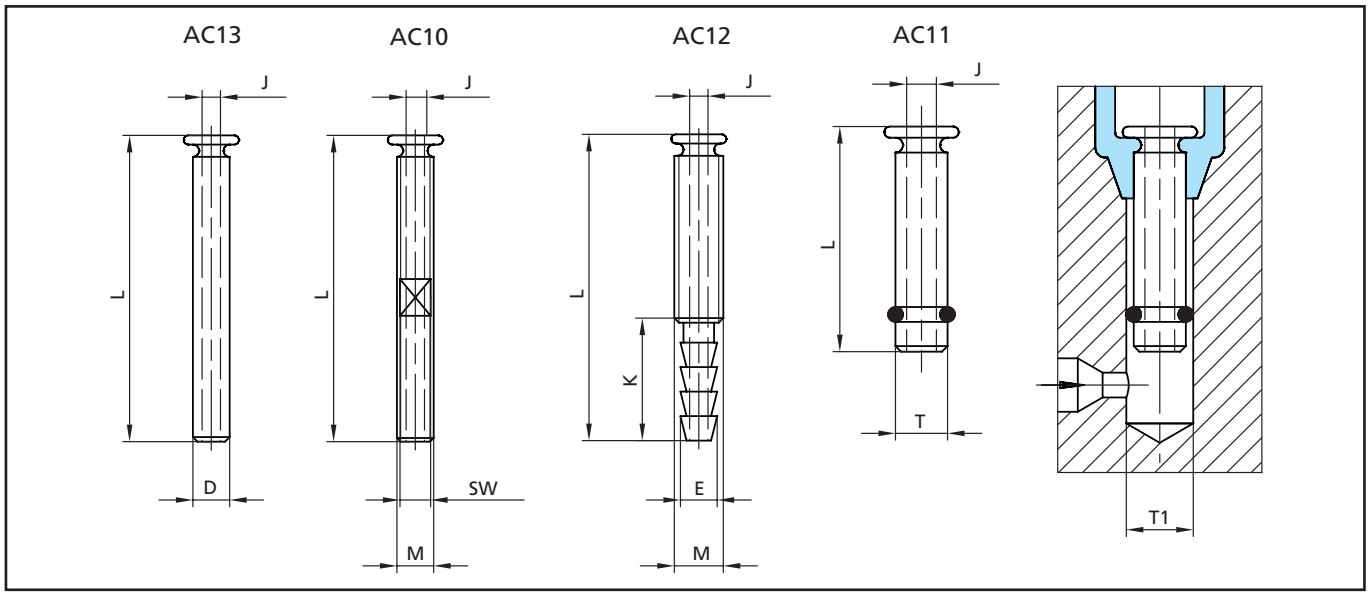


Figure 31 Form of standard connections

Table 39 Connections - METRIC Dimensions

Type	Connections Dimensions							
AC13	Ø D	4	6	8	10	12	14	16
	Ø J	1.52	3.17	3.98	5.94	6.35	7.13	7.92
	L	50	50	60	70	70	80	80
AC10	M	M4	M6	M8	M10	M12	M14	M16
	SW	3	5	6	8	10	11	13
	Ø J	1.52	3.17	3.98	5.53	7.13	7.92	9.52
	L	50	50	60	70	70	80	80
AC12	M	M4	M6	M8	M10	M12	M14	
	Ø E	2.7	4	6	8	10	12	
	K	8	12	20	20	25	25	
	Ø J	1.02	1.52	2.94	3.98	5.94	6.35	
	L	50	50	60	70	70	80	80
AC11	Ø T h7	3.8	5.8	7.8	9.8	11.8		
	Ø T1 H8	4	6	8	10	12		
	Ø J	1.52	2.18	3.98	6.04	7.92		
	L	20	25	30	30	30		

Table 40 Cones - METRIC Dimensions

Cones m x n x h	Connection Type			
	AC13	AC10	AC12	AC11
6 x 5 x 3* 8 x 6 x 4	D4	M4	-	4
12 x 10 x 6	D6	M6	M6	6
14 x 12 x 6	D8	M8	M8	8
21 x 14 x 10	D10	M10	M10	10
24 x 16 x 10	D12	M12	M12	12
26 x 18 x 12	D14	M14	M14	-
28 x 20 x 12	D16	M16	-	-

* For profile 6.5 x 5 (973)

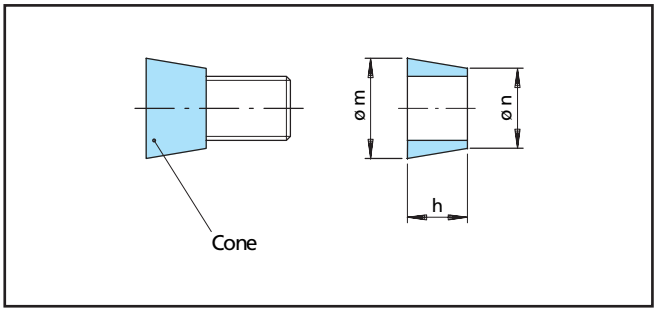


Figure 32 Cone configuration

■ Metal Air Connections

The air connections and valves can generally only be provided on the bottom surface of the profile on Airseals. With some profiles it is possible to vulcanize the connections into the side wall. Please contact Trelleborg Sealing Solutions for standard stem designs to avoid tooling cost wherever possible.

Metal Air Connections Sizes – INCH Dimensions

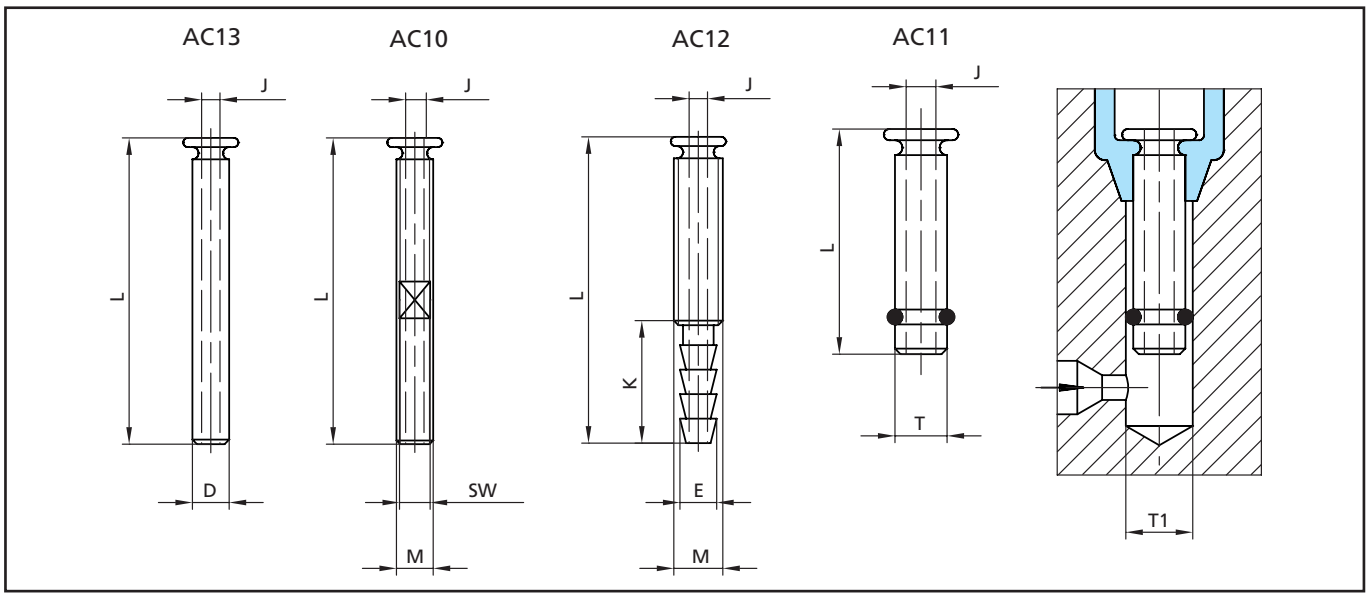


Figure 33 Form of standard connections

Table 41 Connections - INCH Dimensions

Type	Connections Dimensions							
AC13	Ø D	0.157	0.236	0.314	0.393	0.472	0.551	0.629
	Ø J	0.060	0.125	0.157	0.234	0.250	0.281	0.312
	L	1.969	1.969	2.362	2.755	2.755	3.149	3.149
AC10	M	M4	M6	M8	M10	M12	M14	M16
	SW	0.118	0.196	0.236	0.314	0.393	0.433	0.511
	Ø J	0.060	0.125	0.157	0.218	0.281	0.312	0.375
	L	1.969	1.969	2.362	2.755	2.755	3.149	3.149
AC12	M	M4	M6	M8	M10	M12	M14	
	Ø E	0.105	0.157	0.236	0.314	0.393	0.472	
	K	0.315	0.472	0.787	0.787	0.984	0.984	
	Ø J	0.040	0.060	0.116	0.157	0.234	0.250	
	L	1.969	1.969	2.362	2.755	2.755	3.149	3.149
AC11	Ø T h7	0.150	0.228	0.307	0.385	0.464		
	Ø T1 H8	0.157	0.236	0.314	0.393	0.472		
	Ø J	0.060	0.086	0.157	0.238	0.312		
	L	0.787	0.984	1.181	1.181	1.181		

Table 42 Cones - INCH Dimensions

Cones m x n x h	Connection Type			
	AC13	AC10	AC12	AC11
0.236 x 0.196 x 0.118* 0.314 x 0.236 x 0.157	D 0.157	M4	-	0.150
0.472 x 0.394 x 0.236	D 0.236	M6	M6	0.236
0.551 x 0.472 x 0.236	D 0.314	M8	M8	0.314
0.826 x 0.551 x 0.394	D 0.393	M10	M10	0.393
0.944 x 0.629 x 0.394	D 0.472	M12	M12	0.472
1.023 x 0.708 x 0.472	D 0.551	M14	M14	-
1.102 x 0.787 x 0.472	D 0.629	M16	-	-

* For profile 0.236 x 0.196 (973)

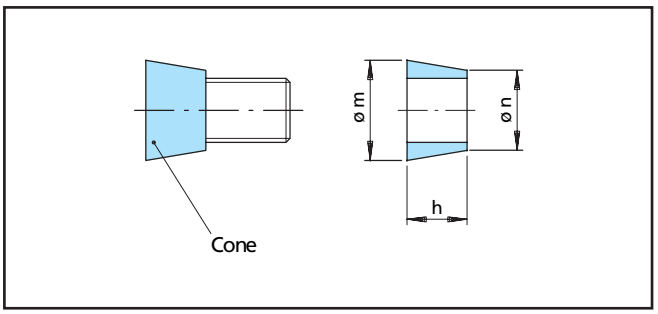


Figure 34 Cone configuration

■ Air Connections, Reinforced and Non-Reinforced Hose, Metal Connections

Table 43 Connection Sizes - METRIC - INCH Dimensions

Type	ID-Ø mm (INCH)	OD-Ø mm (INCH)	Ø-Clearance Hole mm (INCH)	Length mm (INCH)	Connector Description	End Fittings
 AC1	3.175 (0.125)	6.35 (0.250)	7.20 (0.281)	Flexible	Flexible hose vulcanized to base or end of seal	 1/8 NPT Male 1/8 NPT Female 0.305-32 NEF Tire Core G 1/8 Male R 1/8 Male
	3.175 (0.125)	7.94 (0.313)	8.73 (0.343)			
 AC2	4.78 (0.188)	9.53 (0.375)	10.30 (0.406)	Flexible	Flexible reinforced hose crimped to base or end of seal	
 AC3A	6.35 (0.250)	11.94 (0.470)	12.70 (0.500)	Flexible	Flexible reinforced hose crimped to base or end of seal	
 AC3B	6.35 (0.250)	11.94 (0.470)	15.10 (0.593)	Flexible	Flexible reinforced hose attached to 1/8 NPT female connector on base or end of seal	
 AC4A	4.75 (0.187)	- -	11.10 (0.437)	50.80 (2.000)	Mechanically attached to base of seal, hole-Ø for Nut and Washer 24.60 mm x 7.90 mm (0.968 inch x 0.312 inch), or 24.60 mm (0.968 inch) for entire assembly	1/8 NPT/S
 AC4B	6.35 (0.250)	11.94 (0.470)	12.70 (0.500)	Flexible	Flexible reinforced hose attached to mechanical connector base of seal, hole-Ø for Nut and Washer 24.60 mm x 7.90 mm (0.968 inch x 0.312 inch), or 24.60 mm (0.968 inch) for entire assembly	
 AC4C	4.11 (0.162)	6.40 (0.250)	14.30 (0.562)	27.43 (1.080)	Tubing attached to base of seal, hole-Ø for Nut and Washer 24.60 mm x 3.20 mm (0.968 inch x 0.125 inch), or 24.60 mm (0.968 inch) for entire assembly	Push-Connect
 AC5	- -	- -	7.92 (0.312)	33.00 (1.300)	Mechanically attached to base of seal, hole-Ø for Nut and Washer 15.90 mm x 5.60 mm (0.625 inch x 0.218 inch), or 15.90 mm (0.625 inch) for entire assembly	0.305-32 NEF Tire Core

■ End Plugs

If the Airseal is not designed and employed as a closed geometric form, end plugs are required to close off the seal ends. These end plugs cannot be activated, so that their profile height can be selected for the loaded or relieved state.

The standard design is to supply ends in the relieved state. Contact your local Trelleborg Sealing Solutions marketing company to check tooling availability if loaded state ends are required.

Clamping
Ends of strip seals should be securely clamped as illustrated below.

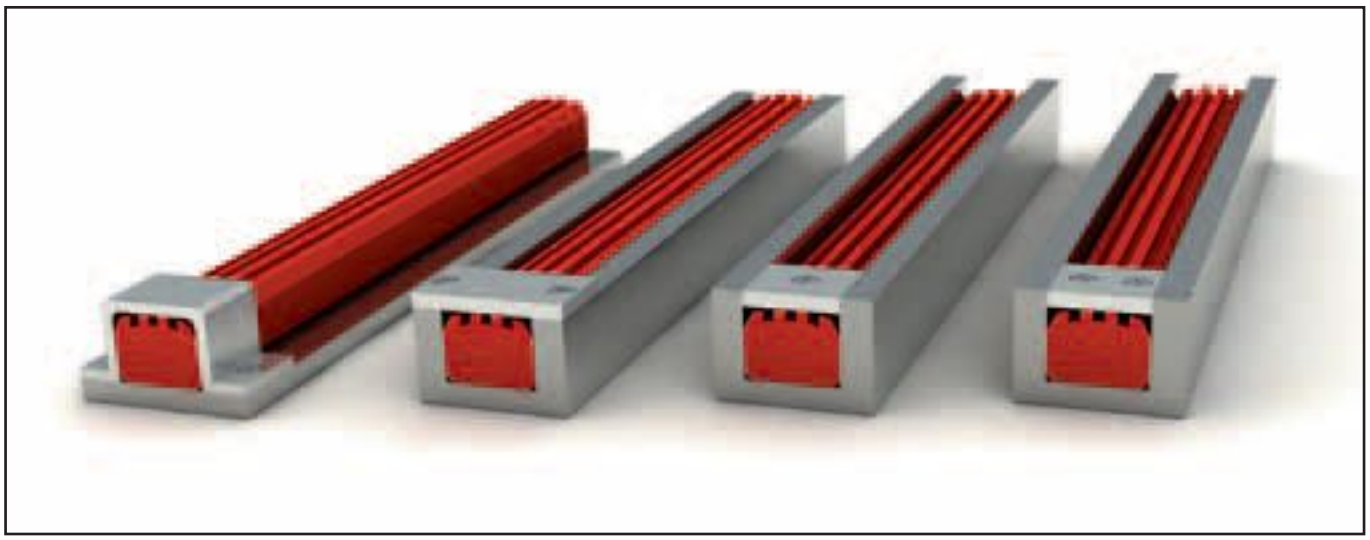


Figure 35 Clamping examples - high-pressure profiles

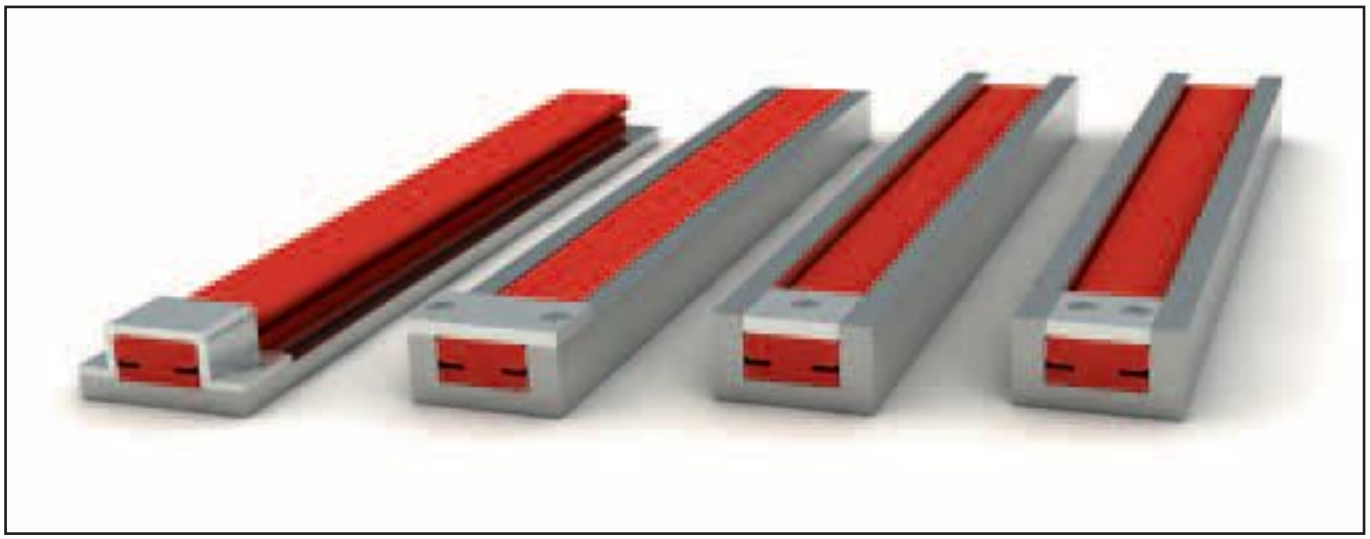


Figure 36 Clamping examples - low-pressure profile

■ End Plugs for Profiles without Fabric Reinforcement

End Plug Sizes – METRIC Dimensions

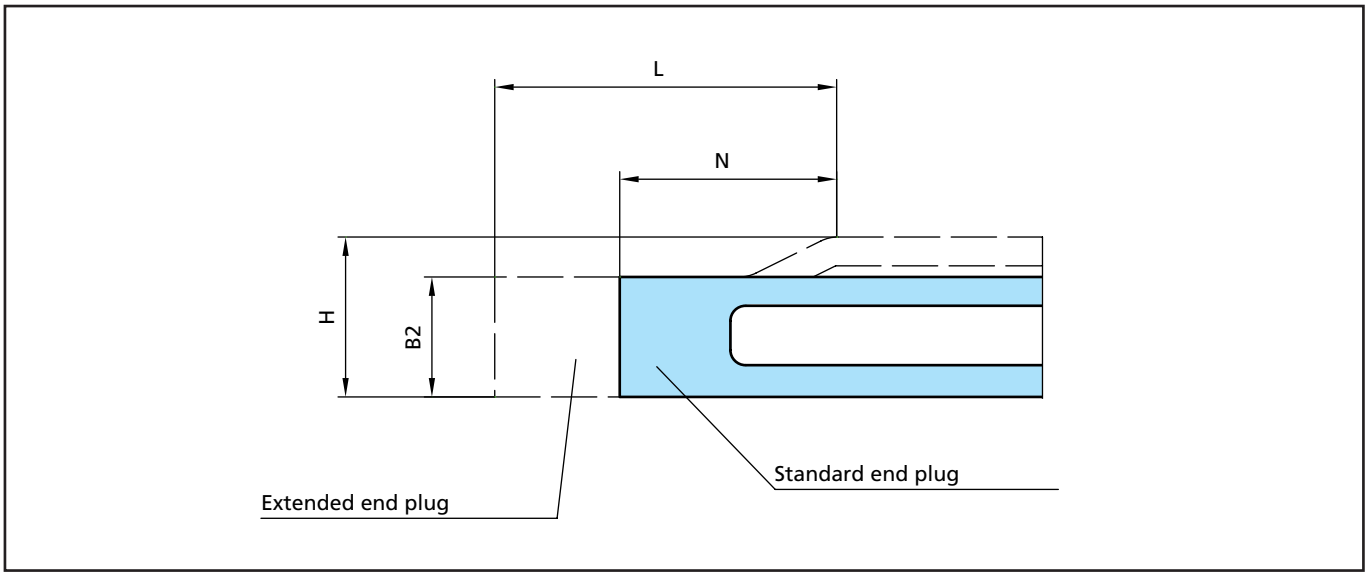


Figure 37 End plugs for high-pressure profile

Table 44 End Plugs for High-Pressure Profiles – METRIC Dimensions

Profile Ref.No.	Dimensions				
	A x B	H	B2	N	L
973	6.50 x 5.00	6.50	5.50	17.78	30.48
977	10.00 x 8.00	10.00	9.00	18.03	30.73
15092	14.00 x 10.00	13.00	11.00	20.62	33.32
950	16.00 x 12.00	15.00	13.00	20.62	33.32
971	16.00 x 14.00	17.51	15.00	22.23	34.93
960	16.00 x 18.00	21.50	19.50	22.23	34.93
969	20.00 x 20.00	21.00	21.50	22.48	35.18
970	21.00 x 24.00	29.00	26.00	23.88	36.58
955	22.00 x 19.00	22.50	20.50	22.23	34.93
952	26.00 x 19.00	23.50	20.50	22.86	35.56
6119	35.00 x 32.00	42.00	35.00	33.02	45.72

■ End Plugs for Profiles without Fabric Reinforcement

End Plug Sizes – INCH Dimensions

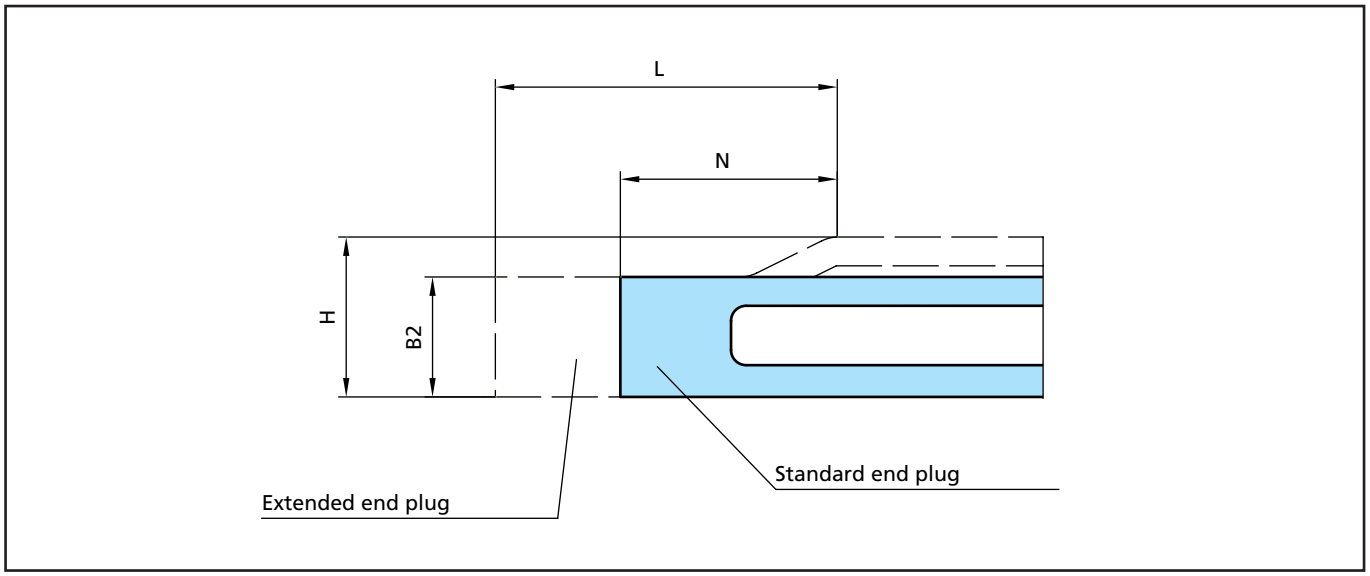


Figure 38 End plugs for high-pressure profile

Table 45 End Plugs for High-Pressure Profiles – INCH Dimensions

Profile Ref.No.	Dimensions				
	A x B	H	B2	N	L
973	0.256 x 0.197	0.256	0.217	0.700	1.200
977	0.394 x 0.315	0.393	0.354	0.710	1.210
15092	0.551 x 0.394	0.512	0.433	0.812	1.312
950	0.630 x 0.472	0.590	0.512	0.812	1.312
971	0.630 x 0.551	0.689	0.590	0.875	1.375
960	0.630 x 0.709	0.847	0.768	0.875	1.375
969	0.787 x 0.787	0.944	0.847	0.885	1.385
970	0.827 x 0.945	1.142	1.024	0.940	1.440
955	0.866 x 0.748	0.886	0.807	0.875	1.375
952	1.024 x 0.748	0.926	0.807	0.900	1.400
6119	1.378 x 1.260	1.654	1.378	1.300	1.800

■ End Plugs for Profiles with Fabric Reinforcement

End Plug Sizes – METRIC Dimensions

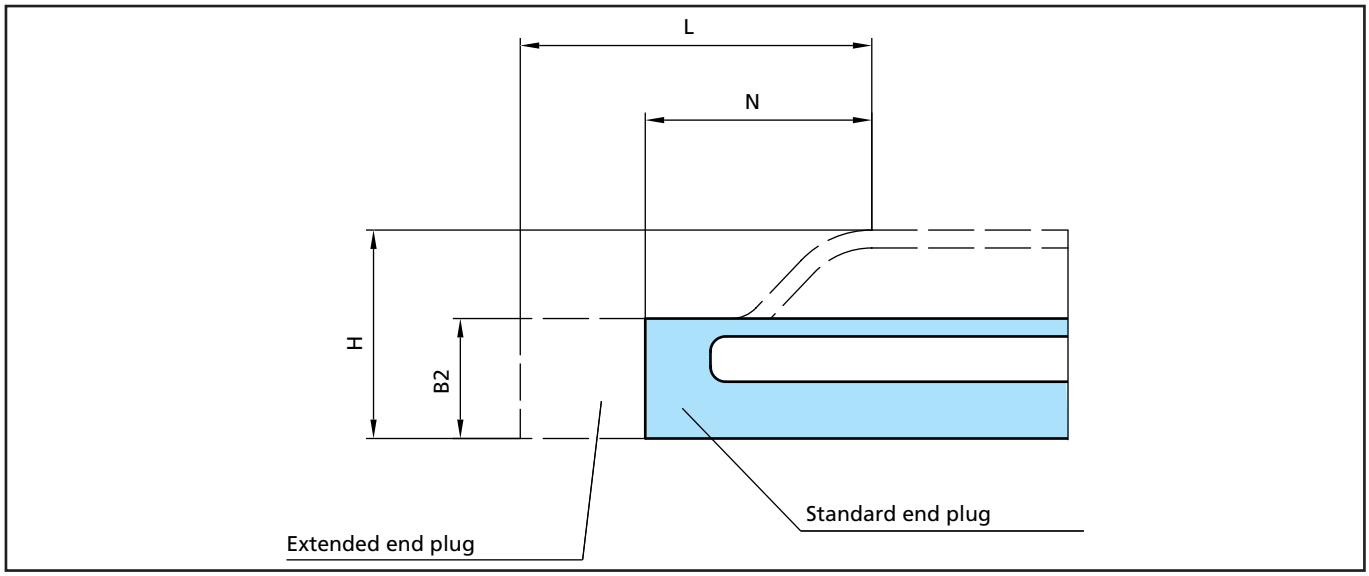


Figure 39 End plugs for low-pressure profile

Table 46 End Plugs for Fabric Reinforced Standard Profiles – METRIC Dimensions

Profile Ref. No.	Dimensions				
	A x B	H	B2	N	L
573	17.46 x 11.11	14.27	11.11	22.23	60.33
537	31.75 x 15.88	25.40	15.88	28.58	47.63
535	50.80 x 22.23	41.28	22.23	30.18	57.15
548	76.20 x 31.75	57.15	31.75	42.88	82.55
717	25.40 x 12.70	20.64	12.70	22.23	60.33
580	31.75 x 15.88	25.40	15.88	28.58	79.38
582	50.80 x 22.23	41.28	22.23	38.10	88.90
583	76.20 x 31.75	63.50	31.75	57.15	104.78
705	101.60 x 41.27	85.73	41.27	60.33	104.78
599	15.88 x 12.70	22.23	12.70	38.10	57.15
591	17.46 x 12.70	23.81	12.70	38.10	57.15
581	22.22 x 15.87	28.58	15.87	41.28	57.15
598	17.46 x 12.70	19.05	12.70	38.10	57.15
597	22.23 x 15.88	25.40	15.88	41.28	57.15
708	44.45 x 30.96	51.60	30.96	50.80	88.90
715	13.72 x 11.68	21.21	11.68	31.75	44.45
707	16.67 x 11.11	22.23	11.11	33.34	46.04

■ End Plugs for Profiles with Fabric Reinforcement

End Plug Sizes – INCH Dimensions

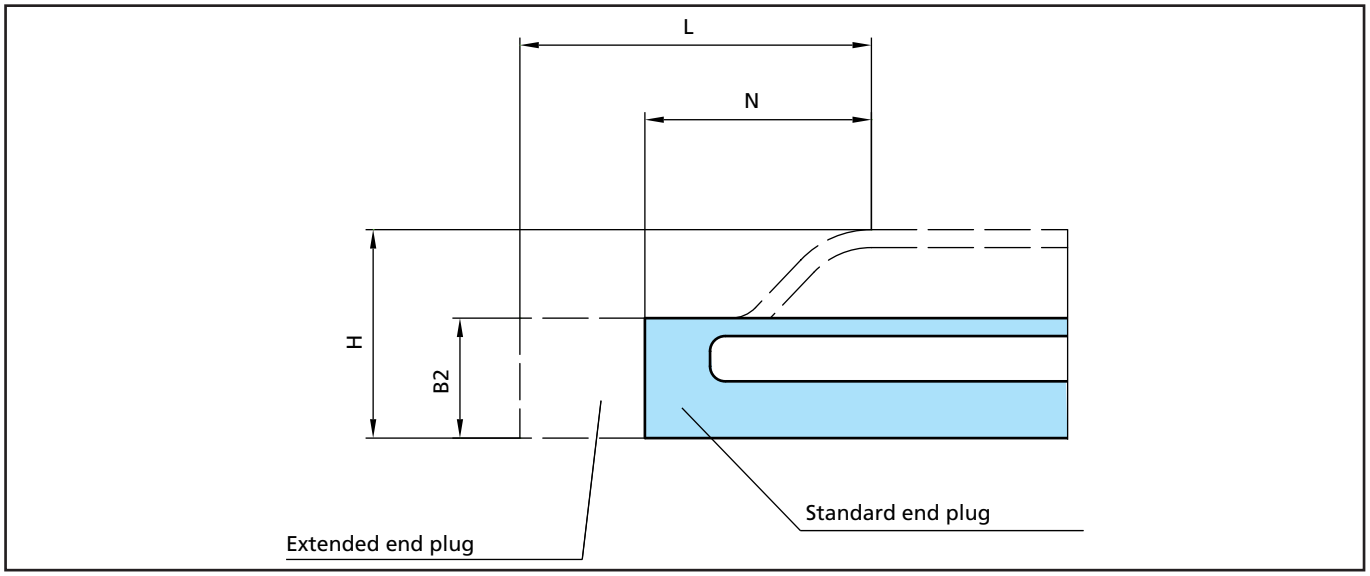


Figure 40 End plugs for low-pressure profile

Table 47 End Plugs for Fabric Reinforced Standard Profiles – INCH Dimensions

Profile Ref. No.	Dimensions				
	A x B	H	B2	N	L
573	0.687 x 0.437	0.562	0.437	0.875	2.375
537	1.250 x 0.625	1.000	0.625	1.125	1.875
535	2.000 x 0.875	1.625	0.875	1.188	2.250
548	3.000 x 1.250	2.250	1.250	1.688	3.250
717	1.000 x 0.500	0.812	0.500	0.875	2.375
580	1.250 x 0.625	1.000	0.625	1.125	3.125
582	2.000 x 0.875	1.625	0.875	1.500	3.500
583	3.000 x 1.250	2.500	1.250	2.250	4.125
705	4.000 x 1.625	3.125	1.625	2.375	4.125
599	0.625 x 0.500	0.875	0.500	1.500	2.250
591	0.687 x 0.500	0.937	0.500	1.500	2.250
581	0.875 x 0.625	1.125	0.625	1.625	2.250
598	0.688 x 0.500	0.750	0.500	1.500	2.250
597	0.875 x 0.625	1.000	0.625	1.625	2.250
708	1.750 x 1.219	2.032	1.219	2.000	3.500
715	0.540 x 0.440	0.815	0.440	1.250	1.750
707	0.650 x 0.430	0.875	0.430	1.312	1.812

■ General Quality Criteria and Storage Guidelines

General Quality Criteria

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

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, normal inspection.

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.

Guidelines for the storage of polymer products based on ISO 2230

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Table 48 Initial and extension storage periods for unassembled components

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

Note 1: If the storage temperature is over or under 25°C (77°F) this will influence the storage time. Storage at 10°C (50°F) higher will reduce the storage time by about 50%. Storage at 10°C (50°F) lower will increase the storage time by around 100%.
Note 2: In application areas such as aerospace the storage periods can differ from this specification. These specific storage conditions have to be agreed between the supplier and the buyer.

Engineering Action Request (EAR) for Airseal

TSS Project No.

→ Please send back to:

Name _____

Fax no. _____

Phone no. _____

We use your details to work out the optimum sealing recommendation. Your data will be confidential.

Company

Name _____

Street/P.O.Box _____

Post code/city _____

Country _____

Contact

Name _____

Department _____

Title _____

Phone no. _____

Fax no. _____

Date, Signature _____

Profile No. _____

Material _____

Medium to seal _____

Approval required? _____

Differential pressure (environment / medium): _____ / _____

Operating temperature max. _____ min. _____

duration _____

Valve adapter (selection: see catalog) _____

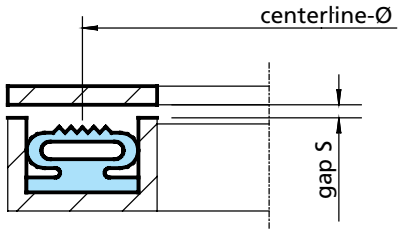
Advice:
Our recommendation is based on your technical input. Missings details can lead to a different sealing solution.

Application

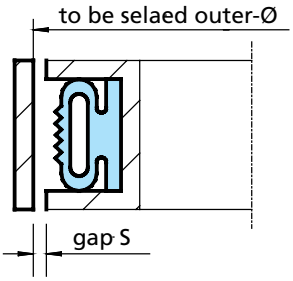
Airseal will be used for Sealing _____

Blending / Lifting of devices _____

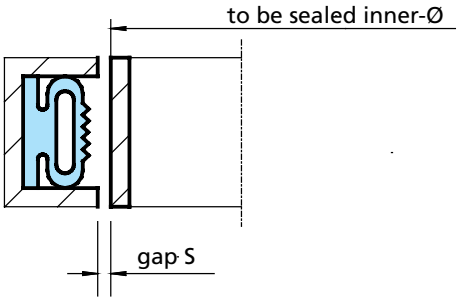
Engineering Action Request (EAR) for Airseal



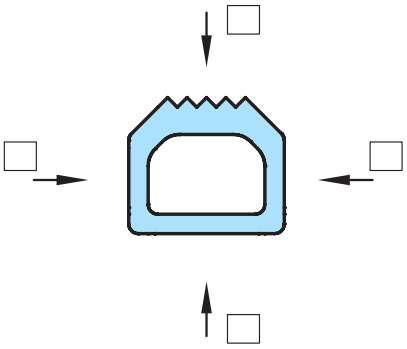
Axial Expansion



Radial Expansion Outside



Radial Expansion Inside

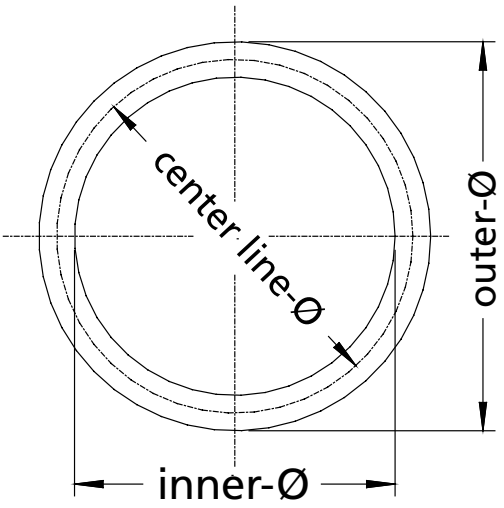


Sealing Surface

face seal: _____	inflate out: _____
center line-Ø: _____	outer-Ø to be sealed: _____
gap S: _____	inflate in: _____
	inner-Ø to be sealed: _____

Engineering Action Request (EAR) for Airseal

Type circular



face seal: _____

center line-Ø: _____

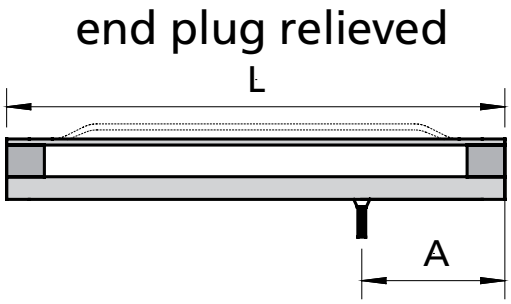
inflate out: _____

outer-Ø to be sealed: _____

inflate in: _____

inner-Ø to be sealed: _____

gap S: _____



L: _____

A: _____

Dimension A defines the position of the valve adapter.

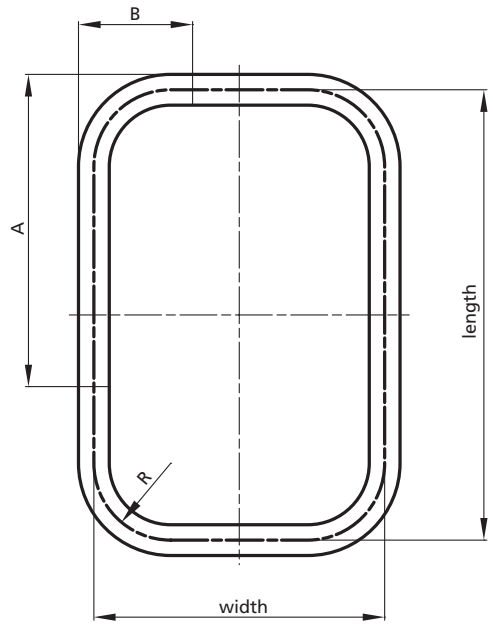
Seal relieved: _____

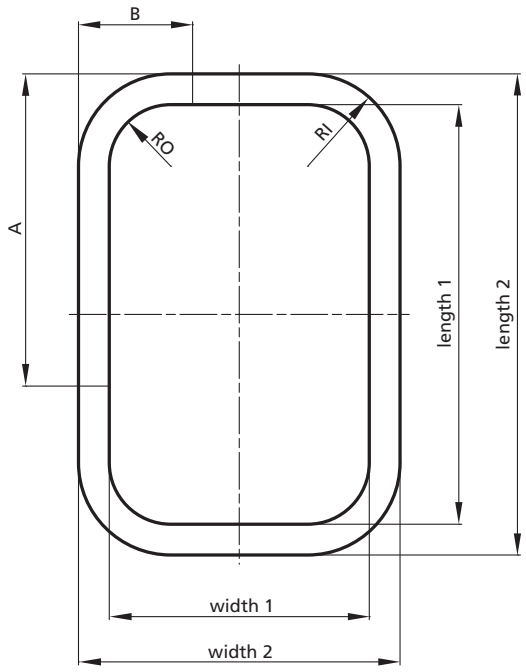
(more remarks: see catalog)

Sketch / Description of the application

Engineering Action Request (EAR) for Airseal

Type quadratic or rectangular, e.g. door seal





Width (face seal): _____

Width 1 (inflate in): _____

Width 2 (inflate out): _____

Length (face seal): _____

Length 1 (inflate in): _____

Length 2 (inflate out): _____

R (centerline-Ø): _____

RI (inflate in): _____

RO (inflate out): _____

A: _____

B: _____

Gap S: _____

Dimensions A & B refer to the position of the valve seat. All dimensions refer to the devices which are to be sealed. Radius R / RI / RO have to be in accordance with our remarks about minimum radius (see catalog), rectangular types without radius could be possible after consulation with Trelleborg Sealing Solutions.

Sketch / Description of the application

Notes

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TRELLEBORG

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