Inflatable Rubber Seals

the ideal solution for difficult sealing situations

- Pollution Control and Laboratory Equipment
- Laundry, Textile and Paper Making Equipment
- Test Facilities In General Engineering
- Food and Pharmaceutical Process Areas
- Clean Room Door Seals
- Food Processing Equipment
- Watertight Door Seals
- Chemical Plants
- Oven Door Seals

iff® FLEX

Introduction

Seals

J-Flex inflator seals are the ideal solution for difficult sealing situations.

When parts move in relation to one another and are connected and disconnected at will, the most effective technique is to use inflator seals.

They provide effective solutions for:

- Large doors where machining the sealing surfaces to accommodate a conventional seal is impractical
- Processing equipment where rapid sealing and unsealing is required.
- Horizontal and vertical sliding doors

Inflator seals are inflated with air (or another fluid) using a pressure regulated supply system. When pressure is applied the seal inflates to conform to uneven surfaces and provides a reliable barrier from moisture, dust and other contaminants.

Inflator seals can operate in temperatures from - 60ºC to +200ºC and even higher temperatures for shorter periods of time. Expansion capabilities (the ability to close a gap) vary by profile. However, the larger the expansion gap the larger the profile.

Using a wealth of knowledge and experience manufacturing inflator seals, J-Flex provides bespoke solutions for diverse customer requirements across a range of industries including power generation, medical and marine applications.

Clamps

Inflatable clamps apply a controlled pressure uniformly across their length to hold objects in place throughout cutting and machining operations, or hold pieces in place during bonding. These applications can include stopping items as they pass along a conveyor line and bonding air frame components.

Actuators

Inflatable actuators may be combined with traditional seals or clamps. For example, an inflatable actuator may push a seal made or a harder material to seal against a rotating piece of equipment. Like inflator seals, an inflatable actuator will allow for variation in a sealing gap. This is particularly relevant for large sealing equipment.

Contents

Seal Configurations

Inflatable seals can be manufactured in almost any shape or size . They can be supplied in continuous loops and expand radially inwards and outwards as well as axially. Inflator seals can be made into axial expanding rectangles, "U" shapes or other similar shapes using pre moulded corners.

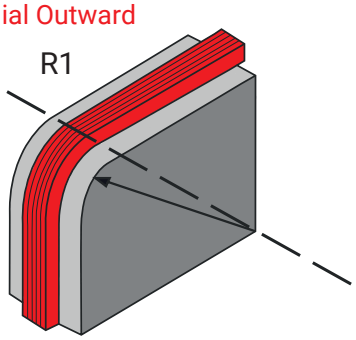
Straight length inflator seals can also be manufactured by sealing the ends of a length of extrusion.

Often inflator profiles will fit to the corners of a given application without requiring moulded corners. However, in the case of tight corners these will be required.

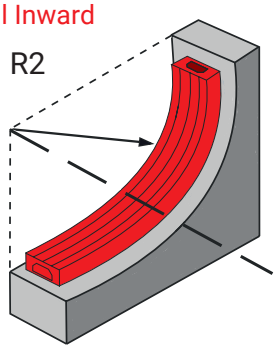
The diagrams below illustrate different common seal configurations.

The tables below show the minimum bend radii for radial inwards, outwards and axial expansion.

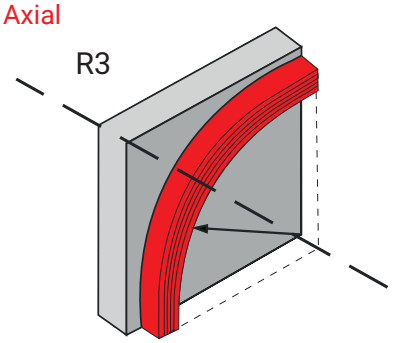
Radial Outward



Radial Inward



Axial



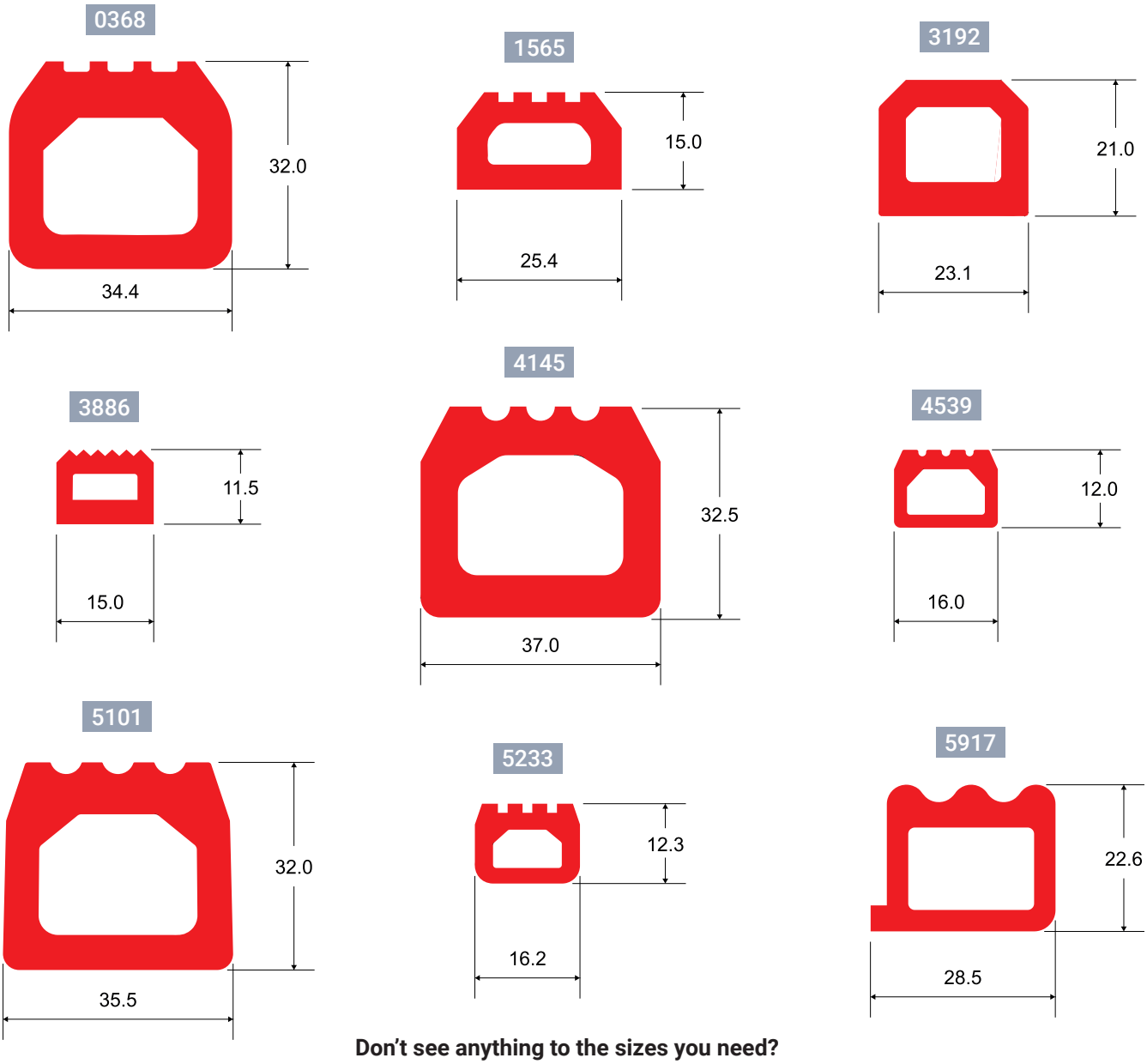
Minimum Radius in Direction of Expansion			
Inflator Ref No	Outward	Inward	Axial
0368	130	500	450
1091	130	230	210
1092	150	420	335
1342	210	195	250
1565	40	140	140
1602	40	140	120
1742	205	185	420
2139	-	-	-
2251	50	50	150
2264	150	150	320
2296	145	190	400
2357	125	240	450
2427	40	90	70
2668	200	200	-
2774	80	180	150
2924	100	100	150
2969	50	50	140
3015	90	90	130
3069	150	220	225
3074	100	100	250
3091	100	180	130
3104	160	130	300
3158	75	135	200
3192	200	200	250
3886	90	90	200
3991	80	80	110
4008	140	140	240

Minimum Radius in Direction of Expansion			
Inflator Ref No	Outward	Inward	Axial
4145	250	350	500
4245	110	110	150
4272	40	100	80
4418	275	280	485
4539	90	90	200
4565	150	150	150
4654	120	120	200
4681	150	150	230
4725	120	120	130
4732	100	100	170
4739	80	150	130
4805	100	100	240
4812	90	90	140
4822	150	150	310
4893	200	200	400
5101	210	210	300
5233	120	120	240
5296	160	160	200
5407	120	120	340
5485	245	275	N/A
5592	300	300	-
5917	220	425	390
5954	-	-	-
5974	150	150	280
6044	160	280	250
6154	150	180	465
6226	200	200	340

Figures are for guideline purposes only

Castellated Profiles

These profiles are designed for heavy duty applications and can seal against high differential pressures. They are commonly used in radial, axial and straight configurations. The sealing gap for this type of seal must be relatively small.



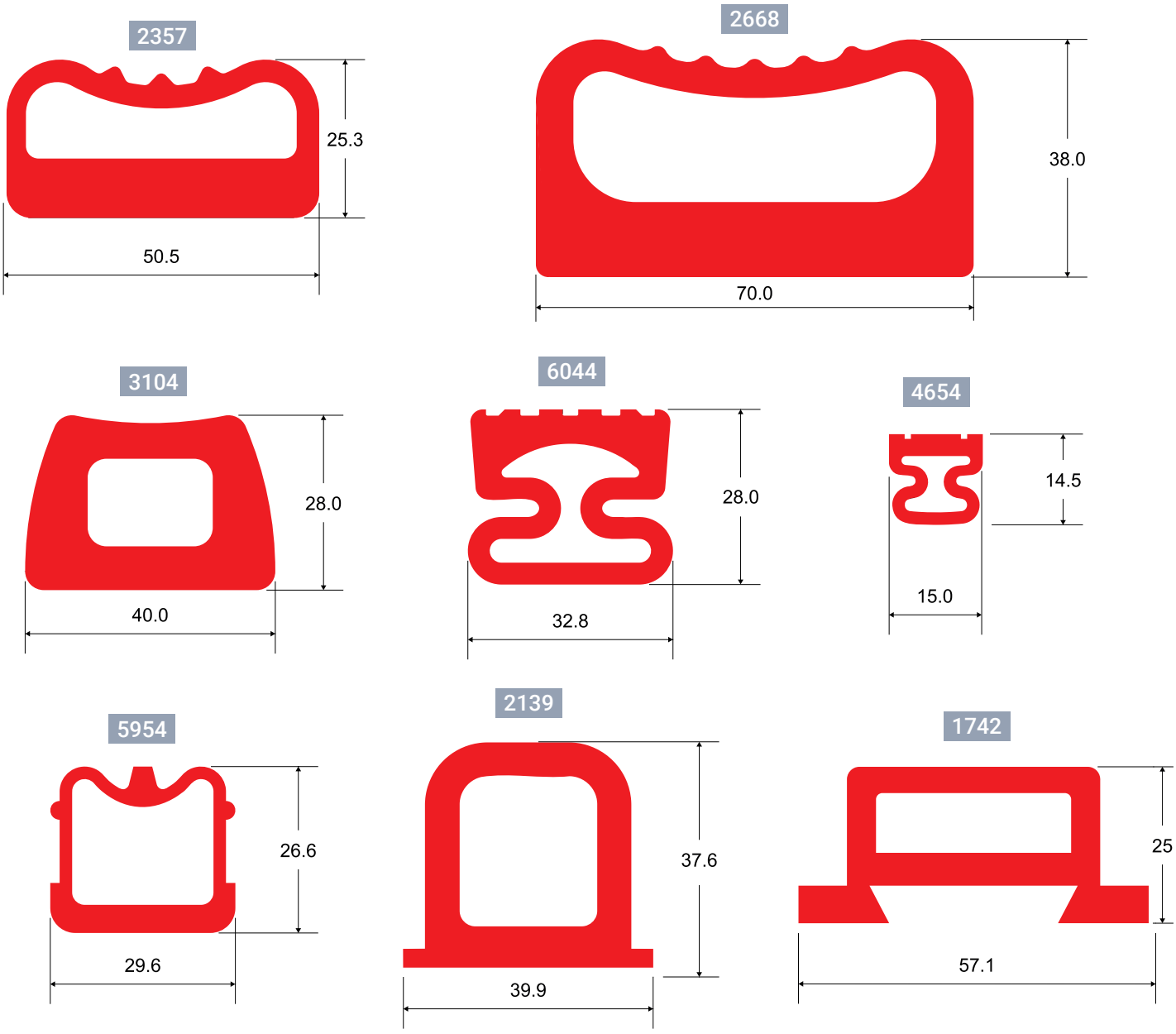
Don't see anything to the sizes you need?

The range of profiles is being added to constantly, so there's a good chance that if you don't see one to match your dimensional requirements, there may be one that does or is very close - without requiring the additional cost of tooling. As such, please contact us to check.

Inflator Ref No	Material	Width (mm)	Height (mm)	Inflated Height |(mm)	Min Pressure (PSI)	Max Pressure (PSI)	Recommended Pressure (PSI)	Moulded Corners
0368	JF60	34.4	32	38	20	35	30	No
1565	JF60	25.4	15	19	10	20	15	No
3192	JF60	23.1	21	25	13	20	15	No
3886	JF60	15	11.5	13.5	10	20	15	No
4145	JF60	37	32.5	37	20	35	30	No
4539	JF60	16	12	14	10	18	15	No
5101	JF60	35.5	32.0	36.5	20	35	30	No
5233	JF60	16.2	12.3	14	10	20	15	No
5917	JF60	28.5	22.6	25.5	8	12	10	No

Unique Profiles

J-Flex can manufacture unique inflatable seal profile so suit the customer's application. Below are examples of custom profiles that have been made previously. Please note the manufacture of a new profile will incur tooling charges



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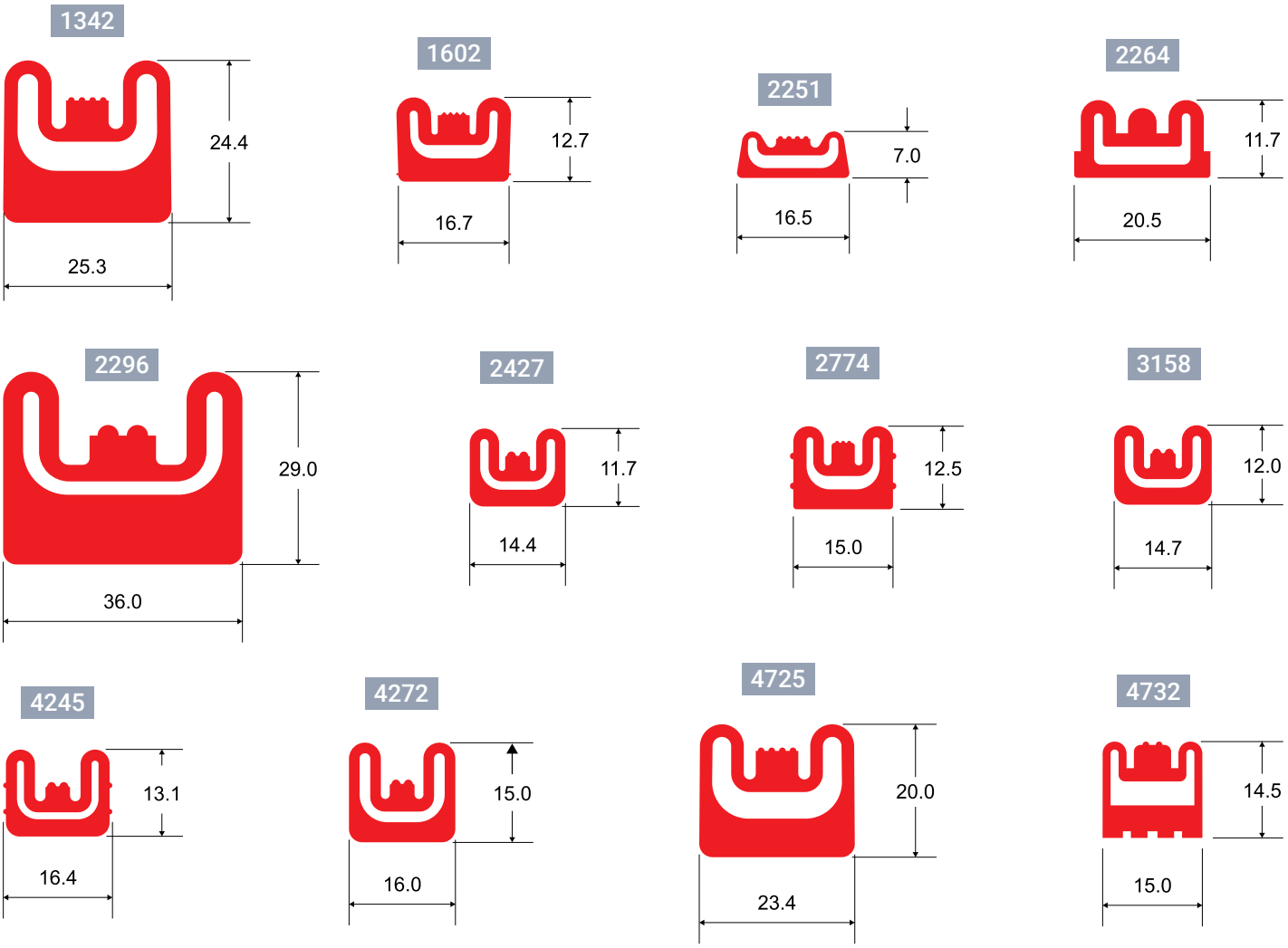
Inflator Ref No	Material	Width (mm)	Height (mm)	Inflated Height |(mm)	Min Pressure (PSI)	Max Pressure (PSI)	Recommended Pressure (PSI)	Moulded Corners
2357	JF60	50.5	25.3	41	8	13	10	No
2668	JF60	70	38	50	20	30	25	No
3104	JF60	40	28	34	20	35	25	No
6044	JF60	32.8	28	37	8	15	10	No
4654	JF60	15	14.5	17	10	20	15	No
5954	JF60	29.6	26.6	37	4	8	5	No
2139	JF60	39.9	37.6	40	20	40	30	No
1742	JF60	57.1	25	33	10	20	15	No

Frog Leg Profiles

These profiles are designed for to fit into a square channel. Their "frog leg" design allows them to expand and cover a large distance relative to their size. These profiles best suit expansion axially and radially outward.



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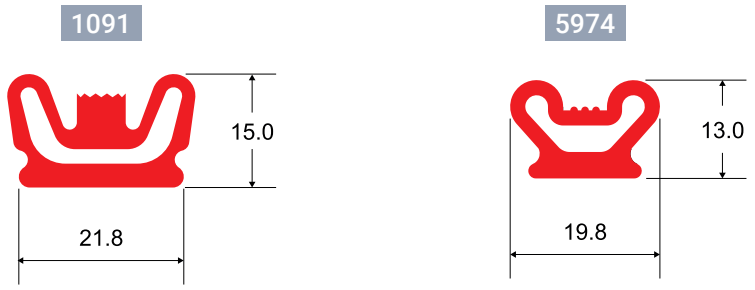
Inflator Ref No	Material	Width (mm)	Height (mm)	Inflated Height |(mm)	Min Pressure (PSI)	Max Pressure (PSI)	Recommended Pressure (PSI)	Moulded Corners
1342	JF60	25.3	24.4	37	15	25	20	No
1602	JF60	16.6	12.7	24	10	20	15	No
2251	JF60	16.5	7	11	8	16	12	No
2264	JF60	20	12	18	10	20	15	No
2296	JF60	36	29	53	10	18	15	Yes
2427	JF60	14.4	11.7	19.5	10	18	15	Yes
2774	JF60	15	12.5	19	10	20	15	No
3158	JF60	14	11.5	20.5	10	18	15	Yes
4245	JF60	14	11	21	10	15	15	No
4272	JF60	16	15	26	8	15	10	Yes
4725	JF60	23.4	20	35	18	25	20	No
4732	JF60	15	14.5	20	8	15	10	No

Footed Snap Profiles

Similar to frog leg profiles, these profile provide large expansion relative to their size. The dovetail shape of their base allows them to be “snap fitted” into a mechanical retainer.



Inflator Ref No	Material	Width (mm)	Height (mm)	Inflated Height	(mm)	Min Pressure (PSI)	Max Pressure (PSI)	Recommended Pressure (PSI)	Moulded Corners
1091	JF60	21.8	15	30	15	25	20	No
5974	JF60	19.8	13	17	8	14	10	Yes

Colours and Printing

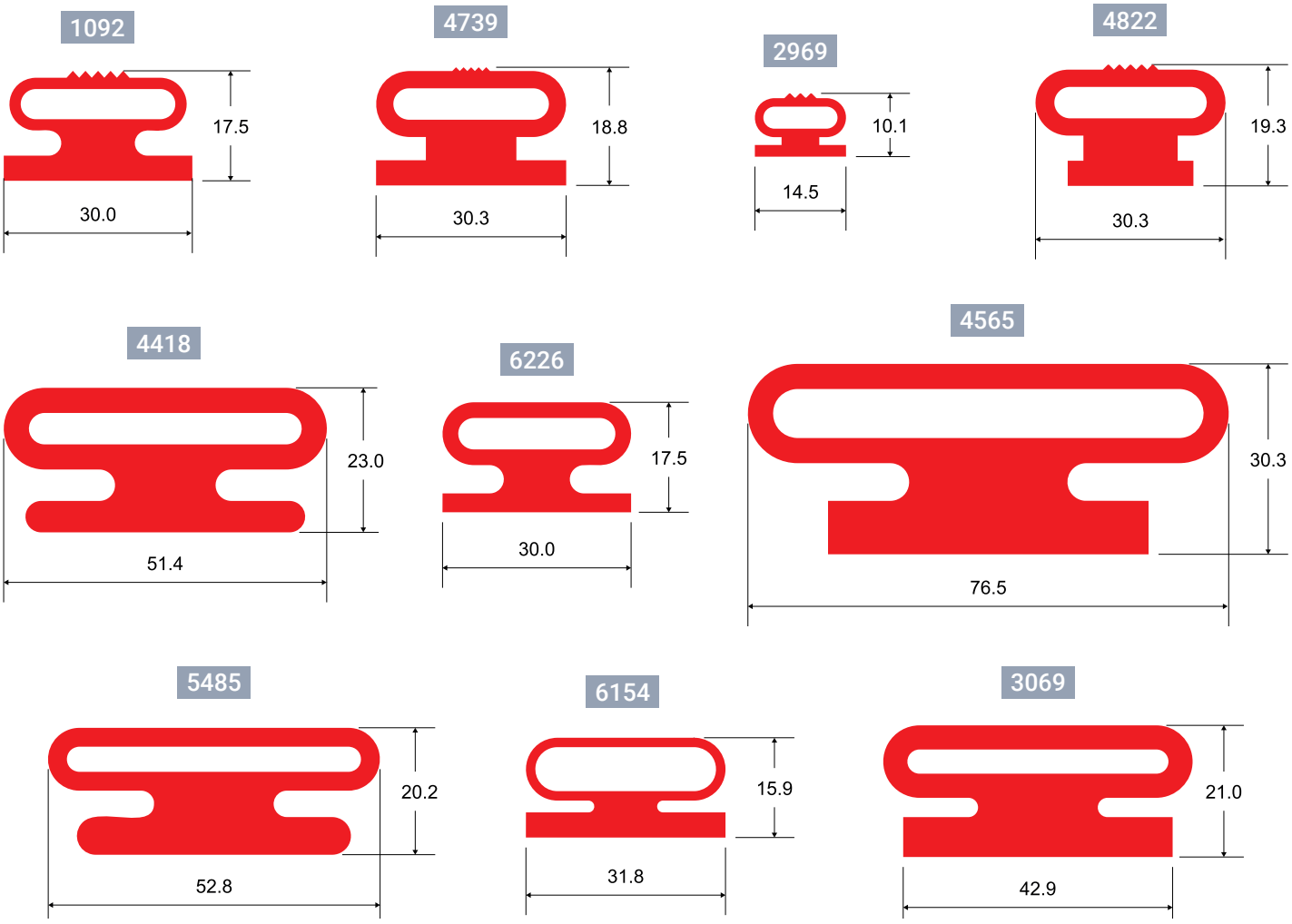
Whilst typically supplied in cobalt blue, seals can be produced in most colours* to suit your requirements. Please advise when requesting any quotes.

An extra cost option is a single colour printing of a logo and/or numbering. Just let us know what you would like and we’ll quote accordingly.

* Rubber Colouring Disclaimer:
There are a multitude of factors to consider and take into account when attempting to colour rubber, whether vulcanised or not. Because of this, it is impossible to accurately colour match to established colour references such as RAL and PANTONE®. Likewise, and for the same reasons, it is also impossible to guarantee an exact colour match between one production run/batch and another done at a separate time. We will of course endeavour to get as close as possible to the desired colour, and with some colours this will be less difficult than others, therefore a degree of tolerance has to be accepted. Should you have concerns over this, please speak to us so that we can review your specific application and requirements.

Stem Foot Location Profiles

These profiles are used for a wide range of applications as they are easily fitted into a variety of mechanical retainers. When inflated these seals are fully rounded, giving them a large expansion range. They are suitable for use in radial , axial or straight applications.



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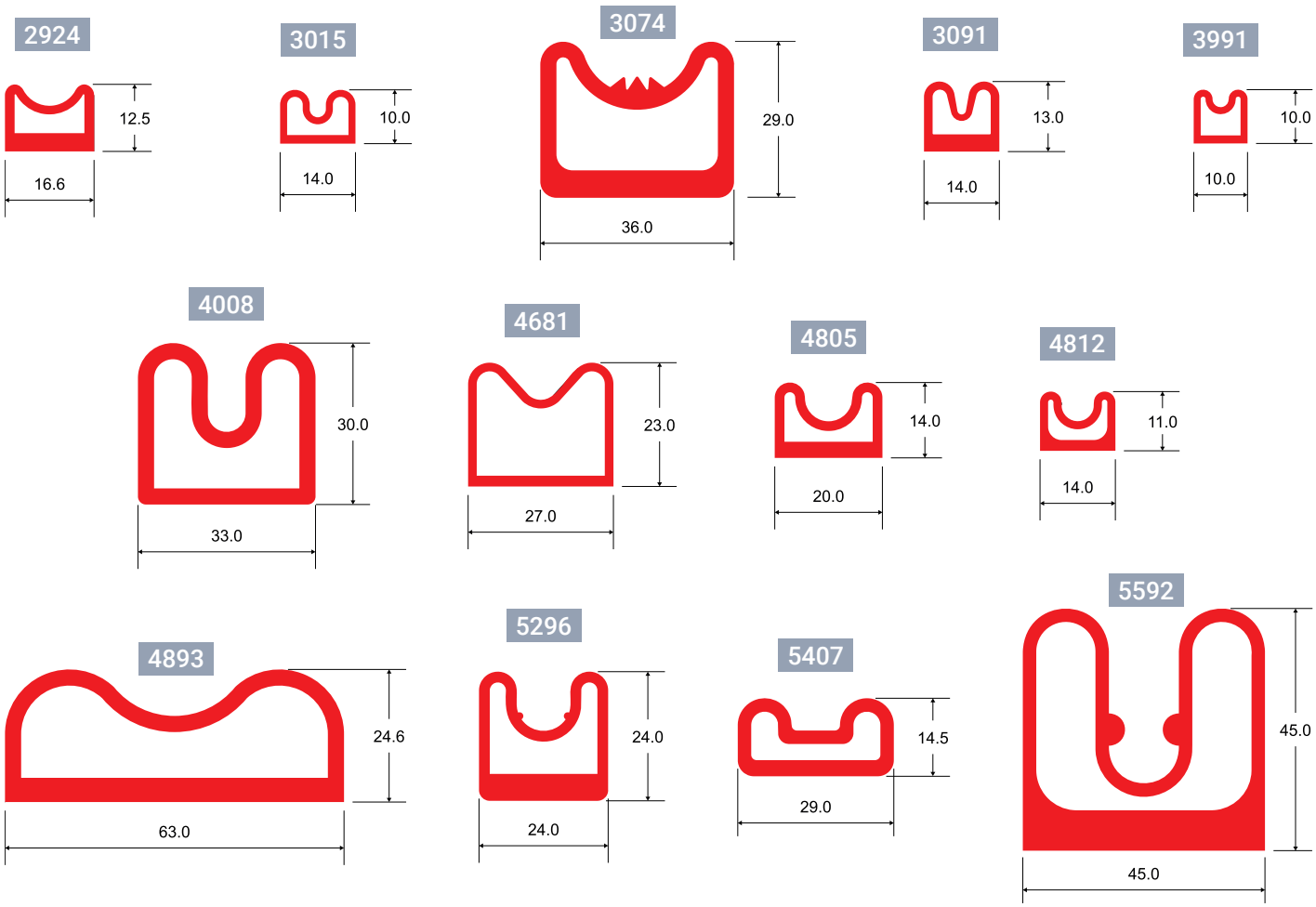
Inflator Ref No	Material	Width (mm)	Height (mm)	Inflated Height |(mm)	Min Pressure (PSI)	Max Pressure (PSI)	Recommended Pressure (PSI)	Moulded Corners
1092	JF60	30	17.5	29.5	10	20	15	No
2969	JF60	14.5	10.1	15	8	15	10	No
3069	JF60	42.9	21	49	15	25	20	No
4418	JF60	51.4	23	42	15	25	20	No
4565	JF60	76.5	30.3	63	8	15	10	No
4739	JF60	30.3	18.8	28	8	15	10	No
4822	JF60	30.3	19.3	27	8	15	10	No
5485	JF60	52.8	20.2	42	20	30	25	No
6154	JF60	31.8	15.9	26	5	12	8	No
6226	JF60	30	17.5	29	8	15	10	No

Channel-Fit Profiles

These profiles are similar to frog leg profiles. Their design allows them to expand over a large distance relative to their width and they can be easily retained in a square channel. These profiles are most suited for applications that require outward and axial expansion.



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Inflator Ref No	Material	Width (mm)	Height (mm)	Inflated Height |(mm)	Min Pressure (PSI)	Max Pressure (PSI)	Recommended Pressure (PSI)	Moulded Corners
2924	JF60	16.5	12.5	18.5	10	20	15	No
3015	JF60	14	10	14.5	10	15	15	No
3074	JF60	36	29	52	15	25	20	No
3091	JF60	14	13	23	8	12	10	Yes
3991	JF60	10	10	13	5	10	8	No
4008	JF60	33	30	42	15	25	20	No
4681	JF60	27	23	30	5	15	8	No
4805	JF60	20	14	19	5	10	5	No
4812	JF60	14	11	17	10	18	15	No
4893	JF60	63	24.6	34	5	10	5	No
5296	JF60	24	24	34	8	15	12	No
5407	JF60	39	14.5	21	8	15	10	No
5592	JF60	45	45	70	6	10	8	No

Inflator Seals Applications

Marine

Inflatable seals provide watertight solutions for sliding window and door applications.

Inflatable seals are often used for transom and salon doors on yachts and can be provided in continuous loops. With the use of moulded corners inflatable seals can also be made into frames and U shapes to suit individual applications.

Frog leg and channel fit profiles are commonly used in these situations as they can be fitted into machined grooves with no overhang to provide more aesthetic solution.

Other marine applications include: portholes, cofferdam bulkheads, cargo hatches and seals that allow for the maintenance of propeller shafts.

Power and Solids Handling

Inflatable seals are used in food processing and pharmaceutical industries where the transfer and storage of dry powders requires an airtight seal.

Examples of these applications include: inflatable seals for butterfly valves, slide gate inflatable seals, bulk bag filler seals, drum filling inflatable seals, hopper seals and seals for viscous pumping equipment.

Foot/Stem location profiles and channel fit profiles are often used in these scenarios, as they can connect and disconnect quickly.

Our FDA approved silicone that is free from TSE/BSE bi products is perfectly suited to these environments.

Energy Generation

In the energy generation industry, specifically nuclear power, J-Flex inflatable seals manufactured to meet the tight tolerances and stringent quality control required.

Within nuclear power plants foot/stem location inflator seals are used to effectively seal pool gates.

Inflatable seals are also used to seal airlocks, access doors, equipment hatches.

During shutdown and maintenance periods inflatable seals are used as nozzle dams to block coolant flow from reactor to steam generator.

Airtight Doors

When an airtight seal is required on a door inflatable seals can be used to ensure a positive seal. The seals expand towards the sealing face and account for any tolerance variation in the door's manufacture.

Using an inflatable seal not only allows for a positive seal but also allows for frequent access as they are quickly inflated/deflated. Footed Snap profiles and Stem/Foot location profiles make for a good solution in these kind of applications, as they can be mechanically retained.

These seals are often used in nuclear power and chemical processing plants as well as labs and research facilities.

Transportation, Aerospace & Defence

Inflatable seals are used for a diverse range of bespoke and technical applications within these markets.

Inflatable bladders are used to provide uniform pressure when bonding airframe components. Inflatable seals are also used for sealing wind tunnels when testing aircraft components.

On railroad passenger cars, inflatable seals are used to allow for rapid boarding and discharge of passengers through larger doors as well as providing an airtight seal which reduces noise and drafts.

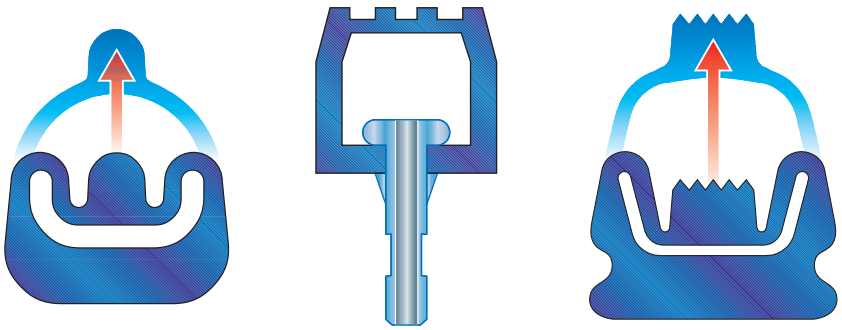
Inflatable seals can be used to provide watertight seals on the cab doors and tail gates of military and other vehicles.

Life Sciences

The specialist material used in our inflatable seals is FDA and USP Class VI certified making it perfectly capable of meeting the requirements of medical and life science applications.

The heat and water resistant properties of silicone make an effective sealing solution for autoclaves and other sterilising applications.

Inflatable seals can also be used to seal glove boxes in aseptic manufacturing environments, as well as actuators to position equipment trays during processing.



Silicone Properties

Chemical Name	Silicone
ASTM Designation (ASTM D14/18)	VMQ
Tensile Strength (psi)	>1200
Hardness (Durometer Shore A)	60
Tear Resistance	Fair
Abrasion Resistance	Poor
Compression Set	Very Good
Resilience Cold	Exceptional
Resilience Hot	Exceptional
Radiation Resistance	Good
Impermeability to gases	Fair
Acid Resistance	
Mild Dilute	Exceptional
Strong Concentrate	Fair
Solvent Resistance	*
Aplihatic Hydrocarbons	Poor
Aromatic Hydrocarbons	Poor
Oxygenated (Keytones, etc)	Poor
Resistance to:	
Swelling in lubricating oil	Poor
Oil and Gasoline	Fair
Animal Oils	Good
Water Absorption	Exceptional
Oxidation	Exceptional
Ozone	Exceptional
Sunlight Aging	Exceptional
Heat Aging	*
Low Temperature	*
Flame	Fair
Vegetable Oils	Poor
Chlorinated Hydrocarbons	Poor to Fair

* depends on grade of silicone

JF60

A custom compound specifically designed for use in the manufacture of inflatable seals.

Features include high tear strength characteristics. Supplied in colour; cobalt blue only. FDA approved to 21 CFR 1 77.2600.

This material complies with European Union directive EC1935/2004. We certify that this material is free from TSE/BSE bi-products.

Shore Hardness	60° +/- 5°
Elongation at break	450%
Tensile strength	10 MPA
Tear strength	25 Kn/M
Specific Gravity	1.16
Temperature Range	-70°C to + 200°c
Compression set	35%

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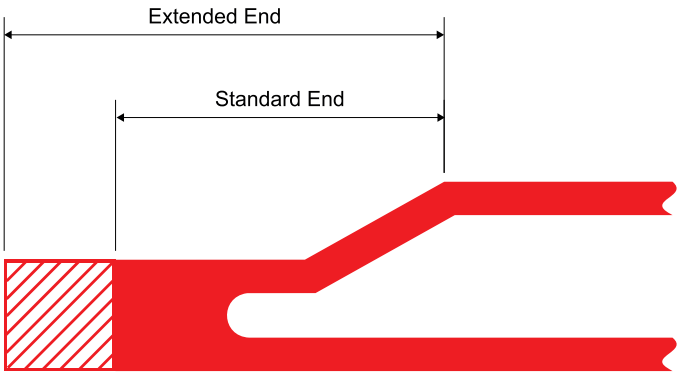
Straight Length Inflators

Inflator seals can also be supplied in straight lengths. This type of design requires solid, non expanding zones on each end of the seal. This is followed by a transition area where the seal expansion increases until it reaches its full height.



Air connectors may be attached through the base or end of the seal. If pressure plates are used to secure the seal in place, then extended non expanding zones will be required.

Moulded Corners

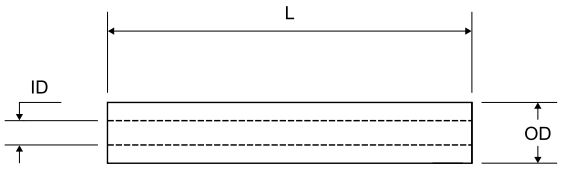
The size of a radius that an inflatable seal can be bent around is dependent on the shape of its specific profile. For axially expanding inflatable seals moulded corners may be used to enable the seal to conform to tight radii or 90° bends. The table below contains existing moulded corners that can be added to inflatable seals.

Moulded corners for new and existing profiles can be manufactured to customers' requirements but tooling charges will be incurred.

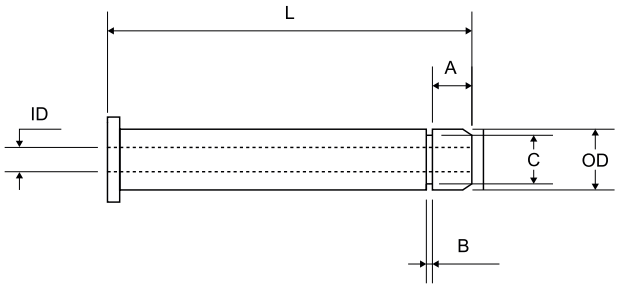
Corner Mould Specifications			
Inflator Ref No	Inner Radius	Outer Radius	Outside Dimensions
2296	30	66	75/75
2427	15	29.5	39/39
3091	2	4	30/30
3158	15	29.5	39/39
3158	24	38.5	48.3/48.5
4272	1.5	17..5	41/41
5974	5.2	25	69/69

Air Connectors

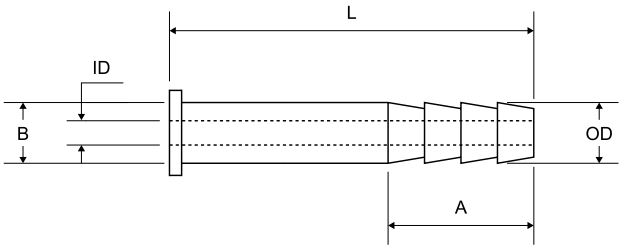
For seals joined into rings the air connector is most commonly joined to the base of the seal. For some castellated, channel fit and foot/stem location inflators air connectors may be placed in a side wall. However, this may have an adverse effect on the inflatable seal's durability and life span. For straight length inflator seals, air connectors may be placed in one or both ends. Bespoke inflation stems may also be manufactured to customer specifications, however extra charges may apply.



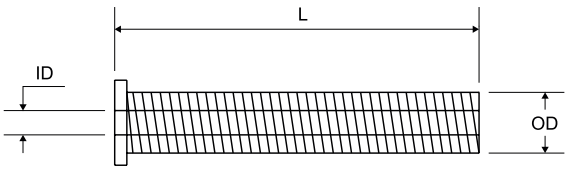
Hose (silicone)				
Ref No	Material	ID	OD	L
ACA1	VGP60	5	8	400
ACA2	VGP60	3	6	400
ACA3	VGP60	4	6	400
ACA4	VGP60	3.5	6.5	400
ACA5	VGP60	6	14	400



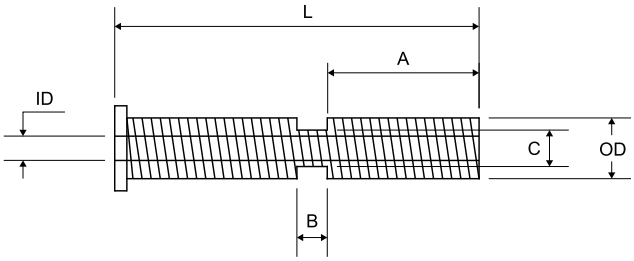
Push Fit Valve (stainless steel)						
Ref No	ID	OD	L	A	B	C
ACB1	4	8	18.8	2	2	5.6
ACB2	2.5	6	26.8	5.6	1.8	5.6
ACB3	2.3	7	34.6	7.5	2	5
ACB4	4	11.9	34.5	6	3.2	8
ACB5	4	8	67.7	10.3	1.5	7.7
ACB6	4.2	8	69.7	5.5	1	7.8
ACB7	4.2	8	202	5	1.5	7.8



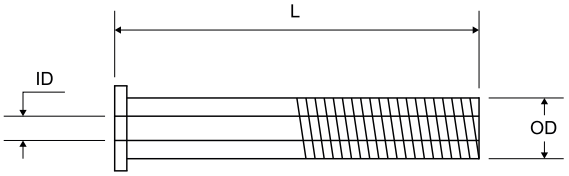
Hose Barb Valve (stainless steel)					
Ref No	ID	OD	L	A	B
ACC1	3	6.6	38.7	15	7.6
ACC2	3	6.6	46.4	12	8
ACC3	3.2	6.3	73	15	7.9
ACC4	3	6.6	38.2	14.5	7.8
ACC5	1.5	4	14.7	7.8	4



Threaded Valve (stainless steel)			
Ref No	ID	OD	L
ACD1	5	9.7	94.3
ACD2	2	6	30
ACD3	5	9.9	67
ACD4	4	7.8	22.2
ACD5	4.3	79	26.5
ACD6	2.9	5.9	40
ACD7	5	9.5	52



Threaded Valve with Wrench Flat (stainless steel)						
Ref No	ID	OD	L	A	B	C
ACE1	5.3	10	50.5	7.2	7.9	7.4
ACE2	4.1	9.6	35.8	15.5	4.4	7



Part Threaded Valve (stainless steel)				
Ref No	ID	OD	L	A
ACF1	4	8	86	34
ACF2	4	8	200	39
ACF3	4	8	200	54

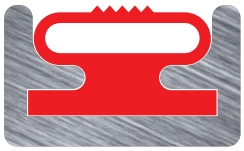
Mechanical Retainers

Retainers for Stem/Foot Location Profiles

Z-Clip and Split-Channel are the most popular.

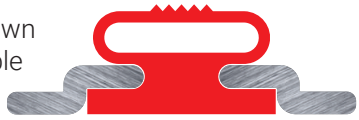
Slide-in

An extruded aluminium retainer profile which the inflatable seal is fed into from one end.



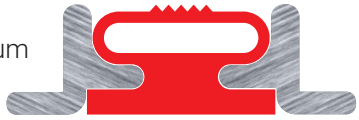
Z-Clip

Clips which are screwed down at set intervals. The inflatable seal is then fitted between the clips.



Split-Channel

A 2-piece extruded aluminium retainer. Generally one side is secured in place and the other is removable to aid seal fitting.



Retainers for Snap-Fit Location Profiles

Rubber Snap-in

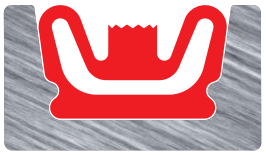
A high shore hardness rubber profile is extruded which fits into a channel and holds the inflatable seal in place.

Snap-in

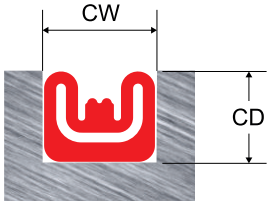
An extruded aluminium profile which the inflatable seal is push-fitted into.

Machined Groove

A machined groove which the inflator seal is push fitted into.



Please Note: We do not supply/provide mechanical retainers. Should this be something you require, we suggest you approach metal machinists local to you.

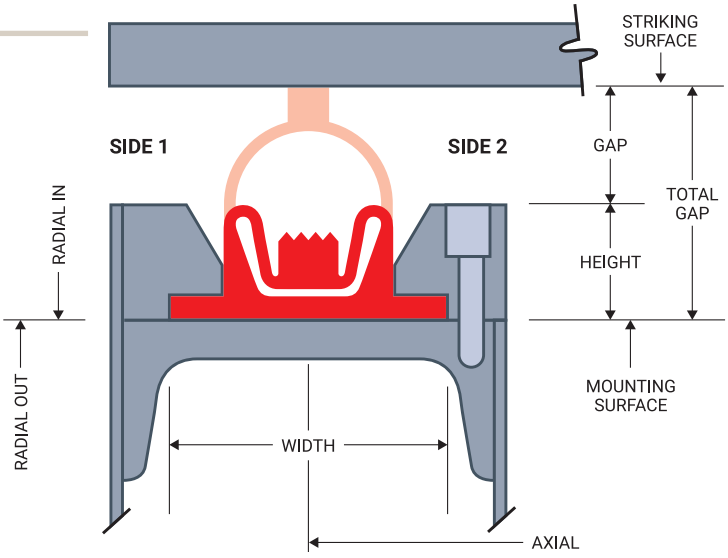


Machined grooves are commonly used to secure seals in radial in/out and axial configurations.

CW= channel width (width of profile plus its tolerance)
CD= channel depth (height of profile plus its tolerance)

Specifying the seal you need

Referring to the typical cross-section below, answer the following questions:



What is the pressure on side 1? .....

What is the pressure on side 2? .....

What is the maximum gap? .....

Or, what is the total gap? .....

What is the maximum height available? .....

What is the maximum width available? .....

What is the bend radius if axial? .....

What is the bend radius if radial out? .....

What is the bend radius if radial in? .....

What movement, if any, is there of the striking surface relative to the mounting surface when the seal is inflated? .....

What is the length measured along the centre line of the base? .....

Is that end to end or continuous loop? .....

What can you tell us about your quantity requirements?

How many seals do you need for prototype purposes? .....

How many seals do you need for long-term purposes? .....

How many would you require on a monthly basis? .....

What can you tell us about the environment conditions in the vicinity of the seals?

How hot does it get? .....°C

How cold does it get? .....°C

What gases are present? .....

What liquids are present? .....

Are there abrasive substances? .....

Is there any radiation? .....

Are any of the above long-term? .....

Which one, or ones, are long-term? .....

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We are a privately-owned, family run business that has constantly delivered outstanding customer service and innovative products since 1984.

We have a real passion for helping our customers to find the best solutions and doing this over 2,000 clients in over 55 countries!

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We ensure where appropriate that our products are tested and approved by the relevant authorities and will provide relevant certifications on request.

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