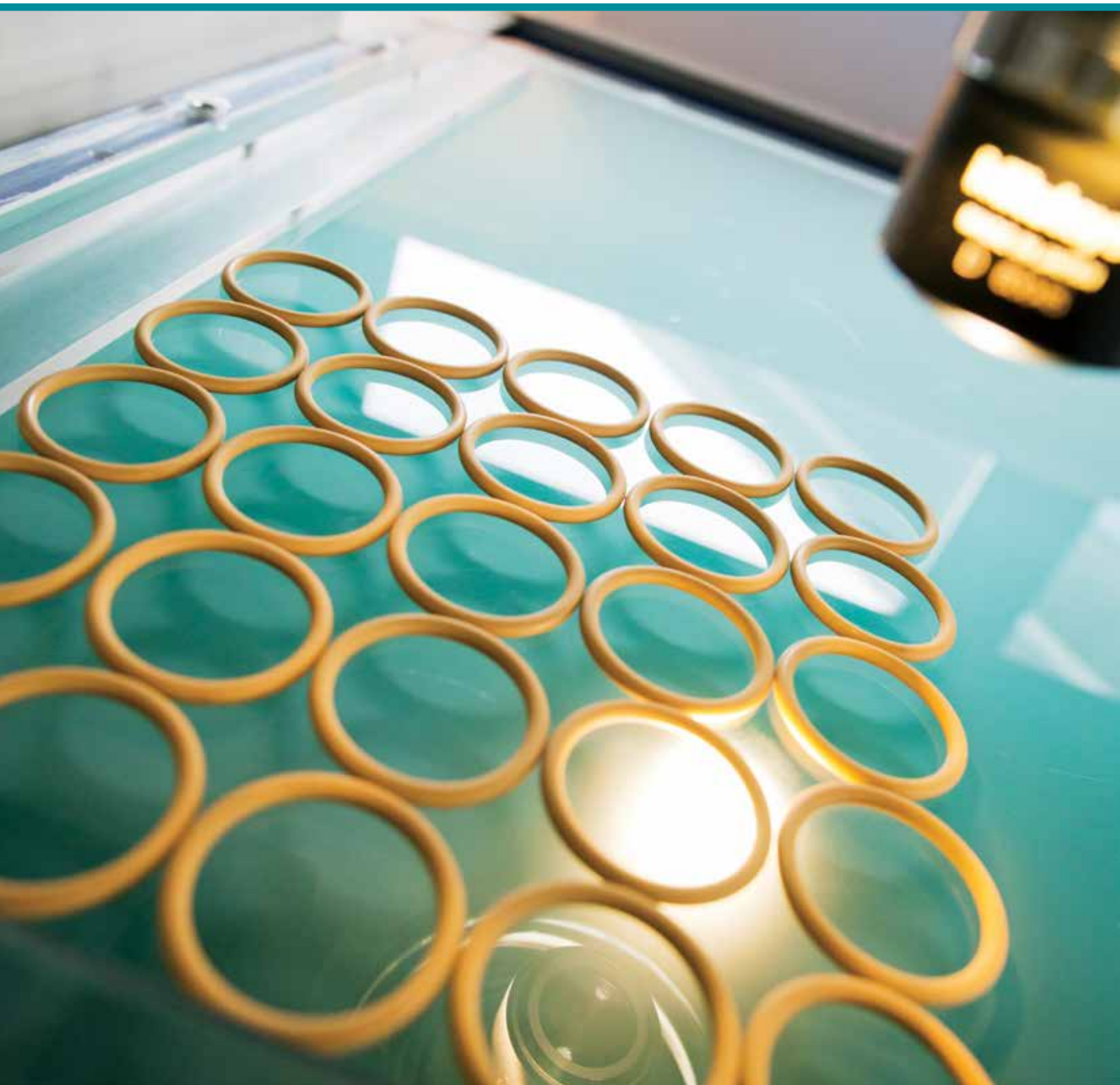
SUPERIOR

The Superior o-ring size list

defining.precision



Precise. Predictable.**Reliable.**Repeatable.

High precision o-rings

O-rings are the most versatile and economical form of sealing component available.

O-rings will conform most readily to general design guideline recommendations, as they have the most extensive record of service life in diverse conditions.

How do we achieve high precision o-rings?

Initially, in 1972, Superior used engineering expertise and revolutionary designs solely for tool making and swiftly evolved into the manufacture of precision o-rings by combining in-depth knowledge with the latest technology and shaping the manufacturing process with a level of precision and insight that, we believe, is unique.

Superior's state of the art toolroom reflects ever-changing customer demands and the improvement and development of mould tools is continuous. These improvements ensure that the most advanced CAD/CAM technology assists us in translating customer drawings into precision tool making templates, which in turn supports the speedy manufacture of production tooling and fast turnaround prototype tooling for o-rings and special seals.

100% in house manufacturing reflects Superior's responsibility for all aspects of every product and its production.

This full control of the manufacturing process ensures total integrity of parts and full traceability of material.

Benefits for the engineer

At Superior, we pride ourselves on our precision o-ring range which exceeds the cross sectional tolerances for the following dimensional standards:

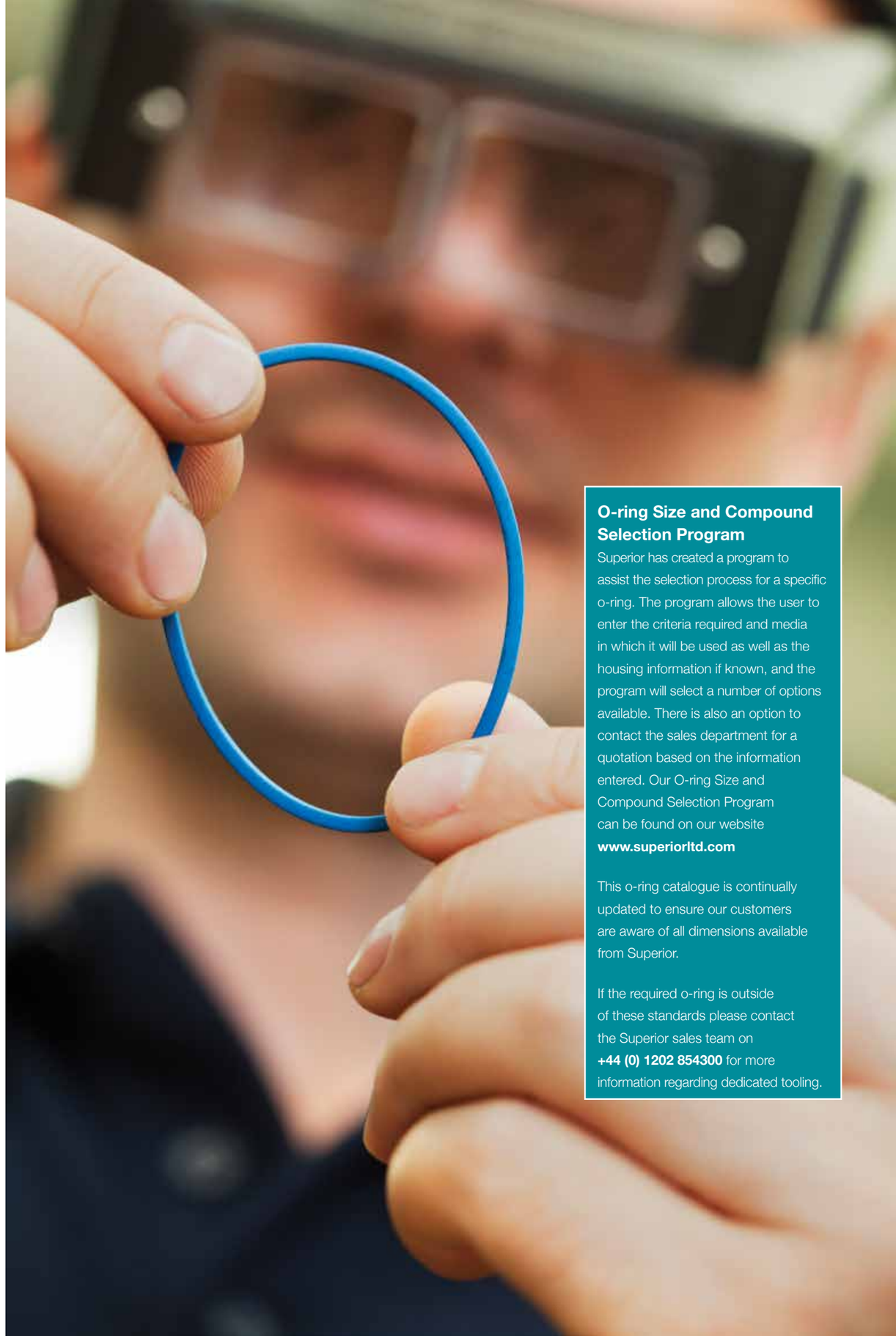
ISO 3601-1
DIN 3771 Part 1
BS 4518

The benefit of close tolerances on an o-ring cross section (d_2), is the ability to reduce our customer's tolerance chain and improve the overall performance of the customer's product.

The SSL references in this catalogue are the 'Superior precision range of o-rings'. The internal diameters conform to ISO 3601-1 tolerances and the cross section diameter has a reduced tolerance. These precision o-ring tolerances apply to NBR 70 compounds.

O-rings manufactured in other materials and hardness' are produced to conform to ISO 3601-1 tolerances. Dimensions for the internal diameter may be towards the lower end of the ISO 3601-1 tolerance when manufactured from different compounds.

High shrinkage compounds may require dedicated tooling to comply with ISO 3601-1 dimensions and tolerances, but will still allow for the principle of a more accurate cross-section. Superior can also supply o-rings to customers specifications.

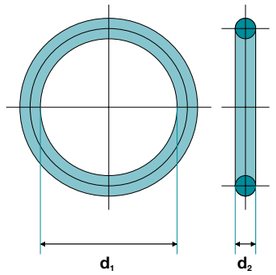


O-ring Size and Compound Selection Program

Superior has created a program to assist the selection process for a specific o-ring. The program allows the user to enter the criteria required and media in which it will be used as well as the housing information if known, and the program will select a number of options available. There is also an option to contact the sales department for a quotation based on the information entered. Our O-ring Size and Compound Selection Program can be found on our website **www.superiorltd.com**

This o-ring catalogue is continually updated to ensure our customers are aware of all dimensions available from Superior.

If the required o-ring is outside of these standards please contact the Superior sales team on **+44 (0) 1202 854300** for more information regarding dedicated tooling.

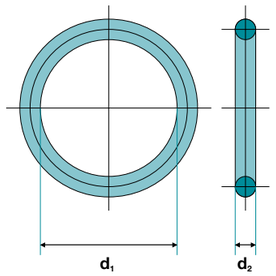


Precision o-rings

The Superior size list

Superior Seals list of o-rings tabulated in ascending internal diameters showing their relevant tolerances.

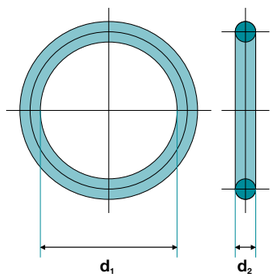
Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL003	1.42	0.12	1.53	0.06
SSL004	1.78	0.13	1.78	0.06
SSL2x1	2.00	0.13	1.00	0.06
SSL2.2x1.6	2.20	0.13	1.60	0.06
SSL2.4x1.9	2.40	0.13	1.90	0.06
SSL2.5x1.5	2.50	0.13	1.50	0.06
SSL005	2.57	0.13	1.78	0.06
SSL2.6x1.9	2.60	0.13	1.90	0.06
SSL2.8x1.6	2.80	0.13	1.60	0.06
SSL104	2.84	0.13	2.62	0.07
SSL2.9x1.6	2.90	0.13	1.60	0.06
SSL006	2.90	0.13	1.78	0.06
SSL3x1	3.00	0.14	1.00	0.06
SSL3x1.5	3.00	0.14	1.50	0.06
SSL3x2	3.00	0.14	2.00	0.06
SSL3.1x1.6	3.10	0.14	1.60	0.06
SSL3.3x2.4	3.30	0.14	2.40	0.07
SSL3.5x1.5	3.50	0.14	1.50	0.06
SSL3.6x2.4	3.60	0.14	2.40	0.07
SSL007	3.68	0.14	1.78	0.06
SSL3.9x1.8	3.90	0.14	1.80	0.06
SSL4x1	4.00	0.14	1.00	0.06
SSL4x1.2	4.00	0.14	1.20	0.06
SSL4x1.5	4.00	0.14	1.50	0.06
SSL4x2	4.00	0.14	2.00	0.06
SSL4x2.2	4.00	0.14	2.20	0.06
SSL4.1x1.6	4.10	0.14	1.60	0.06
SSL4.3x2.4	4.30	0.15	2.40	0.07
SSL106	4.42	0.15	2.62	0.07
SSL008	4.47	0.15	1.78	0.06
SSL4.5x1.6	4.50	0.15	1.60	0.06
SSL4.6x2.4	4.60	0.15	2.40	0.07
SSL4.7x1.42	4.70	0.15	1.42	0.06
SSL4.9x1.9	4.90	0.15	1.90	0.06
SSL5x1	5.00	0.15	1.00	0.06
SSL5x1.5	5.00	0.15	1.50	0.06
SSL5x2	5.00	0.15	2.00	0.06
SSL5x3	5.00	0.15	3.00	0.07
SSL5.1x1.6	5.10	0.15	1.60	0.06
SSL107	5.23	0.15	2.62	0.07
SSL009	5.28	0.15	1.78	0.06
SSL5.3x2.4	5.30	0.15	2.40	0.07
SSL5.5x2.7	5.50	0.16	2.70	0.07
SSL5.6x2	5.60	0.16	2.00	0.06
SSL5.6x2.4	5.60	0.16	2.40	0.07
SSL5.7x1.9	5.70	0.16	1.90	0.06
SSL5.7x2.62	5.70	0.16	2.62	0.07
SSL202	5.94	0.16	3.53	0.08
SSL6x1	6.00	0.16	1.00	0.06
SSL6x1.5	6.00	0.16	1.50	0.06
SSL6x2	6.00	0.16	2.00	0.06
SSL6x2.2	6.00	0.16	2.20	0.06
SSL6x2.5	6.00	0.16	2.50	0.07
SSL6x3	6.00	0.16	3.00	0.07
SSL108	6.02	0.16	2.62	0.07
SSL010	6.07	0.16	1.78	0.06
SSL6.1x1.6	6.10	0.16	1.60	0.06
SSL803	6.35	0.16	1.78	0.06
SSL6.4x1.4	6.40	0.16	1.40	0.06
SSL6.4x1.9	6.40	0.16	1.90	0.06
SSL6.5x1	6.50	0.16	1.00	0.06
SSL6.5x1.5	6.50	0.16	1.50	0.06
SSL6.6x1.6	6.60	0.16	1.60	0.06
SSL6.6x2.4	6.60	0.16	2.40	0.07
SSL610	6.76	0.17	1.78	0.06
SSL6.86x1.78	6.86	0.17	1.78	0.06
SSL7x1	7.00	0.17	1.00	0.06
SSL7x1.5	7.00	0.17	1.50	0.06
SSL7x2	7.00	0.17	2.00	0.06
SSL7x2.5	7.00	0.17	2.50	0.07
SSL7x2.75	7.00	0.17	2.75	0.07
SSL7.1x1.6	7.10	0.17	1.60	0.06
SSL7.3x2.4	7.30	0.17	2.40	0.07
SSL7.5x1.5	7.50	0.17	1.50	0.06
SSL7.5x2	7.50	0.17	2.00	0.06
SSL203	7.52	0.17	3.53	0.08
SSL109	7.59	0.17	2.62	0.07
SSL7.6x2.4	7.60	0.17	2.40	0.07
SSL7.65x1.63	7.65	0.17	1.63	0.06
SSL011	7.65	0.17	1.78	0.06
SSL804	7.92	0.17	1.78	0.06
SSL8x1	8.00	0.17	1.00	0.06



Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL8x1.25	8.00	0.17	1.25	0.06
SSL8x1.5	8.00	0.17	1.50	0.06
SSL8x1.8	8.00	0.17	1.80	0.06
SSL8x2	8.00	0.17	2.00	0.06
SSL8x2.2	8.00	0.17	2.20	0.06
SSL8x3.5	8.00	0.17	3.50	0.08
SSL8.1x1.6	8.10	0.18	1.60	0.06
SSL8.1x2.1	8.10	0.18	2.10	0.06
SSL8.25x1.63	8.25	0.18	1.63	0.06
SSL8.3x2.4	8.30	0.18	2.40	0.07
SSL8.5x1.4	8.50	0.18	1.40	0.06
SSL8.6x2.4	8.60	0.18	2.40	0.07
SSL611	8.74	0.18	1.78	0.06
SSL904	8.90	0.18	1.83	0.06
SSL8.9x1.9	8.90	0.18	1.90	0.06
SSL8.9x2.7	8.90	0.18	2.70	0.07
SSL9x1.5	9.00	0.18	1.50	0.06
SSL9x1.8	9.00	0.18	1.80	0.06
SSL9x2	9.00	0.18	2.00	0.06
SSL9x2.2	9.00	0.18	2.20	0.06
SSL9x2.5	9.00	0.18	2.50	0.07
SSL9x3	9.00	0.18	3.00	0.07
SSL9.1x1.6	9.10	0.18	1.60	0.06
SSL110	9.19	0.18	2.62	0.07
SSL012	9.25	0.18	1.78	0.06
SSL9.3x2.2	9.30	0.18	2.20	0.06
SSL9.3x2.4	9.30	0.18	2.40	0.07
SSL9.4x2.1	9.40	0.19	2.10	0.06
SSL9.5x1.5	9.50	0.19	1.50	0.06
SSL9.5x1.6	9.50	0.19	1.60	0.06
SSL9.5x2	9.50	0.19	2.00	0.06
SSL9.5x3	9.50	0.19	3.00	0.07
SSL9.52x1.78	9.52	0.19	1.78	0.06
SSL9.6x2.4	9.60	0.19	2.40	0.07
SSL613	9.93	0.19	2.62	0.07
SSL10x1	10.00	0.19	1.00	0.06
SSL10x1.1	10.00	0.19	1.10	0.06
SSL10x2	10.00	0.19	2.00	0.06
SSL10x2.1	10.00	0.19	2.10	0.06
SSL10x2.5	10.00	0.19	2.50	0.07
SSL10x3	10.00	0.19	3.00	0.07
SSL10x3.5	10.00	0.19	3.50	0.08
SSL10.1x1.6	10.10	0.19	1.60	0.06
SSL10.2x1.5	10.20	0.19	1.50	0.06
SSL10.2x2.5	10.20	0.19	2.50	0.07
SSL10.3x2.4	10.30	0.19	2.40	0.07
SSL309	10.46	0.19	5.33	0.10
SSL10.5x2	10.50	0.19	2.00	0.06
SSL905	10.51	0.19	1.83	0.06
SSL10.6x2.4	10.60	0.19	2.40	0.07
SSL111	10.77	0.20	2.62	0.07
SSL013	10.82	0.20	1.78	0.06

Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL11x1	11.00	0.20	1.00	0.06
SSL11x1.5	11.00	0.20	1.50	0.06
SSL11x1.6	11.00	0.20	1.60	0.06
SSL11x2	11.00	0.20	2.00	0.06
SSL11x2.25	11.00	0.20	2.25	0.06
SSL11x2.5	11.00	0.20	2.50	0.07
SSL11x3	11.00	0.20	3.00	0.07
SSL11.1x1.6	11.10	0.20	1.60	0.06
SSL806	11.11	0.20	1.78	0.06
SSL11.3x1.5	11.30	0.20	1.50	0.06
SSL11.3x2.4	11.30	0.20	2.40	0.07
SSL11.4x2.1	11.40	0.20	2.10	0.06
SSL11.4x2.6	11.40	0.20	2.60	0.07
SSL11.5x1.5	11.50	0.20	1.50	0.06
SSL11.5x2	11.50	0.20	2.00	0.06
SSL11.5x2.5	11.50	0.20	2.50	0.07
SSL11.5x3	11.50	0.20	3.00	0.07
SSL11.5x3.18	11.50	0.20	3.18	0.08
SSL11.5x3.5	11.50	0.20	3.50	0.08
SSL11.5x4.3	11.50	0.20	4.30	0.08
SSL11.6x2.4	11.60	0.20	2.40	0.07
SSL11.7x3	11.70	0.20	3.00	0.07
SSL906	11.89	0.20	1.98	0.06
SSL614	11.91	0.20	2.62	0.07
SSL12x1	12.00	0.21	1.00	0.06
SSL12x1.5	12.00	0.21	1.50	0.06
SSL12x1.8	12.00	0.21	1.80	0.06
SSL12x2	12.00	0.21	2.00	0.06
SSL12x2.35	12.00	0.21	2.35	0.07
SSL12x2.5	12.00	0.21	2.50	0.07
SSL12x3	12.00	0.21	3.00	0.07
SSL12x5	12.00	0.21	5.00	0.10
SSL12.1x1.6	12.10	0.21	1.60	0.06
SSL12.1x2.2	12.10	0.21	2.20	0.06
SSL12.1x2.7	12.10	0.21	2.70	0.07
SSL206	12.29	0.21	3.53	0.08
SSL12.3x2.4	12.30	0.21	2.40	0.07
SSL112	12.37	0.21	2.62	0.07
SSL014	12.42	0.21	1.78	0.06
SSL12.5x2	12.50	0.21	2.00	0.06
SSL12.5x3	12.50	0.21	3.00	0.07
SSL13x1.5	13.00	0.21	1.50	0.06
SSL13x2	13.00	0.21	2.00	0.06
SSL13x2.5	13.00	0.21	2.50	0.07
SSL13x3	13.00	0.21	3.00	0.07
SSL13.1x1.6	13.10	0.21	1.60	0.06
SSL615	13.11	0.21	2.62	0.07
SSL13.23x1.78	13.23	0.21	1.78	0.06
SSL13.3x2.4	13.30	0.22	2.40	0.07
SSL13.4x2.1	13.40	0.22	2.10	0.06
SSL907	13.46	0.22	2.08	0.06
SSL13.5x3.7	13.50	0.22	3.70	0.08

Our commitment for product excellence is based on sound commercial sense: our customers value quality, integrity and reliable high performance.

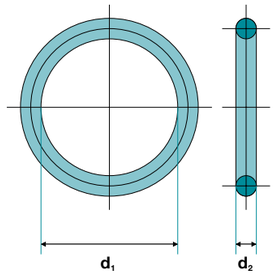


Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL13.6x2.4	13.60	0.22	2.40	0.07
SSL13.6x2.7	13.60	0.22	2.70	0.07
SSL13.7x3.9	13.70	0.22	3.90	0.08
SSL207	13.87	0.22	3.53	0.08
SSL113	13.94	0.22	2.62	0.07
SSL14x1	14.00	0.22	1.00	0.06
SSL14x1.5	14.00	0.22	1.50	0.06
SSL015	14.00	0.22	1.78	0.06
SSL14x2	14.00	0.22	2.00	0.06
SSL14x2.5	14.00	0.22	2.50	0.07
SSL14x2.65	14.00	0.22	2.65	0.07
SSL14x3	14.00	0.22	3.00	0.07
SSL14x3.5	14.00	0.22	3.50	0.08
SSL14x4	14.00	0.22	4.00	0.08
SSL14.1x1.6	14.10	0.22	1.60	0.06
SSL14.3x2.4	14.30	0.22	2.40	0.07
SSL14.5x3	14.50	0.22	3.00	0.07
SSL14.55x1.78	14.55	0.22	1.78	0.06
SSL14.6x2.4	14.60	0.22	2.40	0.07
SSL14.84x3.33	14.84	0.23	3.33	0.08
SSL15x1	15.00	0.23	1.00	0.06
SSL15x1.5	15.00	0.23	1.50	0.06
SSL15x2	15.00	0.23	2.00	0.06
SSL15x2.5	15.00	0.23	2.50	0.07
SSL15x2.65	15.00	0.23	2.65	0.07
SSL15x3	15.00	0.23	3.00	0.07
SSL15x3.5	15.00	0.23	3.50	0.08
SSL15x4	15.00	0.23	4.00	0.08
SSL15x5	15.00	0.23	5.00	0.10
SSL616	15.08	0.23	2.62	0.07
SSL15.1x1.6	15.10	0.23	1.60	0.06
SSL15.1x2.7	15.10	0.23	2.70	0.07
SSL15.2x1.86	15.20	0.23	1.86	0.06
SSL15.3x2.4	15.30	0.23	2.40	0.06
SSL15.4x2.1	15.40	0.23	2.10	0.06
SSL208	15.47	0.23	3.53	0.08
SSL114	15.54	0.23	2.62	0.07
SSL15.6x1.5	15.60	0.23	1.50	0.06
SSL016	15.60	0.23	1.78	0.06
SSL15.6x2.4	15.60	0.23	2.40	0.07
SSL809	15.88	0.23	2.62	0.07
SSL16x1.5	16.00	0.24	1.50	0.06
SSL16x1.9	16.00	0.24	1.90	0.06
SSL16x2	16.00	0.24	2.00	0.06
SSL16x2.5	16.00	0.24	2.50	0.07
SSL16x2.65	16.00	0.24	2.65	0.07
SSL16x3	16.00	0.24	3.00	0.07
SSL16x3.5	16.00	0.24	3.50	0.08
SSL16x4	16.00	0.24	4.00	0.08
SSL16.1x1.6	16.10	0.24	1.60	0.06
SSL16.3x2.4	16.30	0.24	2.40	0.07
SSL908	16.36	0.24	2.20	0.06
SSL16.6x2.4	16.60	0.24	2.40	0.07
SSL16.9x2.7	16.90	0.24	2.70	0.07
SSL17x1.5	17.00	0.24	1.50	0.06

Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL17x2	17.00	0.24	2.00	0.06
SSL17x3	17.00	0.24	3.00	0.07
SSL17x4	17.00	0.24	4.00	0.08
SSL17x4.5	17.00	0.24	4.50	0.08
SSL209	17.04	0.24	3.53	0.08
SSL17.1x1.6	17.10	0.24	1.60	0.06
SSL115	17.12	0.24	2.62	0.07
SSL017	17.17	0.24	1.78	0.06
SSL17.2x3	17.20	0.24	3.00	0.07
SSL17.3x2.4	17.30	0.25	2.40	0.07
SSL810	17.46	0.25	2.62	0.07
SSL17.5x1.5	17.50	0.25	1.50	0.06
SSL17.5x3.5	17.50	0.25	3.50	0.08
SSL17.6x2.4	17.60	0.25	2.40	0.07
SSL617	17.86	0.25	2.62	0.07
SSL17.96x2.62	17.96	0.25	2.62	0.07
SSL18x1	18.00	0.25	1.00	0.06
SSL18x1.5	18.00	0.25	1.50	0.06
SSL18x2	18.00	0.25	2.00	0.06
SSL18x2.5	18.00	0.25	2.50	0.07
SSL18x2.65	18.00	0.25	2.65	0.07
SSL18x2.8	18.00	0.25	2.80	0.07
SSL18x3	18.00	0.25	3.00	0.07
SSL18x3.5	18.00	0.25	3.50	0.08
SSL18x4	18.00	0.25	4.00	0.08
SSL18.1x1.6	18.10	0.25	1.60	0.06
SSL18.3x2.4	18.30	0.25	2.40	0.07
SSL18.3x3.6	18.30	0.25	3.60	0.08
SSL18.4x2.5	18.40	0.25	2.50	0.07
SSL18.4x2.7	18.40	0.25	2.70	0.07
SSL18.6x2.4	18.60	0.25	2.40	0.07
SSL210	18.64	0.25	3.53	0.08
SSL116	18.72	0.26	2.62	0.07
SSL018	18.77	0.26	1.78	0.06
SSL19x1.5	19.00	0.26	1.50	0.06
SSL19x1.75	19.00	0.26	1.75	0.06
SSL19x2	19.00	0.26	2.00	0.06
SSL19x2.5	19.00	0.26	2.50	0.07
SSL19x3	19.00	0.26	3.00	0.07
SSL19.1x1.6	19.10	0.26	1.60	0.06
SSL910	19.18	0.26	2.46	0.07
SSL19.3x2.2	19.30	0.26	2.20	0.06
SSL19.3x2.4	19.30	0.26	2.40	0.07
SSL19.5x2	19.50	0.26	2.00	0.06
SSL19.5x3	19.50	0.26	3.00	0.07
SSL19.5x3.5	19.50	0.26	3.50	0.08
SSL19.6x2.4	19.60	0.26	2.40	0.07
SSL19.8x3.6	19.80	0.26	3.60	0.08
SSL20x1.5	20.00	0.26	1.50	0.06
SSL20x2	20.00	0.26	2.00	0.06
SSL20x2.5	20.00	0.26	2.50	0.07
SSL20x4	20.00	0.26	4.00	0.08
SSL20x4.5	20.00	0.26	4.50	0.08
SSL20x5.60	20.00	0.26	5.60	0.10
SSL20.1x1.6	20.10	0.27	1.60	0.06

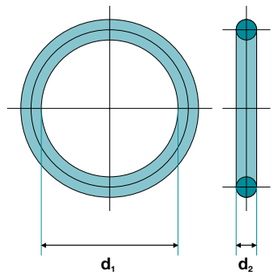
Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL20.2x3	20.20	0.27	3.00	0.07
SSL211	20.22	0.27	3.53	0.08
SSL117	20.29	0.27	2.62	0.07
SSL019	20.35	0.27	1.78	0.06
SSL20.5x2	20.50	0.27	2.00	0.06
SSL20.6x2.4	20.60	0.27	2.40	0.07
SSL812	20.62	0.27	2.62	0.07
SSL20.9x4	20.90	0.27	4.00	0.08
SSL20.95x2.62	20.95	0.27	2.62	0.07
SSL21x2	21.00	0.27	2.00	0.06
SSL21x2.5	21.00	0.27	2.50	0.07
SSL21x3.5	21.00	0.27	3.50	0.08
SSL21.3x2.3	21.30	0.27	2.30	0.07
SSL21.3x3.6	21.30	0.27	3.60	0.08
SSL21.5x2	21.50	0.28	2.00	0.06
SSL21.5x3	21.50	0.28	3.00	0.07
SSL21.6x2.4	21.60	0.28	2.40	0.07
SSL212	21.82	0.28	3.53	0.08
SSL118	21.89	0.28	2.62	0.07
SSL020	21.95	0.28	1.78	0.06
SSL22x2	22.00	0.28	2.00	0.06
SSL22x2.5	22.00	0.28	2.50	0.07
SSL22x2.75	22.00	0.28	2.75	0.07
SSL22x3	22.00	0.28	3.00	0.07
SSL22x3.15	22.00	0.28	3.15	0.07
SSL22x4	22.00	0.28	4.00	0.08
SSL22.1x1.6	22.10	0.28	1.60	0.06
SSL813	22.23	0.28	2.62	0.07
SSL22.5x3	22.50	0.28	3.00	0.07
SSL23x1.5	23.00	0.29	1.50	0.06
SSL23x1.78	23.00	0.29	1.78	0.06
SSL23x2	23.00	0.29	2.00	0.06
SSL23x2.5	23.00	0.29	2.50	0.07
SSL23x3.6	23.00	0.29	3.60	0.08
SSL23x4	23.00	0.29	4.00	0.08
SSL317	23.16	0.29	5.33	0.10
SSL23.3x2.4	23.30	0.29	2.40	0.07
SSL213	23.39	0.29	3.53	0.08
SSL23.4x7.2	23.40	0.29	7.20	0.12
SSL119	23.47	0.29	2.62	0.07
SSL912	23.47	0.29	2.95	0.07
SSL23.5x3	23.50	0.29	3.00	0.07
SSL021	23.52	0.29	1.78	0.06
SSL814	23.80	0.29	2.62	0.07
SSL23.8x3.95	23.80	0.29	3.95	0.08
SSL24x1.5	24.00	0.29	1.50	0.06
SSL24x2	24.00	0.29	2.00	0.06
SSL24x2.5	24.00	0.29	2.50	0.07
SSL24x4	24.00	0.29	4.00	0.08
SSL24x4.5	24.00	0.29	4.50	0.08
SSL24.2x3	24.20	0.30	3.00	0.07

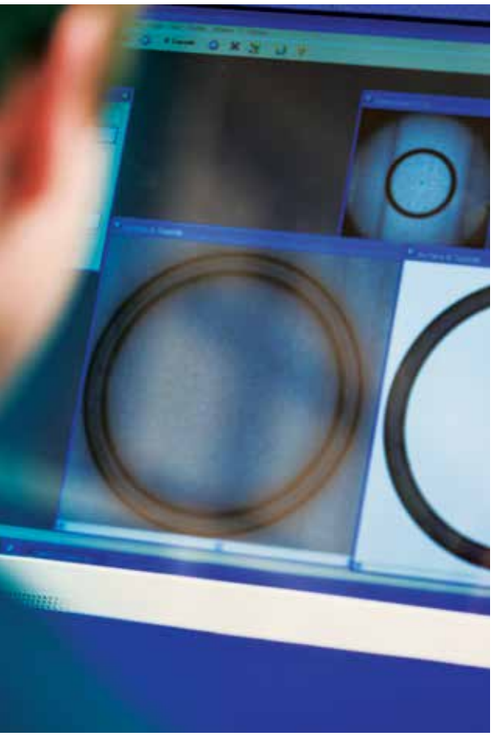
Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL24.5x3	24.50	0.30	3.00	0.07
SSL24.6x2.4	24.60	0.30	2.40	0.07
SSL24.6x3.6	24.60	0.30	3.60	0.08
SSL318	24.77	0.30	5.33	0.10
SSL214	24.99	0.30	3.53	0.08
SSL25x1.5	25.00	0.30	1.50	0.06
SSL25x1.8	25.00	0.30	1.80	0.06
SSL25x2	25.00	0.30	2.00	0.06
SSL25x2.5	25.00	0.30	2.50	0.07
SSL25x3	25.00	0.30	3.00	0.07
SSL25x4	25.00	0.30	4.00	0.08
SSL120	25.07	0.30	2.62	0.07
SSL25.1x1.6	25.10	0.30	1.60	0.06
SSL022	25.12	0.30	1.78	0.06
SSL25.3x2.4	25.30	0.30	2.40	0.07
SSL25.5x3	25.50	0.31	3.00	0.07
SSL25.5x3.2	25.50	0.31	3.20	0.08
SSL618	25.80	0.31	3.53	0.08
SSL26x1.5	26.00	0.31	1.50	0.06
SSL26x2	26.00	0.31	2.00	0.06
SSL26x2.5	26.00	0.31	2.50	0.07
SSL26.2x3	26.20	0.31	3.00	0.07
SSL26.2x3.6	26.20	0.31	3.60	0.08
SSL319	26.34	0.31	5.33	0.10
SSL215	26.57	0.31	3.53	0.08
SSL914	26.62	0.31	2.95	0.07
SSL121	26.64	0.31	2.62	0.07
SSL023	26.70	0.31	1.78	0.06
SSL27x1.5	27.00	0.32	1.50	0.06
SSL27x2	27.00	0.32	2.00	0.06
SSL27x2.5	27.00	0.32	2.50	0.07
SSL27x3	27.00	0.32	3.00	0.07
SSL27x4	27.00	0.32	4.00	0.08
SSL27.1x1.6	27.10	0.32	1.60	0.06
SSL27.3x2	27.30	0.32	2.00	0.06
SSL27.5x3	27.50	0.32	3.00	0.07
SSL27.6x2.4	27.60	0.32	2.40	0.07
SSL27.8x3.6	27.80	0.32	3.60	0.08
SSL320	27.94	0.32	5.33	0.10
SSL28x1.5	28.00	0.32	1.50	0.06
SSL28x2	28.00	0.32	2.00	0.06
SSL28x2.5	28.00	0.32	2.50	0.07
SSL28x4	28.00	0.32	4.00	0.08
SSL216	28.17	0.32	3.53	0.08
SSL28.2x3	28.20	0.32	3.00	0.07
SSL28.2x3.15	28.20	0.32	3.15	0.07
SSL122	28.24	0.33	2.62	0.07
SSL024	28.30	0.33	1.78	0.06
SSL28.3x3.15	28.30	0.33	3.15	0.07
SSL29x2	29.00	0.33	2.00	0.06
SSL29x3	29.00	0.33	3.00	0.07

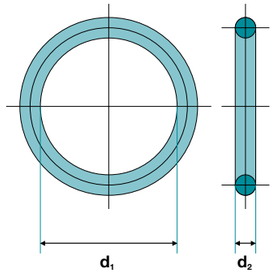


Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL29.1x1.6	29.10	0.33	1.60	0.06
SSL29.2x3	29.20	0.33	3.00	0.07
SSL29.5x3	29.50	0.33	3.00	0.07
SSL321	29.51	0.33	5.33	0.10
SSL29.6x2.4	29.60	0.33	2.40	0.07
SSL29.7x2.8	29.70	0.34	2.80	0.07
SSL916	29.74	0.34	2.95	0.07
SSL217	29.74	0.34	3.53	0.08
SSL123	29.82	0.34	2.62	0.07
SSL025	29.87	0.34	1.78	0.06
SSL30x2	30.00	0.34	2.00	0.06
SSL30x2.5	30.00	0.34	2.50	0.07
SSL30x4	30.00	0.34	4.00	0.08
SSL31x2	31.00	0.34	2.00	0.06
SSL322	31.12	0.35	5.33	0.10
SSL218	31.34	0.35	3.53	0.08
SSL124	31.42	0.35	2.62	0.07
SSL026	31.47	0.35	1.78	0.06
SSL31.5x3	31.50	0.35	3.00	0.07
SSL31.6x2.4	31.60	0.35	2.40	0.07
SSL32x2	32.00	0.35	2.00	0.06
SSL32x2.5	32.00	0.35	2.50	0.07
SSL32x3	32.00	0.35	3.00	0.07
SSL32x4	32.00	0.35	4.00	0.08
SSL32x5	32.00	0.35	5.00	0.10
SSL32.1x1.6	32.10	0.35	1.60	0.06
SSL219	32.92	0.36	3.53	0.08
SSL125	32.99	0.36	2.62	0.07
SSL33x2	33.00	0.36	2.00	0.06
SSL33x2.5	33.00	0.36	2.50	0.07
SSL027	33.05	0.36	1.78	0.06
SSL34x3	34.00	0.37	3.00	0.07
SSL34x4	34.00	0.37	4.00	0.08
SSL34x5	34.00	0.37	5.00	0.10
SSL34.2x3	34.20	0.37	3.00	0.07
SSL34.5x3	34.50	0.37	3.00	0.07
SSL220	34.52	0.37	3.53	0.08
SSL126	34.59	0.37	2.62	0.07
SSL028	34.65	0.37	1.78	0.06
SSL34.67x2.62	34.67	0.37	2.62	0.07
SSL34.8x1.65	34.80	0.37	1.65	0.06
SSL34.9x2	34.90	0.37	2.00	0.06
SSL35x2	35.00	0.37	2.00	0.06
SSL35x2.5	35.00	0.37	2.50	0.07
SSL35x3.5	35.00	0.37	3.50	0.08
SSL35x4	35.00	0.37	4.00	0.08
SSL35.2x3.15	35.20	0.38	3.15	0.07
SSL35.5x2.5	35.50	0.38	2.50	0.07
SSL35.5x3	35.50	0.38	3.00	0.07

Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL35.6x2.4	35.60	0.38	2.40	0.07
SSL36x2	36.00	0.38	2.00	0.06
SSL36x2.5	36.00	0.38	2.50	0.07
SSL36x3	36.00	0.38	3.00	0.07
SSL36x4	36.00	0.38	4.00	0.08
SSL221	36.09	0.38	3.53	0.08
SSL127	36.17	0.38	2.62	0.07
SSL36.2x3	36.20	0.38	3.00	0.07
SSL36.5x2.4	36.50	0.38	2.40	0.07
SSL517	36.27	0.38	1.78	0.06
SSL36.5x3	36.50	0.38	3.00	0.07
SSL37x2	37.00	0.39	2.00	0.06
SSL37x4	37.00	0.39	4.00	0.08
SSL37.1x1.6	37.10	0.39	1.60	0.06
SSL325	37.47	0.39	5.33	0.10
SSL37.6x2.4	37.60	0.39	2.40	0.07
SSL222	37.69	0.39	3.53	0.08
SSL128	37.77	0.39	2.62	0.07
SSL029	37.82	0.39	1.78	0.06
SSL38x2	38.00	0.40	2.00	0.06
SSL38x2.5	38.00	0.40	2.50	0.07
SSL38x3	38.00	0.40	3.00	0.07
SSL38x5	38.00	0.40	5.00	0.10
SSL38.7x2.8	38.70	0.40	2.80	0.07
SSL39x2	39.00	0.40	2.00	0.06
SSL129	39.34	0.40	2.62	0.07
SSL519	39.45	0.41	1.78	0.06
SSL39.5x3	39.50	0.41	3.00	0.07
SSL39.6x2.4	39.60	0.41	2.40	0.07
SSL824	39.70	0.41	3.53	0.08
SSL40x2	40.00	0.41	2.00	0.06
SSL40x4	40.00	0.41	4.00	0.08
SSL40.2x3	40.20	0.41	3.00	0.07
SSL326	40.64	0.41	5.33	0.10
SSL223	40.86	0.42	3.53	0.08
SSL130	40.94	0.42	2.62	0.07
SSL030	41.00	0.42	1.78	0.06
SSL41x2	41.00	0.42	2.00	0.06
SSL41x2.5	41.00	0.42	2.50	0.07
SSL41x4	41.00	0.42	4.00	0.08
SSL42x2	42.00	0.42	2.00	0.06
SSL42x4	42.00	0.42	4.00	0.08
SSL42.4x3.15	42.40	0.43	3.15	0.07
SSL42.4x4.13	42.40	0.43	4.13	0.08
SSL42.5x3	42.50	0.43	3.00	0.07
SSL131	42.52	0.43	2.62	0.07
SSL826	42.85	0.43	3.53	0.08
SSL43x2	43.00	0.43	2.00	0.06
SSL924	43.70	0.44	3.00	0.07

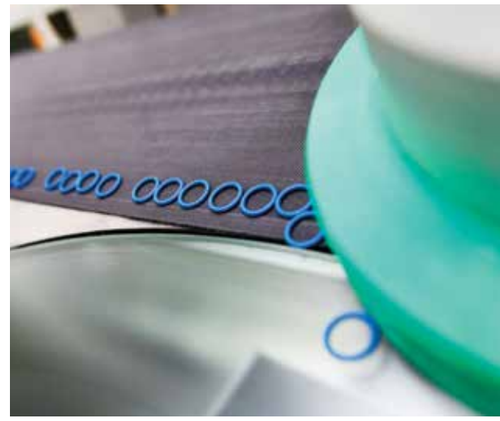


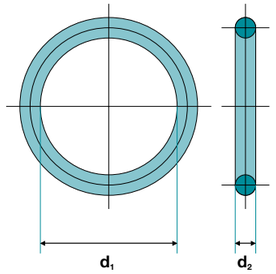




Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL327	43.82	0.44	5.33	0.10
SSL44x2	44.00	0.44	2.00	0.06
SSL44x3	44.00	0.44	3.00	0.07
SSL224	44.04	0.44	3.53	0.08
SSL132	44.12	0.44	2.62	0.07
SSL031	44.17	0.44	1.78	0.06
SSL827	44.45	0.44	3.53	0.08
SSL44.5x3	44.50	0.44	3.00	0.07
SSL44.6x2.4	44.60	0.44	2.40	0.07
SSL45x2	45.00	0.44	2.00	0.06
SSL45x2.5	45.00	0.44	2.50	0.07
SSL45x3	45.00	0.44	3.00	0.07
SSL45x3.5	45.00	0.44	3.50	0.08
SSL133	45.69	0.45	2.62	0.07
SSL46x2.5	46.00	0.45	2.50	0.07
SSL828	46.04	0.45	3.53	0.08
SSL46.5x3	46.50	0.46	3.00	0.07
SSL328	46.99	0.46	5.33	0.10
SSL47x2	47.00	0.46	2.00	0.06
SSL47x2.5	47.00	0.46	2.50	0.07
SSL47x3	47.00	0.46	3.00	0.07
SSL47x4	47.00	0.46	4.00	0.08
SSL225	47.22	0.46	3.53	0.08
SSL134	47.30	0.46	2.62	0.07
SSL032	47.35	0.46	1.78	0.06
SSL48x1.5	48.00	0.47	1.50	0.06
SSL48x2	48.00	0.47	2.00	0.06
SSL135	48.90	0.47	2.62	0.07
SSL49.15x5.33	49.15	0.47	5.33	0.10
SSL49.5x3	49.50	0.48	3.00	0.07
SSL49.6x2.4	49.60	0.48	2.40	0.07
SSL50x2	50.00	0.48	2.00	0.06
SSL50x3	50.00	0.48	3.00	0.07
SSL50x5	50.00	0.48	5.00	0.10
SSL50.1x1.6	50.10	0.48	1.60	0.06
SSL329	50.17	0.48	5.33	0.10
SSL226	50.39	0.48	3.53	0.08
SSL136	50.47	0.48	2.62	0.07
SSL033	50.52	0.48	1.78	0.06
SSL831	50.80	0.49	3.53	0.08
SSL51x3.5	51.00	0.49	3.50	0.08
SSL51.6x2.4	51.60	0.49	2.40	0.07
SSL52x2	52.00	0.49	2.00	0.06
SSL52x3	52.00	0.49	3.00	0.07
SSL137	52.07	0.49	2.62	0.07
SSL53x2.5	53.00	0.50	2.50	0.07
SSL53x3	53.00	0.50	3.00	0.07
SSL53x6	53.00	0.50	6.00	0.10

Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL330	53.34	0.50	5.33	0.10
SSL227	53.57	0.51	3.53	0.08
SSL138	53.64	0.51	2.62	0.07
SSL034	53.70	0.51	1.78	0.06
SSL54x2	54.00	0.51	2.00	0.06
SSL54x4	54.00	0.51	4.00	0.08
SSL54.4x4.15	54.40	0.51	4.15	0.08
SSL54.5x3	54.50	0.51	3.00	0.07
SSL54.6x2.4	54.60	0.51	2.40	0.07
SSL55x3	55.00	0.52	3.00	0.07
SSL55x4	55.00	0.52	4.00	0.08
SSL55x5	55.00	0.52	5.00	0.10
SSL139	55.25	0.52	2.62	0.07
SSL834	55.56	0.52	3.53	0.08
SSL55.6x2.4	55.60	0.52	2.40	0.07
SSL56x3	56.00	0.52	3.00	0.07
SSL56x5	56.00	0.52	5.00	0.10
SSL331	56.52	0.53	5.33	0.10
SSL228	56.74	0.53	3.53	0.08
SSL140	56.82	0.53	2.62	0.07
SSL035	56.87	0.53	1.78	0.06
SSL57x2	57.00	0.53	2.00	0.06
SSL57x3	57.00	0.53	3.00	0.07
SSL835	57.15	0.53	3.53	0.08
SSL58x1.5	58.00	0.54	1.50	0.06
SSL58x2	58.00	0.54	2.00	0.06
SSL58x3	58.00	0.54	3.00	0.07
SSL58x3.5	58.00	0.54	3.50	0.08
SSL58x4	58.00	0.54	4.00	0.08
SSL141	58.42	0.54	2.62	0.07
SSL59x2	59.00	0.54	2.00	0.06
SSL59.5x3	59.50	0.55	3.00	0.07
SSL59.6x2.4	59.60	0.55	2.40	0.07
SSL332	59.69	0.55	5.33	0.10
SSL229	59.92	0.55	3.53	0.08
SSL142	59.99	0.55	2.62	0.07
SSL036	60.05	0.55	1.78	0.06
SSL61.6x2.4	61.60	0.56	2.40	0.07
SSL143	61.60	0.56	2.62	0.07
SSL62x3	62.00	0.56	3.00	0.07
SSL62x6	62.00	0.56	6.00	0.10
SSL333	62.87	0.57	5.33	0.10
SSL63x2	63.00	0.57	2.00	0.06
SSL63x2.5	63.00	0.57	2.50	0.07
SSL63x3	63.00	0.57	3.00	0.07
SSL230	63.09	0.57	3.53	0.08
SSL144	63.17	0.57	2.62	0.07
SSL037	63.22	0.57	1.78	0.06

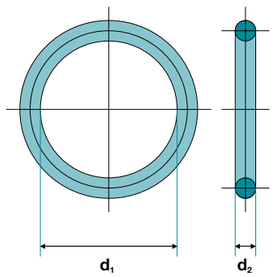




Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL64x3	64.00	0.58	3.00	0.07
SSL64x3.5	64.00	0.58	3.50	0.08
SSL64.3x5.7	64.30	0.58	5.70	0.10
SSL64.5x3	64.50	0.58	3.00	0.07
SSL145	64.77	0.58	2.62	0.07
SSL65x2	65.00	0.58	2.00	0.06
SSL65x2.5	65.00	0.58	2.50	0.07
SSL65x5	65.00	0.58	5.00	0.10
SSL840	65.10	0.59	3.53	0.08
SSL66x2	66.00	0.59	2.00	0.06
SSL66x2.5	66.00	0.59	2.50	0.07
SSL334	66.04	0.59	5.33	0.10
SSL231	66.27	0.59	3.53	0.08
SSL146	66.34	0.59	2.62	0.07
SSL038	66.40	0.59	1.78	0.06
SSL67x2	67.00	0.60	2.00	0.06
SSL67x4	67.00	0.60	4.00	0.08
SSL67.6x2.4	67.60	0.60	2.40	0.07
SSL147	67.95	0.61	2.62	0.07
SSL68x1.5	68.00	0.61	1.50	0.06
SSL68x2	68.00	0.61	2.00	0.06
SSL68x3	68.00	0.61	3.00	0.07
SSL68x4	68.00	0.61	4.00	0.08
SSL335	69.22	0.61	5.33	0.10
SSL232	69.44	0.62	3.53	0.08
SSL69.5x3	69.50	0.62	3.00	0.07
SSL148	69.52	0.62	2.62	0.07
SSL039	69.57	0.62	1.78	0.06
SSL70x2	70.00	0.62	2.00	0.06
SSL70x3	70.00	0.62	3.00	0.07
SSL70x5	70.00	0.62	5.00	0.10
SSL71x4	71.00	0.63	4.00	0.08
SSL71.5x3	71.50	0.63	3.00	0.07
SSL72x2	72.00	0.63	2.00	0.06
SSL72x2.5	72.00	0.63	2.50	0.07
SSL72x4	72.00	0.63	4.00	0.08
SSL233	72.62	0.64	3.53	0.08
SSL150	72.70	0.64	2.62	0.07
SSL040	72.75	0.64	1.78	0.06
SSL73x2.5	73.00	0.64	2.50	0.07
SSL73x3	73.00	0.64	3.00	0.07
SSL73x4	73.00	0.64	4.00	0.08
SSL73x5	73.00	0.64	5.00	0.10
SSL74x2.5	74.00	0.65	2.50	0.07
SSL74.3x5.7	74.30	0.65	5.70	0.10
SSL74.5x3	74.50	0.65	3.00	0.07
SSL846	74.60	0.65	3.53	0.08
SSL337	75.57	0.66	5.33	0.10

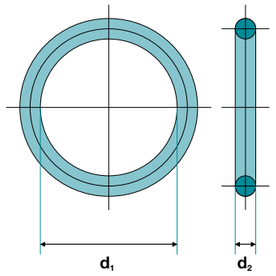
Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL234	75.79	0.66	3.53	0.08
SSL75.79x4	75.79	0.66	4.00	0.08
SSL151	75.88	0.66	2.62	0.07
SSL76x2	76.00	0.66	2.00	0.06
SSL76x3	76.00	0.66	3.00	0.07
SSL77.93x5.33	77.93	0.67	5.33	0.10
SSL78x3.5	78.00	0.67	3.50	0.08
SSL78x5	78.00	0.67	5.00	0.10
SSL338	78.74	0.68	5.33	0.10
SSL532	78.99	0.68	1.78	0.06
SSL79x2.5	79.00	0.68	2.50	0.07
SSL80x2.5	80.00	0.69	2.50	0.07
SSL80x3	80.00	0.69	3.00	0.07
SSL642	80.60	0.69	2.62	0.07
SSL81x3	81.00	0.70	3.00	0.07
SSL339	81.92	0.70	5.33	0.10
SSL82x3	82.00	0.70	3.00	0.07
SSL236	82.14	0.70	3.53	0.08
SSL152	82.22	0.70	2.62	0.07
SSL83x3	83.00	0.71	3.00	0.07
SSL83x3.5	83.00	0.71	3.50	0.08
SSL84x3	84.00	0.72	3.00	0.07
SSL84.5x3	84.50	0.72	3.00	0.07
SSL85x2	85.00	0.72	2.00	0.06
SSL85x2.5	85.00	0.72	2.50	0.07
SSL85x4	85.00	0.72	4.00	0.08
SSL340	85.09	0.72	5.33	0.10
SSL237	85.32	0.72	3.53	0.08
SSL88x3	88.00	0.74	3.00	0.07
SSL88x4	88.00	0.74	4.00	0.08
SSL341	88.27	0.74	5.33	0.10
SSL238	88.50	0.75	3.53	0.08
SSL153	88.57	0.75	2.62	0.07
SSL89.5x3	89.50	0.75	3.00	0.07
SSL90x3	90.00	0.76	3.00	0.07
SSL90x4	90.00	0.76	4.00	0.08
SSL342	91.44	0.77	5.33	0.10
SSL239	91.67	0.77	3.53	0.08
SSL92x3	92.00	0.77	3.00	0.07
SSL93x3	93.00	0.78	3.00	0.07
SSL93.47x2.62	93.47	0.78	2.62	0.07
SSL93.5x2.4	93.50	0.78	2.40	0.07
SSL94x3	94.00	0.78	3.00	0.07
SSL94.5x3	94.50	0.79	3.00	0.07
SSL343	94.62	0.79	5.33	0.10
SSL240	94.84	0.79	3.53	0.08
SSL154	94.93	0.79	2.62	0.07
SSL044	94.94	0.79	1.78	0.06

Innovate, prove and refine;
continuous improvement is
embedded in our culture.



Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL96.5x2.62	96.50	0.80	2.62	0.07
SSL344	97.80	0.81	5.33	0.10
SSL98x4	98.00	0.81	4.00	0.08
SSL241	98.02	0.81	3.53	0.08
SSL98.6x2	98.60	0.82	2.00	0.06
SSL99.5x3	99.50	0.82	3.00	0.07
SSL100x2	100.00	0.82	2.00	0.06
SSL100x2.5	100.00	0.82	2.50	0.07
SSL100x3	100.00	0.82	3.00	0.07
SSL345	100.97	0.83	5.33	0.10
SSL242	101.19	0.83	3.53	0.08
SSL155	101.27	0.83	2.62	0.07
SSL045	101.34	0.83	1.78	0.06
SSL102x3	102.00	0.84	3.00	0.07
SSL102x4	102.00	0.84	4.00	0.08
SSL103x3.5	103.00	0.85	3.50	0.08
SSL104x4	104.00	0.85	4.00	0.08
SSL104x7.5	104.00	0.85	7.50	0.12
SSL346	104.14	0.85	5.33	0.10
SSL243	104.37	0.85	3.53	0.08
SSL105x2	105.00	0.86	2.00	0.06
SSL105x4	105.00	0.86	4.00	0.08
SSL106x8	106.00	0.87	8.00	0.12
SSL347	107.32	0.87	5.33	0.10
SSL244	107.54	0.88	3.53	0.08
SSL108x3	108.00	0.88	3.00	0.07
SSL109.5x3	109.50	0.89	3.00	0.07
SSL110x3	110.00	0.89	3.00	0.07
SSL348	110.49	0.90	5.33	0.10
SSL245	110.72	0.90	3.53	0.08
SSL111x3	111.00	0.90	3.00	0.07
SSL111x4	111.00	0.90	4.00	0.08
SSL112.3x3	112.30	0.91	3.00	0.07
SSL113x3	113.00	0.91	3.00	0.07
SSL113x3.5	113.00	0.91	3.50	0.08
SSL114x3	114.00	0.92	3.00	0.07
SSL114.3x5.7	114.30	0.92	5.70	0.10
SSL114.5x3	114.50	0.92	3.00	0.07
SSL116x5.9	116.00	0.93	5.90	0.10
SSL247	117.07	0.94	3.53	0.08
SSL119.5x3	119.50	0.96	3.00	0.07
SSL120x3	120.00	0.96	3.00	0.07
SSL427	120.02	0.96	6.99	0.12
SSL248	120.24	0.96	3.53	0.08
SSL048	120.40	0.96	1.78	0.06
SSL122x1.5	122.00	0.97	1.50	0.06
SSL123x3.5	123.00	0.98	3.50	0.08
SSL352	123.19	0.98	5.33	0.10
SSL428	123.20	0.98	6.99	0.12
SSL125x4	125.00	0.99	4.00	0.08
SSL126x3	126.00	1.00	3.00	0.07

Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL353	126.37	1.00	5.33	0.10
SSL250	126.59	1.00	3.53	0.08
SSL127x4	127.00	1.00	4.00	0.08
SSL548	129.40	1.02	1.78	0.06
SSL129.5x3	129.50	1.02	3.00	0.07
SSL130x2	130.00	1.03	2.00	0.06
SSL130x3	130.00	1.03	3.00	0.07
SSL130x3.5	130.00	1.03	3.50	0.08
SSL252	132.94	1.05	3.53	0.08
SSL134.5x3	134.50	1.06	3.00	0.07
SSL135x4	135.00	1.06	4.00	0.08
SSL138x4	138.00	1.08	4.00	0.08
SSL139x2	139.00	1.09	2.00	0.06
SSL433	139.07	1.09	6.99	0.12
SSL254	139.29	1.09	3.53	0.08
SSL139.5x3	139.50	1.09	3.00	0.07
SSL140x2	140.00	1.09	2.00	0.06
SSL140x4	140.00	1.09	4.00	0.08
SSL142x2	142.00	1.11	2.00	0.06
SSL358	142.24	1.11	5.33	0.10
SSL255	142.47	1.11	3.53	0.08
SSL144x3.5	144.00	1.12	3.50	0.08
SSL144x3.7	144.00	1.12	3.70	0.08
SSL144x5	144.00	1.12	5.00	0.10
SSL144.1x8.4	144.10	1.12	8.40	0.12
SSL144.3x5.7	144.30	1.12	5.70	0.10
SSL144.5x3	144.50	1.12	3.00	0.07
SSL145x3	145.00	1.13	3.00	0.07
SSL145x4	145.00	1.13	4.00	0.08
SSL256	145.65	1.13	3.53	0.08
SSL869	146.05	1.13	5.33	0.10
SSL554	148.46	1.15	1.78	0.06
SSL149.3x5.7	149.30	1.16	5.70	0.10
SSL149.5x3	149.50	1.16	3.00	0.07
SSL437	151.77	1.17	6.99	0.10
SSL152x3	152.00	1.17	3.00	0.07
SSL258	152.00	1.17	3.53	0.08
SSL152x5	152.00	1.17	5.00	0.10
SSL163	152.07	1.17	2.62	0.07
SSL154x4	154.00	1.19	4.00	0.08
SSL155x4	155.00	1.19	4.00	0.08
SSL158x6	158.00	1.21	6.00	0.10
SSL362	158.12	1.21	5.33	0.10
SSL159x4	159.00	1.22	4.00	0.08
SSL160x2	160.00	1.23	2.00	0.06
SSL160x3	160.00	1.23	3.00	0.07
SSL160x4	160.00	1.23	4.00	0.08
SSL164.1x8.4	164.10	1.25	8.40	0.12
SSL363	164.47	1.26	5.33	0.10
SSL439	164.47	1.26	6.99	0.12
SSL164.5x3	164.50	1.26	3.00	0.07



Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL260	164.70	1.26	3.53	0.08
SSL165x3.5	165.00	1.26	3.50	0.08
SSL169.5x3	169.50	1.29	3.00	0.07
SSL170x4	170.00	1.29	4.00	0.08
SSL364	170.82	1.30	5.33	0.10
SSL174.3x5.7	174.30	1.32	5.70	0.10
SSL174.5x3	174.50	1.32	3.00	0.07
SSL175x4	175.00	1.33	4.00	0.08
SSL175x5	175.00	1.33	5.00	0.10
SSL365	177.17	1.34	5.33	0.10
SSL441	177.17	1.34	6.99	0.12
SSL262	177.39	1.34	3.53	0.08
SSL180x2.5	180.00	1.36	2.50	0.07
SSL180x4	180.00	1.36	4.00	0.08
SSL183x4	183.00	1.38	4.00	0.08
SSL263	183.75	1.38	3.53	0.08
SSL184.3x5.7	184.30	1.39	5.70	0.10
SSL185x4	185.00	1.39	4.00	0.08
SSL367	189.87	1.42	5.33	0.10
SSL443	189.87	1.42	6.99	0.12
SSL192x3	192.00	1.44	3.00	0.07
SSL194.5x3	194.50	1.45	3.00	0.07
SSL196x3	196.00	1.46	3.00	0.07
SSL444	196.22	1.47	6.99	0.12
SSL197x4	197.00	1.47	4.00	0.08
SSL198x3	198.00	1.48	3.00	0.07
SSL200x4	200.00	1.49	4.00	0.08
SSL369	202.57	1.51	5.33	0.10
SSL445	202.57	1.51	6.99	0.12
SSL204x3	204.00	1.52	3.00	0.07
SSL205x3	205.00	1.52	3.00	0.07
SSL207x4	207.00	1.54	4.00	0.08
SSL208x4.5	208.00	1.54	4.50	0.08
SSL209.3x5.7	209.30	1.55	5.70	0.10
SSL210x3	210.00	1.56	3.00	0.07
SSL210x4	210.00	1.56	4.00	0.08
SSL268	215.50	1.59	3.53	0.08
SSL216x4	216.00	1.60	4.00	0.08
SSL219.1x8.4	219.10	1.62	8.40	0.12
SSL220x4	220.00	1.62	4.00	0.08
SSL372	221.62	1.63	5.33	0.10
SSL269	221.85	1.63	3.53	0.08
SSL225x4	225.00	1.65	4.00	0.08
SSL373	227.97	1.67	5.33	0.10
SSL270	228.20	1.68	3.53	0.08
SSL229.3x5.7	229.30	1.68	5.70	0.10
SSL230x2.5	230.00	1.69	2.50	0.07
SSL230x4	230.00	1.69	4.00	0.08
SSL233x3	233.00	1.71	3.00	0.07
SSL239.3x5.7	239.30	1.75	5.70	0.10
SSL239.5x3	239.50	1.75	3.00	0.07
SSL448	240.67	1.76	6.99	0.12
SSL245x4	245.00	1.78	4.00	0.08
SSL273	247.25	1.80	3.53	0.08
SSL274	253.60	1.84	3.53	0.08
SSL254.6x6.5	254.60	1.85	6.50	0.12
SSL450	266.07	1.92	6.99	0.12

Superior Reference	Internal d_1 (mm)	Tolerances +/-	Cross Section Ø d_2 (mm)	Tolerances +/-
SSL269.3x5.7	269.30	1.94	5.70	0.10
SSL270x4	270.00	1.95	4.00	0.08
SSL684	272.40	1.96	6.99	0.12
SSL275x4	275.00	1.98	4.00	0.08
SSL279.3x5.7	279.30	2.01	5.70	0.10
SSL285x4	285.00	2.04	4.00	0.08
SSL289.3x5.7	289.30	2.07	5.70	0.10
SSL452	291.47	2.09	6.99	0.12
SSL297x4	297.00	2.12	4.00	0.08
SSL299.3x5.7	299.30	2.14	5.70	0.10
SSL307x4	307.00	2.19	4.00	0.08
SSL309.3x5.7	309.30	2.20	5.70	0.10
SSL310x7	310.00	2.20	7.00	0.12
SSL319.3x5.7	319.30	2.26	5.70	0.10
SSL322x4	322.00	2.28	4.00	0.08
SSL323x4	323.00	2.29	4.00	0.08
SSL382	329.57	2.33	5.33	0.10
SSL279	329.80	2.33	3.53	0.08
SSL330x4	330.00	2.33	4.00	0.08
SSL346x4	346.00	2.43	4.00	0.08
SSL349.5x5.7	349.50	2.46	5.70	0.10
SSL355x5.7	355.00	2.49	5.70	0.10
SSL355x7	355.00	2.49	7.00	0.12
SSL359.3x5.7	359.30	2.52	5.70	0.10
SSL370x4	370.00	2.59	4.00	0.08
SSL372x4	372.00	2.60	4.00	0.08
SSL388x6	388.00	2.70	6.00	0.10
SSL462	417.96	2.89	6.99	0.12
SSL283	430.66	2.97	3.53	0.08
SSL284	456.06	3.13	3.53	0.08

Assembly

An o-ring is a precision component requiring care during installation and handling. Many failures of o-rings can be directly related to improper installation. Long-term leak-free o-rings can only be achieved when the correct size for the housing is chosen.

O-ring stretch during assembly

During assembly an o-ring inside diameter can be stretched up to 50% for most compounds, however it is advisable to keep below this value where possible to prevent damage to the o-ring. Sometimes this value may be unachievable, this is particularly true with o-rings of small inside diameter and large section.

It is essential to give the o-ring time to recover, this is especially important during automatic assembly.

Fitting aids and sharp edges

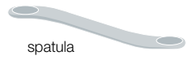
O-rings should not be drawn over sharp edges, threads, slits, bores and splines during fitting. The use of fitting aids during assembly ensures the avoidance of sharp edges and features.

Suitable assembly tools, as detailed, aid location and avoid contact with sharp edges. The aid should be manufactured from materials which will not damage sealing locations and surfaces (e.g. plastic or brass).

For manual assembly or removal of an o-ring from a groove, a spatula-type tool can be manufactured from a soft material. All edges should be smooth, rounded and free from burrs.

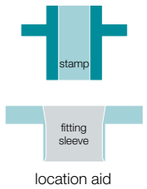
Piston sealing assembly aid

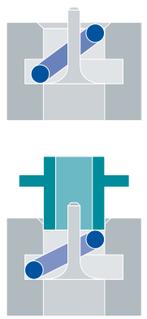
Use of a Fitting Aid



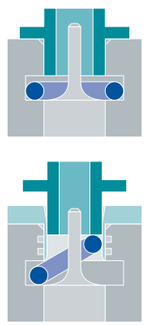
spatula

Rod sealing assembly aids





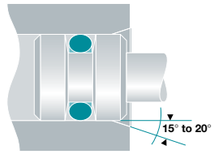
Sequence shows the use of a stamp and location aid.



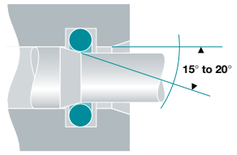
The use of a fitting sleeve to supplement the location aid and stamp further protects the o-ring from sharp edges.

Housing chamfers

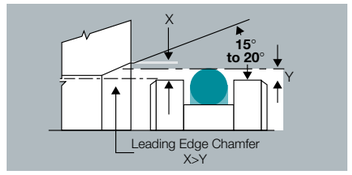
To prevent damaging the o-ring section during assembly, chamfers are necessary on all leading edges, all other edges must be free from burrs. Dimension X should always be greater than dimension Y to ensure trouble free assembly.



Piston assembly

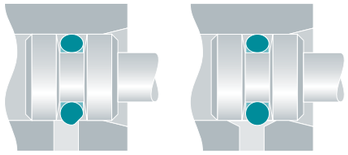


Rod assembly



Traversing cross drilled ports

An o-ring can be sheared when a spool or a rod moves in a bore broken by cross-drilled ports. The deformed o-ring returns to its original round cross section as it enters the port and is sheared as it leaves the drilled area. To avoid this, connection holes should be repositioned. If repositioning is not feasible, an internal chamfer is recommended.



Optimal solution is chamfering the full bore circumference,allowing the o-ring to return to a round cross-section before re-compression.

Rolling

O-rings are at risk from rolling when fitted over a diameter. This risk can be accentuated on large inside-diameter/ small section o-rings. This can result in spiral failure and leakage. To reduce the risk of rolling we recommend that suitable lubrication be applied to the o-ring prior to assembly.

Cleanliness / cleaning materials

At Superior we rigorously control cleanliness at all process stages, particularly during the final post-deflashing cleaning cycle.

All seals are supplied to the customer free from surface silicone film and surface particle contamination (e.g. flash particles).

Foreign particle contamination on seals can cause leakage after assembly.

If applying lubricants, the seal should be assembled immediately into the housing, or protected if placed in storage or transition.

All cleaning media must be compatible with the elastomer.

Storage

Recommended storage conditions for products based on Superior rubber compounds.

Optimum service is the primary objective in the development of any compound at Superior.

We give careful consideration to minimising the compound factors that may adversely affect seal performance. It is in the nature of rubbers that changes can occur during extended component storage and become exacerbated by inappropriate conditions and practices.

Recommended conditions should always be followed.

Light

Sunlight and intense artificial light can cause surface deterioration of rubber components. In extreme cases, this is manifested as shallow crazing.

We recommend that storage of such parts should take place in dark or very low-intensity artificial light conditions.

Humidity

You should avoid conditions where condensation may occur prior to assembly/installation.

Contaminants

Airborne contaminants deposited on the surface of o-rings prior to installation can promote surface attack. Examples include cutting oil mists, powders and active chemicals used in production processes.

In the case of particulates, such contamination can create a leakage path when in service.

As far as is possible, o-rings should be kept in their sealed delivery bags until required for installation.

Stress

Always store o-rings in their unstressed, free state, avoiding distortion and the risk of ozone attack. Large o-rings should never be hung on pegs.

Temperature

Finished components should be stored below 30°C and preferably below 25°C.

Extended exposure to higher temperatures in air can accelerate ageing effects and cause distortion, hardening, elongation loss and impairment of low temperature flexibility.

If inadvertent freezing has occurred, the apparent hardening effect can be reversed by warming to normal ambient temperatures.

Oxygen and ozone

Superior o-rings are supplied in sealed polythene bags which prevent exposure to circulating air and atmospheric impurities.

We recommend that o-rings are kept in these bags until required – it is the combined effect of atmospheric oxygen and temperature that promotes the problems encountered above.

Ozone is present in low concentrations in the atmosphere and at much higher levels near some electrical equipment. It will attack rubber components based upon particular elastomers when they are stretched or distorted. This appears as cracks at right angles to the direction of distortion.

Of all common o-ring elastomers, only nitrile (NBR) is significantly prone to ozone attack.

Once again, storage in the original sealed polythene bags in dark or very low-intensity artificial light conditions offers full protection.

Shelf life

It is practically impossible to define a specific maximum shelf life for finished elastomeric products. To achieve the best results, always rotate stock and store as recommended.

The following table of suggested shelf life is for guidance only.

3 years

- Superior FN
- Superior WN

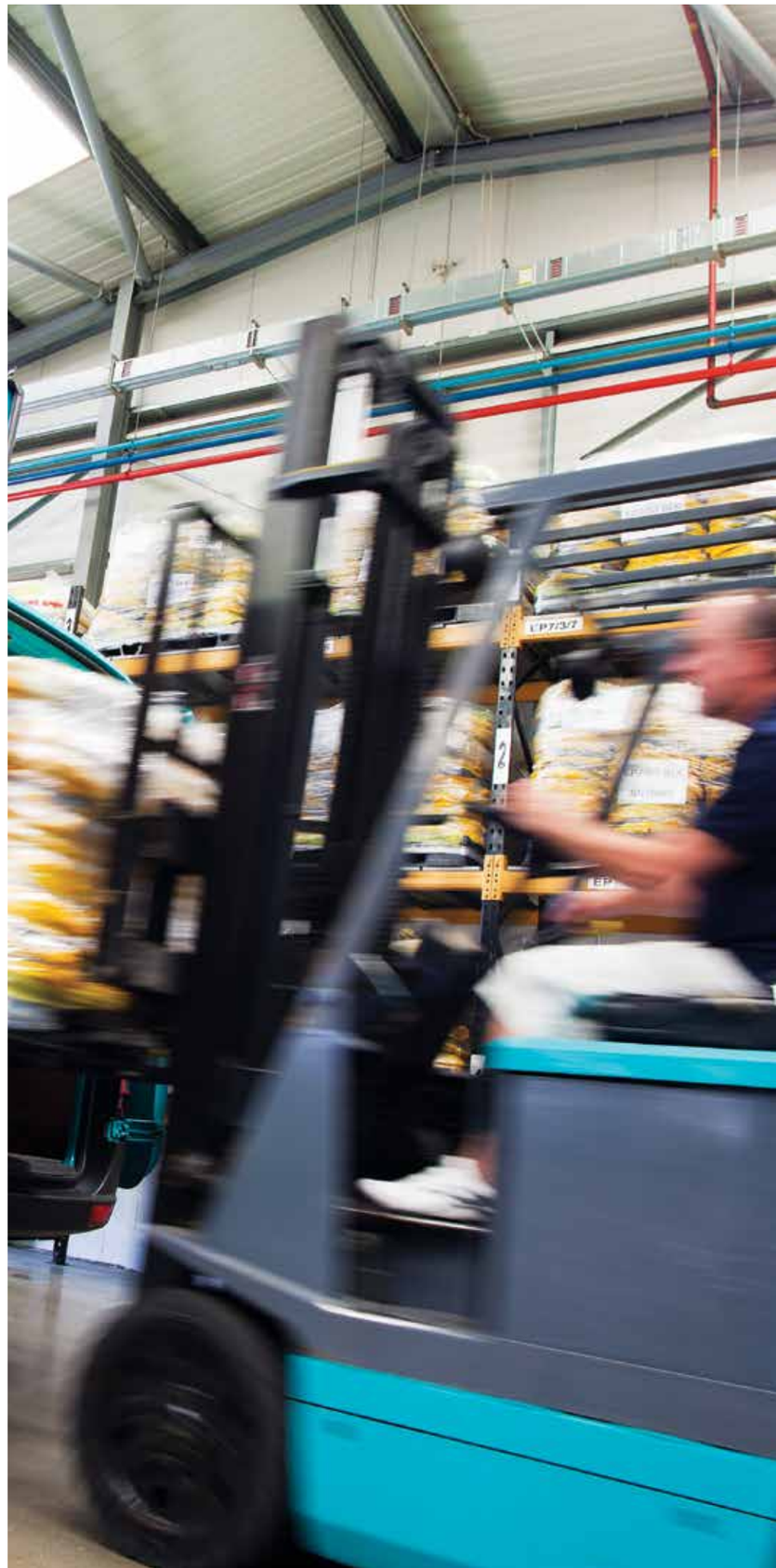
5 years

- Superior LN
- Superior MN
- Superior HN

7 years

- Superior EP
- Superior SIL
- Superior PA
- Superior TH
- Superior VF/VP

These storage times are more conservative than those proposed in BS ISO 2230:2002, 'Controlled storage and packaging of vulcanised rubber and rubber products'.



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