

O-rings



Description

O-rings are circular sealing elements with a circular cross-section. The simplicity of the shape of an O-ring combined with the elasticity of the materials of which O-rings are made give the O-ring universal properties and make it the most widely used sealing element.

O-rings can be produced from many different elastomer materials and a wide range of O-rings of standard materials is available from stock. The bandwidth of available O-rings is so wide and so closely graded that almost any application is covered. O-rings are standardized in DIN ISO 3601 (former DIN 3771).

Special properties

- high operational reliability
- small installation grooves
- simple installation
- cost-effective production
- high availability

Applications

O-ring seals are used in all areas of industrial technology. The applications are divided into static applications (no relative movement between the sealed parts of a machine) and dynamic applications (the sealed parts of a machine move in relation to each other). The vast majority of O-ring are used for static or slowly moving machine parts.

Designation

The common designation of an O-ring provides information on the inner diameter, the cross section, the material and the hardness:

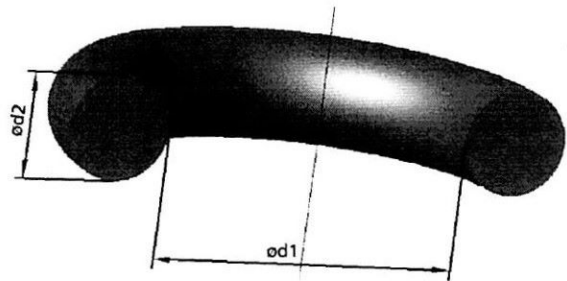
O-ring 50 - 3 NBR 70

inner diameter d_1 in mm

cross section d_2 in mm

material code according to DIN ISO 1629

hardness in Shore A



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	material type	NBR 70
colour	black	

property	unit	test method	test parameter	value
hardness	IRHD	ASTM D 1415		70 ±5
tensile strength	MPa	ASTM D 412		16,2
ultimate elongation	%	ASTM D 412		359
specific gravity	g/cm ³	ASTM D 297		1,28 ±0,03
compression set	%	ASTM D 395 B	22h / 100°C	12
low temp. resistance	°C	ASTM D 2137	brittleness no cracks after 3 min. at	-40
low temp. resistance	°C	ASTM D 1329	TR10	-27

changes of properties after ageing							
medium	test method	time h	tempe- rature °C	hardness points	tensile strength %	ultimate elongation %	Volumen volume %
air	ASTM D 573	70	100	+3	+6	-9	
ASTM IRM oil 901	ASTM D 471	70	100	+3	-12	-7	-8
ASTM IRM oil 903	ASTM D 471	70	100	-6	-9	-14	+9
fuel A	ASTM D 471	70	23	-6	-11	-12	+4
fuel B	ASTM D 471	70	23	-5	-32	-17	+15

material approvals:	DVGW DIN EN 549 H3/B2 (-20...+80°C)
	The above indicated data were determined to the best knowledge according to modern laboratory standards on standardised test specimen. If these data are compared with data which were determined on finished parts it may come to variations.

Quality

Delivery quality

The following delivery quality applies to all standard O-rings for which no other special arrangement has been made:

tolerances according to DIN ISO 3601-1 class B (former DIN 3771-1)

form and surface deviations according to DIN ISO 3601-3 type grade N (former DIN 3771-4 type grade N)

acceptable quality level DIN ISO 2859-1 AQL 1.5

Internal diameter XXL

Many applications of large O-rings are faced with the question of whether O-rings of the required sizes are available, how much they cost and also how they are manufactured.

In addition to the traditional O-rings produced by endless molding, round cord rings of butt-glued or butt-vulcanized round cords are available. The drawbacks of these versions include the distinctly higher cord thickness tolerances and the lower stress bearing capacity of the glued joint. Mold-made O-rings do not have these drawbacks but are substantially more expensive due to the large size of the molds and the need for large presses.

A special manufacturing method with special mold design now enables us to make large O-rings (of 700mm O.D. and larger) as another alternative at a very attractive price.

These O-rings are also made by endless molding. The only difference to the traditional O-ring is the outer shape in the uncompressed state, which is not ideally round. When the ring is slightly expanded when fitted, that deviation disappears. With this development, we can offer you the advantages of endless molded O-rings at distinctly better prices.

Tolerances

Inner diameter tolerances

according to DIN ISO 3601-1 class B (former DIN 3771-1)

The inner diameter tolerances in the table below were calculated using the formula according to DIN ISO 3601-1:

$$\Delta d_1 = \pm [(d_{10,95} \times 0,009) + 0,11]$$

Inner diameter d_1 [mm]			Tolerance Δd_1 [mm]
	$d_1 \leq$	0.53	± 0.11
0.53	$< d_1 \leq$	1.71	± 0.12
1.71	$< d_1 \leq$	2.93	± 0.13
2.93	$< d_1 \leq$	4.17	± 0.14
4.17	$< d_1 \leq$	5.44	± 0.15
5.44	$< d_1 \leq$	6.72	± 0.16
6.72	$< d_1 \leq$	8.01	± 0.17
8.01	$< d_1 \leq$	9.31	± 0.18
9.31	$< d_1 \leq$	10.62	± 0.19
10.62	$< d_1 \leq$	11.94	± 0.20
11.94	$< d_1 \leq$	13.27	± 0.21
13.27	$< d_1 \leq$	14.61	± 0.22
14.61	$< d_1 \leq$	15.95	± 0.23
15.95	$< d_1 \leq$	17.29	± 0.24
17.29	$< d_1 \leq$	18.64	± 0.25
18.64	$< d_1 \leq$	20.00	± 0.26
20.00	$< d_1 \leq$	21.36	± 0.27
21.36	$< d_1 \leq$	22.73	± 0.28
22.73	$< d_1 \leq$	24.10	± 0.29
24.10	$< d_1 \leq$	25.47	± 0.30
25.47	$< d_1 \leq$	26.85	± 0.31
26.85	$< d_1 \leq$	28.23	± 0.32
28.23	$< d_1 \leq$	29.61	± 0.33
29.61	$< d_1 \leq$	31.00	± 0.34
31.00	$< d_1 \leq$	32.39	± 0.35
32.39	$< d_1 \leq$	33.78	± 0.36
33.78	$< d_1 \leq$	35.18	± 0.37
35.18	$< d_1 \leq$	36.58	± 0.38
36.58	$< d_1 \leq$	37.98	± 0.39
37.98	$< d_1 \leq$	39.38	± 0.40
39.38	$< d_1 \leq$	40.79	± 0.41
40.79	$< d_1 \leq$	42.20	± 0.42
42.20	$< d_1 \leq$	43.61	± 0.43
43.61	$< d_1 \leq$	45.02	± 0.44
45.02	$< d_1 \leq$	46.44	± 0.45
46.44	$< d_1 \leq$	47.86	± 0.46
47.86	$< d_1 \leq$	49.28	± 0.47
49.28	$< d_1 \leq$	50.70	± 0.48
50.70	$< d_1 \leq$	52.12	± 0.49
52.12	$< d_1 \leq$	53.55	± 0.50
53.55	$< d_1 \leq$	54.98	± 0.51
54.98	$< d_1 \leq$	56.41	± 0.52
56.41	$< d_1 \leq$	57.84	± 0.53
57.84	$< d_1 \leq$	59.27	± 0.54

Inner diameter d_1 [mm]			Tolerance Δd_1 [mm]
59.27	$< d_1 \leq$	60.71	± 0.55
60.71	$< d_1 \leq$	62.14	± 0.56
62.14	$< d_1 \leq$	63.58	± 0.57
63.58	$< d_1 \leq$	65.02	± 0.58
65.02	$< d_1 \leq$	66.47	± 0.59
66.47	$< d_1 \leq$	67.91	± 0.60
67.91	$< d_1 \leq$	69.35	± 0.61
69.35	$< d_1 \leq$	70.80	± 0.62
70.80	$< d_1 \leq$	72.25	± 0.63
72.25	$< d_1 \leq$	73.70	± 0.64
73.70	$< d_1 \leq$	75.15	± 0.65
75.15	$< d_1 \leq$	76.60	± 0.66
76.60	$< d_1 \leq$	78.05	± 0.67
78.05	$< d_1 \leq$	79.51	± 0.68
79.51	$< d_1 \leq$	80.97	± 0.69
80.97	$< d_1 \leq$	82.42	± 0.70
82.42	$< d_1 \leq$	83.88	± 0.71
83.88	$< d_1 \leq$	85.34	± 0.72
85.34	$< d_1 \leq$	86.80	± 0.73
86.80	$< d_1 \leq$	88.27	± 0.74
88.27	$< d_1 \leq$	89.73	± 0.75
89.73	$< d_1 \leq$	91.20	± 0.76
91.20	$< d_1 \leq$	92.66	± 0.77
92.66	$< d_1 \leq$	94.13	± 0.78
94.13	$< d_1 \leq$	95.60	± 0.79
95.60	$< d_1 \leq$	97.07	± 0.80
97.07	$< d_1 \leq$	98.54	± 0.81
98.54	$< d_1 \leq$	100.01	± 0.82
100.01	$< d_1 \leq$	101.48	± 0.83
101.48	$< d_1 \leq$	102.96	± 0.84
102.96	$< d_1 \leq$	104.43	± 0.85
104.43	$< d_1 \leq$	105.91	± 0.86
105.91	$< d_1 \leq$	107.39	± 0.87
107.39	$< d_1 \leq$	108.86	± 0.88
108.86	$< d_1 \leq$	110.34	± 0.89
110.34	$< d_1 \leq$	111.82	± 0.90
111.82	$< d_1 \leq$	113.30	± 0.91
113.30	$< d_1 \leq$	114.79	± 0.92
114.79	$< d_1 \leq$	116.27	± 0.93
116.27	$< d_1 \leq$	117.75	± 0.94
117.75	$< d_1 \leq$	119.24	± 0.95
119.24	$< d_1 \leq$	120.72	± 0.96
120.72	$< d_1 \leq$	122.21	± 0.97
122.21	$< d_1 \leq$	123.70	± 0.98

Inner diameter d_1 [mm]	Tolerance Δd_1 [mm]
123.70 < d_1 ≤ 125.19	± 0.99
125.19 < d_1 ≤ 126.68	± 1.00
126.68 < d_1 ≤ 128.17	± 1.01
128.17 < d_1 ≤ 129.66	± 1.02
129.66 < d_1 ≤ 131.15	± 1.03
131.15 < d_1 ≤ 132.64	± 1.04
132.64 < d_1 ≤ 134.14	± 1.05
134.14 < d_1 ≤ 135.63	± 1.06
135.63 < d_1 ≤ 137.13	± 1.07
137.13 < d_1 ≤ 138.62	± 1.08
138.62 < d_1 ≤ 140.12	± 1.09
140.12 < d_1 ≤ 141.62	± 1.10
141.62 < d_1 ≤ 143.12	± 1.11
143.12 < d_1 ≤ 144.62	± 1.12
144.62 < d_1 ≤ 146.12	± 1.13
146.12 < d_1 ≤ 147.62	± 1.14
147.62 < d_1 ≤ 149.12	± 1.15
149.12 < d_1 ≤ 150.62	± 1.16
150.62 < d_1 ≤ 152.13	± 1.17
152.13 < d_1 ≤ 153.63	± 1.18
153.63 < d_1 ≤ 155.13	± 1.19
155.13 < d_1 ≤ 156.64	± 1.20
156.64 < d_1 ≤ 158.15	± 1.21
158.15 < d_1 ≤ 159.65	± 1.22
159.65 < d_1 ≤ 161.16	± 1.23
161.16 < d_1 ≤ 162.67	± 1.24
162.67 < d_1 ≤ 164.18	± 1.25
164.18 < d_1 ≤ 165.69	± 1.26
165.69 < d_1 ≤ 167.20	± 1.27
167.20 < d_1 ≤ 168.71	± 1.28
168.71 < d_1 ≤ 170.22	± 1.29
170.22 < d_1 ≤ 171.73	± 1.30
171.73 < d_1 ≤ 173.25	± 1.31
173.25 < d_1 ≤ 174.76	± 1.32
174.76 < d_1 ≤ 176.28	± 1.33
176.28 < d_1 ≤ 177.79	± 1.34
177.79 < d_1 ≤ 179.31	± 1.35
179.31 < d_1 ≤ 180.82	± 1.36
180.82 < d_1 ≤ 182.34	± 1.37
182.34 < d_1 ≤ 183.86	± 1.38
183.86 < d_1 ≤ 185.38	± 1.39
185.38 < d_1 ≤ 186.89	± 1.40
186.89 < d_1 ≤ 188.41	± 1.41
188.41 < d_1 ≤ 189.93	± 1.42

Inner diameter d_1 [mm]	Tolerance Δd_1 [mm]
189.93 < d_1 ≤ 191.45	± 1.43
191.45 < d_1 ≤ 192.98	± 1.44
192.98 < d_1 ≤ 194.50	± 1.45
194.50 < d_1 ≤ 196.02	± 1.46
196.02 < d_1 ≤ 197.54	± 1.47
197.54 < d_1 ≤ 199.07	± 1.48
199.07 < d_1 ≤ 200.59	± 1.49
200.59 < d_1 ≤ 202.12	± 1.50
202.12 < d_1 ≤ 203.64	± 1.51
203.64 < d_1 ≤ 205.17	± 1.52
205.17 < d_1 ≤ 206.69	± 1.53
206.69 < d_1 ≤ 208.22	± 1.54
208.22 < d_1 ≤ 209.75	± 1.55
209.75 < d_1 ≤ 211.28	± 1.56
211.28 < d_1 ≤ 212.81	± 1.57
212.81 < d_1 ≤ 214.34	± 1.58
214.34 < d_1 ≤ 215.87	± 1.59
215.87 < d_1 ≤ 217.40	± 1.60
217.40 < d_1 ≤ 218.93	± 1.61
218.93 < d_1 ≤ 220.46	± 1.62
220.46 < d_1 ≤ 221.99	± 1.63
221.99 < d_1 ≤ 223.52	± 1.64
223.52 < d_1 ≤ 225.06	± 1.65
225.06 < d_1 ≤ 226.59	± 1.66
226.59 < d_1 ≤ 228.12	± 1.67
228.12 < d_1 ≤ 229.66	± 1.68
229.66 < d_1 ≤ 231.19	± 1.69
231.19 < d_1 ≤ 232.73	± 1.70
232.73 < d_1 ≤ 234.27	± 1.71
234.27 < d_1 ≤ 235.80	± 1.72
235.80 < d_1 ≤ 237.34	± 1.73
237.34 < d_1 ≤ 238.88	± 1.74
238.88 < d_1 ≤ 240.42	± 1.75
240.42 < d_1 ≤ 241.95	± 1.76
241.95 < d_1 ≤ 243.49	± 1.77
243.49 < d_1 ≤ 245.03	± 1.78
245.03 < d_1 ≤ 246.57	± 1.79
246.57 < d_1 ≤ 248.11	± 1.80
248.11 < d_1 ≤ 249.66	± 1.81
249.66 < d_1 ≤ 251.20	± 1.82
251.20 < d_1 ≤ 252.74	± 1.83
252.74 < d_1 ≤ 254.28	± 1.84
254.28 < d_1 ≤ 255.82	± 1.85
255.82 < d_1 ≤ 257.37	± 1.86

Inner diameter d_1 [mm]	Tolerance Δd_1 [mm]
257.37 < d_1 ≤ 258.91	± 1.87
258.91 < d_1 ≤ 260.46	± 1.88
260.46 < d_1 ≤ 262.00	± 1.89
262.00 < d_1 ≤ 263.55	± 1.90
263.55 < d_1 ≤ 265.09	± 1.91
265.09 < d_1 ≤ 266.64	± 1.92
266.64 < d_1 ≤ 268.18	± 1.93
268.18 < d_1 ≤ 269.73	± 1.94
269.73 < d_1 ≤ 271.28	± 1.95
271.28 < d_1 ≤ 272.83	± 1.96
272.83 < d_1 ≤ 274.38	± 1.97
274.38 < d_1 ≤ 275.92	± 1.98
275.92 < d_1 ≤ 277.47	± 1.99
277.47 < d_1 ≤ 279.02	± 2.00
279.02 < d_1 ≤ 280.57	± 2.01
280.57 < d_1 ≤ 282.12	± 2.02
282.12 < d_1 ≤ 283.68	± 2.03
283.68 < d_1 ≤ 285.23	± 2.04
285.23 < d_1 ≤ 286.78	± 2.05
286.78 < d_1 ≤ 288.33	± 2.06
288.33 < d_1 ≤ 289.88	± 2.07
289.88 < d_1 ≤ 291.44	± 2.08
291.44 < d_1 ≤ 292.99	± 2.09
292.99 < d_1 ≤ 294.54	± 2.10
294.54 < d_1 ≤ 296.10	± 2.11
296.10 < d_1 ≤ 297.65	± 2.12
297.65 < d_1 ≤ 299.21	± 2.13
299.21 < d_1 ≤ 300.76	± 2.14
300.76 < d_1 ≤ 302.32	± 2.15
302.32 < d_1 ≤ 303.88	± 2.16
303.88 < d_1 ≤ 305.43	± 2.17
305.43 < d_1 ≤ 306.99	± 2.18
306.99 < d_1 ≤ 308.55	± 2.19
308.55 < d_1 ≤ 310.11	± 2.20
310.11 < d_1 ≤ 311.66	± 2.21
311.66 < d_1 ≤ 313.22	± 2.22
313.22 < d_1 ≤ 314.78	± 2.23
314.78 < d_1 ≤ 316.34	± 2.24
316.34 < d_1 ≤ 317.90	± 2.25
317.90 < d_1 ≤ 319.46	± 2.26
319.46 < d_1 ≤ 321.02	± 2.27
321.02 < d_1 ≤ 322.58	± 2.28
322.58 < d_1 ≤ 324.15	± 2.29
324.15 < d_1 ≤ 325.71	± 2.30

Inner diameter d_1 [mm]	Tolerance Δd_1 [mm]
325.71 < d_1 ≤ 327.27	± 2.31
327.27 < d_1 ≤ 328.83	± 2.32
328.83 < d_1 ≤ 330.39	± 2.33
330.39 < d_1 ≤ 331.96	± 2.34
331.96 < d_1 ≤ 333.52	± 2.35
333.52 < d_1 ≤ 335.09	± 2.36
335.09 < d_1 ≤ 336.65	± 2.37
336.65 < d_1 ≤ 338.21	± 2.38
338.21 < d_1 ≤ 339.78	± 2.39
339.78 < d_1 ≤ 341.35	± 2.40
341.35 < d_1 ≤ 342.91	± 2.41
342.91 < d_1 ≤ 344.48	± 2.42
344.48 < d_1 ≤ 346.04	± 2.43
346.04 < d_1 ≤ 347.61	± 2.44
347.61 < d_1 ≤ 349.18	± 2.45
349.18 < d_1 ≤ 350.75	± 2.46
350.75 < d_1 ≤ 352.31	± 2.47
352.31 < d_1 ≤ 353.88	± 2.48
353.88 < d_1 ≤ 355.45	± 2.49
355.45 < d_1 ≤ 357.02	± 2.50
357.02 < d_1 ≤ 358.59	± 2.51
358.59 < d_1 ≤ 360.16	± 2.52
360.16 < d_1 ≤ 361.73	± 2.53
361.73 < d_1 ≤ 363.30	± 2.54
363.30 < d_1 ≤ 364.87	± 2.55
364.87 < d_1 ≤ 366.44	± 2.56
366.44 < d_1 ≤ 368.01	± 2.57
368.01 < d_1 ≤ 369.58	± 2.58
369.58 < d_1 ≤ 371.16	± 2.59
371.16 < d_1 ≤ 372.73	± 2.60
372.73 < d_1 ≤ 374.30	± 2.61
374.30 < d_1 ≤ 375.87	± 2.62
375.87 < d_1 ≤ 377.45	± 2.63
377.45 < d_1 ≤ 379.02	± 2.64
379.02 < d_1 ≤ 380.59	± 2.65
380.59 < d_1 ≤ 382.17	± 2.66
382.17 < d_1 ≤ 383.74	± 2.67
383.74 < d_1 ≤ 385.32	± 2.68
385.32 < d_1 ≤ 386.89	± 2.69
386.89 < d_1 ≤ 388.47	± 2.70
388.47 < d_1 ≤ 390.05	± 2.71
390.05 < d_1 ≤ 391.62	± 2.72
391.62 < d_1 ≤ 393.20	± 2.73
393.20 < d_1 ≤ 394.78	± 2.74

Inner diameter d_1 [mm]	Tolerance Δd_1 [mm]
394.78 < d_1 ≤ 396.35	± 2.75
396.35 < d_1 ≤ 397.93	± 2.76
397.93 < d_1 ≤ 399.51	± 2.77
399.51 < d_1 ≤ 401.09	± 2.78
401.09 < d_1 ≤ 402.66	± 2.79
402.66 < d_1 ≤ 404.24	± 2.80
404.24 < d_1 ≤ 405.82	± 2.81
405.82 < d_1 ≤ 407.40	± 2.82
407.40 < d_1 ≤ 408.98	± 2.83
408.98 < d_1 ≤ 410.56	± 2.84
410.56 < d_1 ≤ 412.14	± 2.85
412.14 < d_1 ≤ 413.72	± 2.86
413.72 < d_1 ≤ 415.30	± 2.87
415.30 < d_1 ≤ 416.89	± 2.88
416.89 < d_1 ≤ 418.47	± 2.89
418.47 < d_1 ≤ 420.05	± 2.90
420.05 < d_1 ≤ 421.63	± 2.91
421.63 < d_1 ≤ 423.21	± 2.92
423.21 < d_1 ≤ 424.80	± 2.93
424.80 < d_1 ≤ 426.38	± 2.94
426.38 < d_1 ≤ 427.96	± 2.95
427.96 < d_1 ≤ 429.55	± 2.96
429.55 < d_1 ≤ 431.13	± 2.97
431.13 < d_1 ≤ 432.71	± 2.98
432.71 < d_1 ≤ 434.30	± 2.99
434.30 < d_1 ≤ 435.88	± 3.00
435.88 < d_1 ≤ 437.47	± 3.01
437.47 < d_1 ≤ 439.05	± 3.02
439.05 < d_1 ≤ 440.64	± 3.03
440.64 < d_1 ≤ 442.22	± 3.04
442.22 < d_1 ≤ 443.81	± 3.05
443.81 < d_1 ≤ 445.40	± 3.06
445.40 < d_1 ≤ 446.98	± 3.07
446.98 < d_1 ≤ 448.57	± 3.08
448.57 < d_1 ≤ 450.16	± 3.09
450.16 < d_1 ≤ 451.75	± 3.10
451.75 < d_1 ≤ 453.33	± 3.11
453.33 < d_1 ≤ 454.92	± 3.12
454.92 < d_1 ≤ 456.51	± 3.13
456.51 < d_1 ≤ 458.10	± 3.14
458.10 < d_1 ≤ 459.69	± 3.15
459.69 < d_1 ≤ 461.28	± 3.16
461.28 < d_1 ≤ 462.87	± 3.17
462.87 < d_1 ≤ 464.46	± 3.18

Inner diameter d_1 [mm]	Tolerance Δd_1 [mm]
464.46 < d_1 ≤ 466.05	± 3.19
466.05 < d_1 ≤ 467.64	± 3.20
467.64 < d_1 ≤ 469.23	± 3.21
469.23 < d_1 ≤ 470.82	± 3.22
470.82 < d_1 ≤ 472.41	± 3.23
472.41 < d_1 ≤ 474.00	± 3.24
474.00 < d_1 ≤ 475.59	± 3.25
475.59 < d_1 ≤ 477.19	± 3.26
477.19 < d_1 ≤ 478.78	± 3.27
478.78 < d_1 ≤ 480.37	± 3.28
480.37 < d_1 ≤ 481.96	± 3.29
481.96 < d_1 ≤ 483.56	± 3.30
483.56 < d_1 ≤ 485.15	± 3.31
485.15 < d_1 ≤ 486.74	± 3.32
486.74 < d_1 ≤ 488.34	± 3.33
488.34 < d_1 ≤ 489.93	± 3.34
489.93 < d_1 ≤ 491.52	± 3.35
491.52 < d_1 ≤ 493.12	± 3.36
493.12 < d_1 ≤ 494.71	± 3.37
494.71 < d_1 ≤ 496.31	± 3.38
496.31 < d_1 ≤ 497.90	± 3.39
497.90 < d_1 ≤ 499.50	± 3.40
499.50 < d_1 ≤ 501.10	± 3.41
501.10 < d_1 ≤ 502.69	± 3.42
502.69 < d_1 ≤ 504.29	± 3.43
504.29 < d_1 ≤ 505.89	± 3.44
505.89 < d_1 ≤ 507.48	± 3.45
507.48 < d_1 ≤ 509.08	± 3.46
509.08 < d_1 ≤ 510.68	± 3.47
510.68 < d_1 ≤ 512.27	± 3.48
512.27 < d_1 ≤ 513.87	± 3.49
513.87 < d_1 ≤ 515.47	± 3.50
515.47 < d_1 ≤ 517.07	± 3.51
517.07 < d_1 ≤ 518.67	± 3.52
518.67 < d_1 ≤ 520.27	± 3.53
520.27 < d_1 ≤ 521.87	± 3.54
521.87 < d_1 ≤ 523.46	± 3.55
523.46 < d_1 ≤ 525.06	± 3.56
525.06 < d_1 ≤ 526.66	± 3.57
526.66 < d_1 ≤ 528.26	± 3.58
528.26 < d_1 ≤ 529.86	± 3.59
529.86 < d_1 ≤ 531.46	± 3.60
531.46 < d_1 ≤ 533.07	± 3.61
533.07 < d_1 ≤ 534.67	± 3.62

Inner diameter d_1 [mm]	Tolerance Δd_1 [mm]
534.67 < d_1 ≤ 536.27	± 3.63
536.27 < d_1 ≤ 537.87	± 3.64
537.87 < d_1 ≤ 539.47	± 3.65
539.47 < d_1 ≤ 541.07	± 3.66
541.07 < d_1 ≤ 542.68	± 3.67
542.68 < d_1 ≤ 544.28	± 3.68
544.28 < d_1 ≤ 545.88	± 3.69
545.88 < d_1 ≤ 547.48	± 3.70
547.48 < d_1 ≤ 549.09	± 3.71
549.09 < d_1 ≤ 550.69	± 3.72
550.69 < d_1 ≤ 552.29	± 3.73
552.29 < d_1 ≤ 553.90	± 3.74
553.90 < d_1 ≤ 555.50	± 3.75
555.50 < d_1 ≤ 557.11	± 3.76
557.11 < d_1 ≤ 558.71	± 3.77
558.71 < d_1 ≤ 560.32	± 3.78
560.32 < d_1 ≤ 561.92	± 3.79
561.92 < d_1 ≤ 563.53	± 3.80
563.53 < d_1 ≤ 565.13	± 3.81
565.13 < d_1 ≤ 566.74	± 3.82
566.74 < d_1 ≤ 568.34	± 3.83
568.34 < d_1 ≤ 569.95	± 3.84
569.95 < d_1 ≤ 571.56	± 3.85
571.56 < d_1 ≤ 573.16	± 3.86
573.16 < d_1 ≤ 574.77	± 3.87
574.77 < d_1 ≤ 576.38	± 3.88
576.38 < d_1 ≤ 577.98	± 3.89
577.98 < d_1 ≤ 579.59	± 3.90
579.59 < d_1 ≤ 581.20	± 3.91
581.20 < d_1 ≤ 582.81	± 3.92
582.81 < d_1 ≤ 584.42	± 3.93
584.42 < d_1 ≤ 586.02	± 3.94
586.02 < d_1 ≤ 587.63	± 3.95
587.63 < d_1 ≤ 589.24	± 3.96
589.24 < d_1 ≤ 590.85	± 3.97
590.85 < d_1 ≤ 592.46	± 3.98
592.46 < d_1 ≤ 594.07	± 3.99
594.07 < d_1 ≤ 595.68	± 4.00
595.68 < d_1 ≤ 597.29	± 4.01
597.29 < d_1 ≤ 598.90	± 4.02
598.90 < d_1 ≤ 600.00	± 4.03
d_1 > 600.00	acc. to formula

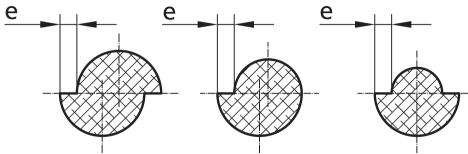
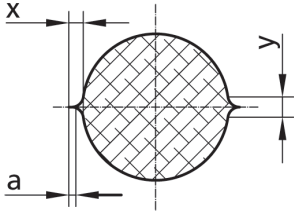
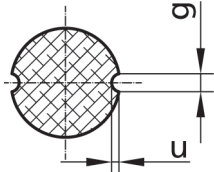
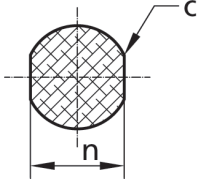
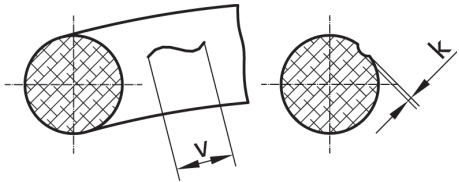
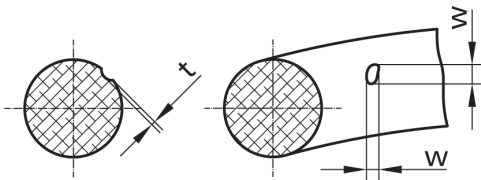
Cross section tolerances

acc. to DIN ISO 3601-1 class B (former DIN 3771-1)

Cross section d_2 [mm]	Tolerance [mm]
d_2 ≤ 0.80	± 0.08
0.80 < d_2 ≤ 2.25	± 0.08
2.25 < d_2 ≤ 3.15	± 0.09
3.15 < d_2 ≤ 4.50	± 0.10
4.50 < d_2 ≤ 6.30	± 0.13
6.30 < d_2 ≤ 8.40	± 0.15
8.40 < d_2 ≤ 10.00	± 0.20
10.00 < d_2 ≤ 12.00	± 0.25
d_2 > 12.00	on inquiry

Surface imperfections
acc. to ISO 3601-3

Maximum limits of imperfection for O-rings **Grade N**

Surface imperfection type	Diagrammatic representation	Dimensions	Maximum limits of imperfection Grade N for O-rings Cross section, d_2				
			> 0.80 ^b ≤ 2.25	> 2.25 ≤ 3.15	> 3.15 ≤ 4.50	> 4.50 ≤ 6.30	> 6.30 ≤ 8,40 ^b
Off-register, mismatch (offset)		e	0.08	0.10	0.13	0.15	0.15
Combined flash (combination of offset, flash and parting line projection)		x	0.10	0.12	0.14	0.16	0.18
		y	0.10	0.12	0.14	0.16	0.18
		a	When the flash can be differentiated, it shall not exceed 0.07mm.				
Backrind		g	0.18	0.27	0.36	0.53	0.70
		u	0.08	0.08	0.10	0.10	0.13
Excessive trimming (radial tool marks not allowed)		n	Trimming is allowed provided the dimension n is not reduced below the minimum diameter d_2 for the O-ring.				
Flow marks (radial orientation of flow marks is not permissible)		v	1.50 ^a	1.50 ^a	6.50 ^a	6.50 ^a	6.50 ^a
		k	0.08	0.08	0.08	0.08	0.08
Non-fills and indentations (including parting line indentations)		w	0.60	0.80	1.00	1.30	1.70
		t	0.08	0.08	0.10	0.10	0.13
Foreign material	-	-	not allowed				

^a Or 0.05 times the O-rings diameter (d_1) whichever is greater.

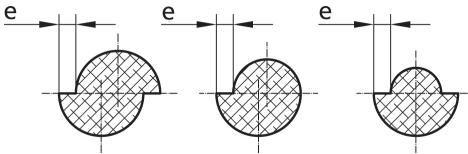
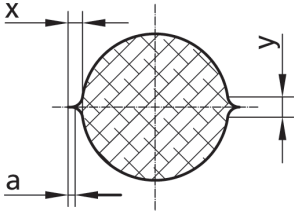
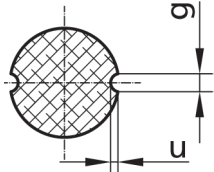
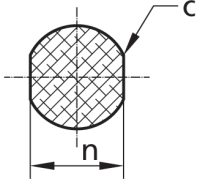
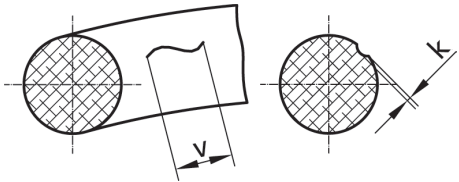
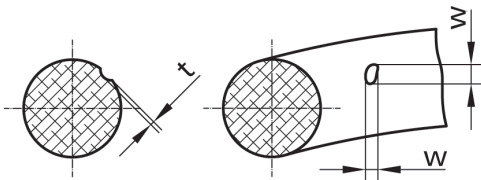
^b Limits of imperfections for cross sections < 0.80 mm or > 8.40 mm shall be agreed upon between manufacturer and customer.

^c Rounded edges.

All dimensions in mm.

Surface imperfections
acc. to ISO 3601-3

Maximum limits of imperfection for O-rings **Grade S**

Surface imperfection type	Diagrammatic representation	Dimensions	Maximum limits of imperfection Grade S for O-rings Cross section, d_2				
			> 0.80 ^b ≤ 2.25	> 2.25 ≤ 3.15	> 3.15 ≤ 4.50	> 4.50 ≤ 6.30	> 6.30 ≤ 8,40 ^b
Off-register, mismatch (offset)		e	0.08	0.08	0.10	0.12	0.13
Combined flash (combination of offset, flash and parting line projection)		x	0.10	0.10	0.13	0.15	0.15
		y	0.10	0.10	0.13	0.15	0.15
		a	When the flash can be differentiated, it shall not exceed 0.07mm.				
Backrind		g	0.10	0.15	0.20	0.20	0.30
		u	0.05	0.08	0.10	0.10	0.13
Excessive trimming (radial tool marks not allowed)		n	Trimming is allowed provided the dimension n is not reduced below the minimum diameter d_2 for the O-ring.				
Flow marks (radial orientation of flow marks is not permissible)		v	1.50 ^a	1.50 ^a	5.00 ^a	5.00 ^a	5.00 ^a
		k	0.05	0.05	0.05	0.05	0.05
Non-fills and indentations (including parting line indentations)		w	0.15	0.25	0.40	0.63	1.00
		t	0.08	0.08	0.10	0.10	0.13
Foreign material	-	-	not allowed				

^a Or 0.05 times the O-rings diameter (d_1) whichever is greater.

^b Limits of imperfections for cross sections < 0.80 mm or > 8.40 mm shall be agreed upon between manufacturer and customer.

^c Rounded edges.

All dimensions in mm.

Tests on O-rings

The inner diameter d_1 is measured by conical plug gauges or stepped plug gauges. Alternatively the inner diameter can be measured by optical instruments or a circumference tape is used for large diameters.

The cross section d_2 is measured by a thickness gauge with reduced contact pressure. Alternatively, optical measuring methods can be applied. Form and surface accuracy is tested visually.

The hardness test, depending on the size of the O-ring, is made according to DIN ISO 7619-1 (DIN 53505) Shore A or DIN ISO 48 (IRHD Micro). The tolerance for hardness tests is ± 5 points.