INTERNATIONAL STANDARD

ISO 3601-1

Third edition
2002-08-01

Fluid power systems — O-rings —

Part 1: Inside diameters, cross-sections, tolerances and size identification code

Transmissions hydrauliques et pneumatiques — Joints toriques —

Partie 1: Diamètres intérieurs, sections, tolérances et code d'identification dimensionnelle

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 3601 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 3601-1 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 7, *Sealing devices*.

This third edition cancels and replaces the second edition (ISO 3601-1:1988), which has been technically revised.

ISO 3601 consists of the following parts, under the general title *Fluid power systems — O-rings*:

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— *Part 1: Inside diameters, cross-sections, tolerances and size identification code*

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— *Part 2: Housing dimensions for general applications*

— *Part 3: Quality acceptance criteria*

— *Part 4: Anti-extrusion devices (back-up rings)*

— *Part 5: Suitability of elastomeric materials for industrial applications*

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Introduction

In fluid power systems, power is transmitted and controlled through a fluid (liquid or gas) under pressure within an enclosed circuit. Components need to be designed to meet these requirements under varying conditions. Testing of components to meet performance requirements provides users with a basis of assurance for determining design application and for checking component compliance with their stated requirements.

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Fluid power systems — O-rings —

Part 1: Inside diameters, cross-sections, tolerances and size identification code

1 Scope

This part of ISO 3601 specifies the inside diameters, cross-sections, tolerances and size identification code for O-rings used in fluid power systems for general purpose applications (series G), as well as for aerospace and similar applications (series A).

The dimensions and tolerances specified in this part of ISO 3601 are suitable for any elastomeric material, provided that suitable tooling is available.

NOTE The tooling most commonly available is based on 70 IRHD NBR shrinkage rates (see ISO 48). For materials that shrink differently from this standard NBR compound, a special mould can be required to maintain the mean diameters and the tolerance limits listed.

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2 Normative references

ISO 3601-1:2002

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 3601. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 3601 are encouraged to investigate the possibility of applying the most recent additions of the normative documents indicated below. For undated references, the last edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 3601-3:—[1)], *Fluid power systems — O-rings — Part 3: Quality acceptance criteria*

ISO 5598, *Fluid power systems and components — Vocabulary*

3 Terms and definitions

For the purposes of this part of ISO 3601, the terms and definitions given in ISO 5598 apply.

NOTE Throughout this part of ISO 3601, the term “O-ring” has been adopted, although the correct term is “toroidal sealing ring”.

1) To be published. (Revision of ISO 3601-3:1987)

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4 Symbols

The following symbols are used in this part of ISO 3601:

d_1 O-ring inside diameter;

d_2 O-ring cross-section diameter.

5 Configuration

The shape of the O-ring shall be toroidal, as shown in Figure 1.

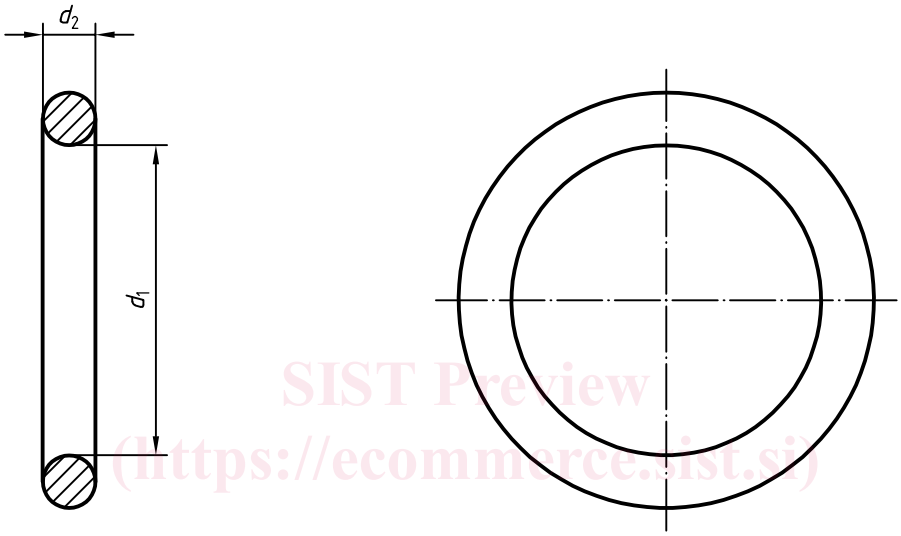

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Figure 1 — Typical O-ring configuration

6 Inside diameters, d_1, cross-sections (section diameter), d_2, and tolerances

The combination of inside diameters, cross-sections and tolerances shall be chosen from Table 2 for general purpose applications (series G) or from Table 3 for aerospace and similar applications, where smaller tolerance limits are recommended (series A).

See note in clause 1.

NOTE Most of the dimensions for the inside diameter were selected from the series of preferred numbers (see ISO 3).

The tolerances for the inside diameters d_1 of series G (Table 2) were calculated using the following formula:

$$\text{Tolerance } d_1 = \pm\,[(\,d_1^{0,95} \times 0{,}009) + 0{,}11]$$

The tolerances for the inside diameters d_1 of series A (Table 3) were calculated using the following formula:

$$\text{Tolerance } d_1 = \pm\,[(\,d_1^{0,96} \times 0{,}007) + 0{,}09]$$

The calculated results shall be rounded to two places after the comma from 5 to 9 in the third place to the next higher 1/100 mm and from 1 to 4 in the third place to the next lower 1/100 mm.

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7 Size identification code

O-rings in accordance with Table 2 or Table 3 shall be designated by the inside diameter d_1 followed by the cross-section (section diameter) d_2, the series letter (G or A), the grade letter (N or S) according to Table 1 of ISO 3601-3:— and this part of ISO 3601. Examples are given in Table 1.

Table 1 — Size identification code for O-rings (examples)

Dimensions in millimetres

Inside diameter d_1	Cross-section d_2	Series letter (G or A)	Grade letter (N or S)	Size code
7,5	1,8	G	S	O-ring 7,5 × 1,8 -G-S-ISO 3601-1
32,5	2,65	A	N	O-ring 32,5 × 2,65-A-N-ISO 3601-1
167,5	3,55	A	S	O-ring 167,5 × 3,55-A-S-ISO 3601-1
268	5,3	G	N	O-ring 268 × 5,3-G-N-ISO 3601-1
515	7	G	N	O-ring 515 × 7-G-N-ISO 3601-1

8 Identification statement (Reference to this part of ISO 3601)

Manufacturers are strongly recommended to use the following statement in test reports, catalogues and sales literature when electing to comply with this part of ISO 3601:

"Inside diameters, cross-sections, tolerances and size identification code are in accordance with ISO 3601-1:2002, *Fluid power systems — O-rings — Part 1: Inside diameters, cross-sections, tolerances and size identification code*."

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Table 2 — Inside diameters, cross-sections and tolerances for general applications (series G)

Dimensions in millimetres

d_1		d_2				
	tol. ±	1,8 ± 0,08	2,65 ± 0,09	3,55 ± 0,1	5,3 ± 0,13	7 ± 0,15
1,8	0,13	x				
2	0,13	x				
2,24	0,13	x				
2,5	0,13	x				
2,8	0,13	x				
3,15	0,14	x				
3,55	0,14	x				
3,75	0,14	x				
4	0,14	x				
4,5	0,15	x				
4,75	0,15	x				
4,87	0,15	x				
5	0,15	x				
5,15	0,15	x				
5,3	0,15	x				
5,6	0,16	x				
6	0,16	x				
6,3	0,16	x				
6,7	0,16	x				
6,9	0,16	x				
7,1	0,16	x				
7,5	0,17	x				
8	0,17	x				
8,5	0,17	x				
8,75	0,18	x				
9	0,18	x				
9,5	0,18	x				
9,75	0,18	x				
10	0,19	x				
10,6	0,19	x				
11,2	0,20	x				
11,6	0,20	x				
11,8	0,19	x				
12,1	0,21	x				
12,5	0,21	x				
12,8	0,21	x				
13,2	0,21	x				
14	0,22	x	x			
14,5	0,22	x	x			
15	0,22	x	x			
15,5	0,23	x	x			
16	0,23	x	x			
17	0,24	x	x			
18	0,25	x	x	x		
19	0,25	x	x	x		
20	0,26	x	x	x		
20,6	0,26	x	x	x		
21,2	0,27	x	x	x		
22,4	0,28	x	x	x		
23	0,29	x	x	x		
23,6	0,29	x	x	x		
24,3	0,30	x	x	x		
25	0,30	x	x	x		
25,8	0,31	x	x	x		
26,5	0,31	x	x	x		
27,3	0,32	x	x	x		
28	0,32	x	x	x		
29	0,33	x	x	x		
30	0,34	x	x	x		
31,5	0,35		x	x		
32,5	0,36		x	x		
33,5	0,36		x	x		
34,5	0,37		x	x		
35,5	0,38		x	x		
36,5	0,38		x	x		
37,5	0,39		x	x		
38,7	0,40		x	x		
40	0,41		x	x	x	
41,2	0,42		x	x	x	
42,5	0,43		x	x	x	
43,7	0,44		x	x	x	
45	0,44		x	x	x	
46,2	0,45		x	x	x	
47,5	0,46		x	x	x	
48,7	0,47		x	x	x	
50	0,48		x	x	x	
51,5	0,49		x	x	x	
53	0,50		x	x	x	
54,5	0,51		x	x	x	
56	0,52		x	x	x	
58	0,54		x	x	x	
60	0,55		x	x	x	
61,5	0,56		x	x	x	
63	0,57		x	x	x	
65	0,58		x	x	x	
67	0,60		x	x	x	
69	0,61		x	x	x	
71	0,63		x	x	x	
73	0,64		x	x	x	
75	0,65		x	x	x	
77,5	0,67		x	x	x	
80	0,69		x	x	x	
82,5	0,71		x	x	x	
85	0,72		x	x	x	
87,5	0,74		x	x	x	
90	0,76		x	x	x	
92,5	0,77		x	x	x	
95	0,79		x	x	x	
97,5	0,81		x	x	x	
100	0,82		x	x	x	
103	0,85		x	x	x	
106	0,87		x	x	x	
109	0,89			x	x	x
112	0,91			x	x	x
115	0,93			x	x	x
118	0,95			x	x	x
122	0,97			x	x	x
125	0,99			x	x	x
128	1,01			x	x	x
132	1,04			x	x	x
136	1,07			x	x	x
140	1,09			x	x	x
142,5	1,11			x	x	x
145	1,13			x	x	x
147,5	1,14			x	x	x
150	1,16			x	x	x
152,5	1,18			x	x	x
155	1,19			x	x	x
157,5	1,21			x	x	x
160	1,23			x	x	x
162,5	1,24			x	x	x
165	1,26			x	x	x
167,5	1,28			x	x	x
170	1,29			x	x	x
172,5	1,31			x	x	x
175	1,33			x	x	x
177,5	1,34			x	x	x
180	1,36			x	x	x
182,5	1,38			x	x	x
185	1,39			x	x	x
187,5	1,41			x	x	x
190	1,43			x	x	x
195	1,46			x	x	x
200	1,49			x	x	x
203	1,51				x	x
206	1,53				x	x
212	1,57				x	x
218	1,61				x	x
224	1,65				x	x
227	1,67				x	x
230	1,69				x	x
236	1,73				x	x
239	1,75				x	x
243	1,77				x	x
250	1,82				x	x
254	1,84				x	x
258	1,87				x	x
261	1,89				x	x
265	1,91				x	x
268	1,92				x	x
272	1,96				x	x
276	1,98				x	x
280	2,01				x	x
283	2,03				x	x
286	2,05				x	x
290	2,08				x	x
295	2,11				x	x
300	2,14				x	x
303	2,16				x	x
307	2,19				x	x
311	2,21				x	x
315	2,24				x	x
320	2,27				x	x
325	2,30				x	x
330	2,33				x	x
335	2,36				x	x
340	2,40				x	x
345	2,43				x	x
350	2,46				x	x
355	2,49				x	x
360	2,52				x	x
365	2,56				x	x
370	2,59				x	x
375	2,62				x	x
379	2,64				x	x
383	2,67				x	x
387	2,70				x	x
391	2,72				x	x
395	2,75				x	x
400	2,78				x	x
406	2,82					x
412	2,85					x
418	2,89					x

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Table 2 (*continued*)

Dimensions in millimetres

d_1		d_2				
	tol. ±	1,8 ± 0,08	2,65 ± 0,09	3,55 ± 0,1	5,3 ± 0,13	7 ± 0,15
425	2,93					x
429	2,96					x
433	2,99					x
437	3,01					x
443	3,05					x
450	3,09					x
456	3,13					x
462	3,17					x
466	3,19					x
470	3,22					x
475	3,25					x
479	3,28					x
483	3,30					x
487	3,33					x
493	3,36					x
500	3,41					x
508	3,46					x
515	3,50					x
523	3,55					x
530	3,60					x
538	3,65					x
545	3,69					x
553	3,74					x
560	3,78					x
570	3,85					x
580	3,91					x
590	3,97					x
600	4,03					x
608	4,08					x
615	4,12					x
623	4,17					x
630	4,22					x
640	4,28					x
650	4,34					x
660	4,40					x
670	4,47					x

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Table 3 — Inside diameters, cross-sections and tolerances for aerospace and similar applications (series A)

Dimensions in millimetres

d_1		d_2				
	tol. ±	1,8 ± 0,08	2,65 ± 0,09	3,55 ± 0,1	5,3 ± 0,13	7 ± 0,15
1,8	0,10	x				
2	0,10	x				
2,24	0,11	x				
2,5	0,11	x				
2,8	0,11	x				
3,15	0,11	x				
3,55	0,11	x				
3,75	0,11	x				
4	0,12	x				
4,5	0,12	x	x			
4,87	0,12	x				
5	0,12	x				
5,15	0,12	x				
5,3	0,12	x	x			
5,6	0,13	x				
6	0,13	x	x			
6,3	0,13	x				
6,7	0,13	x				
6,9	0,13	x	x			
7,1	0,14	x				
7,5	0,14	x				
8	0,14	x	x			
8,5	0,14	x				
8,75	0,15	x				
9	0,15	x	x			
9,5	0,15	x	x			
10	0,15	x	x			
10,6	0,16	x	x			
11,2	0,16	x	x			
11,8	0,16	x	x			
12,5	0,17	x	x			
13,2	0,17	x	x			
14	0,18	x	x	x		
15	0,18	x	x	x		
16	0,19	x	x	x		
17	0,20	x	x	x		
18	0,20	x	x	x		
19	0,21	x	x	x		
20	0,21	x	x	x		
21,2	0,22	x	x	x		
22,4	0,23	x	x	x		
23,6	0,24	x	x	x		
25	0,24	x	x	x		
25,8	0,25	x	x	x		
26,5	0,25	x	x	x		
28	0,26	x	x	x		
30	0,27	x	x	x		
31,5	0,28	x	x	x		
32,5	0,29	x	x	x		
33,5	0,29	x	x	x		
34,5	0,30	x	x	x		
35,5	0,31	x	x	x		
36,5	0,31	x	x	x		
37,5	0,32	x	x	x	x	
38,7	0,32	x	x	x	x	
40	0,33	x	x	x	x	
41,2	0,34	x	x	x	x	
42,5	0,35	x	x	x	x	
43,7	0,35	x	x	x	x	
45	0,36	x	x	x	x	
46,2	0,37		x	x	x	
47,5	0,37	x	x	x	x	
48,7	0,38		x	x	x	
50	0,39	x	x	x	x	
51,5	0,40		x	x	x	
53	0,41	x	x	x	x	
54,5	0,42		x	x	x	
56	0,42	x	x	x	x	
58	0,44		x	x	x	
60	0,45	x	x	x	x	
61,5	0,46		x	x	x	
63	0,46	x	x	x	x	
65	0,48		x	x	x	
67	0,49	x	x	x	x	
69	0,50		x	x	x	
71	0,51	x	x	x	x	
73	0,52		x	x	x	
75	0,53	x	x	x	x	
77,5	0,55			x	x	
80	0,56	x		x	x	
82,5	0,57			x	x	
85	0,59	x	x	x	x	
87,5	0,60			x	x	
90	0,62	x	x	x	x	
92,5	0,63			x	x	
95	0,64	x	x	x	x	
97,5	0,66			x	x	
100	0,67	x	x	x	x	
103	0,69			x	x	
106	0,71	x	x	x	x	
109	0,72			x	x	x
112	0,74	x	x	x	x	x
115	0,76			x	x	x
118	0,77	x	x	x	x	x
122	0,80			x	x	x
125	0,81	x	x	x	x	x
128	0,83			x	x	x
132	0,85		x	x	x	x
136	0,87			x	x	x
140	0,89		x	x	x	x
145	0,92		x	x	x	x
150	0,95		x	x	x	x
155	0,98		x	x	x	x
160	1,00		x	x	x	x
165	1,03		x	x	x	x
170	1,06		x	x	x	x
175	1,09		x	x	x	x
180	1,11		x	x	x	x
185	1,14		x	x	x	x
190	1,17		x	x	x	x
195	1,20		x	x	x	x
200	1,22		x	x	x	x
206	1,26				x	x
212	1,29		x		x	x
218	1,32		x		x	x
224	1,35		x		x	x
230	1,39		x		x	x
236	1,42		x		x	x
243	1,46				x	x
250	1,49		x		x	x
258	1,54		x		x	x
265	1,57		x		x	x
272	1,61				x	x
280	1,65		x		x	x
290	1,71		x		x	x
300	1,76		x		x	x
307	1,80		x		x	x
315	1,84		x		x	x
325	1,90				x	x
335	1,95		x		x	x
345	2,00				x	x
355	2,05		x		x	x
365	2,11				x	x
375	2,16				x	x
387	2,22				x	x
400	2,29				x	x

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