



BSI Standards Publication

**Fluid power systems and components — Cylinder-rod wiper-ring housings in reciprocating applications — Dimensions and tolerances**

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## National foreword

This British Standard is the UK implementation of ISO 6195:2021. It supersedes BS ISO 6195:2013, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MCE/11, Fluid seals and their housings.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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**ISO**  
**6195**

Fourth edition  
2021-06-30

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**Fluid power systems and  
components — Cylinder-rod wiper-  
ring housings in reciprocating  
applications — Dimensions  
and tolerances**

*Transmissions hydrauliques et pneumatiques — Logements de joints  
racleurs pour tiges de piston à mouvement linéaire de vérins —  
Dimensions et tolérances*



Reference number  
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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Sub-committee SC 7, *Sealing devices*.

This fourth edition cancels and replaces the third edition (ISO 6915:2013), which has been technically revised.

The main changes compared to the previous edition are as follows:

- wiper housing sizes for 400 mm and 450 mm rod diameters have been added to [Tables 1, 2, 3, 4](#) and [5](#).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

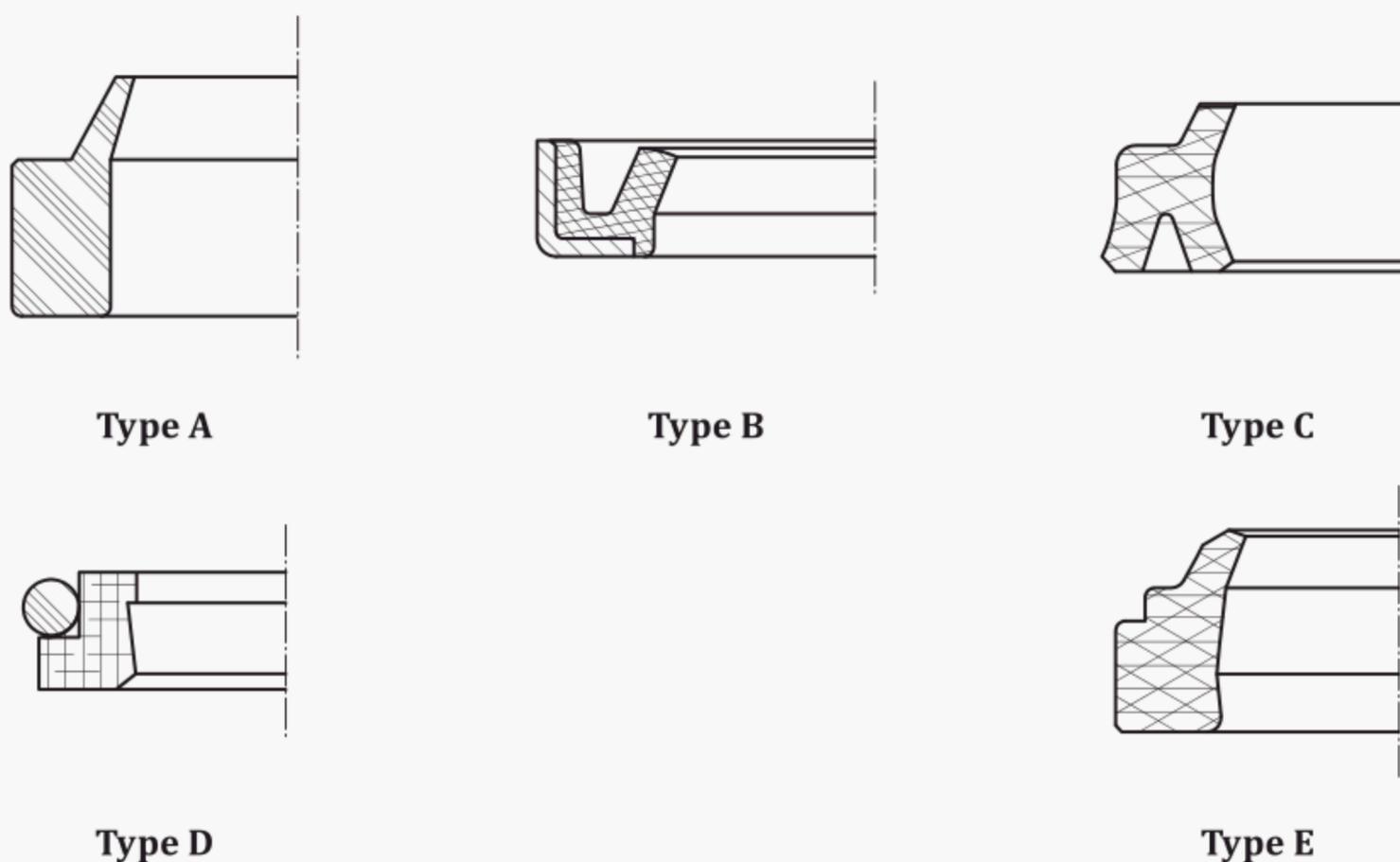
In fluid power systems, power is transmitted and controlled through a fluid (liquid or gas) under pressure within an enclosed circuit. Wiper-rings are used to prevent ingress of contaminants and to thereby protect the seals and bearings within the equipment.

This document is one of a family of standards covering dimensions and tolerances of reciprocating seal housings.

This document is applicable to the following five housing designs:

- Type A: recessed housings with undercut or separate cover to retain elastomeric wipers.
- Type B: open recessed housings for wipers with integral rigid enforcement that are press-fit in the housing.
- Type C: recessed housings with undercut to retain elastomeric wipers (these are the preferred housings for double lip wipers without integral rigid enforcement).
- Type D: recessed housings with undercut to retain elastomer-energized, plastic-faced wipers.
- Type E: recessed housings with undercut or separate cover to retain elastomeric wipers (these are the preferred housings to Type A).

These housing designs are intended for use with the wiper-rings according to [Figure 1](#).



**Figure 1 — Types of wiper-rings**

This document does not otherwise specify the style, configurations, materials, or performance ratings for the wiper-ring.



# Fluid power systems and components — Cylinder-rod wiper-ring housings in reciprocating applications — Dimensions and tolerances

## 1 Scope

This document specifies dimensions and tolerances of housings for wiper-rings used in reciprocating rod applications for fluid power cylinders. The range of rod diameters is from 4 mm to 450 mm.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[ISO 4287:1997](#), *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters*

[ISO 5598](#), *Fluid power systems and components — Vocabulary*

## 3 Terms and definitions

For the purposes of this document, the definitions given in [ISO 5598](#) apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

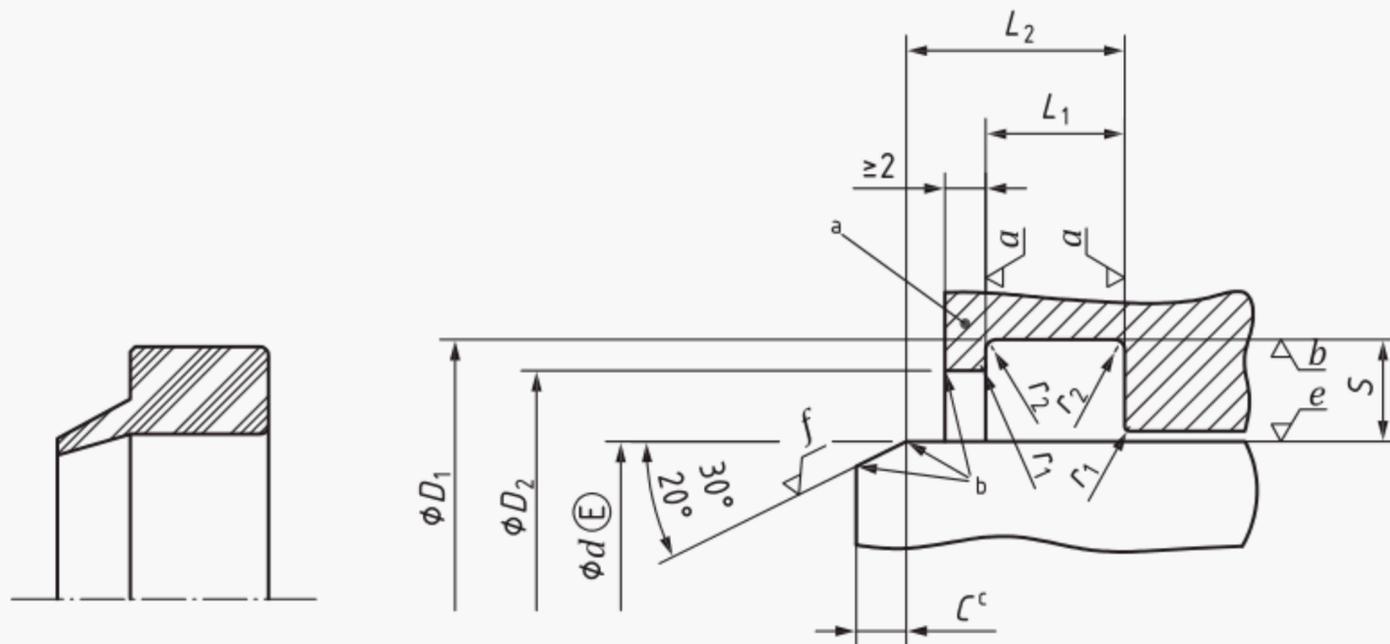
- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

## 4 Symbols

The symbols used in this document are as follows:

<i>a</i>	roughness of the side surface of the wiper housing
<i>b</i>	roughness of the surface of the wiper housing bore
<i>C</i>	axial length of the lead-in chamfer
<i>C0</i>	reference material ratio level (see <a href="#">ISO 4287:1997</a> , 4.5.4)
<i>d</i>	rod diameter
<i>D</i> <sub>1</sub>	outside diameter of wiper housing
<i>D</i> <sub>2</sub>	retainer diameter
<i>e</i>	roughness of the rod
<i>f</i>	roughness of the leading chamfer
<i>L</i> <sub>1</sub>	axial length of the wiper housing

Dimensions in millimetres



**Key**

- a May be integral or with separate retaining plate.
- b Rounded and burr free.
- c See [Table 6](#) for dimensions.

**Figure 2 — Type A wiper housing and typical wiper-ring**

Table 1 — Dimensions for Type A wiper housing

Dimensions in millimetres

Rod diameter a, b	Radial depth	Outside diameter	Axial length	Wiper assembly length	Retainer diameter	Retainer radius	Radius
$d$	$S$	$D_1$ H11 <sup>d</sup>	$L_1$	$L_2$ max	$D_2$ H11 <sup>d</sup>	$r_1$ max	$r_2^c$ max
4	4,0	12	5,0 $^{+0,2}_0$	8	9,5	0,3	0,5
5		13			10,5		
6		14			11,5		
8		16			13,5		
10		18			15,5		
12		20			17,5		
14		22			19,5		
16		24			21,5		
18		26			23,5		
20		28			25,5		
22		30			27,5		
25		33			30,5		
28		36			33,5		
32		40			37,5		
36		44			41,5		
40	48	45,5					
45	53	50,5					
50	58	55,5					
56	5,0	66	6,3 $^{+0,2}_0$	10	63	0,4	0,5
63		73			70		
70		80			77		
80		90			87		
90		100			97		
100	7,5	115	9,5 $^{+0,3}_0$	14	110	0,6	0,5
110		125			120		
125		140			135		
140		155			150		
160		175			170		
180		195			190		
200		215			210		

a See [ISO 3320](#) and [ISO 5597](#).

b One-piece housing can be used with rod diameters greater than 14 mm

c These specific dimensions permit the use of tools conforming to [ISO 883](#).

d Tolerances and fits are according to [ISO 286-2](#).



**Table 2 — Dimensions for Type B wiper housings**

Dimensions in millimetres

Rod diameter <sup>a</sup>	Radial depth	Outside diameter	Axial length	Wiper assembly length
<i>d</i>	<i>S</i>	<i>D</i> <sub>1</sub> H8 <sup>b</sup>	<i>L</i> <sub>1</sub> <sup>+0,5</sup> <sub>0</sub>	<i>L</i> <sub>2</sub> max
4	4,0	12	5	8
5		13		
6		14		
8		16		
10		18		
12	5,0	22	7	11
14		24		
16		26		
18		28		
20		30		
22		32		
25		35		
28		38		
32		42		
36		46		
40		50		
45		55		
50		60		
56		66		
63		73		
70	80			
80	90			
90	100			
100	7,5	115	9	13
110		125		
125		140		
140		155		
160		175		
180		195		
200		215		
220	10,0	240	12	16
250		270		
280		300		
320		340		
360		380		
400		420		
450		470		

<sup>a</sup> See [ISO 3320](#) and [ISO 5597](#).

<sup>b</sup> Tolerances and fits are according to [ISO 286-2](#).



**Table 3 — Dimensions for Type C wiper housings**

Dimensions in millimetres

Rod diameter a, b	Radial depth	Outside diameter	Axial length	Wiper assembly length	Retainer diameter	Radius
$d$	$S$	$D_1$ H11 <sup>e</sup>	$L_1$	$L_2$ max	$D_2$ H11 <sup>e</sup>	$r_1$ max
4	3,0	10	4,0 $\begin{smallmatrix} +0,2 \\ 0 \end{smallmatrix}$	7,0	6,5	0,3
5		11			7,5	
6		12			8,5	
8		14			10,5	
10		16			12,5	
12 <sup>c</sup>		18			14,5	
14 <sup>c</sup>		20			16,5	
16		22			18,5	
18 <sup>c</sup>		24			20,5	
20		26			22,5	
22 <sup>c</sup>		28			24,5	
25		31			27,5	
28 <sup>c</sup>	4,0	36	5,0 $\begin{smallmatrix} +0,2 \\ 0 \end{smallmatrix}$	8,0	31	
32		40			35	
36 <sup>c</sup>		44			39	
40		48			43	
45 <sup>c</sup>		53			48	
50		58			53	
56 <sup>c</sup>	5,0	66	6,0 $\begin{smallmatrix} +0,2 \\ 0 \end{smallmatrix}$	9,7	59	
63		73			66	
70 <sup>c</sup>		80			73	
80		90			83	
90 <sup>c</sup>		100			93	
100		110			103	
110 <sup>c</sup>	7,5	125	8,5 $\begin{smallmatrix} +0,3 \\ 0 \end{smallmatrix}$	13,0	114	0,4
125		140			129	
140 <sup>c, d</sup>		155			144	
160		175			164	
180 <sup>d</sup>		195			184	
200		215			204	

a See [ISO 3320](#) and [ISO 5597](#).

b Split housings should be used for rod diameters up to and including 18 mm.

c These sizes are recommended for use with cylinders conforming to [ISO 6020-2](#) and [ISO 10762](#).

d These sizes are recommended for use with cylinders conforming to [ISO 6020-3](#).

e Tolerances and fits are according to [ISO 286-2](#).



**Table 4 — Dimensions for Type D wiper housings**

Dimensions in millimetres

Rod diameter <sup>a, b, c</sup>	Radial depth	Outside diameter	Axial length	Retainer diameter	Retainer width	Radius	
$d$	$S$	$D_1$ H9d	$L_1 \begin{smallmatrix} +0,2 \\ 0 \end{smallmatrix}$	$D_2$ H11d	$L_3$ min	$r_1$ max	
4	2,4	8,8	3,7	5,5	2	0,4	
5		9,8		6,5			
6		10,8		7,5			
8		12,8		9,5			
10		14,8		11,5			
12	3,4	18,8	5,0	13,5		2	0,8
14		20,8		15,5			
16		22,8		17,5			
18		24,8		19,5			
20		26,8		21,5			
22		28,8		23,5			
25		31,8		26,5			
28		34,8		29,5			
32		38,8		33,5			
36		42,8		37,5			
40 <sup>c</sup>	3,4	46,8	5,0	41,5	2	0,8	
	4,4	48,8	6,3		3		
45	3,4	51,8	5,0	46,5	2		
	4,4	53,8	6,3		3		
50	3,4	56,8	5,0	51,5	2		
	4,4	58,8	6,3		3		
56	3,4	62,8	5,0	57,5	2		
	4,4	64,8	6,3		3		
63	3,4	69,8	5,0	64,5	2		
	4,4	71,8	6,3		3		

<sup>a</sup> See [ISO 3320](#) and [ISO 5597](#).

<sup>b</sup> Split housings should be used for rod diameters up to and including 28 mm.

<sup>c</sup> From 40 mm rod diameters, the smaller wiper profiles are recommended for light applications. The larger wiper profiles are recommended for heavy duty applications.

<sup>d</sup> Tolerances and fits are according to [ISO 286-2](#).

Rod diameter a, b, c	Radial depth	Outside diameter	Axial length	Retainer diameter	Retainer width	Radius
$d$	$S$	$D_1$ H9 <sup>d</sup>	$L_1 \begin{smallmatrix} +0,2 \\ 0 \end{smallmatrix}$	$D_2$ H11 <sup>d</sup>	$L_3$ min	$r_1$ max
70	4,4	78,8	6,3	71,5	3	1,0
	6,1	82,2	8,1	72,0	4	
80	4,4	88,8	6,3	81,5	3	
	6,1	92,2	8,1	82,0	4	
90	4,4	98,8	6,3	91,5	3	
	6,1	102,2	8,1	92,0	4	
100	4,4	108,8	6,3	101,5	3	
	6,1	112,2	8,1	102,0	4	
110	4,4	118,8	6,3	111,5	3	
	6,1	122,2	8,1	112,0	4	
125	4,4	133,8	6,3	126,5	3	
	6,1	137,2	8,1	127,0	4	
140	6,1	152,2	8,1	142,0	4	
	8,0	156,0	9,5	142,5	5	1,5
160	6,1	172,2	8,1	162,0	4	1,0
	8,0	176,0	9,5	162,5	5	1,5
180	6,1	192,2	8,1	182,0	4	1,0
	8,0	196,0	9,5	182,5	5	1,5
200	6,1	212,2	8,1	202,0	4	1,0
	8,0	216,0	9,5	202,5	5	1,5
220	6,1	232,2	8,1	222,0	4	1,0
	8,0	236,0	9,5	222,5	5	1,5
250	6,1	262,2	8,1	252,0	4	1,0
	8,0	266,0	9,5	252,5	5	1,5
280	6,1	292,2	8,1	282,0	4	
	8,0	296,0	9,5	282,5	5	
320	6,1	332,2	8,1	322,0	4	
	8,0	336,0	9,5	322,5	5	
360	6,1	372,2	8,1	362,0	4	
	8,0	376,0	9,5	362,5	5	
400	12,0	424,0	14,0	402,5	8	
450	12,0	474,0		452,5		

a See [ISO 3320](#) and [ISO 5597](#).

b Split housings should be used for rod diameters up to and including 28 mm.

c From 40 mm rod diameters, the smaller wiper profiles are recommended for light applications. The larger wiper profiles are recommended for heavy duty applications.

d Tolerances and fits are according to [ISO 286-2](#).

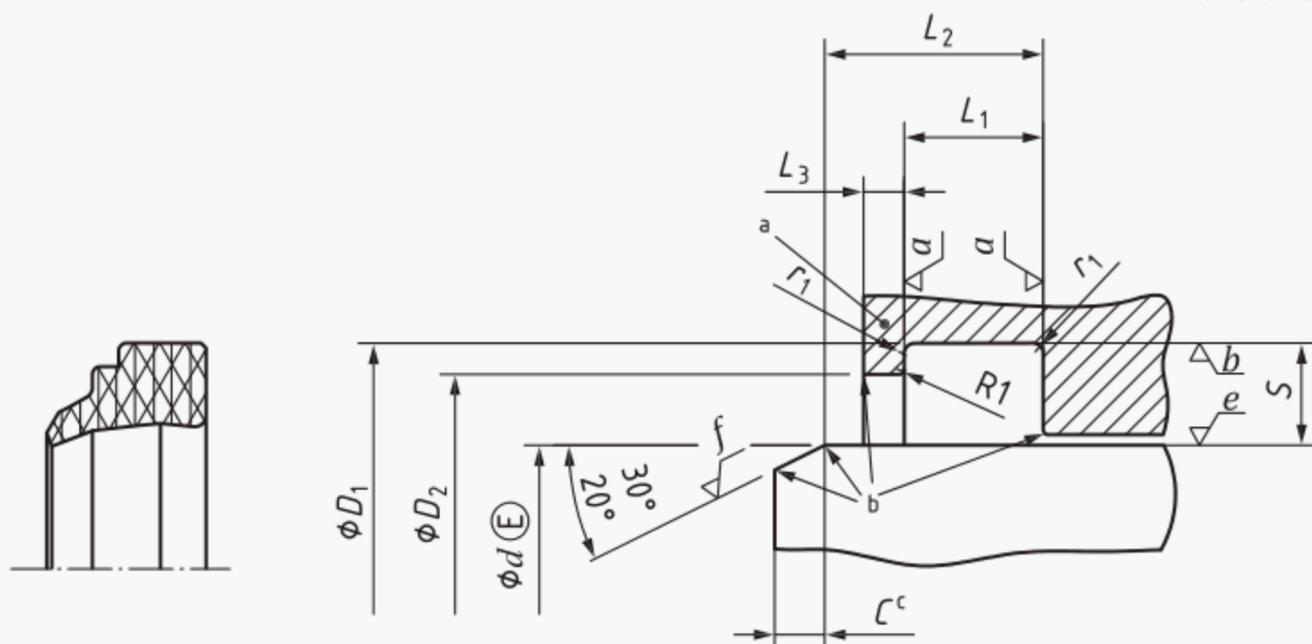
## 6.5 Type E housing

6.5.1 Type E housing and a typical wiper-ring are shown in [Figure 6](#).

6.5.2 Type E housing dimensions and tolerances shall conform to [Table 5](#).

**6.5.3** Type E wiper-rings are recommended for use with cylinders conforming to [ISO 6020-1](#) and to [ISO 6022](#).

Dimensions in millimetres



**Key**

- a May be integral or with separate retaining plate.
- b Rounded and burr free.
- c See [Table 6](#) for dimensions.

**Figure 6 — Type E wiper housing and typical wiper-ring**

**Table 5 — Dimensions for Type E wiper housings**

Dimensions in millimetres

Rod diameter a, b	Radial depth	Outside diameter	Axial length	Wiper assembly length	Retainer width	Retainer diameter	Radius
$d$ f8 <sup>c</sup>	$S$	$D_1$ H11 <sup>c</sup>	$L_1$ $^{+0,15}_0$	$L_2$ max	$L_3$ min	$D_2$ H11 <sup>c</sup>	$r_1$ max
8	4,0	16	4,0	7	1,0	14	0,2
10		18					
12		20					
14		22					
16		24					
18		26					
20		28					
22		30					
25		33					
28		36					
32		40					
36		44					
40		48					
45		53					
50		58					
56	64						
63	71						
70	78						
80	88						
90	6,0	102	5,5	10	1,5	99	0,3
100		112					
110		122					
125		137					
140		152					
160		172					
180		192					
200	212						
220	7,5	235	6,5	13	2,0	231	0,5
250		265					
280		295					
320		335					
360		375					
400		415					
450	465						

a See [ISO 3320](#) and [ISO 5597](#).  
b One-piece housings can be used with rod diameters greater than 14 mm.  
c Tolerances and fits are according to [ISO 286-2](#).

## 7 Other requirements regarding dimensions

7.1 Reference shall be made to [Figures 2, 3, 4, 5](#) and [6](#) for the location of the lead-in chamfer, *C*, on the rod end.

7.2 The rod-end chamfer shall make an angle of between 20° and 30° with the axis.

7.3 The length of the rod-end chamfer shall not be less than specified in [Table 6](#).

7.4 The housing lead-in chamfer dimensions for Type B housings shall conform to [Figure 3](#).

**Table 6 — Lead-in chamfer**

Dimensions in millimetres

Radial depth of housing, <i>S</i>	$S < 4,0$	$4,0 \leq S < 5,5$	$5,5 \leq S < 7,0$	$7,0 \leq S < 9,0$	$9,0 \leq S < 12,0$
Minimum axial length of lead-in chamfer, <i>C</i>	2,0	2,5	3,0	4,0	5,0

## 8 Surface roughness

8.1 The surface roughness of the wiper housing and any mating part has a significant impact upon the life and sealing performance of the wiper.

8.2 Unless otherwise agreed, surface roughness values shall be in accordance with [Table 7](#).

8.3 Unless otherwise agreed, the material ratio, *Rmr* of housing surfaces that are in mating contact with the seal should be between 50 % and 80 % at a profile section level (*Rδc*) of 25 % of *Rz*, from a reference level, *C0*, of 5 % *Rmr* (in accordance with [ISO 4287:1997](#) 4.5.4).

**Table 7 — Surface roughness requirements for wiper housings <sup>a</sup>**

Dimensions in micrometres unless otherwise noted

Radial depth of wiper housing <i>S</i> mm	Surface roughness values <sup>b, c, d</sup>						Minimum required measuring length mm (5 times single sampling length plus 2 times cut off)	
	Dynamic mating surface <sup>e</sup> <i>e</i>	Static mating surface <sup>e</sup> <i>b</i>				Side surface <i>a</i>		Chamfer <i>f</i>
		Axial length <i>L</i>						
		<i>L</i> < 4	4 ≤ <i>L</i> < 5	5 ≤ <i>L</i> < 6	<i>L</i> ≥ 6			
<i>S</i> < 3,4	<i>Ra</i> 0,4 <i>Rz</i> 1,6	<i>Ra</i> 1,6 visual inspection <i>Rz</i> 6,3 visual inspection	<i>Ra</i> 2 1,6 <i>Rz</i> 2 6,3	<i>Ra</i> 4 1,6 <i>Rz</i> 4 6,3	-	<i>Ra</i> 1,6 visual inspection <i>Rz</i> 6,3 visual inspection	5,6	
3,4 ≤ <i>S</i> < 5		-	<i>Ra</i> 2 1,6 <i>Rz</i> 2 6,3	<i>Ra</i> 4 1,6 <i>Rz</i> 4 6,3	<i>Ra</i> 1,6 <i>Rz</i> 6,3	<i>Ra</i> 2 1,6 <i>Rz</i> 2 6,3		
5 ≤ <i>S</i> < 6		-	-	-	<i>Ra</i> 1,6 <i>Rz</i> 6,3	<i>Ra</i> 4 1,6 <i>Rz</i> 4 6,3		
<i>S</i> ≥ 6		-	-	<i>Ra</i> 4 1,6 <i>Rz</i> 4 6,3	<i>Ra</i> 1,6 <i>Rz</i> 6,3	<i>Ra</i> 1,6 <i>Rz</i> 6,3		

<sup>a</sup> Indication of surface roughness to [ISO 1302](#).

<sup>b</sup> See also [Figures 2, 3, 4, 5](#) and [6](#). See [ISO 13715](#) for design of edges and undefined shapes.

<sup>c</sup> The descriptions of *Ra*4 1,6 or *Rz*4 6,3 do not describe a surface roughness of *Ra* 41,6 or *Rz* 46,3. According to [ISO 1302](#) and [ISO 4288](#) they show four sampling lengths and that the roughness does not exceed 1,6 μm for *Ra* and 6,3 μm for *Rz*.

A value of *Ra* 1,6 or *Rz* 6,3 can only be measured if the length to be measured is 5,6 mm or longer.

<sup>d</sup> Special applications may require different surface roughness values.

<sup>e</sup> Visual surface imperfections are not allowed on surfaces *b* and *e* (see [ISO 8785](#)).

## 9 Identification statement

Manufacturers are recommended to use the following statement in test reports, catalogues and sales literature when electing to conform with this standard:

"ISO 6195:2021, Fluid power systems and components — Cylinder-rod wiper-ring housings in reciprocating applications — Dimensions and tolerance."

## Bibliography

- [1] ISO 286 (all parts), *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes*
- [2] [ISO 883](#), *Indexable hardmetal (carbide) inserts with rounded corners, without fixing hole — Dimensions*
- [3] [ISO 1302](#), *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*
- [4] [ISO 3320](#), *Fluid power systems and components — Cylinder bores and piston rod diameters and area ratios — Metric series*
- [5] ISO 4287:1997/Amd 1:2009, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters — Amendment 1: Peak count number*
- [6] [ISO 4288](#), *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture*
- [7] [ISO 5597](#), *Hydraulic fluid power — Cylinders — Dimensions and tolerances of housings for single-acting piston and rod seals in reciprocating applications*
- [8] ISO 6020 (all parts), *Hydraulic fluid power — Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series*
- [9] [ISO 6022](#), *Hydraulic fluid power — Mounting dimensions for single rod cylinders, 25 MPa (250 bar) series*
- [10] [ISO 7425-2](#), *Hydraulic fluid power cylinders — Dimensions and tolerances of housings for elastomer-energized, plastic-faces seals — Part 2: Rod seal housings*
- [11] [ISO 8015](#), *Geometrical product specifications (GPS) — Fundamentals — Concepts, principles and rules*
- [12] [ISO 8785](#), *Geometrical Product Specification (GPS) — Surface imperfections — Terms, definitions and parameters*
- [13] [ISO 10762](#), *Hydraulic fluid power — Mounting dimensions for cylinders, 10 MPa (100 bar) series*
- [14] [ISO 13715](#), *Technical product documentation — Edges of undefined shape — Indication and dimensioning*



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