International Standard 5597/1

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Hydraulic fluid power — Cylinder rod and piston seals for reciprocating applications — Dimensions and tolerances of housings — Part 1 : Normal series

Transmissions hydrauliques — Joints d'étanchéité pour tiges de piston et pistons de vérins hydrauliques à piston — Dimensions et tolérances des logements — Partie 1 : Série normale

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 5597/1 was developed by Technical Committee ISO/TC 131, *Fluid power systems and components*, and was circulated to the member bodies in November 1977.

It has been approved by the member bodies of the following countries :

Australia	Germany, F.R.	Romania
Austria	Hungary	South Africa, Rep. of
Belgium	India	Spain
Brazil	Ireland	Sweden
Bulgaria	Italy	Turkey
Chile	Japan	United Kingdom
Czechoslovakia	Mexico	USA
Finland	Netherlands	USSR
France	Poland	

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Canada
Switzerland

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Hydraulic fluid power — Cylinder rod and piston seals for reciprocating applications — Dimensions and tolerances of housings — Part 1 : Normal series

ERRATUM

Cover page

The title of this International Standard should read :

"Hydraulic fluid power — Cylinders — Housings for piston and rod seals in reciprocating applications — Dimensions and tolerances

Transmissions hydrauliques — Vérins — Logements de joints d'étanchéité pour pistons et tiges de pistons — Dimensions et tolérances"

Page 1 and page 3 (clause 10)

Replace the title of this International Standard by the English title above.

In addition, the reference number of this International Standard should read "ISO 5597" not "ISO 5597/1" wherever it appears.

Hydraulic fluid power — Cylinder rod and piston seals for reciprocating applications — Dimensions and tolerances of housings — Part 1 : Normal series

0 Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. Sealing devices are used to contain the pressurized fluid within components having elements with linear motion, i.e. hydraulic cylinders. These sealing devices are used with both cylinder rod and piston seal housings.

This International Standard is one of a series of standards covering dimensions and tolerances of housings.

1 Scope and field of application

This International Standard establishes the nominal dimensions and associated tolerances for a series of hydraulic cylinder rod and piston seal housings for reciprocating applications in the following range of dimensions :

- for cylinders of 16 to 400 mm;
- for rods of 6 to 360 mm.

It does not give details of seal design, since the manner of construction of seals varies with each manufacturer. The design and material of the seal and any incorporated anti-extrusion component are determined by conditions such as temperature and pressure.

2 References

ISO 286, *ISO System for limits and fits — Part 1 : General, tolerances and deviations.*[1]

ISO 468, *Surface roughness — Parameters, their values and general rules for specifying surfaces.*[2]

ISO 3320, *Fluid power systems and components — Cylinder bores and piston rod diameters — Metric series.*

ISO 4394/1, *Fluid power systems and components — Cylinder barrels — Part 1 : Requirements for steel tubes with specially finished bores.*

1) At present at the stage of draft. (Revision of ISO/R 286-1962.)

2) At present at the stage of draft. (Revision of ISO/R 468-1966.)

3 Definitions

An International Standard giving definitions of terms used is in preparation.

4 Letter symbols

Letter symbols used in this International Standard are as follows :

C = lead-in chamfer

L = seal housing, axial length

d = seal housing, inside diameter (rod diameter or piston seal groove diameter)

D = seal housing, outside diameter (bore diameter or rod seal groove diameter)

G = rod clearance diameter

J = rod seal housing, clearance diameter

P = piston seal housing, clearance diameter

S = seal housing radial depth (cross-section) $\frac{D-d}{2}$

5 Seal housings

5.1 General

5.1.1 See figures 1 and 2 for illustrated examples of typical hydraulic cylinder rod and piston seal housings covered in this International Standard.

NOTE — These figures are diagrammatic only and do not represent recommendations for housing design.

5.1.2 Remove and round all sharp edges and burrs from corners of supporting surfaces, keeping in mind that these surfaces are required to provide maximum support against extrusion.

5.1.3 Consult the seal manufacturer for details of housing design which are not specified in this International Standard.

5.2 Axial length

5.2.1 This International Standard includes a choice of axial length for every nominal piston and rod diameter.

5.2.2 Adopt axial length L_1, as listed in tables 2 and 3, only in consultation with the manufacturer.

5.3 Radial width

5.3.1 This international Standard further includes an alternative seal housing radial depth (cross-section), (S), for most piston and rod diameters (the exceptions being at the upper and lower extremities of the diameter range).

5.3.2 Select the wider seal housing radial depth (cross-section) where higher stresses or wider tolerances are involved. However, consultation with the manufacturer is recommended when making the appropriate selection from the available choices.

6 Dimensions and tolerances[1)]

6.1 Piston seal housing dimensions.

6.1.1 Refer to figure 1 for an illustrated example of piston seal housing dimensions.

6.1.2 Select piston seal housing dimensions from table 2.

6.2 Rod seal housing dimensions

6.2.1 Refer to figure 2 for an illustrated example of rod seal housing dimensions.

6.2.2 Select rod seal housing dimensions from table 3.

6.3 Radial seal space tolerances

6.3.1 Refer to table 4 for radial seal space tolerances.

6.3.2 Refer to notes 1 and 2 of table 4 for the formulae for calculating tolerances on d (see figure 1) and D (see figure 2).

6.3.3 Generally, the formulae and values as shown in table 4, when used in conjunction with ISO/R 286 limits of D H9 and P f8 (for piston case) or d f8 and G H9 (for rod case), in most cases will result in tolerances within the span of d h10 and D H10 respectively.

6.3.4 If alternative limits to those given by example in 6.3.3 are selected for D and P (for piston case) or d and G (for rod case), then the use of the formulae will maintain the necessary radial seal space limits, i.e. any relaxation of tolerance on one housing diameter will be compensated by a tighter tolerance on the other diameter.

1) See ISO 4394 and ISO 3320.

6.4 Housing length

Use a factor of $^{+0,25}_{\ \ 0}$ for the tolerances on the length of the housing.

7 Extrusion gap

7.1 The extrusion gap is determined by the diameter (J or P) of the adjacent metal components behind the seal.

NOTE — Maximum value is achieved when the piston or piston rod is in contact with one side of the cylinder or bearing respectively.

7.2 The extrusion gap for piston seals is further increased by the expansion of the cylinder that occurs from internal pressure.

7.3 It is recommended that details concerning P (see figure 1) and J (see figure 2) are subject for consultation between the housing designer and seal manufacturer.

8 Surface finish

The requirements for the surface finish of the component in contact with the seal are dependent on the application and its life requirements and should be subject to agreement between manufacturer and user.

9 Lead-in chamfer

9.1 Refer to figures 1 and 2 for the location of the lead-in chamfer (C).

9.2 Note that the chamfer is to make an angle of between 20° and 30° with the axis.

9.3 The length of the chamfer shall not be less than that shown in table 1.

Table 1 — Lead-in chamfer

Dimensions in millimetres

Nominal seal housing radial depth (cross-section), S	4	5	7,5	10	12,5	15	20
Minimum length of chamfer C	2	2,5	4	5	6,5	7,5	10

10 Identification statement (Reference to this International Standard)

Use the following statement in test reports, catalogues and sales literature when electing to comply with this International Standard :

"Dimensions and tolerances for hydraulic cylinder rod and piston seal housings selected in accordance with ISO 5597/1, *Hydraulic fluid power — Cylinder rod and piston seals for reciprocating applications — Dimensions and tolerances of housings — Part 1 : Normal series.*"

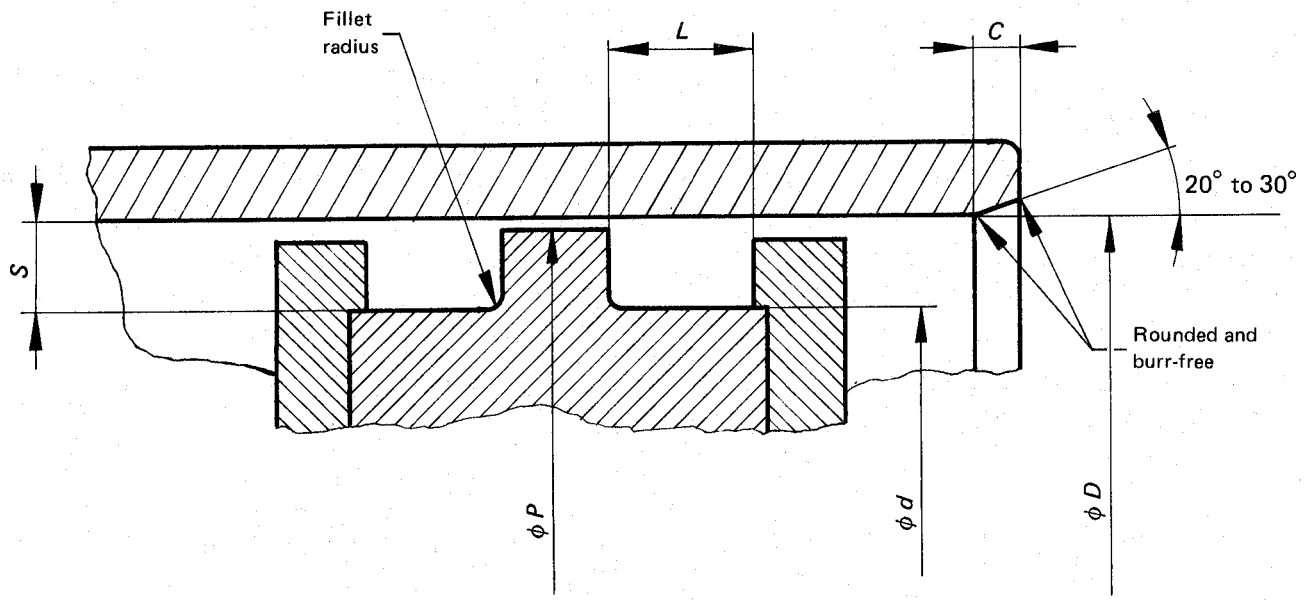

Figure 1 — Example of housing for piston seal

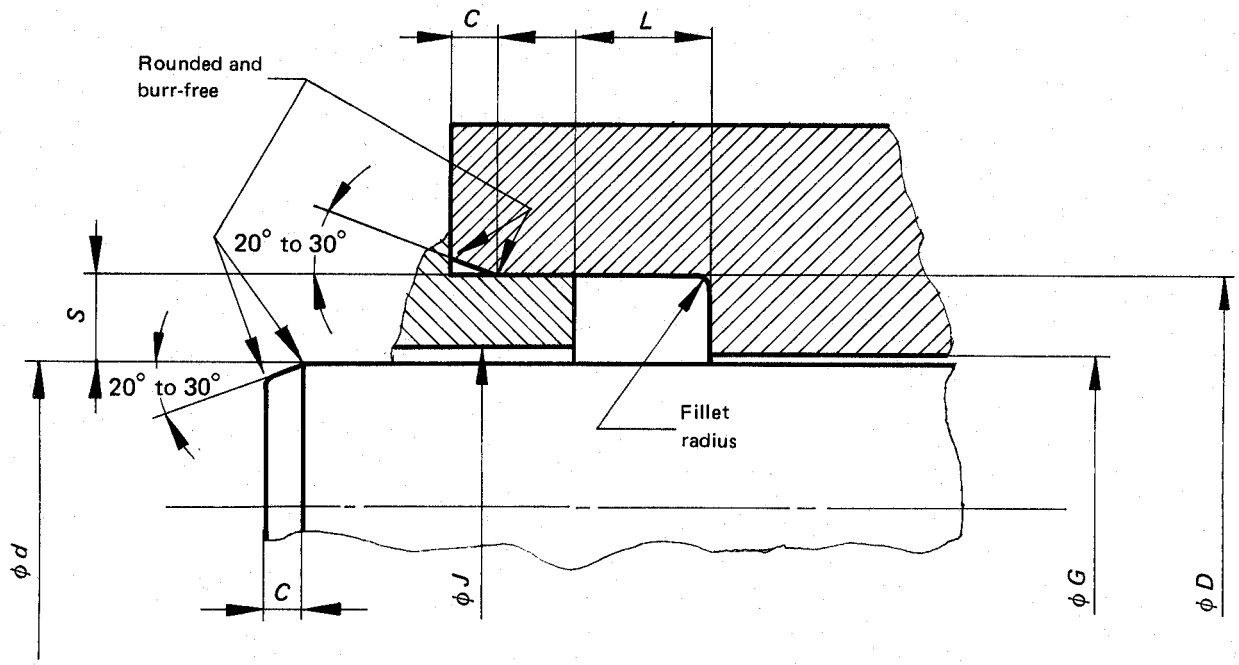

Figure 2 — Example of housing for rod seal

Table 2 — Nominal dimensions for piston seal housings

Dimensions in millimetres

Bore diameter[1] D	Nominal seal housing radial depth (cross-section) S	Groove diameter d	Axial length[2] L_1	L_2	L_3	Fillet radius max.
16	4	8	5,0	6,3	—	0,3
20	4	12	5,0	6,3	—	0,3
25	4	17	5,0	6,3	—	0,3
	5	15	6,3	8	16	0,3
32	4	24	5,0	6,3	—	0,3
	5	22	6,3	8	16	0,3
40	4	32	5,0	6,3	—	0,3
	5	30	6,3	8	16	0,3
50	5	40	6,3	8	16	0,3
	7,5	35	9,5	12,5	25	0,4
63	5	53	6,3	8	16	0,3
	7,5	48	9,5	12,5	25	0,4
80	7,5	65	9,5	12,5	25	0,4
	10	60	12,5	16	32	0,6
100	7,5	85	9,5	12,5	25	0,4
	10	80	12,5	16	32	0,6
125	10	105	12,5	16	32	0,6
	12,5	100	16	20	40	0,8
160	10	140	12,5	16	32	0,6
	12,5	135	16	20	40	0,8
200	12,5	175	16	20	40	0,8
	15	170	20	25	50	0,8
250	12,5	225	16	20	40	0,8
	15	220	20	25	50	0,8
320	15	290	20	25	50	0,8
400	20	360	25	32	63	1,0

1) See ISO 3320.

2) The application of the axial lengths specified in tables 2 and 3 (L_1 = short; L_2 = medium; L_3 = long) depends upon the respective working conditions.