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Hydraulic fluid power — Housings for elastomer-energized, plastic-faced seals — Dimensions and tolerances —

Part 1:
Piston seal housings

Transmissions hydrauliques — Logements pour joints en élastomère renforcé par des matières plastiques —

Partie 1: Logements de joints de piston

ICS: 23.100.20

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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 are 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 Electro-technical Commission (IEC) on all matters of electro-technical 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 is drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 131, Fluid power systems and components, Subcommittee SC 7, Sealing Devices.

This second edition cancels and replaces the first edition (ISO 7425-1:1988), which has been technically revised.

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

— addition of 60 bore to Table 3 to ensure consistency with ISO 3320 and clause 8 Surface roughness to ensure consistency with ISO 5597:2018

Other parts of this series: ISO 7425-2

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.

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 with components having elements with linear motion, i.e. hydraulic cylinders. In general, these sealing devices are used with both cylinder rod and piston seal housings. This document covers piston seal housings.

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

Hydraulic fluid power — Housings for elastomer-energized, plastic-faced seals — Dimensions and tolerances —

Part 1: Piston seal housings

1 Scope

This part of ISO 7425 specifies the dimensions and associated tolerances for a series of piston seal housings to accommodate elastomer-energised, plastic-faced seals used in reciprocating applications.

It is not the intention of this part of ISO 7425 to stipulate details of seal design, since the manner of construction of seals varies with each manufacturer. The design and material of the seals, and any associated anti-extrusion components are determined by conditions such as temperature and pressure.

This part of ISO 7425 applies only to the dimensional characteristics of products manufactured in accordance with this part of ISO 7425. It does not apply to their functional characteristics.

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 286-2:2010, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts*

ISO 883, *Indexable hardmetal (carbide) inserts with rounded corners, without fixing hole — Dimensions*

ISO 1302, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

ISO 3274, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Nominal characteristics of contact (stylus) instruments*

ISO 3320:2013, *Fluid power systems and components — Cylinder bores and piston rod diameters and area ratios — Metric series*

ISO 4287:1997/Amd 1:2009, *Geometric product specifications (GPS) — Surface texture — Profile method — Terms, definitions and surface texture parameters*

ISO 4288, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture*

ISO 5598:2008, *Fluid power systems and components — Vocabulary*

ISO 13715, *Technical product documentation — Edges of undefined shape — Indication and dimensioning*

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 http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Letter symbols

Letter symbols used in this document are as follows:

a	roughness of the side surface of the seal housing
b	roughness of the static pressure mating surface of the seal housing
C	axial length of the lead-in chamfer
$C0$	reference material ratio level (see ISO 4287:1997 Section 4.5.4)
D	bore diameter (outside diameter of the seal housing)
d	piston seal groove diameter (inside diameter of the seal housing)
d_3	clearance diameter of the piston
e	roughness of dynamic pressure mating surface
f	surface roughness of lead-in chamfer
L_1	axial length (seal groove length) of the seal housing without back-up rings
L_2	axial length (seal groove length) of the seal housing with back-up rings
r	groove corner radius
$R\delta c$	= profile section height difference (see ISO 4287:1997 Section 4.5.3)
S	$\frac{(D-d)}{2}$ radial depth (cross-section) of the seal housing
X	reference surface
Y	maximum run-out tolerance

5 Seal housings

5.1 General

5.1.1 An illustrated example of a typical hydraulic cylinder piston seal housing covered by this part of ISO 7425 is given in Figure 1.

NOTE The figure is diagrammatic only and does not represent an endorsement of recommendation of a particular housing design.

5.1.2 All sharp edges and burrs shall be removed from corners of supporting surfaces and rounded, although it should be borne in mind that these surfaces are required to provide maximum support against extrusion.

5.1.3 The seal manufacturer shall be consulted for details of housing design which are not specified in this document.

5.2 Axial length

For axial lengths for the nominal piston diameters, see Table 3.

NOTE If the extrusion gap exceeds the capabilities of the plastic-faced material to bridge such a gap, length L_2 should be selected and back-up rings (anti-extrusion rings) used, see clause 7.

5.3 Radial depth

5.3.1 For radial depths, see Table 3.

NOTE This document includes an alternative seal housing radial depth for bore diameters where $D \geq 25$ mm.

5.3.2 The larger radial depths shall be selected where higher stresses or wider tolerances are involved. Consultation with the manufacturer, however, is recommended when making the appropriate selection.

6 Dimensions and tolerances

Seal housing dimensions and tolerances shall be selected from Table 3.

7 Extrusion gap

The extrusion gap (D — d_3, see Figure 1) is determined by the bore diameter and adjacent metal components on either side of the seal.

NOTE 1 The extrusion gap will vary considerably depending upon use or non-use of non-metallic bearings on the piston.

NOTE 2 Maximum value for the extrusion gap is achieved when the piston is in contact with one side of the cylinder or bearing.

NOTE 3 The extrusion gap is widened by the expansion of the cylinder due to internal pressure.

NOTE 4 It is recommended that details concerning the extrusion gap and need for non-extrusion rings be subject to consultations between the housing designer and seal manufacturer.

8 Surface finish

8.1 General statement

The surface roughness of the seal housing and any mating part has a significant impact on the life and sealing performance of the seal.

Where surface roughness measurements are taken, it is recommended that instruments complying with ISO 3274, including an electric wave filter, be used.

8.2 Sliding and static sealing surfaces

8.2.1 Unless otherwise agreed, the roughness values shall be in accordance with Table 1.

8.2.2 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 ($R\delta c$) of 25 % of *Rz*, from a reference level, *C*0, of 5 % *Rmr* (in accordance with ISO 4287:1997/Amd 1:2009 section 4.5.4)

8.2.3 For some seal designs, a minimum surface roughness of 0,1µm *Ra* may be required for the sliding sealing surface as the surface otherwise may be too smooth to provide adequate lubrication for the seal.

8.2.4 Exceptional service conditions may necessitate the selection of other grades of surface roughness, in which case they should be subject to agreement between manufacturer and user.

