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# International Standard



# 7181

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

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## Hydraulic fluid power — Cylinders — Bore and rod area ratios

*Transmissions hydrauliques — Vérins — Rapports entre surfaces d'alésage et de tige*

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**Descriptors** : fluid power, hydraulic fluid power, hydraulic cylinders, bores, piston-rods, dimensions.

## 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 7181 was developed by Technical Committee ISO/TC 131, *Fluid power systems*, and was circulated to the member bodies in June 1981.

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

Australia	France	South Africa, Rep. of
Austria	Germany, F.R.	Spain
Belgium	Hungary	Sweden
Brazil	Japan	Switzerland
China	Netherlands	United Kingdom
Czechoslovakia	Norway	USA
Egypt, Arab Rep. of	Poland	USSR
Finland	Romania	

No member body expressed disapproval of the document.

# Hydraulic fluid power — Cylinders — Bore and rod area ratios

## 0 Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit.

One component of such systems is the fluid power cylinder. This is a device which converts power into linear mechanical force and motion. It consists of a movable element, i.e. a piston and piston rod, operating within a cylindrical bore.

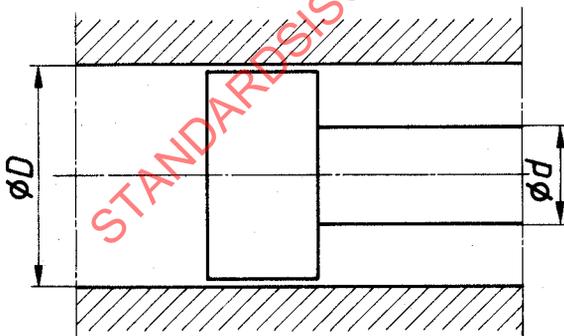
## 1 Scope and field of application

This International Standard specifies for each pair of diameters ( $D$  internal diameter,  $d$  piston rod diameter) of hydraulic cylinders a corresponding standard ratio  $\phi$  between the useful areas  $A_1$  and  $A_2$ .

## 2 Reference

ISO 5598, *Hydraulic and pneumatic fluid power — Vocabulary*.<sup>1)</sup>

## 3 Area ratios



Figure

## NOTES

1 For each pair of diameters ( $D$ ,  $d$ ) there is a corresponding ratio  $\phi$  between the useful areas  $A_1$  and  $A_2$ .

$$A_1 = \frac{\pi}{4} D^2 \quad A_2 = \frac{\pi}{4} [D^2 - d^2]$$

2 The table gives, for guidance, for each value of  $D$  those standard values of  $d$  that give ratios  $\phi$  approximately equal to one of the following preferred numbers:

1,06 — 1,12 — 1,25 — 1,4 — 1,6 — 2 — 2,5 — 5

3 Moreover, for each pair ( $D$ ,  $d$ ) the table gives calculated values of  $A_1$  and  $A_2$  and the corresponding effective value of  $\phi$ .

## 4 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 :

"Hydraulic cylinder area ratios conform to ISO 7181, *Hydraulic fluid power — Cylinders — Bore and rod area ratios*."

1) At present at the stage of draft.

Table — Bore and rod area ratios

$$\varphi = \frac{A_1}{A_2} \quad A_1 = \frac{\pi}{4} D^2 \quad A_2 = \frac{\pi}{4} [D^2 - d^2]$$

Diameters in millimetres  
Areas in square centimetres

$\varphi$	$D$	25	32	40	50	63	80	100	125	160	200	250	320	400	500
	$A_1$	4,91	8,04	12,6	19,6	31,2	50,3	78,5	123	201	314	491	804	1257	1963
1,06	$d$				12	16	20	25	32	40	50	63	80	100	125
	$A_2$				18,5	29,2	47,1	73,6	115	188	295	460	754	1178	1841
	$\varphi$				1,06	1,07	1,07	1,07	1,07	1,07	1,07	1,07	1,07	1,07	1,07
1,12	$d$			12	16	20	25	32	40	50	63	80	100	125	160
	$A_2$			11,4	17,6	28,0	45,4	70,5	110	181	283	441	726	1134	1762
	$\varphi$			1,10	1,11	1,11	1,11	1,11	1,11	1,11	1,11	1,11	1,11	1,11	1,11
1,25	$d$	12	14	18	22	28	36	45	56	70	90	110	140	180	220
	$A_2$	3,78	6,50	10,0	15,8	25,0	40,1	62,6	98,1	163	251	396	650	1002	1583
	$\varphi$	1,30	1,24	1,25	1,24	1,25	1,25	1,25	1,25	1,24	1,25	1,24	1,24	1,25	1,24
1,4	$d$	14	18	22	28	36	45	56	70	90	110	140	180	220	280
	$A_2$	3,37	5,50	8,77	13,5	21	34,4	53,9	84,2	137	219	337	550	877	1348
	$\varphi$	1,46	1,46	1,43	1,46	1,48	1,46	1,46	1,46	1,46	1,43	1,46	1,46	1,43	1,46
1,6	$d$	16	20	25	32	40	50	63	80	100	125	160	200	250	320
	$A_2$	2,90	4,90	7,66	11,6	18,6	30,6	47,4	72,5	123	191	290	490	766	1159
	$\varphi$	1,69	1,64	1,64	1,69	1,68	1,64	1,66	1,69	1,64	1,64	1,69	1,64	1,64	1,69
2	$d$	18	22	28	36	45	56	70	90	110	140	180	220	280	360
	$A_2$	2,36	4,24	6,41	9,46	15,3	25,6	40,1	59,1	106	160	236	424	641	946
	$\varphi$	2,08	1,90	1,96	2,08	2,04	1,96	1,96	2,08	1,90	1,96	2,08	1,90	1,96	2,08
2,5	$d$	20	25	32	40	50	63	80	100	125	160	200	250	320	400
	$A_2$	1,77	3,13	4,52	7,07	11,5	19,1	28,3	44,2	78,3	113	177	313	452	707
	$\varphi$	2,78	2,57	2,78	2,78	2,70	2,63	2,78	2,78	2,57	2,78	2,78	2,57	2,78	2,78
5	$d$				45	56	70	90	110	140	180	220	280	360	450
	$A_2$				3,73	6,54	11,8	14,9	27,7	47,1	60	111	188	239	373
	$\varphi$				5,26	4,76	4,27	5,26	4,43	4,27	5,26	4,43	4,27	5,26	5,26

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