INTERNATIONAL STANDARD

ISO 7181

Second edition
1991-10-01

Hydraulic fluid power — Cylinders — Bore and rod area ratios

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

Reference number
ISO 7181:1991(E)

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.

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.

International Standard ISO 7181 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Sub-Committee SC 3, *Cylinders*.

This second edition cancels and replaces the first edition (ISO 7181:1982), which has been technically revised.

Annex A of this International Standard is for information only.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

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 hydraulic 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.

This page intentionally left blank

Hydraulic fluid power — Cylinders — Bore and rod area ratios

1 Scope

This International Standard specifies for each pair of diameters (AL = cylinder bore; MM = piston rod diameter) of hydraulic cylinders a corresponding standard ratio φ between the useful areas A_1 and A_2.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5598:1985, *Fluid power systems and components — Vocabulary.*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 5598 apply.

4 Area ratios

Dimensions are shown on figure 1 and given in table 1.

NOTES

1 For each pair of diameters (AL, MM) there is a corresponding ratio φ between the useful areas A_1 and A_2.

$$A_1 = \frac{\pi}{4} AL^2$$

$$A_2 = \frac{\pi}{4} (AL^2 - MM^2)$$

2 Table 1 gives, for guidance, for each value of AL those standard values of MM that give ratios φ 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 (AL, MM), table 1 gives calculated values of A_1 and A_2 and the corresponding effective value of φ.

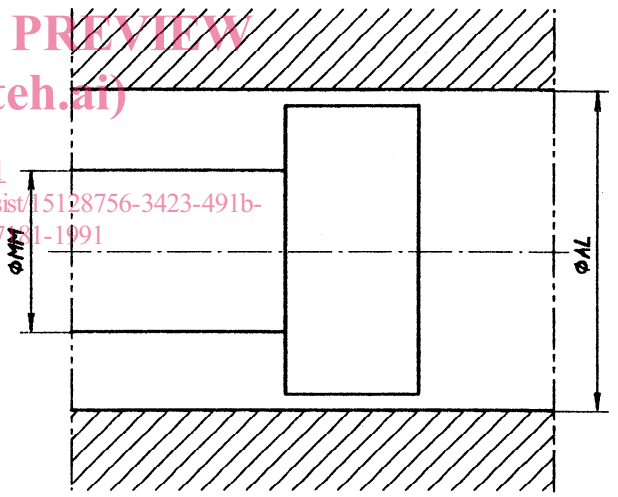

Figure 1

5 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.*"

Table 1 — Bore and rod area ratios

Diameters in millimetres
Areas in square centimetres

φ[1)]	AL	25	32	40	50	63	80	(90)	100	(110)	125	(140)	160	(180)	200	(220)	250	(280)	320	(360)	400	(450)	500
≈	A_1	4,91	8,04	12,6	19,6	31,2	50,3	63,6	78,5	95	123	154	201	254	314	380	491	616	804	1 018	1 257	1 590	1 963
1,06	MM A_2 φ				12 18,5 1,06	16 29,2 1,07	20 47,1 1,07	22 59,8 1,06	25 73,6 1,07	28 88,9 1,07	32 115 1,07	36 144 1,07	40 188 1,07	45 239 1,07	50 295 1,07	56 355 1,07	63 460 1,07	70 577 1,07	80 754 1,07	90 954 1,07	100 1 178 1,07	110 1 495 1,06	125 1 841 1,07
1,12	MM A_2 φ			12 11,4 1,10	16 17,6 1,11	20 28,0 1,11	25 45,4 1,11	28 57,5 1,11	32 70,5 1,11	36 84,9 1,12	40 110 1,11	45 138 1,12	50 181 1,11	56 230 1,11	63 283 1,11	70 342 1,11	80 441 1,11	90 552 1,12	100 726 1,11	110 923 1,10	125 1 134 1,11	140 1 436 1,11	160 1 762 1,11
1,25	MM A_2 φ	12 3,78 1,30	14 6,50 1,24	18 10,0 1,25	22 15,8 1,24	28 25,0 1,25	36 40,1 1,25	40 51,1 1,25	45 62,6 1,25	50 75,4 1,26	56 98,1 1,25	63 123 1,25	70 163 1,24	80 204 1,25	90 251 1,25	100 302 1,26	110 396 1,24	125 493 1,25	140 650 1,24	160 817 1,25	180 1 002 1,25	200 1 276 1,25	220 1 583 1,24
1,4	MM A_2 φ	14 3,37 1,46	18 5,50 1,46	22 8,77 1,43	28 13,5 1,46	36 21 1,48	45 34,4 1,46	50 44 1,45	56 53,9 1,46	63 63,9 1,49	70 84,2 1,46	80 104 1,48	90 137 1,46	100 176 1,45	110 219 1,43	125 257 1,48	140 337 1,46	160 415 1,48	180 550 1,46	200 704 1,45	220 877 1,43	250 1 100 1,45	280 1 348 1,46
1,6	MM A_2 φ	16 2,90 1,69	20 4,90 1,64	25 7,66 1,64	32 11,6 1,69	40 18,6 1,68	50 30,6 1,64	56 39 1,63	63 47,4 1,66	70 56,5 1,68	80 72,5 1,69	90 90,3 1,70	100 123 1,64	110 159 1,60	125 191 1,64	140 226 1,68	160 290 1,69	180 361 1,70	200 490 1,64	220 638 1,60	250 766 1,64	280 975 1,63	320 1 159 1,69
2	MM A_2 φ	18 2,36 2,08	22 4,24 1,90	28 6,41 1,96	36 9,46 2,08	45 15,3 2,04	56 25,6 1,96	63 32,4 1,96	70 40,1 1,96	80 44,8 2,12	90 59,1 2,08	100 75,4 2,04	110 106 1,90	125 132 1,93	140 160 1,96	160 179 2,12	180 236 2,08	200 302 2,04	220 424 1,90	250 527 1,93	280 641 1,96	320 786 2,02	360 946 2,08
2,5	MM A_2 φ	20 1,77 2,78	25 3,13 2,57	32 4,52 2,78	40 7,07 2,78	50 11,5 2,70	63 19,1 2,63	70 25,1 2,53	80 28,3 2,78	90 31,4 3,03	100 44,2 2,78	110 58,9 2,61	125 78,3 2,57	140 101 2,53	160 113 2,78	180 126 3,03	200 177 2,78	220 236 2,61	250 313 2,57	280 402 2,53	320 452 2,78	360 573 2,78	400 707 2,78
5	MM A_2 φ				45 3,73 5,26	56 6,54 4,76	70 11,8 4,27	80 13,35 4,76	90 14,9 5,26	100 16,5 5,76	110 27,7 4,43	125 31,2 4,93	140 47,1 4,27	160 53,4 4,76	180 60 5,26	200 66 5,76	220 111 4,43	250 125 4,93	280 188 4,27	320 214 4,76	360 239 5,26	400 334 4,76	450 373 5,26

NOTE — Values in parentheses are non-preferred values and should be used only for special applications.

1) $\varphi = \frac{A_1}{A_2}$ $\quad A_1 = \frac{\pi}{4} AL^2$ $\quad A_2 = \frac{\pi}{4}\left(AL^2 - MM^2\right)$

Annex A
(informative)

Bibliography

[1] ISO 3320:1987, *Fluid power systems and components — Cylinder bores and piston rod diameters — Metric series*.

UDC 621.22-222:621.8.032

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

Price based on 3 pages