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# International Standard



# 3019/2

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

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## **Hydraulic fluid power — Positive displacement pumps and motors — Dimensions and identification code for mounting flanges and shaft ends — Part 2 : 2 and 4-hole flanges and shaft ends — Metric series**

*Transmissions hydrauliques — Pompes volumétriques et moteurs — Dimensions et code d'identification des flasques de montage et des bouts d'arbres —*

*Partie 2 : Flasques à 2 et 4 trous et bouts d'arbres — Série métrique*

First edition — 1980-04-01

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**Descriptors** : hydraulic fluid power, hydraulic equipment, pumps, positive displacement pumps, hydraulic motors, mounting flanges, shaft ends, dimensions, metric system, designation, codes.

## 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 3019/2 was developed by Technical Committee ISO/TC 131, *Fluid power systems and components*, and was circulated to the member bodies in February 1978.

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

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

No member body expressed disapproval of the document.

This International Standard is part 2 of ISO 3019 and is based upon a metric series of mounting flanges and shaft ends for hydraulic pumps and motors. It contains the preferred series and, in annex A, a non-preferred series.

The whole series in part 1 is also non-preferred. Annex B in part 2 describes examples of methods for sealing between a part 2 mounting flange and its housing.

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# Hydraulic fluid power — Positive displacement pumps and motors — Dimensions and identification code for mounting flanges and shaft ends — Part 2 : 2 and 4-hole flanges and shaft ends — Metric series

## 0 INTRODUCTION

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. Pumps are components which convert mechanical power into hydraulic fluid power. Motors are components which convert hydraulic fluid power into mechanical power.

## 1 SCOPE AND FIELD OF APPLICATION

1.1 This International Standard specifies dimensions and an identification code for positive displacement rotary hydraulic fluid power pump and motor mounting flanges of the following types :

- two-hole oval flanges;
- four-hole square flanges;
- four-hole rectangular flanges.

NOTE — A series of circular and polygon flanges, for products having geometry unsuitable for any of the above flanges, will be added later as Part 3.

1.2 It also specifies dimensions and an identification code for positive displacement rotary hydraulic fluid power pump and motor shaft ends of the following types :

- cylindrical shaft end with key;
- conical shaft end with key and external thread.

### NOTES

1 Additional shaft sizes required for circular and polygon flanges will be included in Part 3, now in preparation.

2 A series of metric involute spline shaft ends will be added to Parts 2 and 3 after the publication of the International Standard for metric involute splines, now in preparation.

3 The combinations of involute spline shaft ends and flanges in Part 1 of this International Standard will remain preferred until ISO metric involute spline shaft ends have been added into Part 2.

1.3 This International Standard establishes a metric series of mounting flanges and shaft ends for positive displacement rotary hydraulic fluid power pumps and motors. The preferred series is to be used for all future pump and motor designs.

The non-preferred series in annex A and the inch-based series in Part 1 should be avoided whenever possible.

NOTE — See note 3 in 1.2.

1.4 This International Standard provides :

- a minimum number of flanges and shaft sizes to cover probable present and future requirements : short and long flange spigot options are included;
- dimensional interchangeability of flange and shaft end mountings;
- a facility for making certain flanges from castings designed originally for Part 1 sizes;
- flange and spigot dimensions that allow for recommended sealing arrangements when sealing is required between a flange and its mating housing (see annex B);
- identification codes for flanges and shaft ends; these codes can be used separately or in combination.

## 2 REFERENCES

ISO 261, *ISO general purpose metric screw threads – General plan.*

ISO/R 286, *ISO system of limits and fits.*

ISO/R 773, *Rectangular or square parallel keys and their corresponding keyways (dimensions in millimetres).*

ISO/R 775, *Cylindrical and 1/10 conical shaft ends.*

ISO/R 1101, *Technical drawings – Tolerances of form and of position.*

ISO 1302, *Technical drawings – Method of indicating surface texture on drawings.*

ISO 3912, *Woodruff keys and keyways.*

ISO 3019/3, *Hydraulic fluid power – Positive displacement pumps and motors – Dimensions and identification code for mounting flanges and shaft ends – Part 3: Polygon flanges, including circular flanges.<sup>1)</sup>*

## 3 DEFINITIONS

An International Standard giving definitions of terms is in preparation.

## 4 DIMENSIONS

### 4.1 Tolerances

4.1.1 Dimensions shown without tolerances are nominal.

4.1.2 Tolerances of form and of position are shown in accordance with ISO/R 1101.

### 4.2 Selection of sizes

4.2.1 Select preferred mounting flanges and shaft dimensions for pumps and motors manufactured in accordance with this International Standard as follows :

- flanges from tables 1 to 3 inclusive;
- shaft ends from 4.5.

4.2.2 If the non-preferred series is required, select as follows :

- flanges from annex A (clause A.1), and tables 5 to 7 inclusive;
- shaft ends from annex A (clause A.2).

### 4.3 Mounting flanges – Preferred series

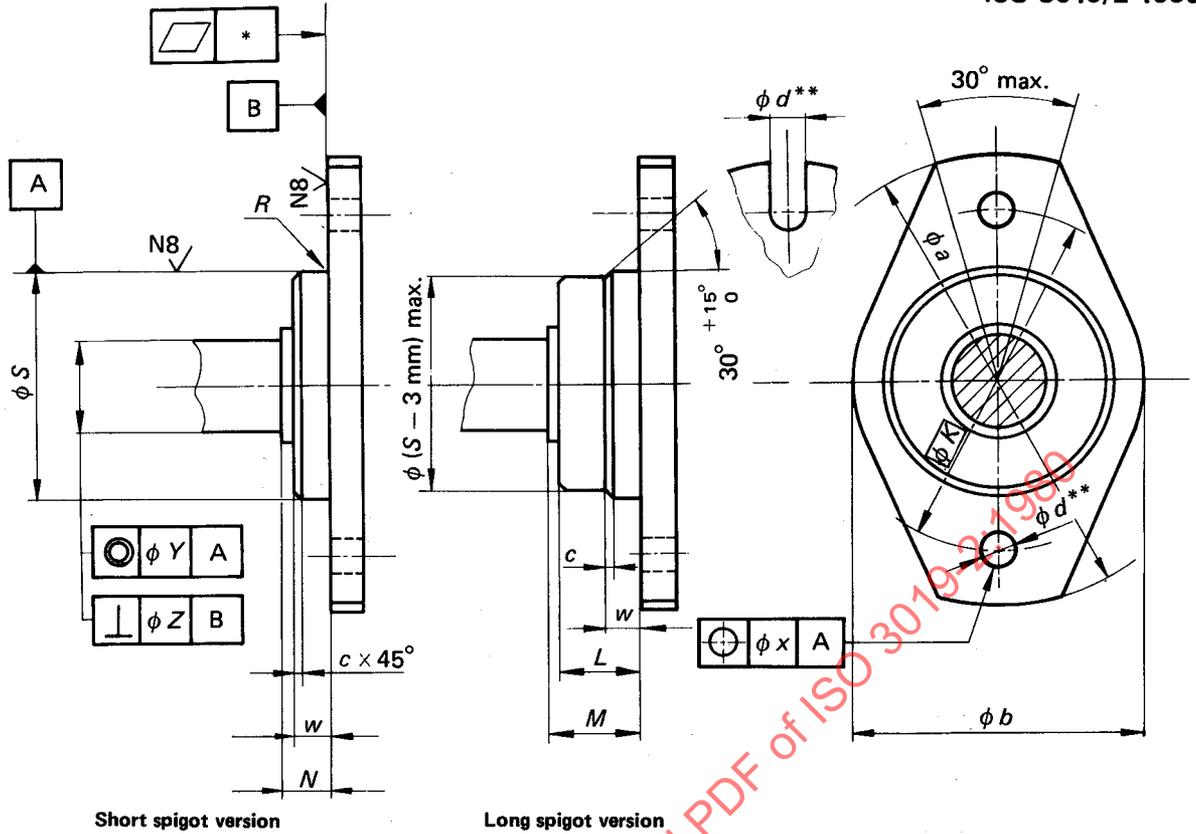
Select mounting flange dimensions from the following tables :

4.3.1 Preferred range of oval mounting flanges, table 1, figure 1.

4.3.2 Preferred range of square mounting flanges, table 2, figure 2.

4.3.3 Preferred range of rectangular mounting flanges, table 3, figure 3.

1) At present at the stage of draft.



- \* Flatness tolerance will be incorporated in due course.
- \*\* Slots may be used instead of holes by agreement between purchaser and supplier.

FIGURE 1 – Basic layout of oval mounting flange

TABLE 1 – Preferred range of oval mounting flanges

Dimensions in millimetres

Short and long spigot versions											Short spigot version	Long spigot version										
S h8 <sup>1)</sup>	K	Fixings			a max.	b max.	w + 0,5 0	c max.	R max. (R min. = 0)	Y2)	Z2) mm/mm	N + $\frac{1}{0}$	M	L max.								
		Bolts		Clearance holes (slots)																		
		Quantity	Nominal diameter	d H13 <sup>1)</sup>											x							
32	56	2	M6	6,6	0,3	75	50	7	1,5	0,5	0,20	0,0015	8	16 <sup>+1</sup> <sub>0</sub>	15,5							
40	63					80	56							20 <sup>+1</sup> <sub>0</sub>	19,5							
50	80					106	65															
63	100		M8	9	0,5	125	80							0,25	0,30	0,0020	10	25 <sup>+1</sup> <sub>0</sub>	24,5			
80	109					M10	11													140	100	
100	140		M12	14	177	125	9							2,0	1,6	0,35	0,0020	32 <sup>+1</sup> <sub>0</sub>	31,5			
125	180		M16	18	1	224														150	40 <sup>+1</sup> <sub>0</sub>	39,5
160	224					M20														22		
200	280		M24	26	335	236	50 <sup>+1,2</sup> <sub>0</sub>							49,5								

1) For tolerance values see ISO/R 286.

2) Tolerances stated are for the unladen condition. (Rigid couplings may require closer tolerances.)





4.4 Use of Part 1 mounting flange castings

Certain short spigot flanges in this International Standard can be made from those similar Part 1 castings that have adequate machining allowance for the spigots. Table 4 provides a cross-reference.

TABLE 4 — Part 2 flanges and related part 1 flange castings

Part 2 flange		Part 1 flange casting
Location	Code	Code
Table 1	50A2*W	50-2
	80A2*W	82-2
	100A2*W	101-2
	125A2*W	127-2
	160A2*W	152-2
Table 2	100B4*W	101-4
	125B4*W	127-4
	250B4*W	177-4**
Table 7	180B4*W	152-4
	224B4*W	165-4

\* See 5.1 e) for hole option.

\*\* Remove corners to conform with  $\phi a$  in figure 2.

4.5 Shaft ends — Preferred series

The following characteristics have been taken from ISO/R 775, unless otherwise stated :

4.5.1 Select nominal diameters ( $d_1$ ) of shaft ends from the following series :

- 10 — 12 — 16 — 20 — 25 — 32 — 40 — 50 — 63 — 80

NOTE — A selection of first and second choice nominal diameters per flange size is now in preparation and will be incorporated in due course.

4.5.2 Shaft end shapes will be one of the following types :

- a) cylindrical shaft end with key, see figure 4;
- b) conical shaft end with key and external thread, see figure 5.

4.5.3 Only parallel keys to ISO/R 773 or Woodruff keys to ISO 3912 are to be used.

4.5.4 Select shaft end lengths,  $l_1$  and  $l_2$  from the short series in ISO/R 775 except for conical shaft ends of nominal diameters 10 and 12 for which the long series only is available.

$N$  or  $M$ , as appropriate. See tables 1 to 3 and 5 to 7 inclusive

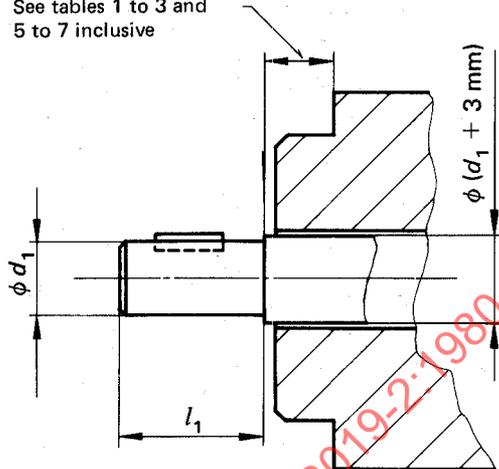


FIGURE 4 — Cylindrical shaft end with key

$N$  or  $M$ , as appropriate. See tables 1 to 3 and 5 to 7 inclusive

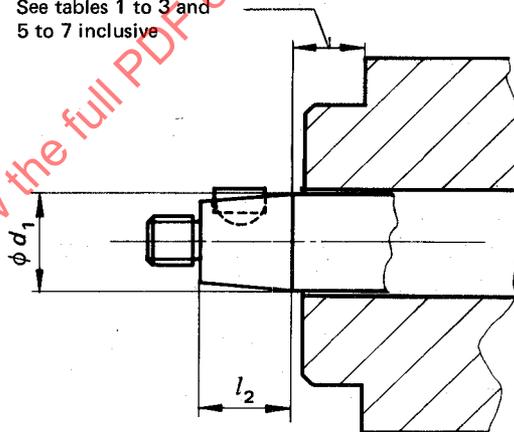


FIGURE 5 — Conical shaft end with key and external thread

4.5.5 Select other shaft end dimensions from ISO/R 775 except for the tolerances on the diameter of cylindrical shaft ends which shall be of grade 7 instead of 6.

NOTE — On conical shafts the length of the conical surface can exceed  $l_2$  towards the mounting flange provided that diameter  $d_1$  is located at  $l_2$ .

5 IDENTIFICATION CODE

5.1 Code for mounting flanges

Where it is required to identify mounting flanges in accordance with this International Standard, the following code shall be used :

- a) use the word "Flange";
- b) indicate the size reference of the flange by using the spigot diameter ( $S$ ) in millimetres;

- c) indicate the flange shape, using the following code :
- oval flange with 2 holes : A
  - square flange with 4 holes : B
  - rectangular flange with 4 holes : C
- d) the number of fixing holes : 2 or 4.

NOTE — Slots can be used in place of holes by agreement between the user and the supplier.

- e) "H" indicates clearance holes (preferred);  
"T" indicates tapped holes (non-preferred, see annex A);
- f) "W" indicates short spigot;  
"L" indicates long spigot;
- g) reference to this International Standard :  
ISO 3019/2.

NOTE — When both a flange and shaft are coded jointly, omit this reference.

5.1.1 See 5.3 for examples of designation.

## 5.2 Code for shaft ends

Where it is required to identify shaft ends in accordance with this International Standard, the following code shall be used :

- a) use the words "shaft end";
- b) indicate the shape of the shaft end using the following code :
- Cylindrical shaft end with key but without internal thread : E
  - Conical shaft end with external thread : F
  - Cylindrical shaft end with key and internal thread (Non-preferred, see annex A, A.2.2.2); G
- c) indicate the size reference of the shaft by using its nominal diameter ( $d_1$  in millimetres);
- d) "N" indicates short shaft;  
"M" indicates long shaft;
- e) reference to this International Standard :  
ISO 3019/2.

5.2.1 See 5.3 for examples of designation

## 5.3 Examples of designation

5.3.1 Designate a four-hole square mounting flange of spigot diameter 100 mm, having short spigot with clearance holes, as follows :

Flange 100B4HW. ISO 3019/2.

5.3.2 Designate a conical shaft end, with external thread, of nominal diameter ( $d_1$ ), 63 mm short series, as follows :

Shaft end F63N. ISO 3019/2.

5.3.3 Designate the combination of both elements defined in 5.3.1 and 5.3.2 as follows :

Flange 100B4HW/Shaft end F63N. ISO 3019/2.

## 6 IDENTIFICATION STATEMENT (Reference to this International Standard)

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

"Dimensions and identification code for mounting flanges and shaft ends, metric series, are in accordance with ISO 3019/2 *Hydraulic fluid power — Positive displacement pumps and motors — Dimensions and identification code for mounting flanges and shaft ends — Part 2 : 2 and 4-hole flanges and shaft ends — Metric series.*"

## 7 MARKING

To assist in distinguishing mounting flanges made in accordance with Part 2 of this International Standard from similar flanges made in accordance with Part 1, the capital letter "M" shall be permanently marked at a normally visible location on every Part 2 flange.

For the same reason, the letter "M" should similarly be permanently marked, immediately adjacent to the mounting face, on the mating housing.

ANNEX A

**NON-PREFERRED METRIC SERIES : MOUNTING FLANGES, SHAFT ENDS AND OTHER FEATURES**

NOTE — This series must be avoided whenever possible.

**A.1 MOUNTING FLANGES**

**A.1.1** Oval flanges (see table 5)

**A.1.2** Square flanges (see table 6)

**A.1.3** Rectangular flanges (see table 7);

**A.1.4** Tapped fixing hole option for mounting flanges

Tapped holes of the same nominal diameter as the flange fixing bolts and conforming to ISO 261 can be substituted for the "d" clearance holes in all flange shapes and sizes in Part 2 of this International Standard.

**A.2 SHAFT ENDS**

The following characteristics have also been taken from ISO/R 775.

**A.2.1** Nominal diameter of shaft ends

Select diameters from the following series :

18 — 30 — 45

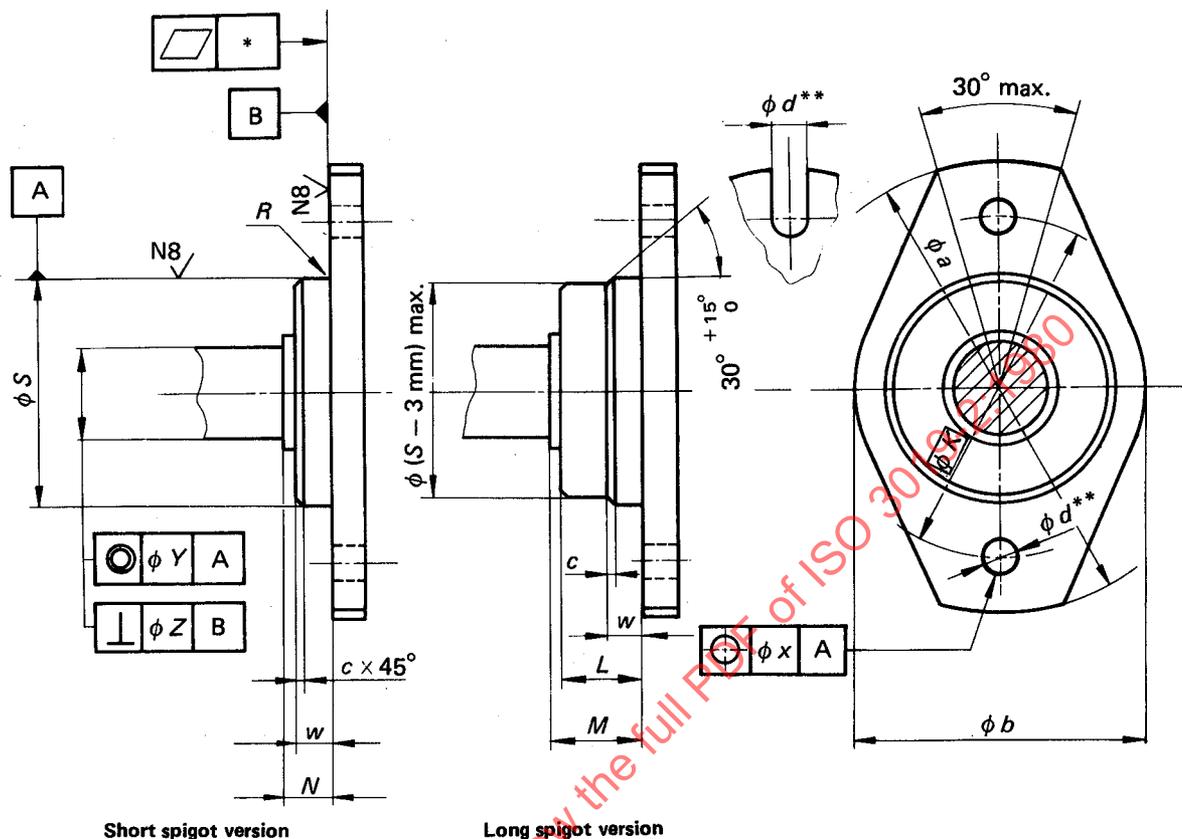
NOTE — A selection of first and second choice nominal diameters per flange size is now in preparation and will be incorporated in due course.

**A.2.2** Shaft end shapes

**A.2.2.1** Apply the sizes in A.2.1 to any shaft end shape appearing in Part 2 of this International Standard.

**A.2.2.2** Cylindrical shaft ends with keys (see figure 4) can be provided with a tapped hole, conforming to this variation in ISO/R 775. Tapped holes can be provided in all sizes of cylindrical shaft appearing in Part 2 of this International Standard.

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- \* Flatness tolerance will be incorporated in due course.
- \*\* Slots may be used instead of holes by agreement between purchaser and supplier.

FIGURE 6 — Basic layout of oval mounting flange

TABLE 5 — Non-preferred series of oval mounting flanges

Dimensions in millimetres

Short and long spigot versions											Short spigot version	Long spigot version			
S h8 <sup>1)</sup>	K	Fixings				a max.	b max.	w + 0,5 0	c max.	R max. (R min. = 0)	Y2)	Z2) mm/mm	N + 1 0	M + 1 0	L max.
		Bolts		Clearance holes (slots)											
		Quantity	Nominal diameter	d H13 <sup>1)</sup>	x										
112	160	2	M12	14	1	200	132	9	2	1,6	0,30	0,0015	10	25	24,5
140	200		M16	18		250	170				0,35	0,0020		32	31,5
180	250		M20	22		300	212							40	39,5

1) For tolerance values see ISO/R 286.

2) Tolerances stated are for the unladen condition. (Rigid couplings may require closer tolerances.)