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**Hydraulic fluid power — Dimensions and  
identification code for mounting flanges  
and shaft ends of displacement pumps and  
motors —**

**Part 1:  
Inch series shown in metric units**

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

*Partie 1: Conversion en unités métriques de la série en inches*



Reference number  
ISO 3019-1:2001(E)

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Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.ch](mailto:copyright@iso.ch)  
Web [www.iso.ch](http://www.iso.ch)

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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 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this part of ISO 3019 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 3019-1 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 2, *Pumps, motors and integral transmissions*.

This second edition cancels and replaces the first edition (ISO 3019-1:1975), which has been technically revised.

ISO 3019 consists of the following parts, under the general title *Hydraulic fluid power — Dimensions and identification code for mounting flanges and shaft ends of displacement pumps and motors*:

- *Part 1: Inch series shown in metric units*
- *Part 2: Metric series*

Annex A forms a normative part of this part of ISO 3019.

## **Introduction**

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

This part of ISO 3019 provides composite dimension reference and identification codes for both pumps and motors, simplified dimensional interchangeability for their flanges and shafts, and preferred sizes and dimensions for new designs.

# Hydraulic fluid power — Dimensions and identification code for mounting flanges and shaft ends of displacement pumps and motors —

## Part 1: Inch series shown in metric units

### 1 Scope

This part of ISO 3019 specifies sizes and dimensions and establishes an identification code for the two- and four-bolt mounting flanges and the shaft ends of positive-displacement, rotary hydraulic fluid power pumps and motors. It is applicable to cylindrical keyed shaft ends with an external thread, as well as to those without a thread, to conical keyed shaft ends with an external thread and to 30° involute spline shaft ends.

NOTE Involute spline is in accordance with SAE J744 [1].

### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 3019. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 3019 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 68-2, *ISO general purpose screw threads — Basic profile — Part 2: Inch screw threads*.

ISO 1101:—<sup>1)</sup>, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*.

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

### 3 Terms and definitions

For the purposes of this part of ISO 3019, the terms and definitions given in ISO 5598 apply.

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1) To be published. (Revision of ISO 1101:1983)

## 4 Dimensions

### 4.1 Tolerances

Dimensions shown without tolerances are nominal.

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

### 4.2 Selection of mounting flanges and shaft ends

Select flange and shaft dimensions for pumps and motors manufactured in accordance with this part of ISO 3019 from Figures 1 to 6 and Tables 1 to 6, inclusive.

Shaft ends according to Figure 3 and Figure 6 may be provided with a tapped hole.

### 4.3 Mating components

The dimensions and related tolerances of the mating components shall be compatible with the dimensions and tolerances specified in this part of ISO 3019, thus avoiding undue body strain as well as transverse loads on shafts in excess of those permitted by the pump or motor manufacturer.

## 5 Identification code

### 5.1 Mounting flanges

Use the mounting flange identification code given in Table 1 and Table 2.

The number preceding the hyphen (-) is an approximation, in millimetres, of the mounting flange pilot diameter.

The number following the hyphen is the number of mounting bolt holes in the flange.

### 5.2 Shaft ends

Use the shaft end identification codes shown in Tables 3 to 6.

The number preceding the hyphen is an approximation, in millimetres, of the shaft major diameter.

The number following the hyphen is arbitrarily assigned as follows:

- cylindrical keyed shaft ends without thread, -1;
- cylindrical keyed shaft ends with external thread, -2;
- conical keyed shaft ends with external thread, -3;
- 30° involute spline shaft ends, -4.

## 6 Flange/shaft end combinations

Use the preferred flange or shaft end combinations given in Table 7. Use other combinations only when necessary, by agreement between the purchaser and the supplier.

## 7 Flange/shaft end concentricity and perpendicularity

Maintain flange or shaft end concentricity within 0,25 mm and perpendicularity within 0,002/1, in accordance with Figures 3 to 6.

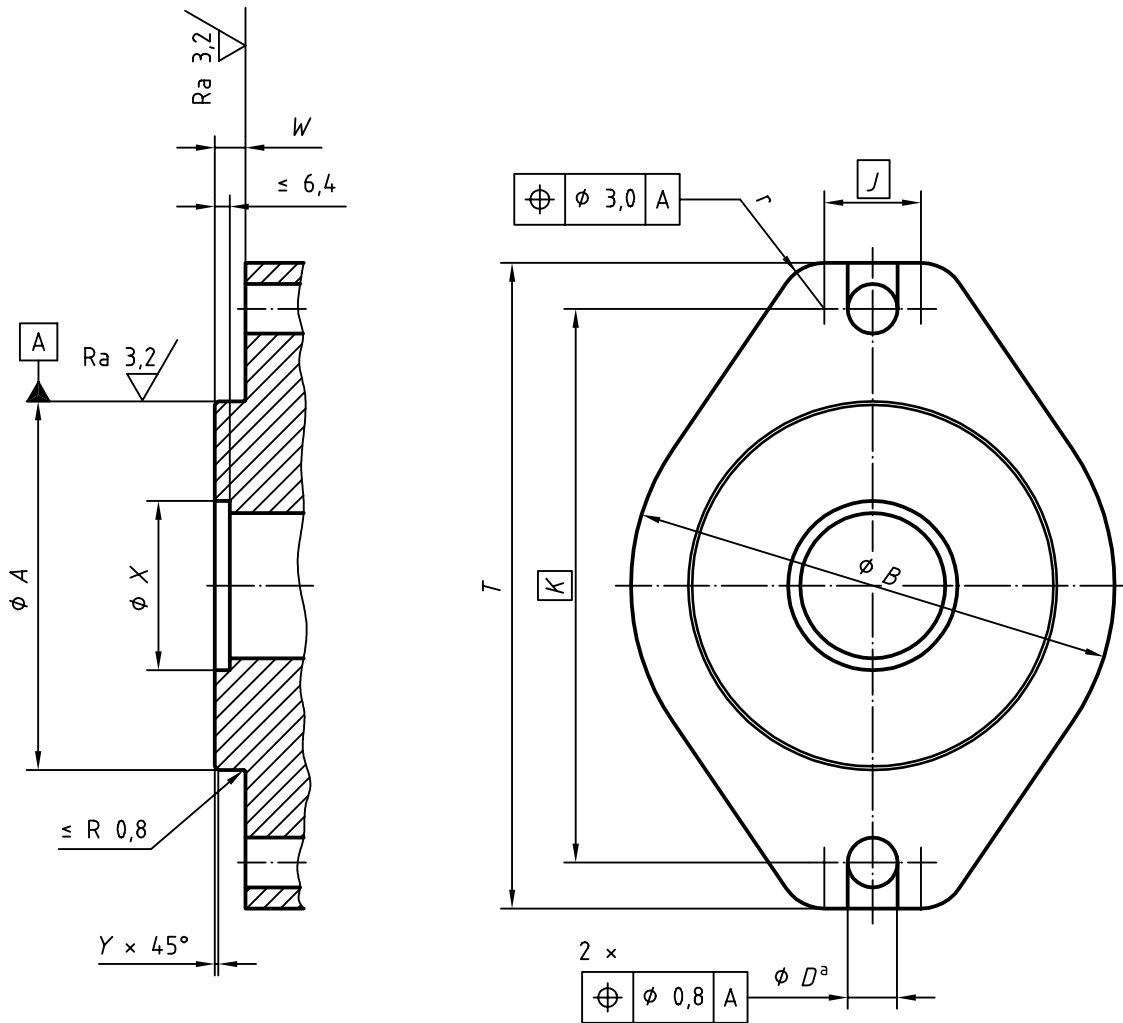
NOTE Rigid couplings may require closer tolerances.

## 8 Identification statement (Reference to this part of ISO 3019)

It is strongly recommended that manufacturers use the following statement in test reports, catalogues and sales literature when electing to comply with this part of ISO 3019:

*“Dimensions and identification code for mounting flanges and shaft ends in accordance with ISO 3019-1:2001, Hydraulic fluid power — Dimensions and identification code for mounting flanges and shaft ends of displacement pumps and motors — Part 1: Inch series shown in metric units.”*

Dimensions in millimetres,  
surface roughness values in micrometres



a Slots instead of holes are optional.

Figure 1 — Basic layout of two-bolt mounting flanges

Table 1 — Dimensions of two-bolt mounting flanges

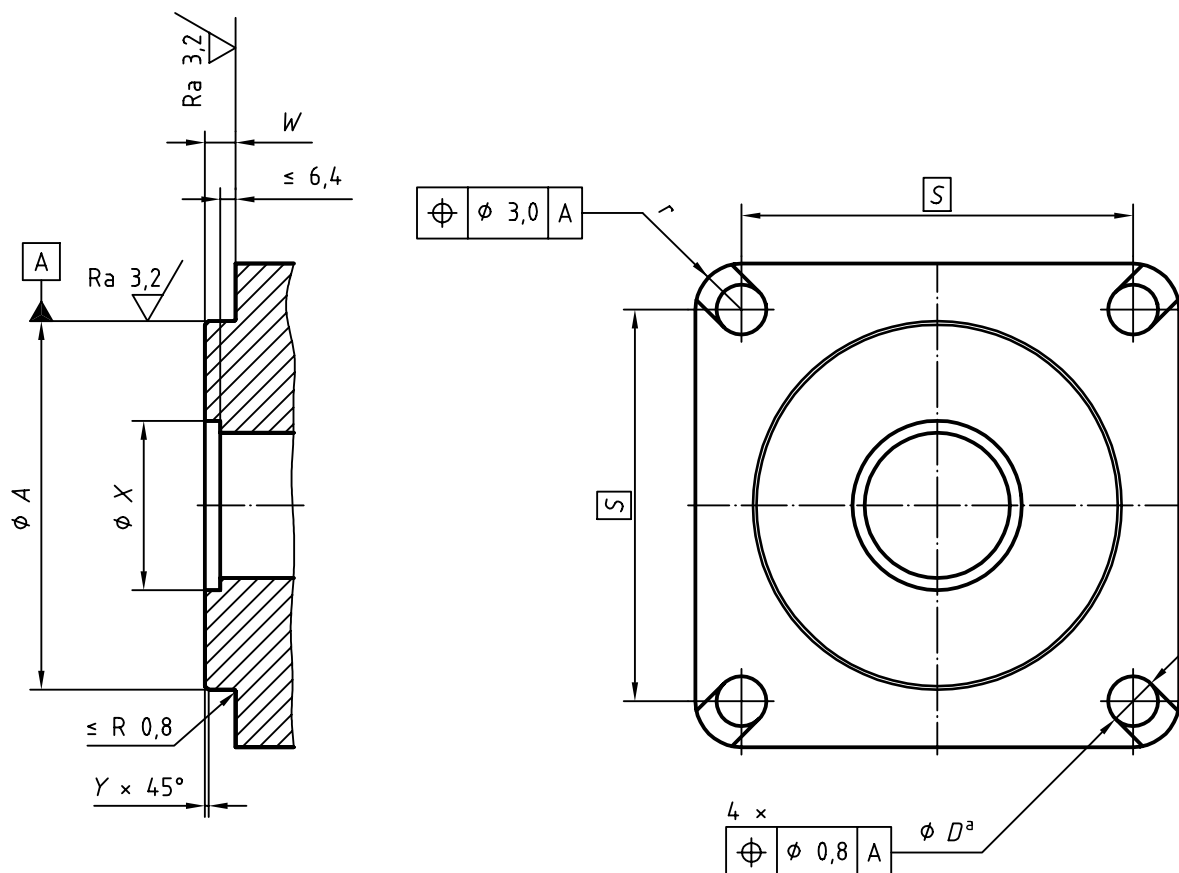
Dimensions in millimetres

Identification code	Pilot dimensions				Flange dimensions							
	A	W	X	Y	B	J	K	D	T	r		
	0 - 0,05	0 - 0,5	min.	max.				+ 0,3 - 0,1		max.		
50-2	50,8	6,4	—	0,8	64	± 0,5	14	82,6	10,3	102	± 0,5	10
82-2	82,55	6,4	—	0,8	95		18	106,4	11,1	130		12
101-2	101,6	9,7	51	1,5	120		25	146	14,3	174		14
127-2	127	12,7	64	1,5	148	± 1,5	31	181	17,5	213	± 1,5	16
152-2	152,4	12,7	70	1,5	200		40	228,6	20,6	267		19
165-2	165,1	15,9	70	2,3	270		55	317,5	27	368		25
177-2	177,8	15,9	70	2,3	300		60	350	27	400		25

Tolerances: dimensions without tolerances ± 0,5.



Dimensions in millimetres,  
surface roughness values in micrometres



a Slots instead of holes are optional.

Figure 2 — Basic layout of four-bolt mounting flanges

Table 2 — Dimensions of four-bolt mounting flanges

Dimensions en millimetres

Identification code	Pilot dimensions				Flange dimensions		
	A	W	X	Y	S	D	r
	0 - 0,05	0 - 0,5	min.	max.		+ 0,3 - 0,1	
101-4	101,6	9,7	51	1,5	89,8	14,3	14
127-4	127	12,7	64	1,5	114,5	14,3	14
152-4	152,4	12,7	70	1,5	161,6	20,6	19
165-4	165,1	15,9	70	2,3	224,5	20,6	19
177-4	177,8	15,9	70	2,3	247,5	27	25

Tolerances: dimensions without tolerances  $\pm 0,5$ .

Dimensions in millimetres,  
surface roughness values in micrometres

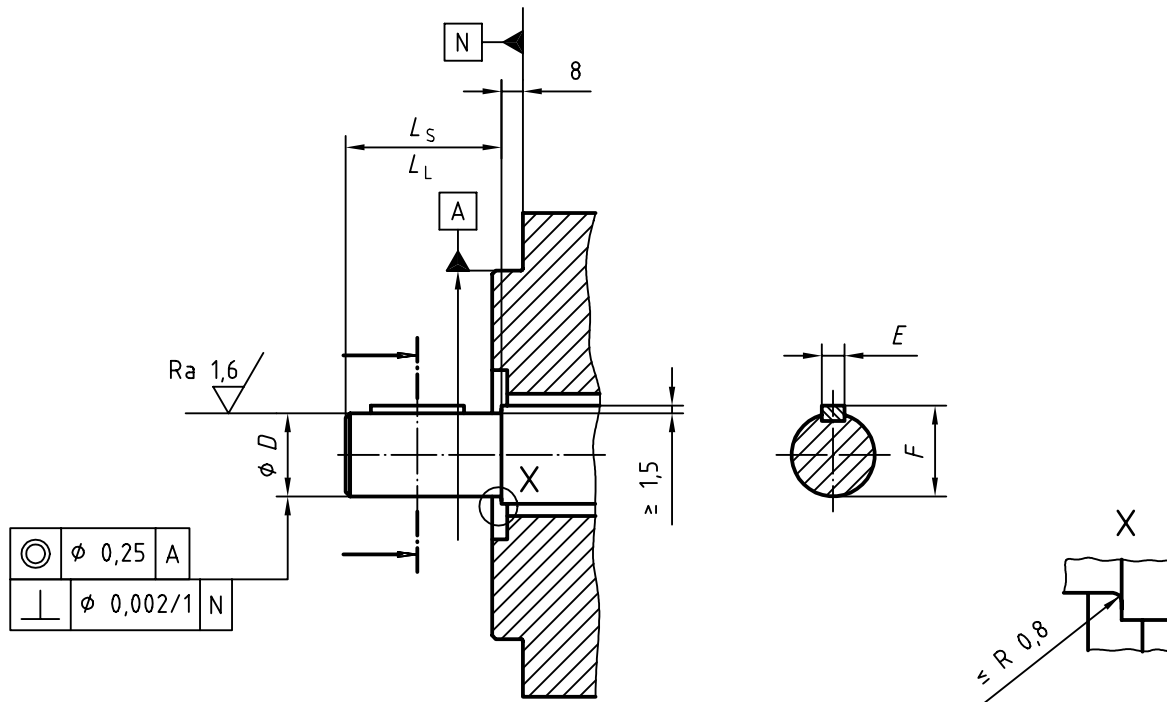


Figure 3 — Basic layout of cylindrical keyed shaft ends without thread

Table 3 — Dimensions of cylindrical keyed shaft ends without thread

Dimensions in millimetres

Identification code	$D$		$E$ (key width)	$F$	$L_L^a$	$L_S$
	max.	min.	+0,03 0	$\pm 0,13$		
13-1	12,70	12,67	3,18	14,07	—	19
16-1	15,88	15,85	3,97	17,6	51	24
19-1	19,05	19,02	4,78	21,1	51	24
22-1	22,23	22,20	6,35	24,9	63	33
25-1	25,40	25,35	6,35	28,1	70	38
32-1	31,75	31,70	7,94	35,2	76	48
38-1	38,10	38,05	9,53	42,27	83	54
44-1	44,45	44,40	11,11	49,3	92	67

Tolerances: dimensions without tolerances  $\pm 0,5$ .

<sup>a</sup> Optional long length shaft.

Dimensions in millimetres,  
surface roughness values in micrometres

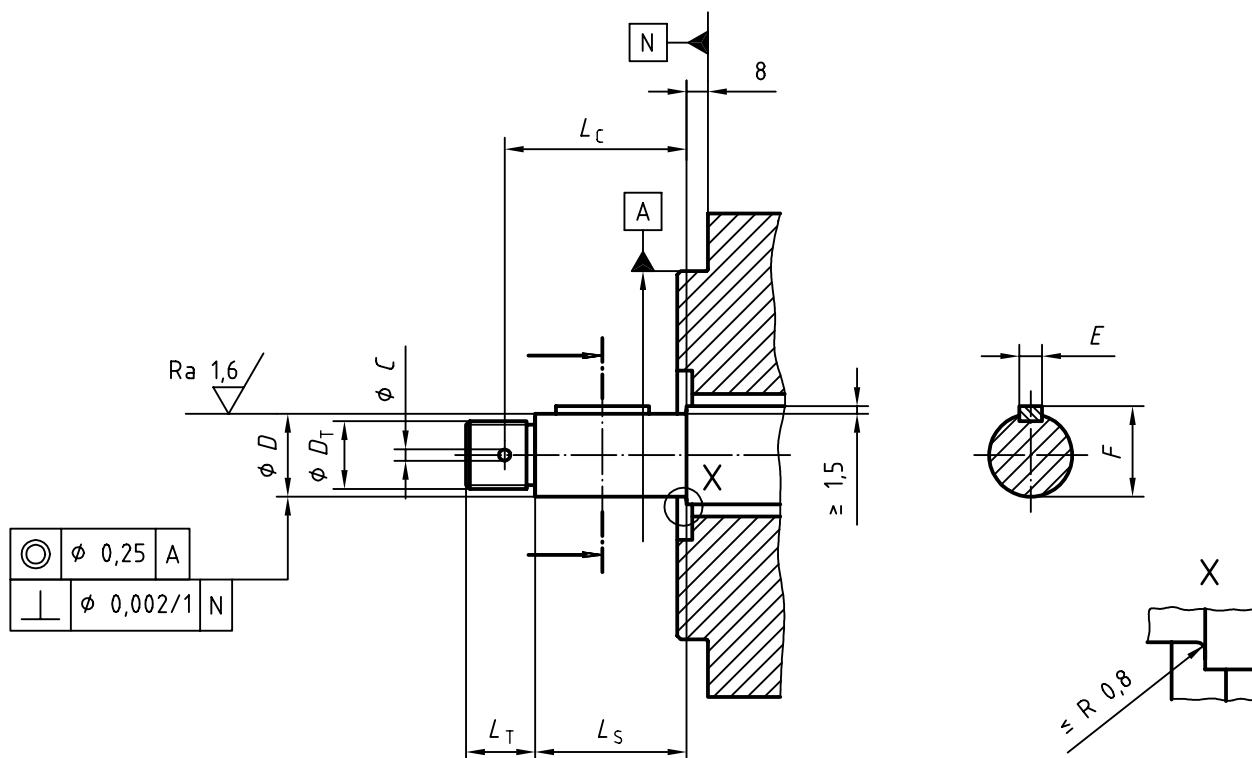


Figure 4 — Basic layout of cylindrical keyed shaft ends with external thread

Table 4 — Dimensions of cylindrical keyed shaft ends with external thread

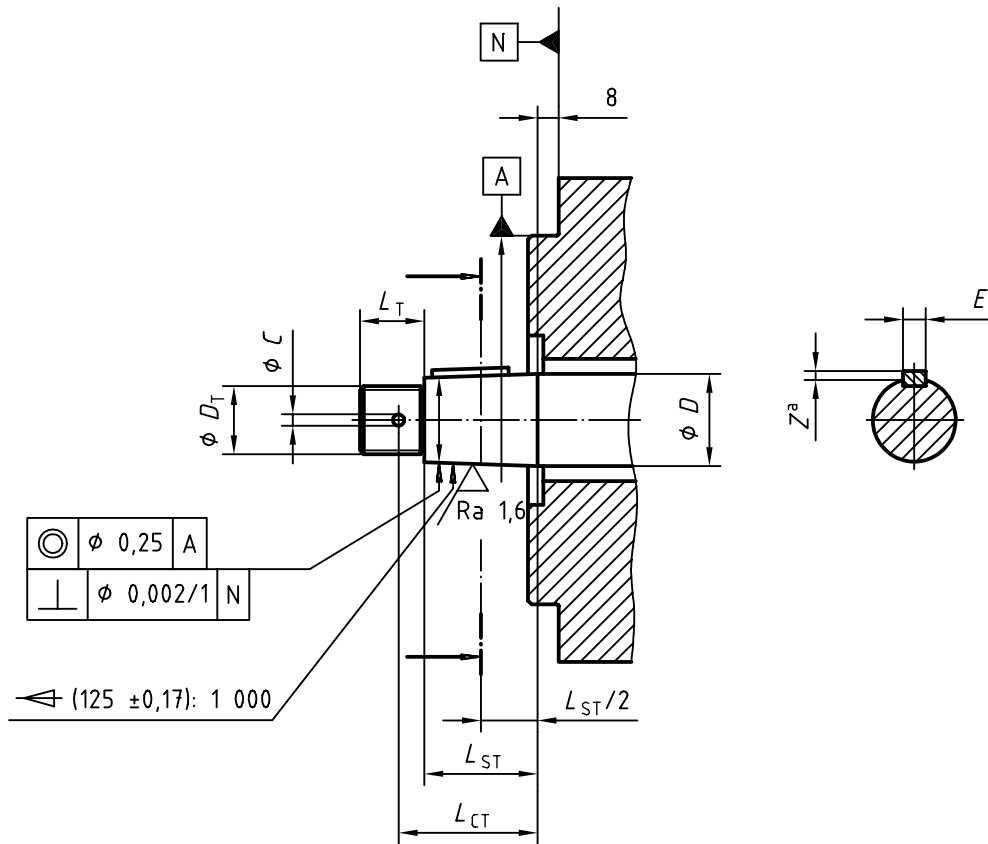
Dimensions in millimetres

Identification code	C + 0,13 - 0,08	D		DT <sup>a</sup>	E (key width) + 0,03 0	F ± 0,13	LC	LS	LT
		max.	min.						
13-2	2,4	12,70	12,67	3/8-24	3,18	14,07	29	19	14,25
16-2	3,2	15,88	15,85	1/2-20	3,97	17,6	34	24	18,25
19-2	3,2	19,05	19,02	1/2-20	4,78	21,1	34	24	18,25
22-2	4	22,23	22,20	5/8-18	6,35	24,9	48	33	23
25-2	4	25,40	25,35	3/4-16	6,35	28,1	52	38	27
32-2	4	31,75	31,70	1-12	7,94	35,2	67	48	31
38-2	4	38,10	38,05	1 1/8-12	9,53	42,27	73	54	34,9
44-2	4	44,45	44,40	1 1/4-12	11,11	49,3	89	67	39,7

Tolerances: dimensions without tolerances ± 0,5.

<sup>a</sup> For threads, see annex A.

Dimensions in millimetres,  
surface roughness values in micrometres



a Dimension Z is normal to the key and at the large end of the taper.

Figure 5 — Basic layout of conical keyed shaft ends with external thread

Table 5 — Dimensions of conical keyed shaft ends with external thread

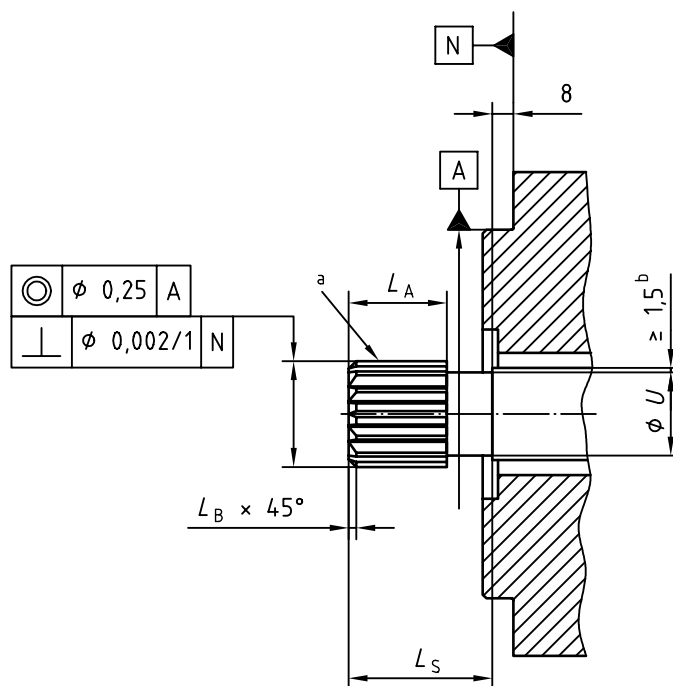
Dimensions in millimetres

Identification code	C + 0,13 - 0,08	D		D <sub>T</sub> <sup>a</sup>	E (key width) + 0,03 0	L <sub>CT</sub>	L <sub>ST</sub>	L <sub>T</sub>	Z	
		max.	min.						min.	max.
13-3	2	12,70	12,67	5/16-32	3,18	25	17	12,7	1,63	1,37
16-3	3,2	15,88	15,85	1/2-20	3,97	28	17	18,26	2,13	1,88
19-3	3,2	19,05	19,02	1/2-20	4,78	34	24	18,26	2,54	2,29
22-3	4	22,23	22,20	5/8-18	6,35	43	28	23,01	3,33	3,07
25-3	4	25,43	25,37	3/4-16	6,35	49	35	26,97	3,33	3,07
32-3	4	31,78	31,72	1-12	7,94	49	35	30,96	4,11	3,86
38-3	4	38,13	38,07	1 1/8-12	9,53	62	47	34,92	4,93	4,67
44-3	4	44,48	44,42	1 1/4-12	11,11	71	54	39,67	5,72	5,46
50-3	4	50,83	50,77	1 1/4-12	12,7	90	73	39,67	6,50	6,25

Tolerances: dimensions without tolerances ± 0,5.

a For threads, see annex A.

Dimensions in millimetres



- a Spline
- b Undercut defined by dimension  $U$  is optional.

Figure 6 — Basic layout of 30° involute spline shaft ends

Table 6 — Dimensions of 30° involute spline shaft ends

Dimensions in millimetres

Identification code	Spline		$L_A$ min.	$L_B$		$L_S$	$U$ min.	
	1st choice	2nd choice		1st choice	2nd choice		1st choice	2nd choice
13-4	9T 20/40 DP	—	5,1	1,5	—	19	8,8	—
16-4	9T 16/32 DP	—	7,6	1,5	—	24	11,4	—
19-4	11T 16/32 DP	—	8,9	1,5	—	30	14,3	—
22-4	13T 16/32 DP	—	10,2	1,5	—	33	17,5	—
25-4	15T 16/32 DP	—	12,7	1,5	—	38	20,6	—
32-4	14T 12/24 DP	—	15,2	2	—	48	25,6	—
35-4	—	21T 16/32 DP	15,2	—	2	48	—	30
38-4	17T 12/24 DP	23T 16/32 DP	17,8	2	2	54	31,9	33,2
44-4	13T 8/16 DP	27T 16/32 DP	20,3	3	2	67	35,8	39,5
50-4	15T 8/16 DP	30T 16/32 DP	25,4	3	2	80	42,1	44,3

Tolerances: dimensions without tolerance  $\pm 0,5$ .

**Table 7 — Flange/shaft combinations**

<b>Flange series</b>	<b>Shaft end series</b>
50-	13-
82-	16-
82-	19-
101-	22-
101-	25-
127-	32-
127-	35-
127-	38-
152-	44-
165-	44-
177-	50-

## Annex A (normative)

### ISO inch screw threads — Basic dimensions

Table A.1 specifies the basic dimensions in inches, of which the basic profile is specified in ISO 68-2.

**Table A.1 — Basic dimensions**

Size	Number of threads per inch	Diameter		
		Major	Pitch	Minor
<b>5/16</b>	32	0,312 5	0,292 2	0,278 7
<b>3/8</b>	24	0,375	0,347 9	0,329 9
<b>1/2</b>	20	0,5	0,467 5	0,445 9
<b>5/8</b>	18	0,625	0,588 9	0,564 9
<b>3/4</b>	16	0,75	0,709 4	0,682 3
<b>1</b>	12	1	0,945 9	0,909 8
<b>1 1/8</b>	12	1,125	1,070 9	1,034 8
<b>1 1/4</b>	12	1,25	1,195 9	1,159 8

## Bibliography

- [1] SAE J744:1996, *Hydraulic pump and motor mounting and drive dimensions*.





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