

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 775

iTeh STANDARD PREVIEW
CYLINDRICAL AND 1/10 CONICAL SHAFT ENDS
(standards.iteh.ai)

ISO/R 775:1969

<https://standards.iteh.ai/catalog/standards/sist/2a834d94-1162-439f-9263-615269f0e336/iso-r-775-1969>

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BRIEF HISTORY

The ISO Recommendation R 775, *Cylindrical and 1/10 conical shaft ends*, was drawn up by Technical Committee ISO/TC 14, *Shaft ends*, the Secretariat of which is held by the Institut Belge de Normalisation (IBN).

Work on this question led to the adoption of a Draft ISO Recommendation.

In May 1966, this Draft ISO Recommendation (No. 1015) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Austria	Germany	Norway
Belgium	Greece	Sweden
Brazil	India	Switzerland
Bulgaria	Israel	Turkey
Chile	Japan	U.A.R.
Czechoslovakia	Korea, Rep. of	United Kingdom
Denmark	Netherlands	U.S.S.R.
France	New Zealand	

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No Member Body opposed the approval of the Draft.

The Technical Committee decided to make certain modifications, of relatively minor importance, in Draft ISO Recommendation No. 1015; these were incorporated in a new Draft ISO Recommendation (No. 1702).

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in March 1969, to accept it as an ISO RECOMMENDATION.

CYLINDRICAL AND 1/10 CONICAL SHAFT ENDS

1. SCOPE

This ISO Recommendation determines the dimensional characteristics of

- cylindrical shaft ends (long series and short series);
- 1/10 conical shaft ends (long series and short series), without keys and keyways or with keyways for parallel keys.

For cylindrical shaft ends, the transmissible torques for various applications (pure torque, torque and bending moment) are also given.

This ISO Recommendation will be completed later by details of

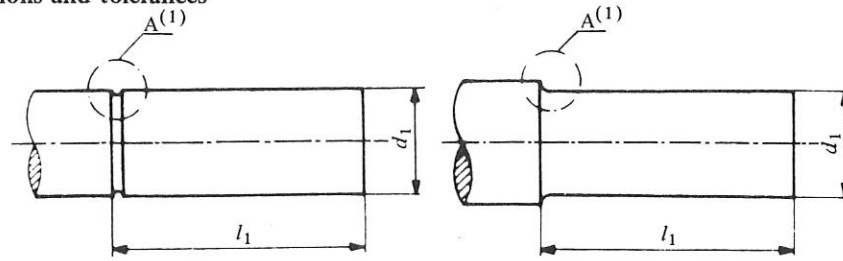
- the joining fillets for cylindrical shaft ends,
- the external and internal threads for conical shaft ends,
- the tolerances on form and position,

and by the addition of

- cylindrical shaft ends with internal thread,
- 1/10 conical shaft ends with Woodruff keys,
- conical shaft ends without keyways.

2. CYLINDRICAL SHAFT ENDS

2.1 Dimensions and tolerances



Dimensions in millimetres

Diameter d_1		Length l_1	
nominal	tolerance ⁽²⁾	long series	short series
6	j6	16	—
7			
8	j6	20	—
9			
10	j6	23	20 ⁽³⁾
11			
12	j6	30	25 ⁽³⁾
14			
16	j6	40	28
18			
19			
20	j6	50	36
22			
24			
25	j6	60	42
28			
30	j6	80	58
32			
35	k6	110	82
38			
40	k6	140	105
42			
45			
48			
50			
55			
56	m6	170	130
60	m6		
63			
65			
70			
71			
75			
80	m6	170	130
85			
90			
95			

Diameter d_1		Length l_1	
nominal	tolerance ⁽²⁾	long series	short series
100	m6	210	165
110			
120			
125			
130			
140	m6	250	200
150			
160			
170	m6	300	240
180			
190			
200	m6	350	280
220			
240			
250			
260			
280			
300			
320			
340			
360			
380			
400	m6	410	330
420			
440			
450			
460			
480	m6	550	450
500			
530			
560			
600			
630	m6	650	540
800			
680			

Keys and keyways. The order relating to the keys and keyways, if required, should specify keys and keyways in conformity with one of the following ISO Recommendations :

ISO Recommendation R 773, *Rectangular or square parallel keys and their corresponding keyways (Dimensions in millimetres);*

ISO Recommendation R 774, *Taper keys and their corresponding keyways with or without gib head (Dimensions in millimetres);*

ISO Recommendation R . . . ,⁽⁴⁾ *Woodruff keys and their corresponding keyways.*

NOTE. — Tolerances on form and position will be specified later.

- (1) Detail A will be specified later.
- (2) See ISO Recommendation R 286, *ISO System of limits and fits — Part 1 : General, tolerances and deviations.*
- (3) The dimensions thus indicated are not in agreement with the related dimensions of the long series conical shaft ends of the table in clause 3.1.1, and attention is drawn to this deviation from the relationship stated in the Annex.
- (4) At present at the stage of draft proposal.

2.2 Transmissible torques

Transmissible torque in kilogramme-force metres

Shaft end diameter d_1 mm	Transmissible torque T kgf·m			Shaft end diameter d_1 mm	Transmissible torque T kgf·m		
	(a)	(b)	(c)		(a)	(b)	(c)
7	0.0545	0.025	95	670	500	236	
8	0.0875	0.04	100	775	600	280	
9	0.132	0.0615	110	1 030	850	387	
10	0.19	0.09	120	1 360	1 120	530	
11	0.265	0.122	125	1 550	1 320	615	
12	0.355	0.17	130	1 700	1 500		
14	0.615	0.29	140	2 120	1 950		
16	0.975	0.462	150	2 650	2 500		
18	1.5	0.69	160	3 250	3 070		
19	1.8	0.85	170	3 870	3 870		
20	2.12	1	180	4 620			
22	3	1.4	190	5 300			
24	4.12	1.9	200	6 300			
25	4.75	2.18	220	8 250			
28	6.9	3.25	240	10 900			
30	21.2	9	250	12 200			
32	25.8	11.2	260	13 600			
35	33.5	15	280	17 000			
38	42.5	20	300	21 200			
40	50	24.3	320	25 800			
42	58	29	340	30 700			
45	71	36.5	360	36 500			
48	87.5	46.2	380	42 500			
50	97.5	53	400	50 000			
55	128	75	420	58 000			
56	136	80	440	67 000			
60	170	100	450	71 000			
63	195	118	460	75 000			
65	212	132	480	87 500			
70	272	175	500	97 500			
71	280	180	530	115 000			
75	335	218	560	136 000			
80	400	272	600	170 000			
85	487	335	630	195 000			

Transmissible torque in newton metres

Shaft end diameter d_1 mm	Transmissible torque T N·m			Shaft end diameter d_1 mm	Transmissible torque T N·m		
	(a)	(b)	(c)		(a)	(b)	(c)
7	0.53	0.25	95	6 500	4 870	2 300	
8	0.85	0.4	100	7 750	5 800	2 720	
9	1.28	0.6	110	10 300	8 250	3 870	
10	1.85	0.875	120	13 200	11 200	5 150	
11	2.58	1.22	125	15 000	12 800	6 000	
12	3.55	1.65	130	17 000	14 500		
14	6	2.8	140	21 200	19 000		
16	9.75	4.5	150	25 800	24 300		
18	14.5	6.7	160	31 500	30 700		
19	17.5	8.25	170	37 500	37 500		
20	21.2	9.75	180	45 000			
22	29	13.6	190	53 000			
24	40	18.5	200	61 500			
25	46.2	21.2	220	82 500			
28	69	31.5	240	106 000			
30	206	98.75	250	118 000			
32	250	109	260	136 000			
35	325	150	280	170 000			
38	425	200	300	206 000			
40	487	236	320	250 000			
42	560	280	340	300 000			
45	710	355	360	355 000			
48	850	450	380	425 000			
50	950	515	400	487 000			
55	1 280	730	420	560 000			
56	1 360	775	440	650 000			
60	1 650	975	450	690 000			
63	1 900	1 150	460	750 000			
65	2 120	1 280	480	850 000			
70	2 650	1 700	500	950 000			
71	2 720	1 800	530	1 150 000			
75	3 250	2 120	560	1 360 000			
80	3 870	2 650	600	1 650 000			
85	4 750	3 350	630	1 900 000			

The values of transmissible torques have been calculated from the following formulae and rounded off to normal numbers of the exceptional R 80 series ⁽¹⁾ :

(a) *transmission of pure torque* :

$$T = \frac{\pi}{4} \times 10^{-3} \times d_1^3 \text{ (kgf}\cdot\text{m)} \quad \text{or} \quad \frac{9.80665 \pi}{4} \times 10^{-3} \times d_1^3 \text{ (N}\cdot\text{m)}$$

This torque corresponds to a stress of 4 kgf/mm². In case of reversal of rotation fluctuations, of high or irregular torque, or of high bending and deformation moments in the coupling, the stresses will have to be checked by appropriate means.

(b) *transmission of torque and bending moment both of a known size* :

$$T = 6 \times 10^{-5} \times d_1^{3.5} \text{ (kgf}\cdot\text{m)} \quad \text{or} \quad 58.8399 \times 10^{-5} \times d_1^{3.5} \text{ (N}\cdot\text{m)}$$

This formula may be applied subject to checking when the torque and bending moment are disproportionate in their influence.

(c) *transmission both of a known torque and of an undetermined bending moment* :

$$T = 2.8 \times 10^{-5} \times d_1^{3.5} \text{ (kgf}\cdot\text{m)} \quad \text{or} \quad 27.45862 \times 10^{-5} \times d_1^{3.5} \text{ (N}\cdot\text{m)}$$

This formula is applicable to the dimensioning of shaft ends of primary machines (for example, electric motors, pumps, etc.) of general manufacture and capable of meeting all conditions of usage.

NOTE. – The three formulae assume the use of steel having a tensile strength of 50 to 60 kgf/mm².

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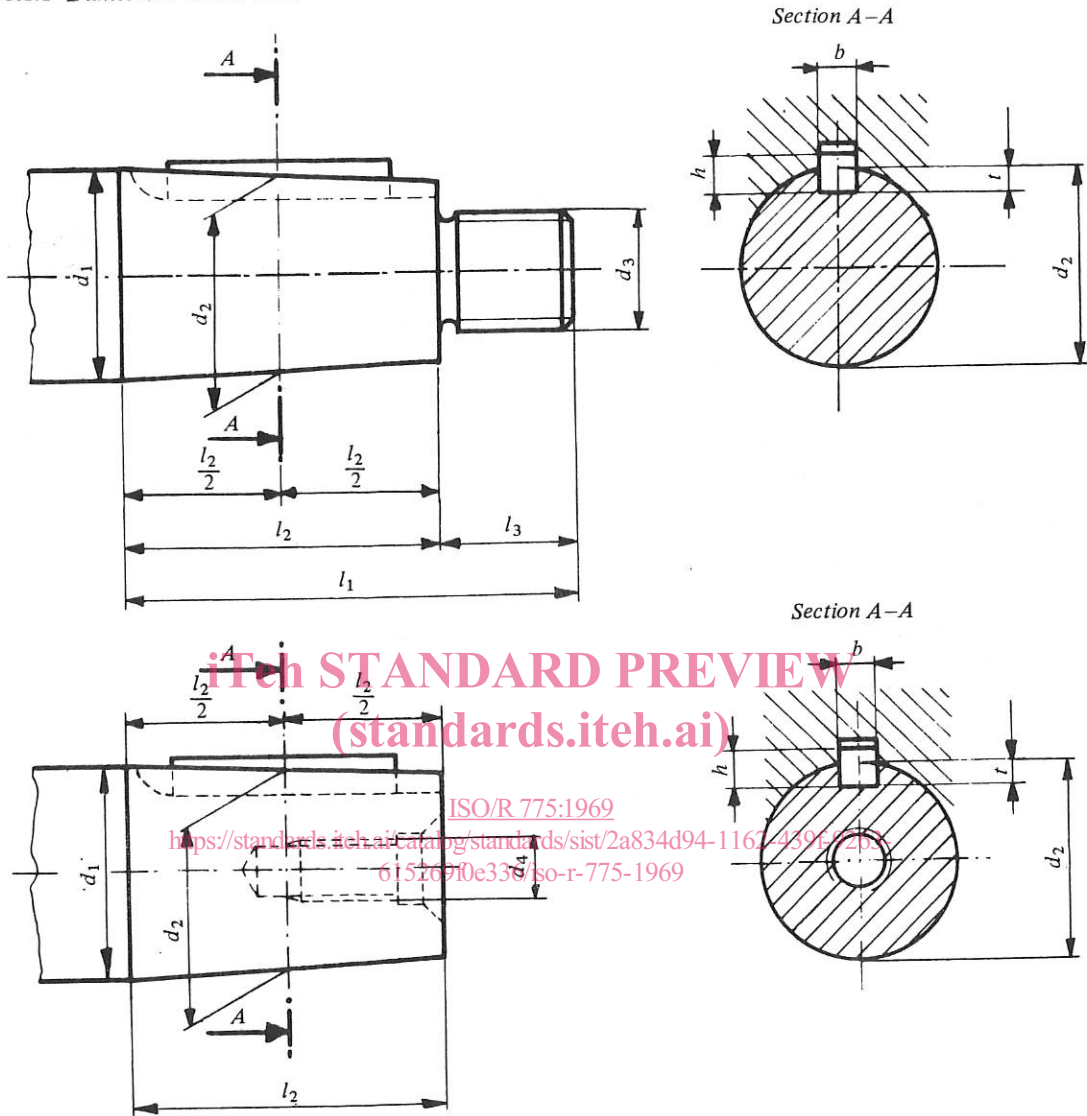
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(1) See ISO Recommendation R 3, *Preferred numbers – Series of preferred numbers*.

3. 1/10 CONICAL SHAFT ENDS

3.1 Long series

3.1.1 Diameters ≤ 220 mm



Keys and keyways⁽¹⁾. The keys and keyways should conform to ISO Recommendation R 773, *Rectangular or square parallel keys and their corresponding keyways (Dimensions in millimetres)*.

(1) 1/10 conical shaft ends can also be made without key and keyway.

1/10 conical shaft ends with Woodruff keys will be the subject of a later ISO Recommendation.

Dimensions in millimetres

Dia- meter	Length			Key and keyway	External thread	Internal thread (1)		
	l_1	l_2	l_3					
d_1				d_2	$b \times h$	t	d_3	d_4
60	140	105	35	54.75	16X10	6	M42X3	M20
63				57.75	16X10	6	M42X3	M20
65				59.75	16X10	6	M42X3	M20
70				64.75	18X11	7	M48X3	M24
71				65.75	18X11	7	M48X3	M24
75				69.75	18X11	7	M48X3	M24
80				73.5	20X12	7.5	M56X4	M30
85				78.5	20X12	7.5	M56X4	M30
90	170	130	40	83.5	22X14	9	M64X4	M30
95				88.5	22X14	9	M64X4	M36
100				91.75	25X14	9	M72X4	M36
110	210	165	45	101.75	25X14	9	M80X4	M42
120				111.75	28X16	10	M90X4	M42
125				116.75	28X16	10	M90X4	M48
130				120	28X16	10	M100X4	-
140	250	200	50	130	32X18	11	M100X4	-
150				140	32X18	11	M110X4	-
160				148	36X20	12	M125X4	-
170	300	240	60	158	36X20	12	M125X4	-
180				168	40X22	13	M140X6	-
190				176	40X22	13	M140X6	-
200	350	280	70	186	40X22	13	M160X6	-
220				206	45X25	15	M160X6	-

Dia- meter	Length			Key and keyway	External thread	Internal thread (1)		
	l_1	l_2	l_3					
d_1				d_2	$b \times h$	t	d_3	d_4
6	16	10	6	5.5	-	-	M4	-
7				6.5	-	-	M4	-
8	20	12	8	7.4	-	-	M6	-
9				8.4	-	-	M6	-
10	23	15 ⁽²⁾	8	9.25	-	-	M6	-
11				10.25	2X2	1.2	M6	-
12	30	18 ⁽²⁾	12	11.1	2X2	1.2	M8X1	M4
14				13.1	3X3	1.8	M8X1	M4
16				14.6	3X3	1.8	M10X1.25	M4
18	40	28	12	16.6	4X4	2.5	M10X1.25	M5
19				17.6	4X4	2.5	M10X1.25	M5
20				18.2	4X4	2.5	M12X1.25	M6
22	50	36	14	20.2	4X4	2.5	M12X1.25	M6
24				22.2	5X5	3	M12X1.25	M6
25	60	42	18	22.9	5X5	3	M16X1.5	M8
28				25.9	5X5	3	M16X1.5	M8
30				27.1	5X5	3	M20X1.5	M10
32	80	58	22	29.1	6X6	3.5	M20X1.5	M10
35				32.1	6X6	3.5	M20X1.5	M10
38				35.1	6X6	3.5	M24X2	M12
40				35.9	10X8	5	M24X2	M12
42				37.9	10X8	5	M24X2	M12
45				40.9	12X8	5	M30X2	M16
48	110	82	28	43.9	12X8	5	M30X2	M16
50				45.9	12X8	5	M36X3	M16
55				50.9	14X9	5.5	M36X3	M20
56				51.9	14X9	5.5	M36X3	M20

(1) Details of the internal thread will be specified later.

(2) See corresponding shaft diameters in the table in clause 2.1, and footnote (3) to that table.

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