INTERNATIONAL STANDARD 2402

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

Shell reamers with taper bore (taper bore 1 : 30 (included)) with slot drive and arbors for shell reamers

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FOREWORD

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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 2402 was drawn up by Technical Committee ISO/TC 29, *Small tools.*

It was approved in September 1971 by the Member Bodies of the following countries :

Australia
Austria
Belgium
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France
Hungary
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Ireland
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Italy
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The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Switzerland
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Shell reamers with taper bore (taper bore 1 : 30 (included)) with slot drive and arbors for shell reamers

1 SCOPE AND FIELD OF APPLICATION

This International Standard deals with

— shell reamers with taper bore, taper 1 : 30 (included) with slot drive (Tables 1 and 2);

— the corresponding arbors for shell reamers (Tables 3 and 4).

It gives dimensions

— for shell reamers with outside diameters above 19,9 mm (0.783 5 in) up to and including 101,6 mm (4 in) having taper bores with large end diameters d_1 from 10 mm (0.393 7 in) to 50 mm (1.968 5 in) and for the corresponding arbors;

— for shell reamer slots and arbor tenons (Tables 5 and 6), in order to ensure interchangeability of shell reamers and corresponding arbors, and details of a method of checking the taper elements.

It supplements ISO/R 236 and ISO/R 521.

2 REFERENCES

ISO/R 236, *Hand reamers and long fluted machine reamers, Morse taper shank.*

ISO/R 240, *Interchangeability dimensions for milling cutters and cutter arbors or cutter mandrels - Metric series and inch series.*

ISO/R 521, *Machine chucking reamers with parallel shanks or Morse taper shanks.*

ISO/R 522, *Special tolerances for reamers.*

3 GENERAL DIMENSIONS AND FITTING DIMENSIONS

The dimensions are given both in millimetres and in inches, the latter being direct conversions of the metric values, conveniently rounded.

The range of outside diameters does not correspond exactly to the ranges already established in ISO/R 236 and ISO/R 521.

The departures from these established ranges are necessary in order to maintain a relationship between the bore and the outside diameter which gives a wall thickness always sufficient to ensure the strength of the reamer.

A study was made of the possibility of adopting the dimensions given in ISO/R 240, but they were regarded as unsuitable for the present application. Since any deviation from correct size on the mating tapered elements would result in considerable movement on the arbor, it is necessary to provide longer slots and tenons in order to ensure adequate length of contact.

4 SHELL REAMERS WITH TAPER BORE (TAPER 1 : 30 (INCLUDED)) WITH SLOT DRIVE

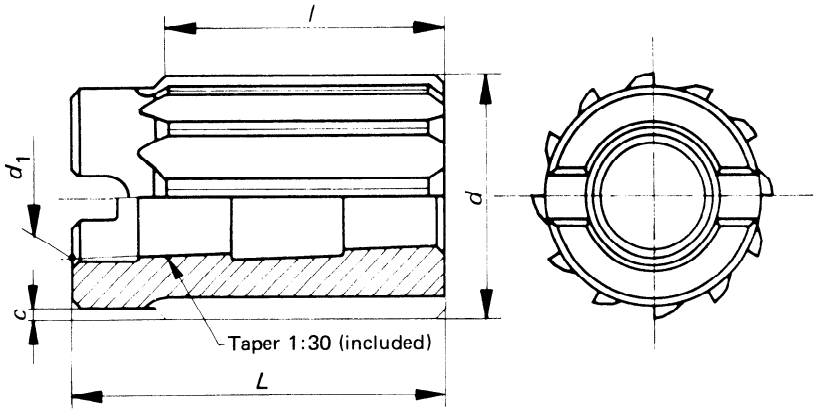


TABLE 1 — Dimensions in millimetres

Diameter ranges d		d_1	l	L	c max.
above	up to and including				
19,9	23,6	10	28	40	1,0
23,6	30,0	13	32	45	
30,0	35,5	16	36	50	1,5
35,5	42,5	19	40	56	
42,5	50,8	22	45	63	
50,8	60,0	27	50	71	2,0
60,0	71,0	32	56	80	
71,0	85,0	40	63	90	2,5
85,0	101,6	50	71	100	

TABLE 2 — Dimensions in inches

Diameter ranges d		d_1	l	L	c max.
above	up to and including				
0.783 5	0.929 1	0.393 7	1 3/32	1 9/16	0.04
0.929 1	1.181 1	0.511 8	1 1/4	1 25/32	
1.181 1	1.397 6	0.629 9	1 13/32	1 31/32	0.06
1.397 6	1.673 2	0.748 0	1 9/16	2 7/32	
1.673 2	2.000 0	0.866 1	1 25/32	2 15/32	
2.000 0	2.362 2	1.063 0	1 31/32	2 25/32	0.08
2.362 2	2.795 3	1.259 8	2 7/32	3 5/32	
2.795 3	3.346 5	1.574 8	2 15/32	3 17/32	0.10
3.346 5	4.000 0	1.968 5	2 25/32	3 15/16	

For form and dimensions of slots and driving tenons, see section 6.

Tolerances :

— on *d* : m6 (for standard reamers). When reamers with special tolerances are required, determine the tolerances in accordance with the rule given in ISO/R 522.

— on d_1 : see clause 7.1.

5 ARBORS FOR SHELL REAMERS WITH TAPER FITMENT (TAPER 1 : 30 (INCLUDED)) WITH TENON DRIVE

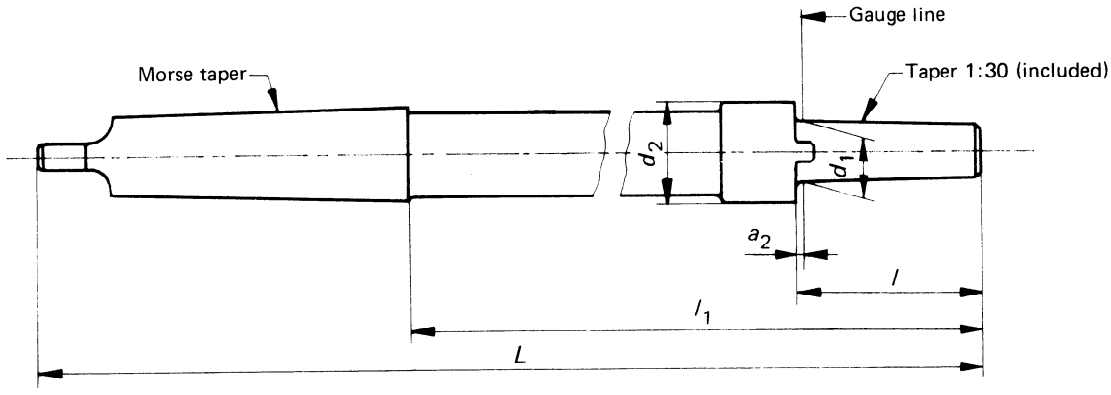


TABLE 3 – **Dimensions in millimetres**

Ranges of shell reamer outside diameters d		d_1	Morse taper shanks No.	d_2 max.	l h16	l_1	L
above	up to and including						
19,9	23,6	10	2	18	40	140	220
23,6	30,0	13	3	21	45	151	250
30,0	35,5	16		27	50	162	261
35,5	42,5	19	4	32	56	174	298
42,5	50,8	22		39	63	188	312
50,8	60,0	27		47	71	203	359
60,0	71,0	32	5	56	80	220	376
71,0	85,0	40		65	90	240	396
85,0	101,6	50		80	100	260	416

TABLE 4 – **Dimensions in inches**

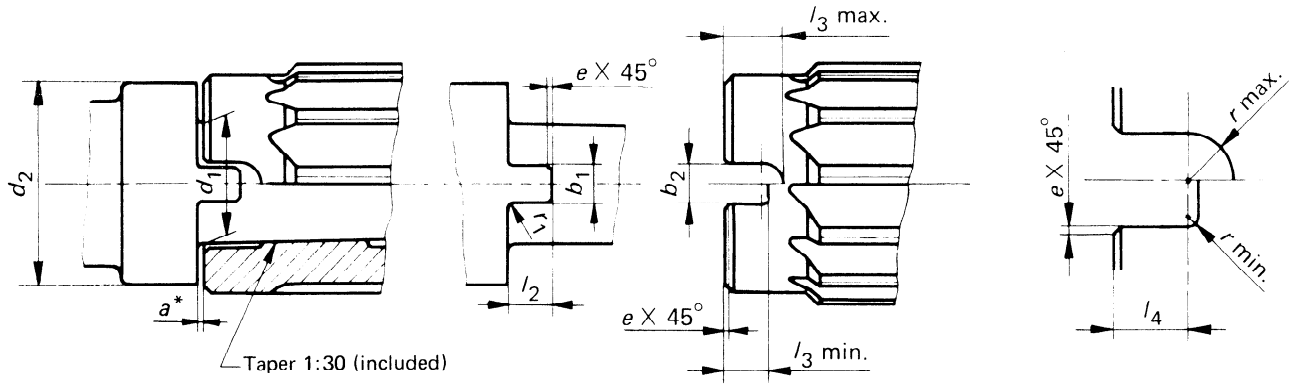
Ranges of shell reamer outside diameters d		d_1	Morse taper shanks No.	d_2 max.	l h16	l_1	L
above	up to and including						
0.783 5	0.929 1	0.393 7	2	11/16	1 9/16	5 9/16	8 11/16
0.929 1	1.181 1	0.511 8	3	13/16	1 25/32	6	9 7/8
1.181 1	1.397 6	0.629 9		1 1/16	1 31/32	6 3/8	10 1/4
1.397 6	1.673 2	0.748 0	4	1 1/4	2 7/32	6 7/8	11 3/4
1.673 2	2.000 0	0.866 1		1 17/32	2 15/32	7 3/8	12 1/4
2.000 0	2.362 2	1.063 0	5	1 13/16	2 25/32	8	14 1/8
2.362 2	2.795 3	1.259 8		2 3/16	3 5/32	8 3/4	14 7/8
2.795 3	3.346 5	1.574 8		2 9/16	3 17/32	9 1/2	15 5/8
3.346 5	4.000 0	1.968 5		3 1/8	3 15/16	10 1/4	16 3/8

For dimensions of driving tenons, see section 6.

For values of a_2 see Table 8.

Tolerances on d_1, see clause 7.2.

6 INTERCHANGEABILITY DIMENSIONS OF SLOTS AND TENONS



y = maximum permissible deviation between the axial plane of the tenon and the axis of diameter d_2.

z = maximum permissible deviation between the axial plane of the slot and the axis of diameter d_1.

TABLE 5 — **Dimensions in millimetres**

d_1	Arbor				Reamer							e***	
	b_1 h 12	l_2 h 12	r_1 max.	y max.	b_2** H 13	l_3 min.	l_3 max.	r min.	r max.	l_4	z max.		
10	4	4,6	0,3	0,075	4,3	5,4	7,0	0,6	2,15	4,8	0,075	0,3	+ 0,1 0
13													
16	5	5,6	0,4	0,100	5,4	6,2	8,3	0,6	2,70	5,6	0,100	0,4	
19	6	6,7	0,5		6,4	7,8	10,2	0,8	3,20	7,0		0,5	
22	7	7,7			7,4	8,6	11,3	1,0	3,70	7,6			
27	8	8,8	0,6		8,4	9,3	12,5	1,0	4,20	8,3		0,6	+ 0,2 0
32	10	9,8			10,4	10,5	14,5	1,2	5,20	9,3			
40	12	11,0	0,8		12,4	11,2	16,2	1,2	6,20	10,0		0,8	
50	14	12,0			14,4	13,1	18,7	1,6	7,20	11,5			

TABLE 6 — **Dimensions in inches**

d_1	Arbor				Reamer							e***	
	b_1 h 12	l_2 h 12	r_1 max.	y max.	b_2** H 13	l_3 min.	l_3 max.	r min.	r max.	l_4	z max.		
0.393 7	0.157 5	0.181 1	0.010	0.003	0.169 3	0.212 6	0.275 6	0.024	0.085	0.189 0	0.003	0.010	+ 0.004 0
0.511 8													
0.629 9	0.196 9	0.220 5	0.015	0.004	0.212 6	0.244 1	0.326 8	0.024	0.106	0.220 5	0.004	0.015	
0.748 0	0.236 2	0.263 8	0.020		0.252 0	0.307 1	0.401 6	0.032	0.126	0.275 6		0.020	
0.866 1	0.275 6	0.303 1			0.291 3	0.338 6	0.444 9	0.039	0.146	0.299 2			
1.063 0	0.315 0	0.346 5	0.025		0.330 7	0.366 1	0.492 1	0.039	0.165	0.326 8		0.025	+ 0.008 0
1.259 8	0.393 7	0.385 8			0.409 4	0.413 4	0.570 9	0.047	0.205	0.366 1			
1.574 8	0.472 4	0.433 1	0.030		0.488 2	0.440 9	0.637 8	0.047	0.244	0.393 7		0.030	
1.968 5	0.551 2	0.472 4			0.566 9	0.515 7	0.736 2	0.063	0.283	0.452 8			

* For values of a, see Table 7.

** The width b_2 of the slot must be parallel for the length l_4.

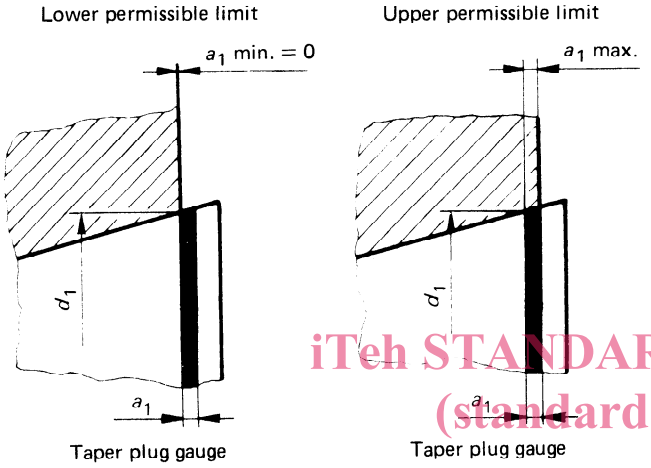
*** Chamfers can be replaced by radii of the same value and tolerance.

Tolerance on d_1 of the reamer taper bore and the large end diameter of the reamer arbor, see section 7.

7 METHOD OF CHECKING TAPER ELEMENT

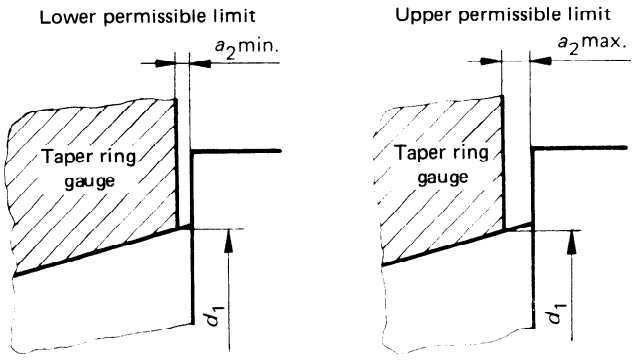
7.1 Tolerance on diameter d_1 of the taper bore in the shell reamer

The tolerance is determined by the amount of the permissible variation a_1 in the position of the gauge plane of the taper bore. The value a_1 represents the depth to which a taper plug gauge of the appropriate nominal size may enter the reamer to be checked with respect to its gauge line (see Table 8).



7.2 Tolerance on diameter d_1 of the arbor large end diameter

The tolerance is determined by the amount of the permissible variation a_2 in the position of the gauge plane on the body of the arbor. The value a_2 represents the permissible distance between the leading face of a taper ring gauge of the appropriate nominal size and the reference plane (or locating face) of the arbor to be checked (see Table 8).



7.3 Limits of clearance on a

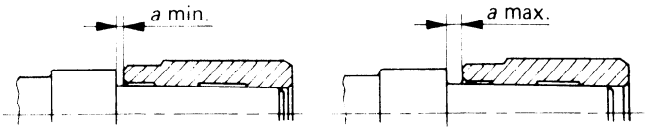


TABLE 7 – Values of a

d_1		a			
		min.		max.	
mm	in	mm	in	mm	in
10	0.393 7	0,3	0.011 8	1,2	0.047 2
13	0.511 8	0,3	0.011 8	1,4	0.055 1
16	0.629 9				
19	0.748 0	0,4	0.015 7	1,7	0.066 9
22	0.866 1				
27	1.063 0				
32	1.259 8	0,5	0.019 7	2,2	0.086 6
40	1.574 8				
50	1.968 5				

The limits on the clearance a between the mouth of the reamer and the reference plane (or locating face) towards the large end of the mating taper arbor, are derived from the tolerances on diameter d_1 of the reamer taper bore and of the taper portion towards the large end diameter of the arbor. These tolerances are determined by the values a_1 and a_2 given in Table 8.

TABLE 8 – Values of a_1 and a_2

d_1		Reamer				Arbor			
		a_1				a_2			
		min.		max.		min.		max.	
mm	in	mm	in	mm	in	mm	in	mm	in
10	0.393 7	0	0	0,5	0.019 7	0,8	0.031 5	1,2	0.047 2
13	0.511 8			0,6	0.023 6	0,9	0.035 4	1,4	0.055 1
16	0.629 9								
19	0.748 0			0,7	0.027 6	1,1	0.043 3	1,7	0.066 9
22	0.866 1								
27	1.063 0								
32	1.259 8			0.9	0.035 4	1,4	0.055 1	2,2	0.086 6
40	1.574 8								
50	1.968 5								

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