

BS ISO 1641-2:2011



BSI Standards Publication

End mills and slot drills

Part 2: Dimensions and designation of milling cutters with Morse taper shanks

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee MTE/18, Tools tips and inserts for cutting applications.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Amendments issued since publication

Date	Text affected
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End mills and slot drills —

Part 2:

**Dimensions and designation of milling
cutters with Morse taper shanks**

Fraises cylindriques 2 tailles et fraises à rainurer —

Partie 2: Dimensions et désignation des fraises à queue cône Morse





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Foreword

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

ISO 1641-2 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 2, *High speed steel cutting tools and their attachments*.

This second edition cancels and replaces the first edition (ISO 1641-2:1978), of which it constitutes a minor revision. In particular, this includes updating of the normative references, addition of the designation (see Clause 4) and indication of the tolerance classes in accordance with ISO 2768-1 and ISO 2768-2.

ISO 1641 consists of the following parts, under the general title *End mills and slot drills*:

- *Part 1: Milling cutters with cylindrical shanks*
- *Part 2: Dimensions and designation of milling cutters with Morse taper shanks*
- *Part 3: Dimensions and designation of milling cutters with 7/24 taper shanks*

End mills and slot drills —

Part 2:

Dimensions and designation of milling cutters with Morse taper shanks

1 Scope

This part of ISO 1641 specifies the general dimensions and designation of the following milling cutters with Morse taper and having a tapped hole:

- end mills, flat-ended or ball-nosed — standard series and long series;
- slot drills — short series and standard series.

Morse taper shanks are in accordance with ISO 296 and ISO 5413.

It is not applicable to the end mills and slot drills with cylindrical shank, which are dealt with in ISO 1641-1; it is not applicable to those with 7/24 taper shank, which are dealt with in ISO 1641-3.

This part of ISO 1641 is not applicable to solid hardmetal end mills and slot drills.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 296, *Machine tools — Self-holding tapers for tool shanks*

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 2768-2, *General tolerances — Part 2: Geometrical tolerances for features without individual tolerance indications*

ISO 5413, *Machine tools — Positive drive of Morse tapers*

3 Dimensions

3.1 General

All dimensions and tolerances are given in millimetres. Tolerances not specified shall be of tolerance class “m” in accordance with ISO 2768-1 and of class “K” in accordance with ISO 2768-2.

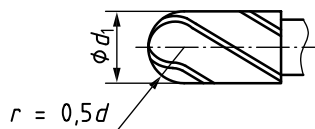
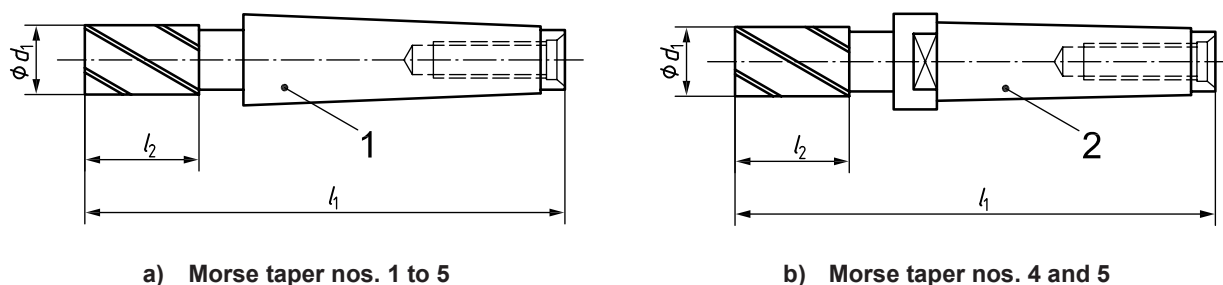
The values, l_1 and l_2 , shall be chosen such that the difference in length ($l_1 - l_2$) remains constant whatever the series (short, normal or long), according to Table 1.

Table 1 — Length difference ($l_1 - l_2$)

Morse taper no.	1	2	3	4		5	
				Alternative I	Alternative II	Alternative I	Alternative II
$(l_1 - l_2)$	70	85	102	125	148	158	186

3.2 Flat-ended end mills and ball-nosed cylindrical end mills

The dimensions of flat-ended end mills and ball-nosed cylindrical end mills shall be in accordance with the dimensions shown in Figure 1 and Table 2.



Key

- 1 Morse taper in accordance with ISO 296
- 2 Morse taper in accordance with ISO 5413

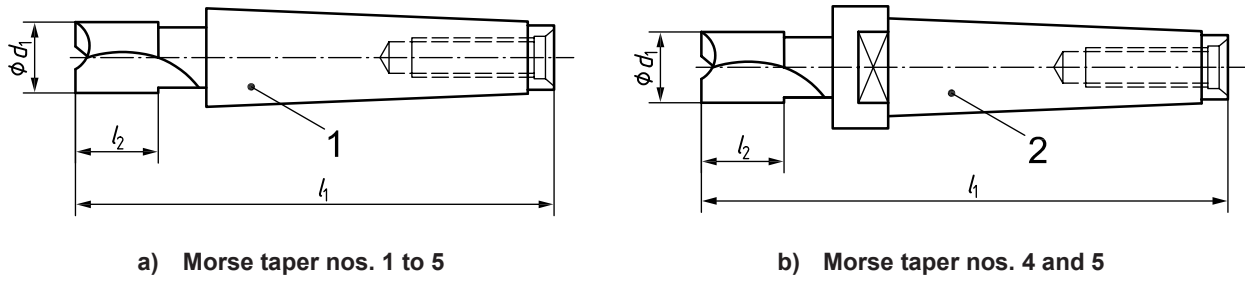
Figure 1 — Dimensions of flat-ended end mills and ball-nosed cylindrical end mills

Table 2 — Dimensions of flat-ended end mills and ball-nosed cylindrical end mills

Range of diameters, d_1 js14		Recommended diameters, d_1		Length, l_1				Length, l_2		Morse taper no.
				Normal series		Long series		Normal series	Long series	
				Alternative I	Alternative II	Alternative I	Alternative II			
5	6	6	—	83	—	94	—	13	24	1
6	7,5	—	7	86	—	100	—	16	30	
7,5	9,5	8	9	89	—	108	—	19	38	
9,5	11,8	10	11	92	—	115	—	22	45	2
11,8	15	12	14	96	—	123	—	26	53	
15	19	16	18	111	—	138	—	32	63	
19	23,6	20	22	117	—	148	—	38	75	3
23,6	30	25	28	123	—	160	—	45	90	
30	37,5	32	36	140	—	177	—	53	106	
37,5	47,5	40	45	147	—	192	—	63	125	4
47,5	60	50	56	155	—	208	—	75	150	
60	75	63	—	178	201	231	254	90	180	
				188	211	250	273			5
				221	249	283	311			
				200	223	275	298			
				233	261	308	336			5
				248	276	338	366			

3.3 Slot drills

The dimensions of slot drills shall be in accordance with the dimensions shown in Figure 2 and Table 3.



Key

- 1 Morse taper in accordance with ISO 296
- 2 Morse taper in accordance with ISO 5413

Figure 2 — Dimensions of slot drills

Table 3 — Dimensions of slot drills

Range of diameters, d_1 e8		Recommended diameters, d_1		Length, l_1				Length, l_2		Morse taper no.
				Short series		Normal series		Short series	Normal series	
From (excluded)	Up to (included)	Alternative I	Alternative II	Alternative I	Alternative II	Alternative I	Alternative II			Short series
5	6	6	—	78	83	83	83	8	13	
6	7,5	—	7	80	86	86	86	10	16	
7,5	9,5	8	9	81	89	89	89	11	19	
9,5	11,8	10	11	83	92	92	92	13	22	
11,8	15	12	14	86	96	96	96	16	26	
15	19	16	18	101	111	111	111	19	32	2
19	23,6	20	22	104	117	117	117	22	38	
23,6	30	25	28	107	123	123	123	26	45	3
30	37,5	32	36	124	140	140	140	32	53	
37,5	47,5	40	45	128	147	147	147	38	63	
47,5	60	50	56	134	155	155	155	45	75	4
60	75	63	—	157	178	178	178	53	90	
				163	188	188	188	63	90	5
				196	221	221	221	75	90	
				170	200	200	200	84	90	4
				203	233	233	233	90	90	
				211	248	248	248	90	90	5

4 Designation

4.1 Flat-ended end mills and ball-nosed cylindrical end mills

Flat-ended end mills and ball-nosed cylindrical end mills in accordance with this part of ISO 1641 shall be designated by:

- a) "Flat-ended end mills" or "ball-nosed cylindrical end mills";
- b) the reference to this part of ISO 1641, i.e. ISO 1641-2;
- c) a hyphen;
- d) the recommended diameter, d_1 ;
- e) a hyphen;
- f) the Morse taper number.

EXAMPLE 1 A flat-ended end mill in accordance with ISO 1641-2 with recommended diameter $d_1 = 8$ and Morse taper no. 1 is designated as follows:

Flat-ended end mills ISO 1641-2 – 8 – 1

EXAMPLE 2 A ball-nosed cylindrical end mill in accordance with ISO 1641-2 with recommended diameter $d_1 = 8$ and Morse taper no. 1 is designated as follows:

Ball-nosed cylindrical end mills ISO 1641-2 – 8 – 1

4.2 Slot drills

Slot drills in accordance with this part of ISO 1641 shall be designated by:

- a) "Slot drill";
- b) the reference to this part of ISO 1641, i.e. ISO 1641-2;
- c) a hyphen;
- d) the recommended diameter, d_1 ;
- e) a hyphen;
- f) the Morse taper number.

EXAMPLE A slot drill in accordance with ISO 1641-2 with recommended diameter $d_1 = 8$ and Morse taper no. 1 is designated as follows:

Slot drill ISO 1641-2 – 8 – 1

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