INTERNATIONAL STANDARD

ISO 1641-1

Second edition
2003-06-01

End mills and slot drills —

Part 1: Milling cutters with cylindrical shanks

Fraises cylindriques 2 tailles et fraises à rainurer —

Partie 1: Fraises à queue cylindrique

Reference number
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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 1641-1 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 2, *Drills, reamers, milling cutters and milling machine accessories*.

This second edition cancels and replaces the first edition (ISO 1641-1:1978), which has been technically revised, in particular by the inclusion of threaded shanks.

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: Milling cutters with Morse taper shanks*

— *Part 3: Milling cutters with 7/24 taper shanks*

End mills and slot drills —

Part 1:
Milling cutters with cylindrical shanks

1 Scope

This part of ISO 1642 specifies the general dimensions of the following milling cutters with plain cylindrical, flatted cylindrical and threaded shanks:

— end mills, flat-ended or ball-nosed — standard series and long series;

— slot drills — short series and standard series.

The dimensional characteristics of cylindrical shanks are in accordance with ISO 3338-1, ISO 3338-2 and ISO 3338-3.

NOTE These same milling cutters with Morse taper shanks having a tapped hole are dealt with in ISO 1641-2, those with 7/24 taper shanks in ISO 1641-3.

This part of ISO 1641 does not apply 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 3338-1, *Cylindrical shanks for milling cutters — Part 1: Dimensional characteristics of plain cylindrical shanks*

ISO 3338-2, *Cylindrical shanks for milling cutters — Part 2: Dimensional characteristics of flatted cylindrical shanks*

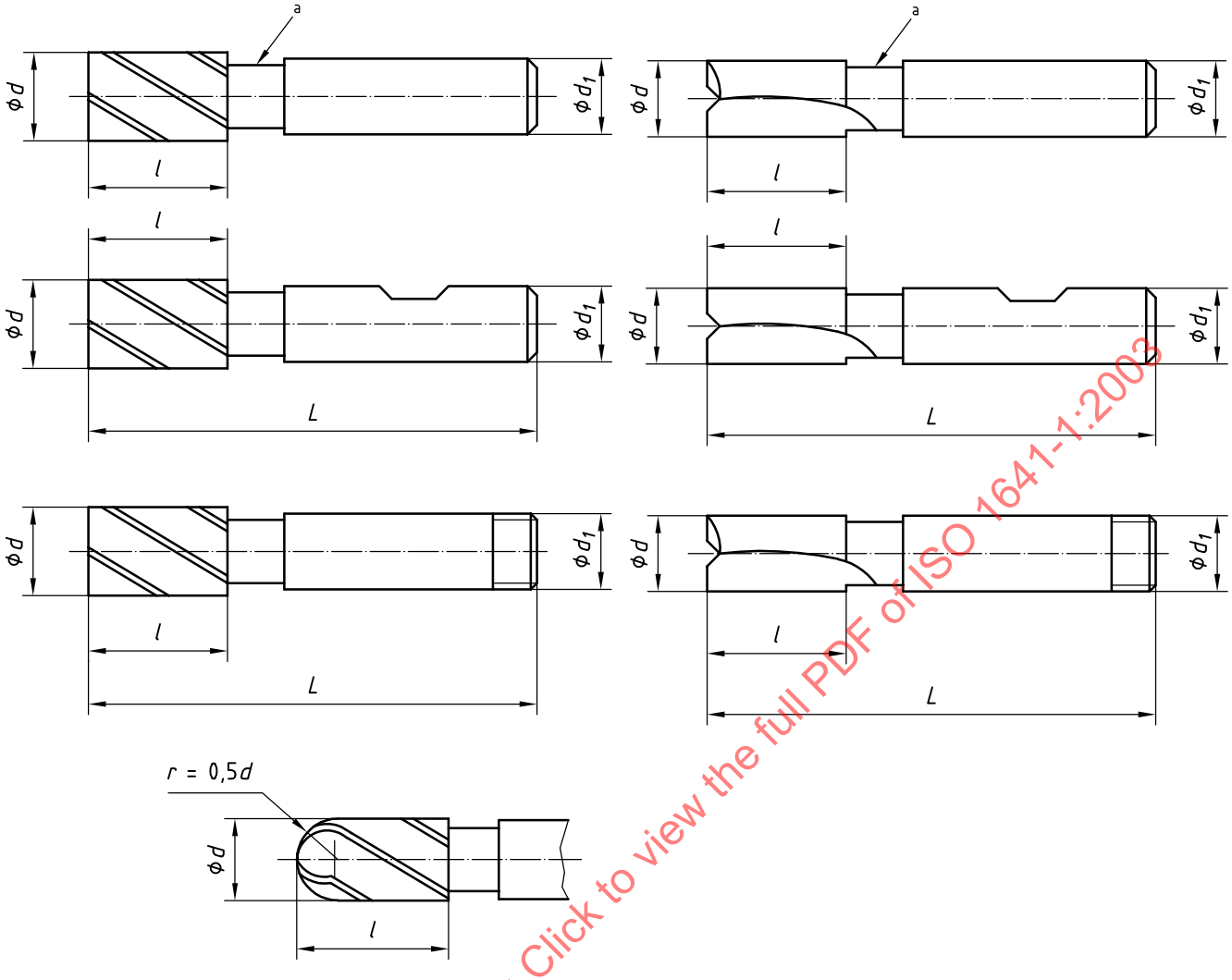
ISO 3338-3, *Cylindrical shanks for milling cutters — Part 3: Dimensional characteristics of threaded shanks*

3 Dimensions

For flat-ended end mills and ball-nosed cylindrical end mills, the standard series and long series given in Table 1 according to the cutting length, l, shall be used.

For slot drills, the short series and standard series given in Table 1 according to the cutting length, l, shall be used.

See Figure 1, Table 1 and Table 2.



a) End mills, flat-ended and ball-nosed **b) Slot drills**

a Optional recess.

Figure 1 — Milling cutters with cylindrical shanks

Table 1

Dimensions in millimetres

Ranges of diameters d	Recommended diameters d		Shank d_1[a] Alternative I	Shank d_1[a] Alternative II	Short series l	Short series L[b] Alternative I	Short series L[b] Alternative II	Standard series l	Standard series L[b] Alternative I	Standard series L[b] Alternative II	Long series l	Long series L[b] Alternative I	Long series L[b] Alternative II
$1{,}9 < d \leqslant 2{,}36$	**2**	—	4[c]	6	4	36	48	7	39	51	10	42	54
$2{,}36 < d \leqslant 3$	**2,5**	—	4[c]	6	5	37	49	8	40	52	12	44	56
	3												
$3 < d \leqslant 3{,}75$	—	**3,5**	4[c]	6	6	38	50	10	42	54	15	47	59
$3{,}75 < d \leqslant 4$	**4**	—	4[c]	6	7	39	51	11	43	55	19	51	63
$4 < d \leqslant 4{,}75$	—		5[c]	6		41			45			53	
$4{,}75 < d \leqslant 5$	**5**	—	5[c]	6	8	42	52	13	47	57	24	58	68
$5 < d \leqslant 6$	**6**	—	6			52			57			68	
$6 < d \leqslant 7{,}5$	—	**7**	8	10	10	54	60	16	60	66	30	74	80
$7{,}5 < d \leqslant 8$	**8**	—	8	10	11	55	61	19	63	69	38	82	88
$8 < d \leqslant 9{,}5$	—	**9**	10			61			69			88	
$9{,}5 < d \leqslant 10$	**10**	—	10		13	63		22	72		45	95	
$10 < d \leqslant 11{,}8$	—	**11**	12			70			79			102	
$11{,}8 < d \leqslant 15$	**12**	**14**	12		16	73		26	83		53	110	
$15 < d \leqslant 19$	**16**	**18**	16		19	79		32	92		63	123	
$19 < d \leqslant 23{,}6$	**20**	**22**	20		22	88		38	104		75	141	
$23{,}6 < d \leqslant 30$	**24** and **25**	**28**	25		26	102		45	121		90	166	
$30 < d \leqslant 37{,}5$	**32**	**36**	32		32	112		53	133		106	186	
$37{,}5 < d \leqslant 47{,}5$	**40**	**45**	40		38	130		63	155		125	217	
$47{,}5 < d \leqslant 60$	**50**	**56**	50		45	147		75	177		150	252	
$60 < d \leqslant 67$	**63**	—	50	63	53	155	165	90	192	202	180	282	292
$67 < d \leqslant 75$	—	**71**	63			165			202			292	

a Tolerances on d_1 in accordance with ISO 3338-1, ISO 3338-2 and ISO 3338-3.

b The two alternatives for the total length result from the two alternatives for the shanks.

c Only for plain cylindrical shanks.

The values L and l have been so chosen that the length difference $(L - l)$ remains constant whatever the series, short, standard or long (see Table 2).

Table 2

Dimensions in millimetres

Range of diameters d	$L - l$	
	Alternative I	Alternative II
$1{,}9 < d \leqslant 4$	32	44
$4 < d \leqslant 5$	34	44
$5 < d \leqslant 6$	44	
$6 < d \leqslant 8$	44	50
$8 < d \leqslant 10$	50	
$10 < d \leqslant 15$	57	
$15 < d \leqslant 19$	60	
$19 < d \leqslant 23{,}6$	66	
$23{,}6 < d \leqslant 30$	76	
$30 < d \leqslant 37{,}5$	80	
$37{,}5 < d \leqslant 47{,}5$	92	
$47{,}5 < d \leqslant 60$	102	
$60 < d \leqslant 67$	102	112
$67 < d \leqslant 75$	112	

4 Tolerances

Tolerances on cutting diameter, d, shall be as follows:

— js 14, for end mills;

— e8, for slot drills.

NOTE In the case of double-ended end milling cutters having a cutting diameter nominally equal to the shank diameter, the maximum cutting diameter should be slightly smaller than the minimum shank diameter.