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
ISO 1641-1:2003(E)

© ISO 2003

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO 2003

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland



Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

© ISO 2003 — All rights reserved

Not for Resale

# 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 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*

© ISO 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

# 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

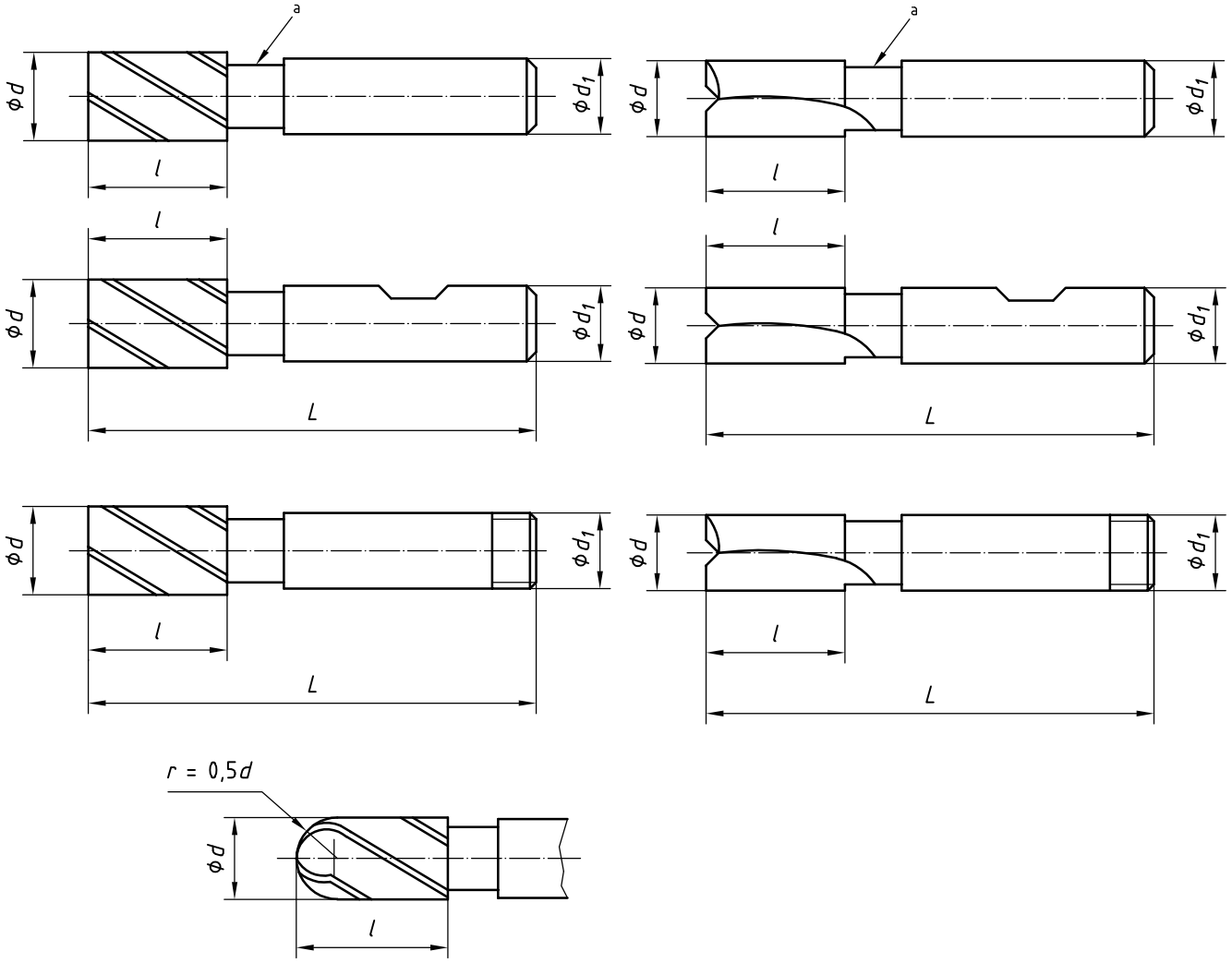
For flat-ended end mills and ball-nosed cylindrical end mills, the standard series and long series given in Table 1 according to the cutting length, $l$, shall be used.

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.

--`,,`-`-`,,`,,`,`,,`---
© ISO 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale




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

a Optional recess.

**Figure 1 — Milling cutters with cylindrical shanks**



© ISO 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

**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.

© ISO 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

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.

--`,,`,,-`-`,,`,,`,`,,`---



© ISO 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

# Bibliography

[1] ISO 1641-2:1978, *End mills and slot drills — Part 2: Milling cutters with Morse taper shanks*

[2] ISO 1641-3:2003, *End mills and slot drills — Part 3: Milling cutters with 7/24 taper shanks*

[3] ISO 11529-1:1998, *Milling cutters — Designation — Part 1: Shank type end mills of solid or tipped design*

© ISO 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

**ICS 25.100.20**

Price based on 5 pages

© ISO 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale