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Milling cutters — Designation —

Part 1: Shank-type end mills of solid or tipped design

Fraises — Désignation

Partie 1: Fraises deux tailles, à queue monobloc ou à lames

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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 11529-1 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 9, *Tools with cutting edges made of hard cutting materials*.

This second edition cancels and replaces the first edition (ISO 11529-1:1998), which has been technically revised. In particular, it incorporates in 4.9 the addition of hollow taper shanks (HSK), types A and C.

ISO 11529 consists of the following parts, under the general title *Milling cutters — Designation*:

- *Part 1: Shank-type end mills of solid or tipped design*
- *Part 2: Shank-type and bore-type milling cutters with indexable inserts*

Milling cutters — Designation —

Part 1: Shank-type end mills of solid or tipped design

1 Scope

This part of ISO 11529 establishes a designation system for shank-type end mills of solid or tipped design with a maximum diameter of 99,9 mm, with the purpose of simplifying communication between the users and suppliers of such tools.

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 3002-1:1982, *Basic quantities in cutting and grinding — Part 1: Geometry of the active part of cutting tools — General terms, reference systems, tool and working angles, chip breakers*

ISO 3002-3:1984, *Basic quantities in cutting and grinding — Part 3: Geometric and kinematic quantities in cutting*

3 Summary explanation of the designation system

Shank-type end mills are designated by a code comprising symbols which identify the important features of the end mills.

Extensions to the designation codes to include manufacturer's or supplier's information about the end mills, and information about the material of the cutting part, are described in Clauses 5 and 6.

No addition to or extension of the designation system given in this part of ISO 11529 shall be made without consulting with Technical Committee ISO/TC 29 and obtaining its agreement.

The symbols defined by this part of ISO 11529 are:

Position Definition of designation symbols

- 1 Designation symbol (letter) identifying the design of end mill (see 4.1)
- 2 Designation symbol (letter) identifying the type of end mill (see 4.2)
- 3 Designation symbol (number) identifying the cutting edge angle, κ_r (see 4.3)
- 4 Designation symbol (letter) identifying the helix angle, λ_s (see 4.4)
- 5 Designation symbol (number) identifying the diameter, \emptyset (see 4.5)

6 Designation symbol (letter) identifying the hand of cutting (see 4.6)
 7 Designation symbol (number) identifying the maximum cutting depth, a_p (see 4.7)
 8 Designation symbol (number) identifying the number of effective cutting edges (see 4.8)
 9 Designation symbol (letter) identifying the type of shank (see 4.9)
 10 Designation symbol (number) identifying the size of shank (see 4.10)

EXAMPLE

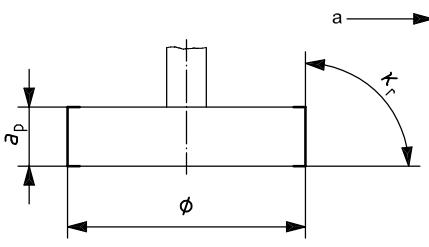
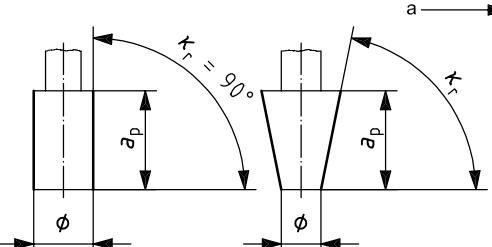
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A	G	90	E	120	R	025	04	A	12

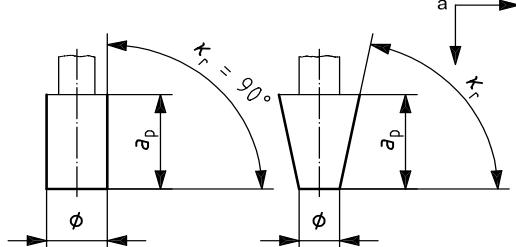
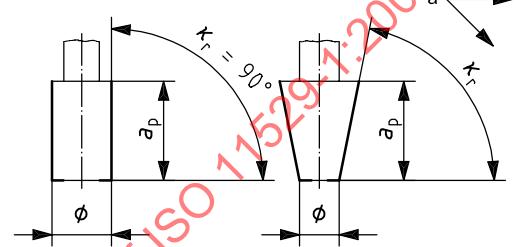
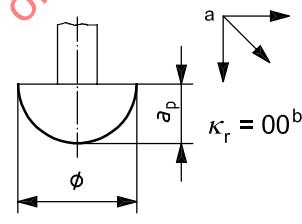
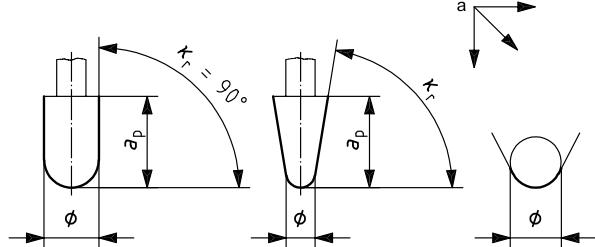
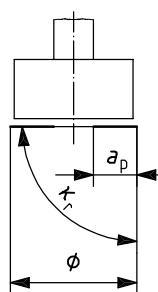
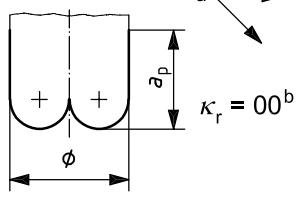
4 Designation symbols

4.1 Designation symbol identifying design of end mill — Position 1

Designation symbol	Design
A	Solid with plain (continuous) cutting edges
B	Solid with interrupted (serrated) cutting edges
D	With brazed tips and plain (continuous) cutting edges
E	With brazed tips and interrupted (serrated) cutting edges
F	With mechanically clamped tips and plain (continuous) cutting edges
G	With mechanically clamped tips and interrupted (serrated) cutting edges

4.2 Designation symbol identifying type of end mill — Position 2

Designation symbol	Type of end mill	Shape
F	T-slot cutter $a_p < \emptyset$	
G	End mill — side cutting ($\kappa_r = 90^\circ$) Tapered end mill — side cutting $a_p \geq \emptyset$	

Designation symbol	Type of end mill	Shape
H	End mill — side and centre cutting ($\kappa_r = 90^\circ$) Tapered end mill — side and centre cutting $a_p > \emptyset$	
J	End mill — side cutting and ramping ($\kappa_r = 90^\circ$) Tapered end mill — side cutting and ramping $a_p \geq \emptyset$	
K	Ball-nosed end mill — centre cutting $a_p \leq 0,5 \emptyset$	
L	Ball-nosed cylindrical end mill — side and centre cutting ($\kappa_r = 90^\circ$) Ball-nosed tapered end mill — side and centre cutting $a_p \geq 0,5 \emptyset$	
M	Spot facing cutter centre cutting = $a_p = 0,5 \emptyset$ not centre cutting = $a_p < 0,5 \emptyset$	
N	Toroidal end mill $a_p < \emptyset$	

^a Feed.^b See 4.3.

4.3 Designation symbol identifying cutting edge angle, κ_r — Position 3

The symbol identifying the cutting edge angle is a two-digit number, corresponding to the nominal cutting edge angle, in degrees, and omitting any decimals. κ_r is defined for the various types of end mill in 4.2, and in ISO 3002-1.

EXAMPLE Cutting edge angle 90°: symbol 90.

For end mills of types K and N, the symbol identifying the cutting edge angle shall be replaced by 00 (double zero).

If κ_r is a decimal value, the symbol identifying the cutting edge angle shall be replaced by XX, and the actual value shown as manufacturer's information (see Clause 5).

4.4 Designation symbol identifying helix angle, λ_s — Position 4

Normal helix angle λ_s	Designation symbol	
	Right-hand helix	Left-hand helix
0°	A	A
0° < $\lambda_s \leq 5^\circ$	B	M
5° < $\lambda_s \leq 10^\circ$	C	N
10° < $\lambda_s \leq 15^\circ$	D	P
15° < $\lambda_s \leq 20^\circ$	E	Q
20° < $\lambda_s \leq 25^\circ$	F	S
25° < $\lambda_s \leq 30^\circ$	G	T
30° < $\lambda_s \leq 35^\circ$	H	U
35° < $\lambda_s \leq 45^\circ$	J	V
45° < $\lambda_s \leq 60^\circ$	K	W
Others	X	Y

4.5 Designation symbol identifying diameter, \varnothing — Position 5

The definition of the diameter of end mills is shown in the drawings in 4.2 (position 2).

The number symbol identifying the diameter of the end mill is a three-digit number and corresponds to the diameter in tenths of a millimetre.

EXAMPLE 1 End mill of diameter 5 mm: symbol 050.

EXAMPLE 2 End mill of diameter 75 mm: symbol 750.

4.6 Designation symbol identifying hand of cutting — Position 6

The symbol for the hand of cutting of an end mill is:

Letter symbol	Hand of cutting
L	Left-hand
R	Right-hand

4.7 Designation symbol identifying the maximum cutting depth, a_p — Position 7

The symbol identifying the maximum cutting depth, a_p (see definition in position 2, and in ISO 3002-3), is a three-digit number, in millimetres and omitting any decimals.

EXAMPLE 1 Maximum cutting depth 8 mm: symbol 008.

EXAMPLE 2 Maximum cutting depth 80 mm: symbol 080.

EXAMPLE 3 Maximum cutting depth 105 mm: symbol 105.

NOTE a_p is described in ISO 3002-3 as “back engagement of the cutting edge”.

4.8 Designation symbol identifying the number of effective cutting edges — Position 8

The symbol identifying the number of cutting edges is a two-digit number corresponding to the number of effective cutting edges.

EXAMPLE 1 12 effective cutting edges: symbol 12.

EXAMPLE 2 2 effective cutting edges: symbol 02.

NOTE The number of effective cutting edges is defined as “the number of cutting edges used to calculate the feed per tooth in the direction of feed motion from which κ_f is defined”.

4.9 Designation symbol identifying type of shank — Position 9

Designation symbol	Type of shank	Illustration
A	Plain cylindrical shank (ISO 3338-1) NOTE The length may be greater than that specified in ISO 3338-1, i.e. for power chucks.	
B	Flatted cylindrical shank (ISO 3338-2)	
C	Cylindrical shanks with 2° angular flat (whistle notch shank)	
D	Threaded cylindrical shank (ISO 3338-3)	
E	Morse taper shank, type A (ISO 296)	
F	Morse taper shank with positive drive (ISO 5413)	
G	7/24 taper shank (ISO 297)	

Designation symbol	Type of shank	Illustration
H	7/24 taper shank for automatic tool changers (ISO 7388-1)	
J	Combined tapered and threaded shank with short cylinder (Bridgeport R8 type shank)	
K	Flatted cylindrical shank combined with a threaded shank	
L	Flatted cylindrical shank combined with 2° angular flat	
M	Shortened 7/24 taper shank (ISO 297)	
N	Hollow taper shank, type A (ISO 12164-1)	
Q	Hollow taper shank, type C (ISO 12164-1)	
X	Other type of shank	

4.10 Designation symbol identifying size of shank — Position 10

The symbol identifying the size of shank is a two- or three-digit number:

- for cylindrical shanks, the nominal diameter in millimetres (for example, 25); for shanks smaller than 10 mm, the first digit is a zero (for example, 08);
- for Morse taper shanks, the number of the Morse taper, preceded by a zero (for example, Morse taper No. 3, symbol 03);
- for 7/24 taper shanks, the number of the shank (for example, 50);
- for hollow taper shanks (HSK), the nominal diameter in millimetres (for example, 100); for shanks smaller than 100 mm, the first digit is a zero (for example, 063).

5 Manufacturer's information

If manufacturers need to give additional information (e.g. to distinguish between different corner configurations), the designation code should be extended and explanatory details given, e.g. in their catalogues.

The extension shall be separated from the standard code by a hyphen (-).

An example of an extension of the standard code follows:

EXAMPLE

1	2	3	4	5	6	7	8	9	10	Manufacturer's information
A	G	90	E	120	R	025	04	A	12	-

6 Additional information on cutting part material

When information is given about the material from which the cutting part of the end mill is made, this shall be given after the designation code, as necessary following the extension for the manufacturer's information.

An example of extension of the standard code to include the manufacturer's additional information and information about the cutting part follows:

EXAMPLE

1	2	3	4	5	6	7	8	9	10	Manufacturer's information	Cutting part material
A	G	90	E	120	R	025	04	A	12	-