INTERNATIONAL STANDARD

ISO 11529

First edition
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Milling cutters — Designation — Shank-type and bore-type milling cutters of solid or tipped design or with indexable cutting edges

Fraises — Désignation — Fraises deux tailles, à queue monobloc ou à lames ou fraises à alésage à plaquettes amovibles

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

The first edition of ISO 11529 cancels and replaces ISO 11529-1:2005 and ISO 11529-2:2005, which have been technically revised.

Milling cutters — Designation — Shank-type and bore-type milling cutters of solid or tipped design or with indexable cutting edges

1 Scope

This International Standard establishes a designation system for shank-type and bore-type milling cutters of either solid or tipped design or with indexable cutting edges with the purpose of simplifying communication between the users and suppliers of such tools.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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, *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, *Basic quantities in cutting and grinding — Part 3: Geometric and kinematic quantities in cutting*

3 Summary explanation of the designation system

Shank-type and bore-type milling cutters are designated by codes comprising symbols which identify the important features of the mills.

Extensions to the designation codes to include manufacturer's or supplier's information about the milling cutters are described in Clause 5.

No addition to or extension of the designation system given in this International Standard shall be made without consultation with ISO/TC 29 and without its agreement. The designation code shall consist of the following:

Position	Definition of designation symbols
1	Number symbol identifying the diameter, Ø (see 4.1)
2	Letter symbol identifying the type of milling cutter (see 4.2)
3	Number symbol identifying the number of effective cutting edges (see 4.3)
4	Letter symbol identifying the hand of cutting (see 4.4)
5	Number symbol identifying the cutting-edge angle, κ_r (see 4.5)
6	Letter symbol identifying the design of end mill or milling cutter (see 4.6)
7	Number symbol identifying the maximum cutting depth or width, a_p (see 4.7)
8	Letter symbol identifying the helix angle or shape of insert (see 4.8)
9	Letter symbol identifying the type of shank (see 4.9)

10 Number symbol identifying the style of shank (see 4.9)

11 Number symbol identifying the size of shank (see 4.10)

EXAMPLE

Position	1	2	3	4	5	6	7	8	9	10	11
End milling cutter of solid design	32	G	04	R	090	A	012	S	ZYL	10	032
Milling cutter of indexable design	250	A	12	R	075	S	075	S	HSK	01	100

4 Designation symbols

4.1 Symbol identifying the diameter — Position 1

The diameter of end mills or milling cutters for each letter symbol is shown in the illustrations in Table 1.

The number symbol identifying the diameter is a one-digit to three-digit number and corresponds to the diameter, in millimetres.

EXAMPLE 1 Ø6 symbol "6"

EXAMPLE 2 Ø32 symbol "32"

EXAMPLE 3 Ø125 symbol "125"

4.2 Symbol identifying the type of milling cutter — Position 2

Table 1 — Type of milling cutter

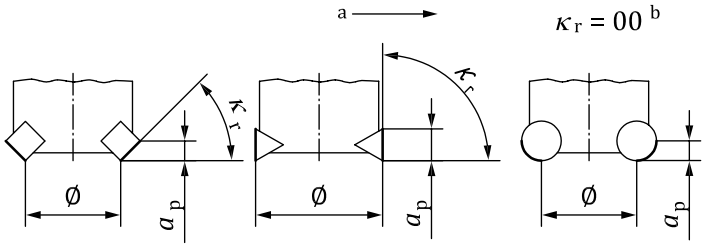
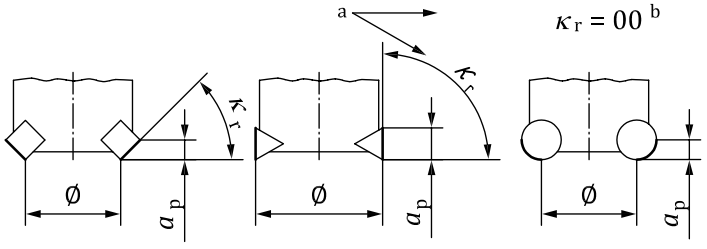
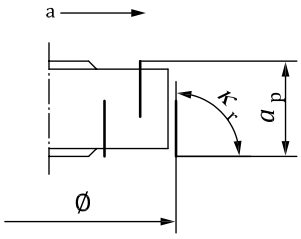
Letter symbol	Type of milling cutter	Shape
A	Face mill Square shoulder face mill $a_p < Ø$ side cutting	
B	Face mill Square shoulder face mill $a_p < Ø$ side cutting and ramping	
C	Full side and face mill $a_p < Ø$	

Table 1 *(continued)*

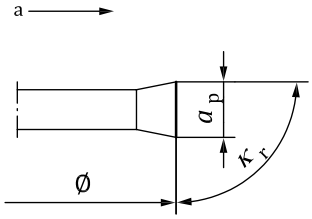
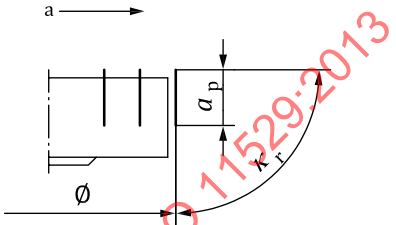
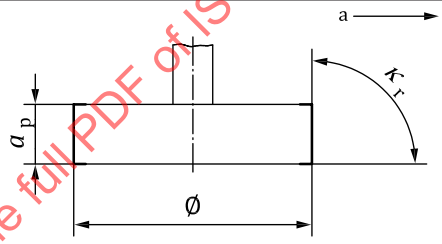
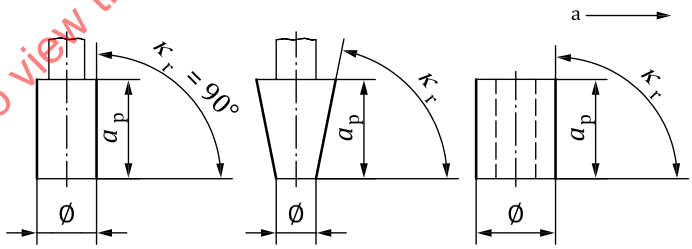
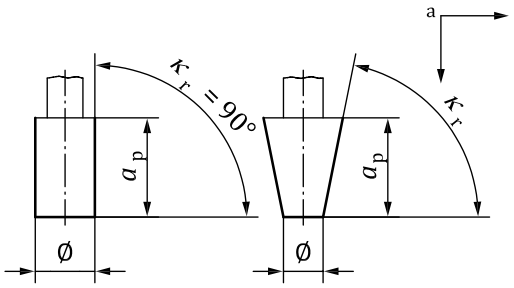
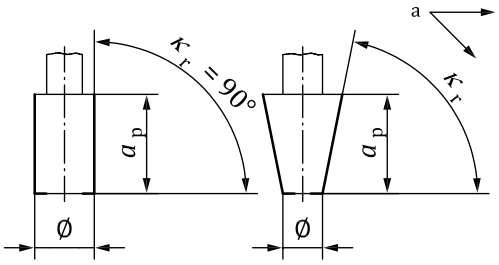
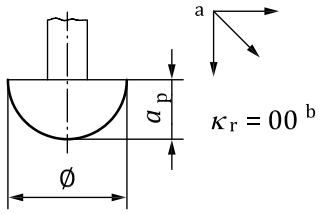
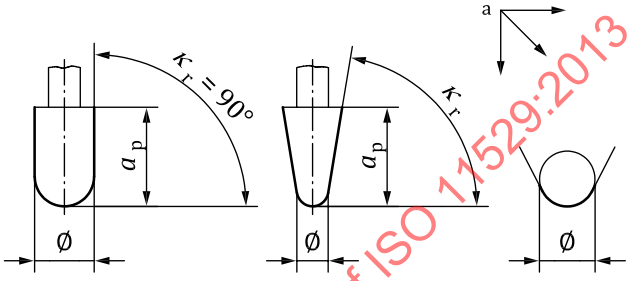
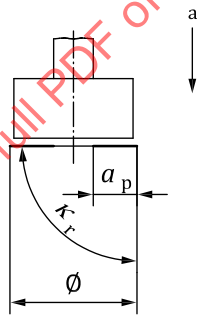
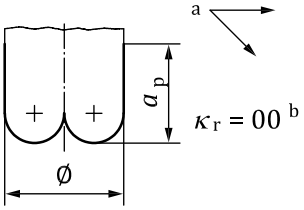
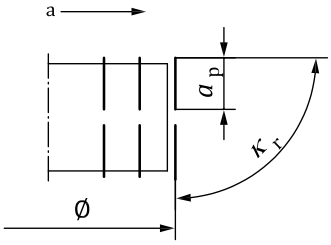
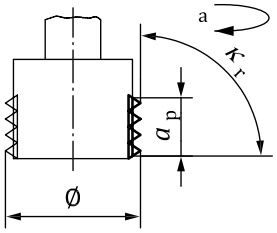
Letter symbol	Type of milling cutter	Shape
D	Slitting cutter $a_p < Ø$	
E	Half side and face mill $a_p < Ø$	
F	T-slot cutter $a_p < Ø$	
G	End mill – side cutting ($\kappa_r = 90°$) Tapered end mill – side cutting $a_p > Ø$	
H	End mill – side and centre cutting ($\kappa_r = 90°$) Tapered end mill – side and centre cutting $a_p > Ø$	
J	End mill – side cutting and ramping ($\kappa_r = 90°$) Tapered end mill – side cutting and ramping $a_p > Ø$	

Table 1 *(continued)*

Letter symbol	Type of milling cutter	Shape
K	Ball-nosed end mill – side and centre cutting $a_p \leq 0{,}5\ Ø$	
L	Ball-nosed cylindrical end mill – side and centre cutting ($\kappa_r = 90°$) Ball-nosed tapered end mill – side and centre cutting $a_p > 0{,}5\ Ø$	
M	Spot facing cutter centre cutting = $a_p = 0{,}5\ Ø$ not centre cutting = $a_p < 0{,}5\ Ø$	
N	Toroidal end mill $a_p < Ø$	
P	Double half-side and face mill $a_p < Ø$	
T	Thread milling cutter	

a Feed.

b See 4.3.

4.3 Symbol identifying the number of effective cutting edges

The number 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_r is defined”.

4.4 Symbol identifying the hand of cutting

The letter symbol for the hand of cutting for a milling cutter is as shown in Table 2:

Table 2 — Hand of cutting

Letter symbol	Hand of cutting
L	Left-hand
R	Right-hand
N	Neutral (both sides)

4.5 Symbol identifying the cutting-edge angle, κ_r

The number symbol identifying the cutting edge angle is a three-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, 5.1.1.1.

The three-digit number designates also milling cutters of “dove tail” design, where the cutting edge angle is larger than 90°.

EXAMPLE 1 Cutting edge angle 90°: symbol “090”.

EXAMPLE 2 Dove tail milling cutter with cutting edge angle 120°: symbol “120”.

For end mills of types K and N (see 4.2), the symbol identifying the cutting edge angle shall be replaced by 000 [triple (or treble) zero].

If end mills and milling cutters are assembled with cartridges that are carrying the cutting edges, the cutting edge angle shall be replaced by 0CA (zero, upper case letter C, upper case letter A).

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

4.6 Symbol identifying the design of end mill or milling cutter

The symbol 6 defines either the design of the end mill or milling cutter, if it is of solid or tipped design, or the design of how the replaceable cutting edges are fixed on to the tool body.

For end mills or milling cutters of solid or tipped design, the letter symbol shall be as shown in Table 3:

Table 3 — Designation for solid or tipped design

Letter 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

For end mills or milling cutters with indexable inserts, the letter symbol shall be as shown in Table 4:

Table 4 — Designation for insert clamping design

Letter symbol	Design
C	Top clamp
K	Milling cutter equipped with cartridges or cassettes
M	Top and hole clamp, insert with hole
P	Hole clamp, insert with hole
S	Screw clamp, insert with partly cylindrical hole
T	Tangentially mounted, insert with hole
V	Tangentially mounted, insert without hole
W	Wedge clamp, insert without hole
X	Special features

4.7 Symbol identifying the maximum cutting depth or width, a_p

The number symbol identifying the maximum cutting depth or width, a_p (see definition in position 2, and in ISO 3002-3, is a three-digit number. If the value of a_p is an integer, it is given in millimetres for all types of cutters. If not, a_p may be given as "T", followed by the value in tenths (1/10) of a millimetre. The latter possibility only applies if a_p is less than 10 mm.

EXAMPLE 1 Maximum cutting depth or width 105 mm: symbol "105"

EXAMPLE 2 Maximum cutting depth or width 80 mm: symbol "080"

EXAMPLE 3 Maximum cutting depth or width 6 mm: symbol "006"

EXAMPLE 4 Maximum cutting depth or width 7,5 mm: symbol "T75"

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

4.8 Symbol identifying the helix angle or shape of insert

For end mills and milling cutters of solid or tipped design (letters "A", "B", "D", "E", "F", "G" of symbol 6), the letter symbol shall be as shown in Table 5:

Table 5 — Designation for helix angle

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

For end mills and milling cutters with indexable insert design (letters "C", "K", "M", "P", "S", "T", "V", "W", "X" of symbol 6), the letter symbol shall be as shown in Table 6:

Table 6 — Designation for insert shapes

Letter symbol	Insert shape	Insert type
H	Hexagonal	Equilateral and equiangular
O	Octagonal	
P	Pentagonal	
S	Square	
T	Triangular	
C	Rhombic with 80° included angle	Equilateral but non-equiangular
D	Rhombic with 55° included angle	
E	Rhombic with 75° included angle	
M	Rhombic with 86° included angle	
V	Rhombic with 35° included angle	
W	Trigon with 80° included angle	
L	Rectangular	Non-equilateral but equiangular
A	Parallelogram-shaped with 85° included angle	Non-equilateral and non-equiangular
B	Parallelogram-shaped with 82° included angle	
K	Parallelogram-shaped with 55° included angle	
R	Round	Round
U	Cutters equipped with cartridges or cassettes or nests	
X	Cutters equipped with other shapes of inserts	
Y	Cutters equipped with more than one shape of insert	

4.9 Symbol identifying the type (symbol 9) and the style (symbol 10) of shank

Symbol 9 (type of shank or bore) and symbol 10 (style of shank or bore) are according to ISO/TS 13399-60. See Table 7.

Table 7 — Designation for shank type and shank style

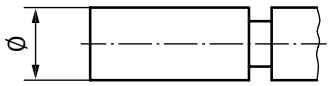
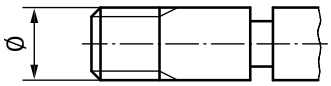
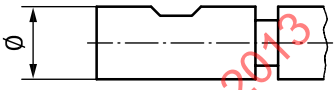
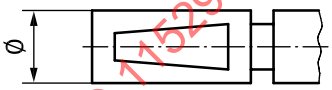
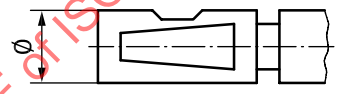
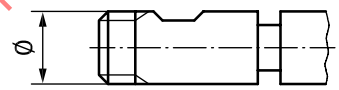
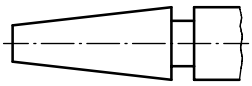
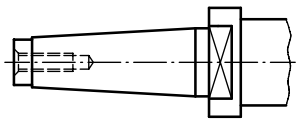
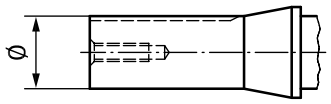
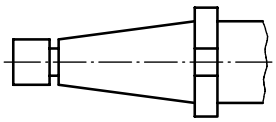
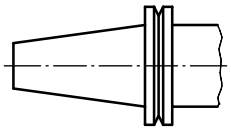
Letter symbol type of shank or bore[a]	Number symbol style of shank or bore[b]	Description of shank or bore	Illustration
ZYL	01	Straight cylindrical shank (ISO 3338-1)	
ZYL	03	Straight cylindrical shank with attachment thread	
ZYL	10	Straight cylindrical shank with plain clamping surface – Weldon shank	
ZYL	13	Straight cylindrical shank with 2° inclined clamping surface – Whistle notch shank without plain contact surface	
ZYL	14	Straight cylindrical shank with plain clamping surface and 2° inclined clamping surface	
ZYL	17	Straight cylindrical shank with plain clamping surface and attachment thread	
MKG	1x	Morse taper shank with attachment thread (for the second digit describing the coolant supply, see ISO/TS 13399-60)	
MKG	4x	Morse taper shank with attachment thread and positive drive (for the second digit describing the coolant supply, see ISO/TS 13399-60)	
BRP	01	Combined tapered and threaded shank with short cylinder – Bridgeport shank form R8	
SKG	1x	Taper 7/24 ISO 7388-1 A	
	2x	taper 7/24 ISO 297 N.M.T.B (DIN 2080-1)	
	3x	taper 7/24 ANSI Inch	
	4x	taper 7/24 ISO 7388-1 U	
	5x	taper 7/24 ISO 7388-1 J	
		steep taper (for the second digit describing the coolant supply, see ISO/TS 13399-60)	

Table 7 *(continued)*

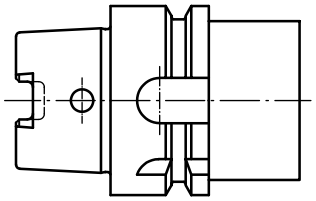
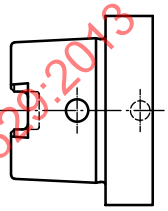
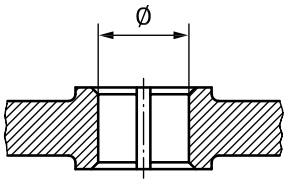
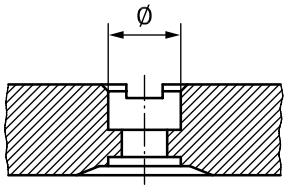
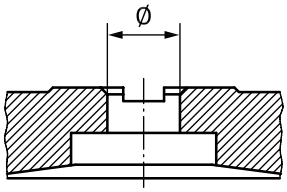
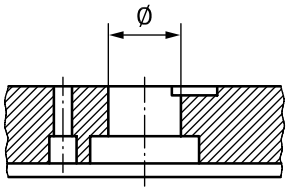
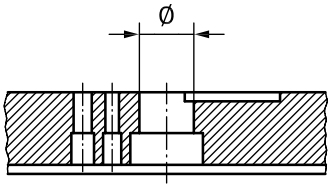
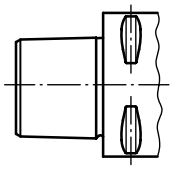
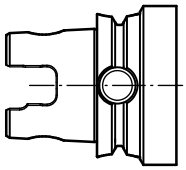
Letter symbol type of shank or bore[a]	Number symbol style of shank or bore[b]	Description of shank or bore	Illustration
HSK	01	Hollow taper shank form A	
	05	hollow taper shank form C according to ISO 12164-1	
FDA	01	Longitudinal drive	
FDA	22	Milling cutter arbor with transversal drive and socket head cap screw (ISO 6462 A)	
FDA	12	Milling cutter arbor with transversal drive and cutter retaining screw (ISO 6462 B)	
SPK		Holding arbor with bolt circle:	
	01	diameter 66,7 mm	
	02	diameter 101,6 mm	
	03	diameter 177,8 mm	
	04	diameter 66,7 mm and 177,8 mm	
	05	diameter 101,6 mm and 177,8 mm	
CCS	01	Polygonal taper with flange contact surface ISO 26623-1	

Table 7 *(continued)*

Letter symbol type of shank or bore[a]	Number symbol style of shank or bore[b]	Description of shank or bore	Illustration
KMT	01	Modular taper with ball track system ISO 26622-1	
[a] Letter symbol type of shank or bore according to ISO/TS 13399-60.			
[b] Number symbol style of shank or bore according to ISO/TS 13399-60.			

4.10 Symbol identifying the size of shank

The size of bore or shank shall be identified using a three-digit number symbol as shown in Examples 1 to 3:

a) for cutters with bores; the nominal diameter of the bore, in millimetres;

b) for bores smaller than 100 mm, the first digit is a zero;

EXAMPLE 1 bore diameter Ø 40 the symbol is "040"

c) for cylindrical shanks, the nominal diameter, in millimetres;

1) for shanks smaller than 100 mm and greater than or equal to 10 mm, the first digit is a zero;

2) for shanks smaller than 10 mm, the first and second digit is a zero;

EXAMPLE 2 shank diameter Ø 25 the symbol is "025"

EXAMPLE 3 shank diameter Ø8 the symbol is "008"

d) for Morse taper shanks, the number of the Morse taper, preceded by two zeros;

EXAMPLE 4 Morse taper size no. 4 the symbol is "004"

e) for steep taper shanks (7/24 taper shanks), the number of the shank preceded by a zero;

EXAMPLE 5 steep taper no 50 the symbol is "050"

f) for hollow taper shanks (HSK), the nominal diameter, in millimetres;

— for shanks smaller than 100 mm, the first digit is a zero.

EXAMPLE 6 HSK 125 the symbol is "125"

EXAMPLE 7 HSK 63 the symbol is "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, for example in their handbooks.

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

An example of an extension of the standard code is as follows:

EXAMPLE

