
INTERNATIONAL STANDARD



1832

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Indexable (throwaway) inserts for cutting tools – Designation – Code of symbolization

Plaquettes amovibles pour outils coupants – Désignation – Code de symbolisation

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 1832 was developed by Technical Committee ISO/TC 29, *Small tools*, and was circulated to the member bodies in May 1976.

It has been approved by the member bodies of the following countries :

Australia	Israel	Sweden
Austria	Italy	Switzerland
Belgium	Korea, Rep. of	Turkey
Czechoslovakia	Mexico	United Kingdom
France	Poland	U.S.A.
Germany	Romania	U.S.S.R.
Hungary	South Africa, Rep. of	
India	Spain	

The member body of the following country expressed disapproval of the document on technical grounds :

Japan

This International Standard cancels and replaces ISO Recommendation R 1832-1971, of which it constitutes a technical revision.

Indexable (throwaway) inserts for cutting tools – Designation – Code of symbolization

1 SCOPE AND FIELD OF APPLICATION

This International Standard establishes a code of symbolization intended for the designation of usual types of indexable (throwaway) inserts, in carbide or any other cutting materials, such as ceramics, etc., for cutting tools in order to simplify orders and specifications for such inserts.

2 EXPLANATION OF THE CODE

The code includes nine symbols, for the designation of dimensions and other characteristics of indexable inserts, of which the first seven symbols must be used in any designation. The last two symbols may be used when necessary.

In addition to the standardized designation (symbols ① to ⑨), a supplementary symbol consisting of one or two characters may be added by the manufacturer for a better

description of his products, on condition that this symbol is separated from the standardized designation by a dash and that it does not contain letters specified for references ⑧ and ⑨.

No addition to or extension of the code given in this International Standard shall be made without consultation with Technical Committee ISO/TC 29 and its agreement. Rather than adding symbols not provided for in this system, it is preferable to add to the designation conforming to this International Standard all necessary explanations in detailed sketches or specifications.

However, in the case where the symbol "X" is used in position 4 of the designation, it is possible to use, in positions 5, 6 and 7, symbols representing values not appearing in this International Standard but which must be described explicitly by the sketch or the detailed specifications mentioned in 3.4.

The significance of the symbols constituting the code is as follows :

- | | | |
|--|---|--------------------|
| <ul style="list-style-type: none"> ① Letter symbol identifying insert shape (see 3.1). ② Letter symbol identifying normal clearance (see 3.2). ③ Letter symbol identifying tolerance class (see 3.3). ④ Letter symbol indicating identifying chip-breakers and/or fixation (see 3.4). ⑤ Number symbol identifying insert size (see 3.5). ⑥ Number symbol identifying insert thickness (see 3.6). ⑦ Letter or number symbol identifying insert corner configuration (see 3.7). | } | Compulsory symbols |
| <ul style="list-style-type: none"> ⑧ Letter symbol indicating cutting edge condition (see 4.1). ⑨ Letter symbol identifying cutting direction (see 4.2). | } | Optional symbols |
-
- ⑩ Symbol for the manufacturer, at his option.

Example :

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	-	⑩
Metric insert :	T	P	G	N	16	03	08	E	N	-	..
Inch insert :	T	P	G	N	3	2	2	E	N	-	..

NOTE — The designations and symbols of the different angles allowing geometrical definition of the indexable inserts are in conformity with ISO 3002/I, *Geometry of the active part of cutting tools — Part I : General terms, reference systems, tool and working angles*, with the following conventions :

- the insert is considered in the tool-in-hand system;
- the reference plane P_r is parallel to the base of the insert;
- the assumed working plane P_f is perpendicular to the reference plane P_r and is parallel to the assumed direction of feed motion. This plane is defined only in the case of inserts having one or more wiper edges.

The assumed direction of feed motion is taken parallel to the considered wiper edge (see the note in 3.7).

3 SYMBOLS

3.1 Symbol for insert shape — Reference ①

Type	Letter symbol
I Equilateral and equiangular inserts	H — Hexagonal inserts O — Octagonal inserts P — Pentagonal inserts R — Round inserts S — Square inserts T — Triangular inserts
II Equilateral but non-equiangular inserts	C — Rhombic inserts with 80° included angle ¹⁾ D — Rhombic inserts with 55° included angle ¹⁾ E — Rhombic inserts with 75° included angle ¹⁾ M — Rhombic inserts with 86° included angle ¹⁾ V — Rhombic inserts with 35° included angle ¹⁾ W — Hexagonal inserts with 80° included angle ¹⁾ (see figure on page 4)
III Non-equilateral but equiangular inserts	L — Rectangular inserts
IV Non-equilateral and non-equiangular inserts	A — Parallelogram-shaped inserts with 85° included angle ¹⁾ B — Parallelogram-shaped inserts with 82° included angle ¹⁾ K — Parallelogram-shaped inserts with 55° included angle ¹⁾

1) The included angle considered is always the smaller angle.

3.2 Symbol for normal clearance – Reference ②

Letter symbol
<p>For the normal clearance, choose, from the symbols listed below, the one which corresponds to the major cutting edge.</p> <p>If (in spite of different normal clearances) all cutting edges should be used as major cutting edges, the symbol to be used for the designation of the normal clearance shall be the symbol applicable to the normal clearance of the longer cutting edge, which is also considered as the major cutting edge for the indication of the insert size (see reference ⑤).</p>
<p>A – 3° B – 5° C – 7° D – 15° E – 20° F – 25° G – 30° N – 0° P – 11° O – Other normal clearances requiring special specification</p>

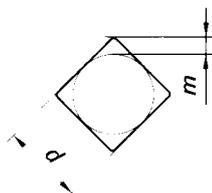
3.3 Symbol for tolerance classes – Reference ③

d : nominal diameter of the insert inscribed circle
 s : thickness of the insert
 m : three cases are to be considered for this dimension :

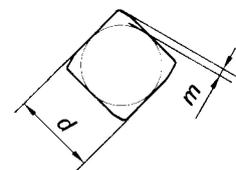
1st case – Inserts with odd number of sides and rounded corner



2nd case – Inserts with even number of sides and rounded corner



3rd case – Inserts with wiper edges (see the note in 3.7)



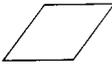
Letter symbol	Tolerance in millimetres			Tolerance in inches		
	<i>m</i>	<i>s</i>	<i>d</i>	<i>m</i>	<i>s</i>	<i>d</i>
A	± 0,005 ¹⁾	± 0,025	± 0,025	± 0.000 2 ¹⁾	± 0.001	± 0.001 0
F	± 0,005 ¹⁾	± 0,025	± 0,013	± 0.000 2 ¹⁾	± 0.001	± 0.000 5
C	± 0,013 ¹⁾	± 0,025	± 0,025	± 0.000 5 ¹⁾	± 0.001	± 0.001 0
H	± 0,013	± 0,025	± 0,013	± 0.000 5	± 0.001	± 0.000 5
E	± 0,025	± 0,025	± 0,025	± 0.001 0	± 0.001	± 0.001 0
G	± 0,025	± 0,13	± 0,025	± 0.001 0	± 0.005	± 0.001 0
J	± 0,005 ¹⁾	± 0,025	from ± 0,05 ²⁾ to ± 0,13	± 0.000 2 ¹⁾	± 0.001	from ± 0.002 ²⁾ to ± 0.005
K	± 0,013 ¹⁾	± 0,025	from ± 0,05 ²⁾ to ± 0,13	± 0.000 5 ¹⁾	± 0.001	from ± 0.002 ²⁾ to ± 0.005
L	± 0,025 ¹⁾	± 0,025	from ± 0,05 ²⁾ to ± 0,13	± 0.001 0 ¹⁾	± 0.001	from ± 0.002 ²⁾ to ± 0.005
M	from ± 0,08 ²⁾ to ± 0,18	± 0,13	from ± 0,05 ²⁾ to ± 0,13	from ± 0.003 ²⁾ to ± 0.007	± 0.005	from ± 0.002 ²⁾ to ± 0.005
U	from ± 0,13 ²⁾ to ± 0,38	± 0,13	from ± 0,08 ²⁾ to ± 0,25	from ± 0.005 ²⁾ to ± 0.015	± 0.005	from ± 0.003 ²⁾ to ± 0.010

- 1) These tolerances normally apply to indexable inserts with wiper edges.
- 2) The tolerance is dependent upon the insert size and should be indicated for each insert according to the standards on the corresponding sizes.

In the case of inserts with included angle 60° or more, of shapes C, E, M, P, S, T, W, the values for tolerance classes M and U on *m* and classes M, J, K, L and U on *d* are indicated in the following table.

Diameter of inscribed circle <i>d</i>		Tolerance on <i>m</i>				Tolerance on <i>d</i>			
		Class M		Class U		Classes M, J, K, L		Class U	
mm	in	mm	in	mm	in	mm	in	mm	in
6,35	0.250	± 0,08	± 0.003	± 0,13	± 0.005	± 0,05	± 0.002	± 0,08	± 0.003
9,525	0.375	± 0,08	± 0.003	± 0,13	± 0.005	± 0,05	± 0.002	± 0,08	± 0.003
12,7	0.500	± 0,13	± 0.005	± 0,20	± 0.008	± 0,08	± 0.003	± 0,13	± 0.005
15,875	0.625	± 0,15	± 0.006	± 0,27	± 0.011	± 0,10	± 0.004	± 0,18	± 0.007
19,05	0.750	± 0,15	± 0.006	± 0,27	± 0.011	± 0,10	± 0.004	± 0,18	± 0.007
25,4	1.000	± 0,18	± 0.007	± 0,38	± 0.015	± 0,13	± 0.005	± 0,25	± 0.010
Shapes of the inserts concerned		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> P  </div> <div style="text-align: center;"> S  </div> <div style="text-align: center;"> T  </div> <div style="text-align: center;"> C, E, M  </div> <div style="text-align: center;"> W  </div> </div>							

In the case of rhombic inserts with included angle 55° (shape D), the values for tolerance class M on *m* and *d* are indicated in the following table.

Diameter of inscribed circle <i>d</i>		Tolerance on <i>m</i>		Tolerance on <i>d</i>		Shape of the insert concerned
		mm	in	mm	in	
6,35	0.250	± 0,11	± 0.004	± 0,05	± 0.002	D 
9,525	0.375	± 0,11	± 0.004	± 0,05	± 0.002	
12,70	0.500	± 0,15	± 0.006	± 0,08	± 0.003	
15,875	0.625	± 0,18	± 0.007	± 0,10	± 0.004	
19,05	0.750	± 0,18	± 0.007	± 0,10	± 0.004	

The tolerance on *m* increases appreciably when the included angle is less than 55°.

3.4 Symbol for chip breakers¹⁾ and/or for fixation – Reference (4)

Letter symbol	
N	– Without chip breaker, without cylindrical ²⁾ fixation hole.
E³⁾	– Without chip breaker, without cylindrical fixation hole but with inscribed circle smaller than 1/4 in.
A	– Without chip breaker, with cylindrical fixation hole.
D³⁾	– Without chip breaker, with cylindrical fixation hole but with inscribed circle smaller than 1/4 in.
R	– With chip breaker on one face only, without cylindrical fixation hole.
S³⁾	– With chip breaker on one face only, without cylindrical fixation hole but with inscribed circle smaller than 1/4 in.
M	– With chip breaker on one face only, with cylindrical fixation hole.
p³⁾	– With chip breaker on one face only, with cylindrical fixation hole but with inscribed circle smaller than 1/4 in.
F	– With chip breaker on both faces, without cylindrical fixation hole.
L³⁾	– With chip breaker on both faces, without cylindrical fixation hole but with inscribed circle smaller than 1/4 in.
G	– With chip breakers on both faces, with cylindrical fixation hole.
K³⁾	– With chip breaker on both faces, with cylindrical fixation hole but with inscribed circle smaller than 1/4 in.
X⁴⁾	– With chip breaker or dimensions requiring detailed explanation, a sketch or additional specifications (see clause 2).

1) For definition of chip breakers, see ISO 3002/1/Add. 1.

2) These symbols also apply to standardized inserts with a hole partly cylindrical.

3) These symbols are necessary only for inserts with dimensions in inches. They ensure clear meanings of the symbols which follow them.

4) Non-equilateral inserts shall be always designated by X because the indication of width (measured perpendicularly on the major cutting edge or perpendicularly on the longer edge) and details concerning special features of manufacture are necessary.

NOTE – It is emphasized that at present neither the shape nor the dimensions of chip breakers are likely to be standardized either in a national standard or in an International Standard. For this reason special features shall be explicitly described by a sketch or by additional specifications.

3.5 Symbol for insert size — Reference 5

Type	Number symbol
<p>I - II Equilateral inserts</p>	<p>— In countries using the metric system, choose the value of the side length as a symbol of designation and disregard any decimals.</p> <p><i>Example</i> : Edge length : 16,5 mm Symbol of designation : 16</p> <p>— In countries using the inch system, choose the value of the diameter of the inscribed circle as a symbol of designation.</p> <p>The symbol is the numerator of the fraction :</p> <p>a) in 1/32 in for inserts with an inscribed circle smaller than 1/4 in; b) in 1/8 in for inserts with an inscribed circle of 1/4 in and more.</p> <p>NOTE — In the case of round inserts, the diameter value is given as the designation symbol.</p>
<p>III - IV Non-equilateral inserts</p>	<p>The symbol of designation for the insert size is always given for the major cutting edge or the longer cutting edge. The indication of other dimensions shall be made by means of a sketch or detailed explanation, which is indicated at position 4 by the symbol X.</p> <p>— In countries using the metric system, the symbol of designation is the length, disregarding any decimals.</p> <p><i>Example</i> : Length of the main edge : 19,5 mm Symbol of designation : 19</p> <p>— In countries using the inch system, the symbol of designation is the numerator of the fraction for the value in 1/4 in.</p> <p><i>Example</i> : Length of the main edge : 3/4 in Symbol of designation : 3</p>

NOTE — When the symbol resulting from the retained value of a metric dimension has only one digit, it shall be preceded by 0 (zero).

Example : Length of edge : 9,525 mm
Symbol of designation : 09

3.6 Symbol for insert thickness — Reference 6

Number symbol
<p>— In countries using the metric system, take the numerical value of the thickness as the symbol of designation of the insert thickness, disregarding any decimals. If the resulting symbol has only one digit, it shall be preceded by 0 (zero).</p> <p><i>Example</i> : Insert thickness : 3,18 mm Symbol of designation : 03</p> <p>— In countries using the inch system, the symbol of designation is the numerator of the fraction :</p> <p>a) in 1/32 in for inserts with an inscribed circle smaller than 1/4 in; b) in 1/16 in for inserts with an inscribed circle of 1/4 in and more.</p> <p>NOTE — In order to determine the symbol of designation for rectangular or parallelogram-shaped inserts, use width instead of inscribed circle.</p> <p>Width shall be indicated by means of a sketch, a detailed explanation or a reference to detailed specifications. [See footnote 4] in sub-clause 3.4]</p>

3.7 Symbol for insert corner configuration — Reference ⑦

Number or letter symbol															
<p>1) If inserts have rounded corners, the symbol of designation is represented :</p> <p>a) in countries using the metric system, by the value of the corner radius given in 0,1 mm; if the number is less than 10, it should be preceded by 0 (zero).</p> <p><i>Example :</i> Corner radius : 0,8 mm Designation symbol : 08</p> <p>If the corner is not rounded, use the symbol of designation 00 (zero-zero).</p> <p>b) in countries using the inch system, by the following figures :</p> <table style="margin-left: 40px; border: none;"> <tr><td>0</td><td>— Sharp corner</td></tr> <tr><td>1</td><td>— Corner radius 1/64 in</td></tr> <tr><td>2</td><td>— Corner radius 1/32 in</td></tr> <tr><td>3</td><td>— Corner radius 3/64 in</td></tr> <tr><td>4</td><td>— Corner radius 1/16 in</td></tr> <tr><td>6</td><td>— Corner radius 3/32 in</td></tr> <tr><td>8</td><td>— Corner radius 1/8 in</td></tr> </table>		0	— Sharp corner	1	— Corner radius 1/64 in	2	— Corner radius 1/32 in	3	— Corner radius 3/64 in	4	— Corner radius 1/16 in	6	— Corner radius 3/32 in	8	— Corner radius 1/8 in
0	— Sharp corner														
1	— Corner radius 1/64 in														
2	— Corner radius 1/32 in														
3	— Corner radius 3/64 in														
4	— Corner radius 1/16 in														
6	— Corner radius 3/32 in														
8	— Corner radius 1/8 in														
<p>2) If inserts have wiper edges, use, in the order given, the following symbols of designation :</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top; padding-right: 20px;"> <p>For cutting edge angle κ_r</p> <p>A — 45° D — 60° E — 75° F — 85° P — 90°</p> </td> <td style="width: 50%; vertical-align: top;"> <p>For wiper edge normal clearance α'_n</p> <p>A — 3° B — 5° D — 15° E — 20° F — 25° G — 30° N — 0° P — 11°</p> </td> </tr> </table>		<p>For cutting edge angle κ_r</p> <p>A — 45° D — 60° E — 75° F — 85° P — 90°</p>	<p>For wiper edge normal clearance α'_n</p> <p>A — 3° B — 5° D — 15° E — 20° F — 25° G — 30° N — 0° P — 11°</p>												
<p>For cutting edge angle κ_r</p> <p>A — 45° D — 60° E — 75° F — 85° P — 90°</p>	<p>For wiper edge normal clearance α'_n</p> <p>A — 3° B — 5° D — 15° E — 20° F — 25° G — 30° N — 0° P — 11°</p>														
<p>NOTE — The wiper edge is a part of the minor cutting edge.</p>															
<p>The diagram illustrates the geometry of a cutting insert. It shows the major cutting edge, minor cutting edge, and wiper edge. The angle between the major and minor cutting edges is labeled κ_r. The normal clearance angle is labeled α'_n. A section line A-A is shown, with a corresponding cross-section labeled 'Section A-A' showing the wiper edge profile. The assumed direction of feed motion is indicated by an arrow. Other features labeled include 'Chamfered corner', 'Major cutting edge', 'Minor cutting edge', and 'Wiper edge'. Points A and P_f are marked on the diagram.</p>															
<p>3) If inserts have any special features at the corners, the symbol of designation to be used is the following¹⁾ :</p> <p>a) in countries using the metric system : ZZ</p> <p>b) in countries using the inch system : Z</p>															
<p>4) To supplement the designation in position 7 for round inserts, those countries using the metric system shall indicate 00 (zero-zero) and those using the inch system 0 (zero).</p>															

1) Symbols ZZ or Z indicate that detailed explanations are necessary : they shall be used for non-standardized inserts only.