

# ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

## ISO RECOMMENDATION

### R 1832

INDEXABLE (THROWAWAY) INSERTS

DESIGNATION

CODE OF SYMBOLIZATION

1st EDITION

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## BRIEF HISTORY

The ISO Recommendation R 1832, *Indexable (throwaway) inserts – Designation – Code of symbolization*, was drawn up by Technical Committee ISO/TC 29, *Small tools*, the Secretariat of which is held by the Association Française de Normalisation (AFNOR).

Work on this question led to the adoption of Draft ISO Recommendation No. 1832, which was circulated to all the ISO Member Bodies for enquiry in April 1969. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Israel	Spain
Belgium	Japan	Sweden
Czechoslovakia	Netherlands	Switzerland
France	New Zealand	Turkey
Germany	Peru	U.A.R.
Greece	Poland	United Kingdom
India	Portugal	U.S.A.
Ireland	South Africa, Rep. of	U.S.S.R.

The following Member Body opposed the approval of the Draft :

Austria

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

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INDEXABLE (THROWAWAY) INSERTS

DESIGNATION

CODE OF SYMBOLIZATION

1. SCOPE

This ISO Recommendation 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., in order to simplify orders and specifications for such inserts.

2. EXPLANATION OF THE CODE

The code includes seven symbols, intended solely for the designation of dimensions and other characteristics of indexable inserts. All seven symbols must be used in any designation. Two supplementary symbols, given in the Appendix, may be used when required.

No addition to or extension of the code given in this ISO Recommendation should be made without consultation with Technical Committee ISO/TC 29 and by mutual agreement. Rather than adding symbols not provided for in this system, it is preferable to add all necessary explanations to a designation conforming to the specified code.

However, in the case where 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 ISO Recommendation but which must be described explicitly by a sketch or additional specifications.

The significance of the seven primary symbols and two supplementary symbols constituting the code is as follows :

- ① Letter symbol identifying insert shape (see clause 3.1).
  - ② Letter symbol identifying relief angle (see clause 3.2).
  - ③ Letter symbol indicating tolerances (see clause 3.3).
  - ④ Letter symbol indicating special features for chip grooves on top rake surfaces and/or for fixing (see clause 3.4).
  - ⑤ Number symbol identifying insert size (see clause 3.5).
  - ⑥ Number symbol identifying insert thickness (see clause 3.6).
  - ⑦ Letter or number symbol identifying insert corner configuration (see clause 3.7).
- 
- ⑧ Letter symbol indicating cutting edge condition
  - ⑨ Letter symbol identifying cutting direction
- } (see Appendix).

Examples :

	①	②	③	④	⑤	⑥	⑦	⑧	⑨
metric insert	T	P	G	N	16	03	08	- E	N
inch insert	T	P	G	N	3	2	2	- E	N

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		Corner angle <sup>(1)</sup>
	C	Rhombic inserts
	D	" "
	E	" "
	M	" "
III Non-equilateral but equiangular inserts	L	Rectangular inserts
		Corner angle <sup>(1)</sup>
IV Non-equilateral and non-equiangular inserts	A	Parallelogram-shaped inserts
	B	" "
	K	" "
		Corner angle <sup>(1)</sup>

(1) The corner angle is always the smaller angle.

3.2 Symbol for relief angle – Reference ②

Type	Letter symbol
I Equilateral and equiangular inserts	<p>For the relief angle, choose, from the symbols listed below, the one which corresponds to <i>the main cutting edge</i>.</p> <p>If (in spite of different relief angles) all cutting edges should be used as main cutting edges, the symbol to be used for the designation of the relief angle should be the symbol applicable to the relief angle of the longer cutting edge, which is also considered as the main 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°</p>
II Equilateral but non-equiangular inserts	
III Non-equilateral but equiangular inserts	
IV Non-equilateral and non-equiangular inserts	

3.3 Symbol for tolerances – Reference ③

Type	Letter symbol	Tolerances			
		Dimension $m^{(1)}$		Dimension $s^{(1)}$	
		mm	in	mm	in
I Equilateral and equiangular inserts	A	± 0.005 <sup>(2)</sup>	± 0.0002 <sup>(2)</sup>	± 0.025	± 0.001
	C	± 0.013	± 0.0005	± 0.025	± 0.001
	E	± 0.025	± 0.0010	± 0.025	± 0.001
	G	± 0.025	± 0.0010	± 0.130	± 0.005
II Equilateral but non-equiangular inserts	M	± 0.050	± 0.0020	± 0.130	± 0.005
	U	± 0.120 <sup>(3)</sup>	± 0.0040 <sup>(3)</sup>	± 0.130	± 0.005
		± 0.130	± 0.0050		
III Non-equilateral but equiangular inserts		± 0.375 <sup>(3)</sup>	± 0.0150 <sup>(3)</sup>		
IV Non-equilateral and non-equiangular inserts		<p>Except for triangular inserts, dimension <math>m</math> is the distance measured on the bisectrix, between the inscribed circle contacting either every side of the insert or only two sides (in the latter case the diameter of the inscribed circle should be given) and the edge corner rounded off. In the case where the edge corner includes a secondary edge it is the distance between the secondary edge and a line parallel to it, tangent to the inscribed circle.</p> <p>For triangular inserts having rounded cutting corners, dimension <math>m</math> is the insert height, i.e. the distance between one side and the opposite corner.</p>			

(1) See ISO Recommendation R 883, *Throwaway carbide indexable inserts – Dimensions*.

(2) These tolerances only apply to indexable inserts with secondary edges.

(3) The tolerance is dependent upon the insert size and should be indicated for each insert according to the standards on the corresponding sizes.

3.4 Symbol for special features for chip grooves on top rake surfaces and/or for fixing – Reference ④

Type	Letter symbol
<p><b>I</b> Equilateral and equiangular inserts</p>	<p>N – Without special features on top rake surfaces, without cylindrical fixing hole.</p> <p>E<sup>(1)</sup> – Without special features on top rake surfaces, without cylindrical fixing hole but with inscribed circle smaller than 1/4 in.</p> <p>A – Without special features on top rake surfaces, with cylindrical fixing hole.</p>
<p><b>II</b> Equilateral but non-equiangular inserts</p>	<p>D<sup>(1)</sup> – Without special features on top rake surfaces, with cylindrical fixing hole but with inscribed circle smaller than 1/4 in.</p> <p>R – With special features on one single top rake surface only, without cylindrical fixing hole.</p> <p>S<sup>(1)</sup> – With special features on a single top rake surface only, without cylindrical fixing hole but with inscribed circle smaller than 1/4 in.</p>
<p><b>III<sup>(2)</sup></b> Non-equilateral but equiangular inserts</p>	<p>M – With special features on one single top rake surface only, with cylindrical fixing hole.</p> <p>P<sup>(1)</sup> – With special features on a single top rake surface only, with cylindrical fixing hole but with inscribed circle smaller than 1/4 in.</p> <p>F – With special features on both top rake surfaces, without cylindrical fixing hole.</p> <p>L<sup>(1)</sup> – With special features on both top rake surfaces, without cylindrical fixing hole but with inscribed circle smaller than 1/4 in.</p>
<p><b>IV<sup>(2)</sup></b> Non-equilateral and non-equiangular inserts</p>	<p>G – With special features on both top rake surfaces, with cylindrical fixing hole.</p> <p>K<sup>(1)</sup> – With special features on both top rake surfaces, with cylindrical fixing hole but with inscribed circle smaller than 1/4 in.</p> <p>X<sup>(2)</sup> – With special features or dimensions requiring detailed explanation, a sketch or additional specifications (see section 2).</p>

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

(2) Inserts of types III and IV should be designated by X because the indication of width (measured perpendicularly on the main edge or perpendicularly on the longer edge) and details concerning special features of manufacture are necessary.

NOTE. – Special features for chip grooves are generally called “chip rollers”. It is emphasized that in the present situation neither the shape nor the dimensions of chip rollers are likely to be standardized either in a national standard or in an ISO Recommendation. For this reason special features should be explicitly described by a sketch or by additional specifications.

3.5 Symbol for insert size - Reference (5)

Type	Number symbol
I Equilateral and equiangular inserts	<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>
II Equilateral but non-equiangular inserts	
III Non-equilateral but equiangular inserts	<p>The symbol of designation for the insert size is always given for the main cutting edge or the longer cutting edge. The indication of other dimensions should be made by means of a sketch or detailed explanation, which is indicated at position 4 by 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>
IV Non-equilateral and non-equiangular inserts	

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

*Example* : Length of edge : 9.52 mm  
Symbol of designation : 09

3.6 Symbol for insert thickness - Reference (6)

Type	Number symbol
I Equilateral and equiangular inserts	<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 should 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 should be indicated by means of a sketch, a detailed explanation or a reference to detailed specifications. (See footnote (2) in clause 3.4.)</p>
II Equilateral but non-equiangular inserts	
III Non-equilateral but equiangular inserts	
IV Non-equilateral and non-equiangular inserts	