INTERNATIONAL STANDARD

ISO 9361-1

Second edition
2014-08-01

Indexable inserts for cutting tools — Ceramic inserts with rounded corners —

Part 1: Dimensions of inserts without fixing hole

Plaquettes amovibles pour outils coupants — Plaquettes en céramique avec arrondi de pointe —

Partie 1: Dimensions des plaquettes sans trou de fixation

Reference number
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Contents

Page

Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 29, *Small tools*, Subcommittee SC 9, *Tools with defined cutting edges, cutting items*.

This second edition cancels and replaces the first edition (ISO 9361-1:1991), which has been technically revised.

ISO 9361 consists of the following parts, under the general title *Indexable inserts for cutting tools — Ceramic inserts with rounded corners*:

— *Part 1: Dimensions of inserts without fixing hole*

— *Part 2: Dimensions of inserts with cylindrical fixing hole*

Indexable inserts for cutting tools — Ceramic inserts with rounded corners —

Part 1: Dimensions of inserts without fixing hole

1 Scope

This part of ISO 9361 specifies the dimensions of indexable ceramic inserts with rounded corners, without fixing hole, and with 0° and 11° normal clearance. These inserts are primarily intended to be mounted by top clamping on turning and boring tools.

Ceramic cutting materials consist of a variety of oxides, nitrides, and carbides. In contrast with hardmetals (including cermets), ceramics do not have a metallic binding matrix. Such ceramic materials are, for example, oxide ceramics [consisting primarily of aluminium oxide (Al_2O_3)], carboxide ceramics [consisting generally of a mixture of aluminium oxide and other materials such as titanium carbide (TiC)], and nitride ceramics [consisting generally of a mixture of silicon nitride and other materials, such as yttrium oxide (Y_2O_3) and aluminium oxide].

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 1832, *Indexable inserts for cutting tools — Designation*

3 Types of inserts

The types of indexable ceramic inserts specified in this part of ISO 9361 are the following:

— TN: triangular inserts, with 0° normal clearance;

— TP: triangular inserts, with 11° normal clearance;

— SN: square inserts, with 0° normal clearance;

— SP: square inserts, with 11° normal clearance;

— CN: rhombic inserts, with 0° normal clearance and 80° included angle;

— DN: rhombic inserts, with 0° normal clearance and 55° included angle;

— RN: round inserts, with 0° normal clearance.

Inserts dealt with in this part of ISO 9361 are standardized without chip breakers.

In general, the inserts are used with chamfered or rounded cutting edges (see Clause 5).

Table B.1 gives the range of sizes for the inserts (see Annex B).

4 Tolerances

The indexable ceramic inserts which are the subject of this part of ISO 9361 are provided in tolerance class G, in accordance with ISO 1832.

The values of the tolerances in accordance with ISO 1832 are given in Table 2 to Table 5 for the insert dimensions.

5 Cutting edge

5.1 Cutting edge condition

The cutting edge condition of the indexable ceramic inserts specified in this part of ISO 9361 is to be selected from those specified in ISO 1832.

5.2 Additional information

The dimensions of chamfered cutting edges T, S, K, or P may be specified, following the letter symbol on cutting edge condition in the manufacturer's catalogue. Such information on cutting edge dimensions, if specified, shall have the form of a five-digit number, the first three digits being the value of b_γ in units of 0,01 mm and the last two digits being the value of γ_b, in degrees (see also Figure 1).

NOTE In the case of cutting edge condition K and P, the first chamfer $b_{\gamma 1}$, defined in accordance with Figure 2, is at the manufacturer's choice and is not part of the additional information (five-digit number) as described in 5.2.

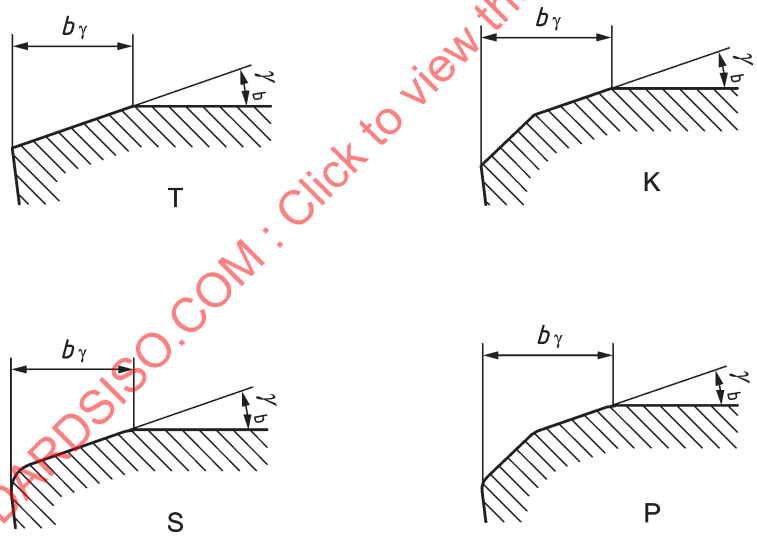

Figure 1

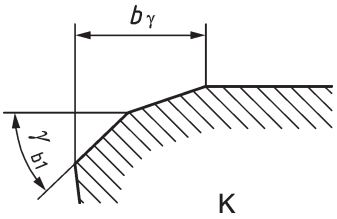

Figure 2

EXAMPLE Chamfered cutting edge T on an insert TNGN 160412

b_γ = 0,2 mm

γ_b = 20°

Designation and additional information:

TNGN 160412T 02020

6 Designation and marking

6.1 Designation

The designation of the indexable ceramic inserts which form the subject of this part of ISO 9361 shall conform to ISO 1832.

In addition to this designation, one or both of the following can be indicated:

— the number symbol for the additional information on cutting edge dimensions, according to 5.2;

— the commercial designation of the ceramic grade.

6.2 Marking

The following symbol, at least, shall be marked on the insert itself (except when this would be difficult to carry out on smaller inserts):

— symbol of the commercial designation of the ceramic grade.

7 Measurement

Annex A indicates the methods of measuring the dimension *m* of the indexable inserts covered by this part of ISO 9361.

8 Recommended dimensions

The choice of the more common dimensions is restricted to the values given in Table 2 to Table 6. It is strongly recommended that these standard inserts be used each time wherever possible (first preference). When other inserts are required, their dimensions shall be selected from the non-shaded areas of Table B.1 (second preference). Inserts corresponding to the dimensions given in the shaded areas of this table are not recommended.

NOTE The *m*-dimensions are calculated using the exact values, rounded off to the third decimal point, of the corner radius r_ε, in accordance with Table 1.

Table 1 — Values of r_ε used for calculation of dimension *m*

Designation of r_ε	**04**	**08**	**12**	**16**	**20**	**24**
Calculation value of r_ε, mm	0,397	0,794	1,191	1,588	1,984	2,381

8.1 Triangular inserts

TNGN
0° normal clearance
without chip breakers

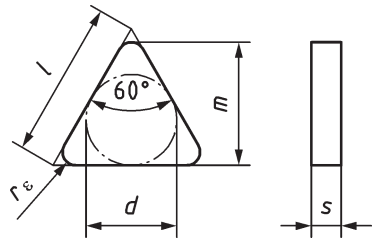

Figure 3

TPGN
11° normal clearance
without chip breakers

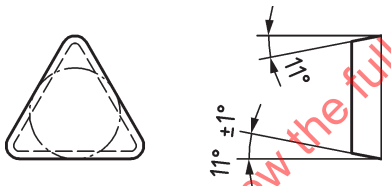

Figure 4

Table 2 — Dimensions of triangular inserts

Dimensions in millimetres

Insert		*l* ≈	*d* ±0,025	*s* ±0,13	*m* ±0,025	r_ε ±0,1
TNGN 110304	—	11	6,35	3,18	9,128	0,4
TNGN 110308	TPGN 110308				8,731	0,8
TNGN 110312	TPGN 110312				8,334	1,2
—	TPGN 160308	16,5	9,525		13,494	0,8
—	TPGN 160312				13,097	1,2
TNGN 160404	—			4,76	13,891	0,4
TNGN 160408	—				13,494	0,8
TNGN 160412	—				13,097	1,2
TNGN 160416	—				12,7	1,6
TNGN 160420	—				12,304	2

Table 2 *(continued)*

Insert		l ≈	d ±0,025	s ±0,13	m ±0,025	r_ε ±0,1
TNGN 160708	—	16,5	9,525	7,94	13,494	0,8
TNGN 160712	—				13,097	1,2
TNGN 160716	—				12,7	1,6
TNGN 160720	—				12,304	2
TNGN 160724	—				11,907	2,4
TNGN 220712	—	22	12,7		17,859	1,2
TNGN 220716	—				17,463	1,6
TNGN 220720	—				17,066	2

8.2 Square inserts

SNGN
0° normal clearance
without chip breakers

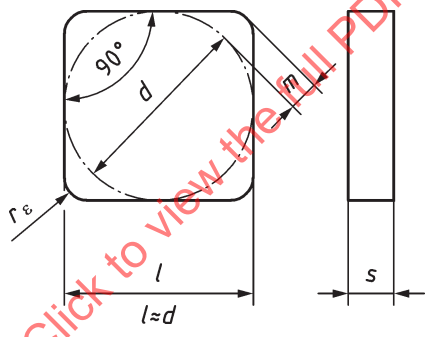

Figure 5

SPGN
11° normal clearance
without chip breakers

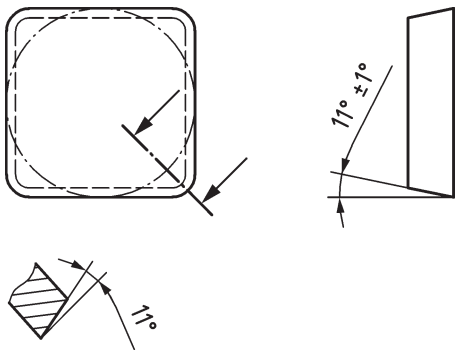

Figure 6

Table 3 — Dimensions of square inserts

Dimensions in millimetres

Insert		d ±0,025	s ±0,13	m ±0,025	r_ε ±0,1
SNGN 090304	SPGN 090304	9,525	3,18	1,808	0,4
SNGN 090308	SPGN 090308			1,644	0,8
SNGN 090404	—		4,76	1,808	0,4
SNGN 090408	—			1,644	0,8
SNGN 090412	—			1,479	1,2
—	SPGN 120304	12,7	3,18	2,466	0,4
—	SPGN 120308			2,301	0,8
—	SPGN 120312			2,137	1,2
SNGN 120404	—		4,76	2,466	0,4
SNGN 120408	SPGN 120408			2,301	0,8
SNGN 120412	SPGN 120412			2,137	1,2
SNGN 120416	SPGN 120416			1,972	1,6
SNGN 120420	—			1,808	2
SNGN 120708	—		7,94	2,301	0,8
SNGN 120712	—			2,137	1,2
SNGN 120716	—			1,972	1,6
SNGN 120720	—			1,808	2
SNGN 120724	—			1,644	2,4
SNGN 150708	—	15,875		2,959	0,8
SNGN 150712	—			2,795	1,2
SNGN 150716	—			2,63	1,6
SNGN 150720	—			2,466	2
SNGN 150724	—			2,301	2,4
SNGN 190712	—	19,05		3,452	1,2
SNGN 190716	—			3,288	1,6
SNGN 190720	—			3,123	2
SNGN 190724	—			2,959	2,4

8.3 Rhombic inserts with 80° included angle

CNGN
0° normal clearance
without chip breakers

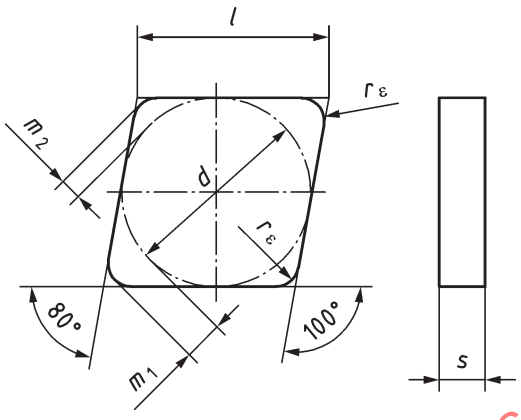

Figure 7

Table 4 — Dimensions of rhombic inserts with 80° included angle

Dimensions in millimetres

Insert	l ≈	d ±0,025	s ±0,13	m_1 ±0,025	m_2 ±0,025	r_ε ±0,1
CNGN 120404	1,29	12,7	4,76	3,308	1,818	0,4
CNGN 120408				3,088	1,697	0,8
CNGN 120412				2,867	1,576	1,2
CNGN 120416				2,647	1,455	1,6
CNGN 120708			7,94	3,088	1,697	0,8
CNGN 120712				2,867	1,576	1,2
CNGN 120716				2,646	1,454	1,6
CNGN 160708	16,1	15,875		3,97	2,182	0,8
CNGN 160712				3,749	2,061	1,2
CNGN 160716				3,529	1,939	1,6
CNGN 160720				3,308	1,818	2
CNGN 160724				3,088	1,697	2,4

8.4 Rhombic inserts with 55° included angle

DNGN
0° normal clearance
without chip breakers

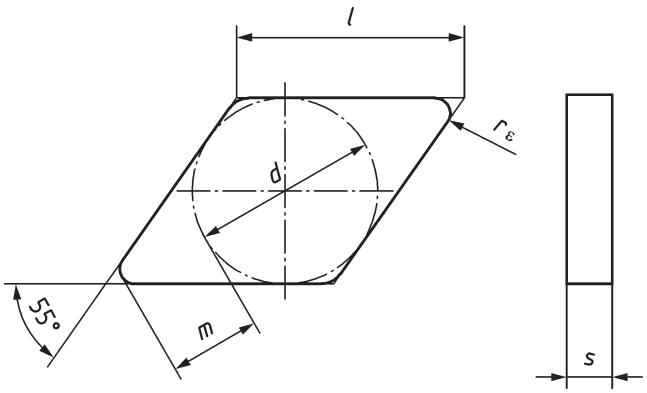

Figure 8

Table 5 — Dimensions of rhombic inserts with 55° included angle

Dimensions in millimetres

Insert	l ≈	d ±0,025	s ±0,13	m ±0,025	r_ε ±0,1
DNGN 150408	15,5	12,7	4,76	6,478	0,8
DNGN 150412				6,015	1,2
DNGN 150416				5,552	1,6
DNGN 150608			6,35	6,478	0,8
DNGN 150612				6,015	1,2
DNGN 150616				5,552	1,6
DNGN 150708			7,94	6,478	0,8
DNGN 150712				6,015	1,2
DNGN 150716				5,552	1,6

8.5 Round inserts

RNGN
0° normal clearance
without chip breakers

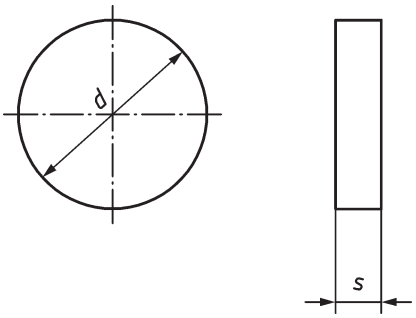

Figure 9

Table 6 — Dimensions of round inserts

Dimensions in millimetres

Insert	*d* ±0,025	*s* ±0,13
RNGN 090400	9,525	4,76
RNGN 120400	12,7	
RNGN 120700		7,94
RNGN 150700	15,875	
RNGN 190700	19,05	
RNGN 250900	25,4	9,52

Annex A
(normative)

Method of measurement of "*m*" dimension

A.1 Triangular inserts

Dimension *m* is related to the side opposite the corner that is to be measured. The insert is placed on a surface plate as shown in Figure A.1 and checked by means of a dial gauge zeroed with the aid of a gauge block corresponding to dimension *m*. The dial gauge then gives a reading of the error when applied to the inserts to be measured.

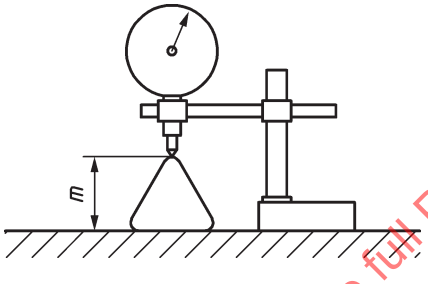

Figure A.1

A.2 Square inserts

Dimension *m* is checked by reference to the diameter *d* of a precision roller, where *d* corresponds to the nominal diameter of the inscribed circle of the insert. The insert is mounted on a 90° vee-block as shown in Figure A.2 and checked by means of a dial gauge which has been zeroed to dimension *m* by means of a roller with the aid of a gauge block. The dial gauge then gives a direct reading of the error when applied to the inserts to be measured.

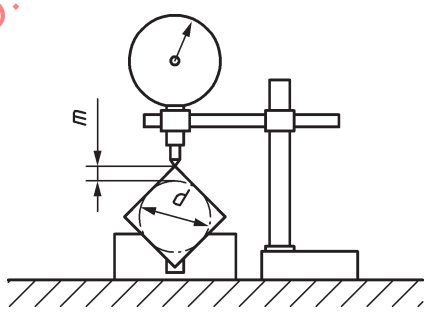

Figure A.2

A.3 Rhombic inserts

Dimension *m* is checked by reference to the diameter *d* of a precision roller, where *d* corresponds to the nominal size of the inscribed circle of the insert. The insert is mounted on a 55°, 80°, or 100° vee-block as shown in Figure A.3 and checked by means of a dial gauge which has been zeroed to dimension *m* by means of a roller with the aid of a gauge block. The dial gauge then gives a direct reading of the error when applied to the inserts to be measured.

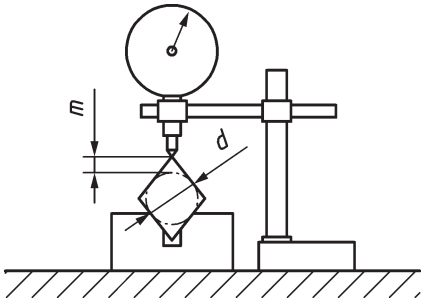

Figure A.3

A.4 Round inserts

The diameter *d* is measured with a micrometer or a similar device.

Annex B
(normative)

Range of sizes of inserts with rounded corners, without fixing hole, having shapes covered by this part of ISO 9361

Table B.1 — Range of sizes

Dimensions in millimetres

d	Normal clearance, α_n															
	0°									11°						
	Designation	$\frac{d}{2}$	Corner radius, r_ε							Designation	Corner radius, r_ε					
			0,4	0,8	1,2	1,6	2	2,4	3,2		0,4	0,8	1,2	1,6	2	2,4
6,35	TNGN 1103		+	+	+					TPGN 1103		+	+			
9,525	TNGN 1603									TPGN 1603		+	+			
	TNGN 1604		+	+	+	+	+			TPGN 1604						
	TNGN 1607			+	+	+	+	+								
12,7	TNGN 2204															
	TNGN 2207				+	+	+									
15,875	TNGN 2707															
9,525	SNGN 0903		+	+						SPGN 0903	+	+				
	SNGN 0904		+	+	+					SPGN 0904						
12,7	SNGN 1203									SPGN 1203	+	+	+			
	SNGN 1204		+	+	+	+				SPGN 1204		+	+	+		
	SNGN 1207			+	+	+	+	+								
15,875	SNGN 1507			+	+	+	+	+								
19,05	SNGN 1907					+	+	+								
25,4	SNGN 2507															
12,7	CNGN 1204		+	+	+	+				CPGN 1204						
	CNGN 1207			+	+	+										
15,875	CNGN 1607			+	+	+	+	+								
19,5	CNGN 1907															
12,7	DNGN 1504			+	+	+										
	DNGN 1506			+	+	+										
	DNGN 1507			+	+	+										
9,525	RNGN 090400	+														
12,7	RNGN 120400	+														
	RNGN 120700	+														
15,875	RNGN 150700	+														
19,05	RNGN190700	+														
25,4	RNGN 250700															
	RNGN 250900	+														

+	First preference, inserts included in this part of ISO 9361 (see Tables 2 to 6).
	Non-shaded areas: second preference, inserts not covered by this part of ISO 9361.
	Shaded areas: inserts not recommended.