

# INTERNATIONAL STANDARD

**ISO**  
**9361-1**

First edition  
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## **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  
ISO 9361-1:1991(E)

## 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.

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.

International Standard ISO 9361-1 was prepared by Technical Committee ISO/TC 29, *Small tools*.

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*

Annexes A and B form an integral part of this part of ISO 9361. Annex C is for information only.

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# 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  $0^\circ$  and  $11^\circ$  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  $\text{Al}_2\text{O}_3$ ), 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  $\text{Y}_2\text{O}_3$  and aluminium oxide).

#### 2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 9361. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9361 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1832:1991, *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  $0^\circ$  normal clearance;
- TP: triangular inserts, with  $11^\circ$  normal clearance;
- SN: square inserts, with  $0^\circ$  normal clearance;
- SP: square inserts, with  $11^\circ$  normal clearance;
- CN: rhombic inserts, with  $0^\circ$  normal clearance and  $80^\circ$  included angle;
- DN: rhombic inserts, with  $0^\circ$  normal clearance and  $55^\circ$  included angle;
- RN: round inserts, with  $0^\circ$  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 1832:1991, 5.1.

### 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  $b_\gamma$  in units of 0,01 mm and the last two digits being the value of  $\gamma_b$ , in degrees (see also figure 1).

NOTE 1 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.

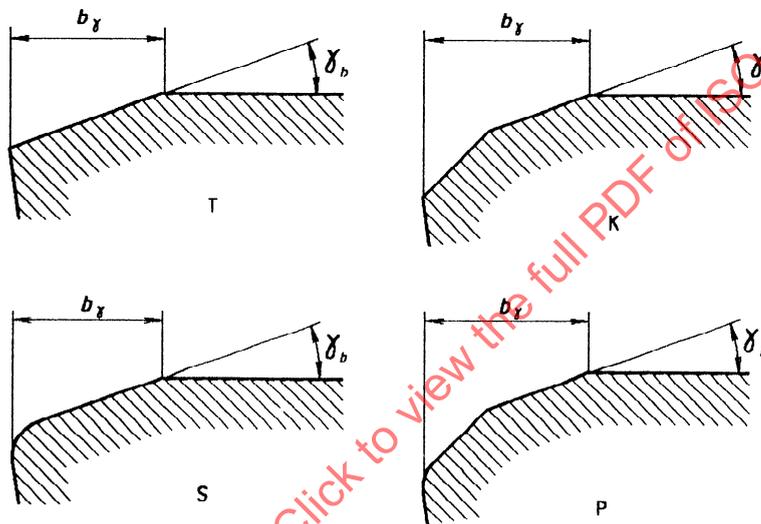


Figure 1

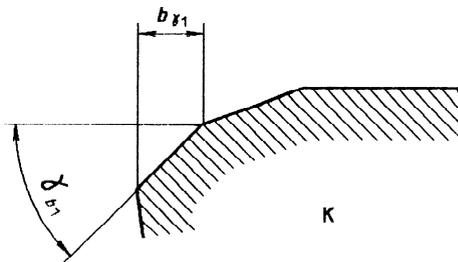


Figure 2

**EXAMPLE**

Chamfered cutting edge T on an insert TNGN 160412

$$b_y = 0,2 \text{ mm}$$

$$\gamma_b = 20^\circ$$

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 may 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 2 The  $m$ -dimensions are calculated using the exact values rounded off to the third decimal point, of the corner radius  $r_e$ , in accordance with table 1.

**Table 1 — Values of  $r_e$  used for calculation of dimension  $m$**

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

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8.1 Triangular inserts

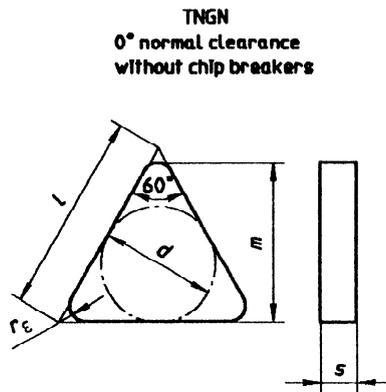


Figure 3

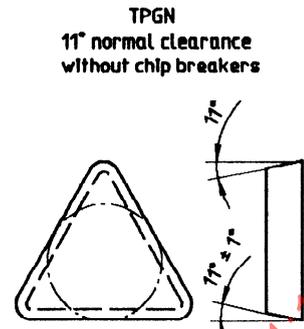


Figure 4

Table 2 — Dimensions of triangular inserts

Dimensions in millimetres

Insert		$l$ $\approx$	$d$ $\pm 0,025$	$s$ $\pm 0,13$	$m$ $\pm 0,025$	$r_{\epsilon}$ $\pm 0,1$		
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	4,76	13,494	0,8		
—	TPGN 160312				13,097	1,2		
TNGN 160404	—				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		
TNGN 160708	—				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

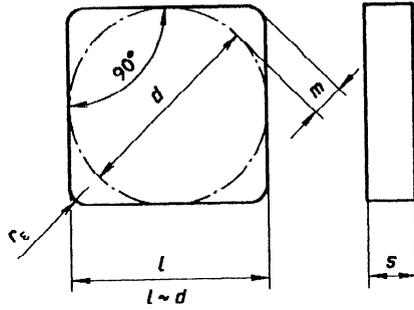


Figure 5

SPGN  
11° normal clearance  
without chip breakers

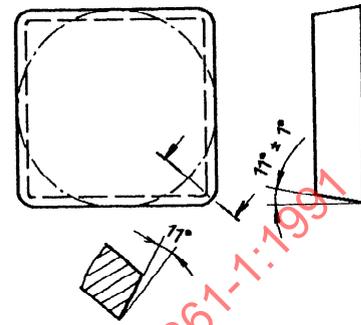


Figure 6

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Table 3 — Dimensions of square inserts

Dimensions in millimetres

Insert		$d$ $\pm 0,025$	$s$ $\pm 0,13$	$m$ $\pm 0,025$	$r_f$ $\pm 0,1$
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
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

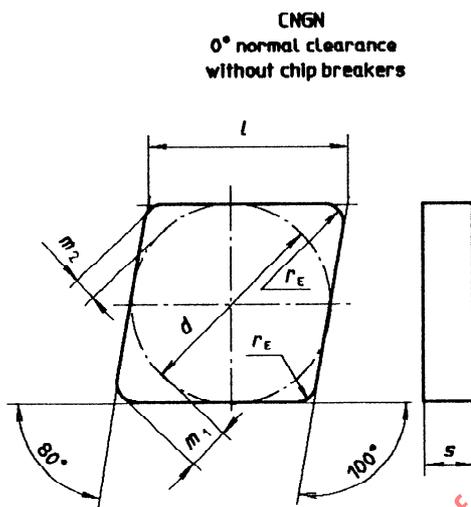


Figure 7

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

Dimensions in millimetres

Insert	$l$ $\approx$	$d$ $\pm 0,025$	$s$ $\pm 0,13$	$m_1$ $\pm 0,025$	$m_2$ $\pm 0,025$	$r_E$ $\pm 0,1$
CNGN 120404	12,9	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				3,088	1,697	0,8
CNGN 120712	16,1	15,875	7,94	2,867	1,576	1,2
CNGN 120716				2,646	1,454	1,6
CNGN 160708				3,97	2,182	0,8
CNGN 160712				3,749	2,061	1,2
CNGN 160716				3,529	1,939	1,6
CNGN 160720	16,1	15,875	7,94	3,308	1,818	2
CNGN 160724				3,088	1,697	2,4

8.4 Rhombic inserts with 55° included angle

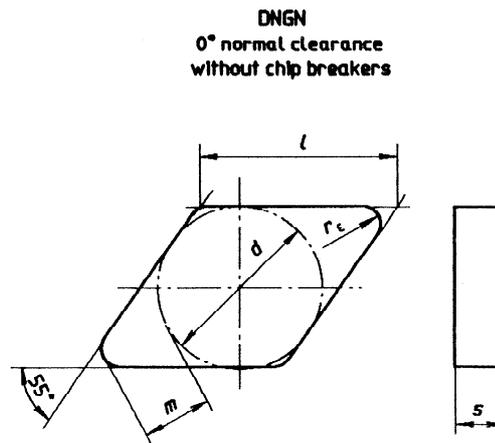


Figure 8

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

Dimensions in millimetres

Insert	$l$ $\approx$	$d$ $\pm 0,025$	$r_e$ $\pm 0,13$	$m$ $\pm 0,025$	$r_s$ $\pm 0,1$
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

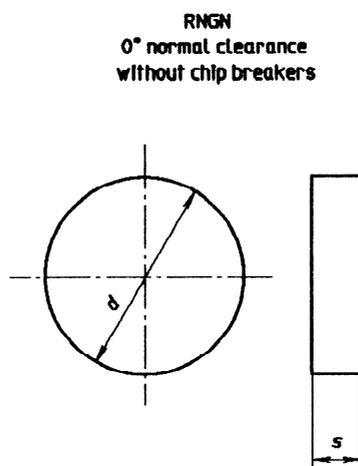


Figure 9

Table 6 — Dimensions of round inserts

Dimensions in millimetres

Insert	$d$ $\pm 0,025$	$s$ $\pm 0,13$
RNGN 090400	9,525	4,76
RNGN 120400	12,7	
RNGN 120700		15,875
RNGN 150700		
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.

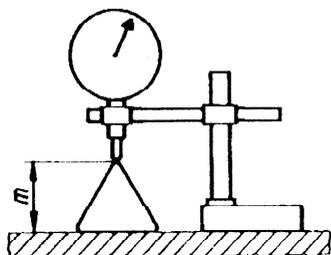


Figure A.1

#### 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  $90^\circ$  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.

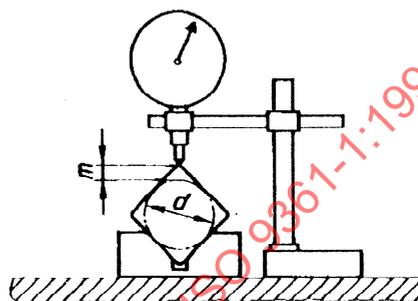


Figure A.2

#### 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  $55^\circ$ ,  $80^\circ$  or  $100^\circ$  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.

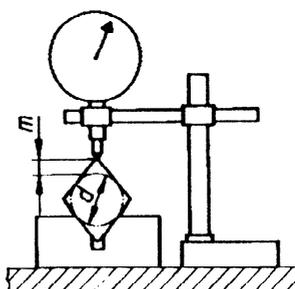


Figure A.3

#### A.4 Round inserts

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