

INTERNATIONAL
STANDARD

TC 29
ISO
6987-2

First edition
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**Indexable inserts for cutting tools — Hardmetal
(carbide) inserts with rounded corners, with
partly cylindrical fixing hole —**

Part 2 :

Dimensions of inserts with 11° normal clearance

*Plaquettes amovibles pour outils coupants — Plaquettes en métaux-durs (carbures
métalliques) avec arrondi de pointe et trou de fixation partiellement cylindrique —*

Partie 2 : Dimensions des plaquettes à dépouille normale 11°



Reference number
ISO 6987-2 : 1990 (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 6987-2 was prepared by Technical Committee ISO/TC 29, *Small tools*.

ISO 6987 consists of the following parts, under the general title *Indexable inserts for cutting tools — Hardmetal (carbide) inserts with rounded corners, with partly cylindrical fixing hole*:

- *Part 1: Dimensions of inserts with 7° normal clearance*
- *Part 2: Dimensions of inserts with 11° normal clearance*
- *Part 3: V-shape inserts* [Technical Report]

Annexes A, B and C form an integral part of this part of ISO 6987. Annex D is for information only.

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Indexable inserts for cutting tools — Hardmetal (carbide) inserts with rounded corners, with partly cylindrical fixing hole —

Part 2 :

Dimensions of inserts with 11° normal clearance

1 Scope

This part of ISO 6987 specifies the dimensions of indexable hardmetal (carbide) inserts with rounded corners, with a partly cylindrical fixing hole and with 11° normal clearance. These inserts are primarily intended to be mounted on tools by a countersunk head screw or any other fixing element, such as a pin lock.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 6987. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 6987 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 513 : 1975, *Application of carbides for machining by chip removal — Designation of the main groups of chip removal and groups of application.*

ISO 1832 : 1985, *Indexable inserts for cutting tools — Designation.*

3 Types of inserts

The types of indexable hardmetal (carbide) inserts specified in this part of ISO 6987 are the following :

- TP: triangular inserts, with 11° normal clearance;
- SP: square inserts, with 11° normal clearance;

— CP: rhombic inserts, with 11° normal clearance and 80° included angle;

— RP: round inserts, with 11° normal clearance.

Inserts dealt with in this part of ISO 6987 are standardized without chip breakers (designated by the letter W) and with chip breakers on the face (designated by the letter T).

At present, neither the shape nor the dimensions of chip breakers are standardized. Thus, if necessary, special features have to be explained with a diagram or additional specifications.

Table C.1 gives the range of sizes for these inserts.

4 Interchangeability

4.1 Tolerances

The indexable hardmetal (carbide) inserts which are the subject of this part of ISO 6987 are provided in tolerance class M, in accordance with ISO 1832.

The values of the tolerances in accordance with ISO 1832 are given in annex A.

Other tolerances are included in table 1 for hole dimensions, and in tables 3 to 5 for the corner radii r_e .

4.2 Thickness s of inserts with chip breaker

The thickness s of inserts with chip breakers is defined as the distance between the cutting edge at the corner and the opposing supporting surface of the insert; see figures 1a) and 1b).

4.3 Fixing hole

In order to guarantee interchangeability when mounting the insert by a countersunk head screw having a head taper angle between 40° and 60°, the form of the hole is partly cylindrical and its dimensions are related to the diameter of the inscribed circle of the insert. Figure 1a) and table 1 give the elements of definition of the fixing hole.

The point P is defined by diameter d_2 given in table 1 and the distance t , measured from the cutting edge, at the corner, and given by the condition

$$0,05 d_1 < t < 0,3 d_1$$

The diameter d_1 of the cylindrical part of the hole is given in table 1.

The part of the profile between d_1 and P is left to the manufacturer's option but shall satisfy the following requirements:

- the use of screws with head taper angle β between 40° and 60° shall be possible;
- the angle of the tangent theoretical taper at point P has the value $\varphi > 65^\circ$;
- the distance between the contact line with a screw having 40° head taper angle and the contact line with a screw having 60° head taper angle shall be as small as possible.

The part of the profile above point P is left to the manufacturer's option.

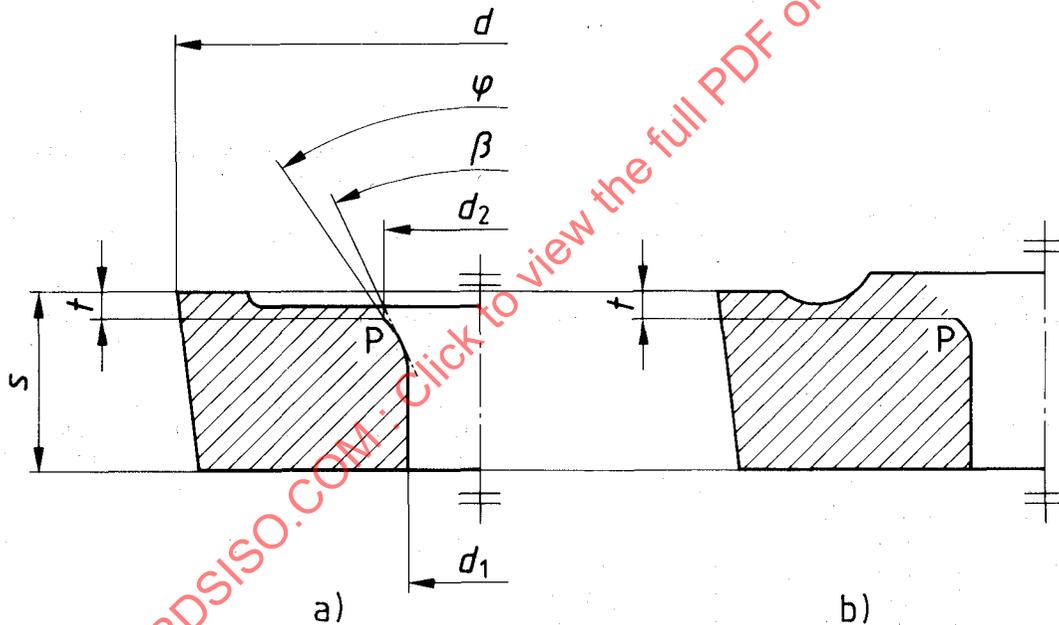


Figure 1

Table 1 — Diameters of the fixing hole

Dimensions in millimetres

d	for insert shape	T, S, C, R	4,76	5,56	6,35	7,94	9,525	12,7
		R	—	—	6	8	10/12	—
d_1 Js13			2,15	2,5	2,8	3,4	4,4	5,5
d_2 Js13			2,7	3,3	3,75	4,5	6	7,5

5 Designation and marking

5.1 Designation

The designation of the indexable hardmetal (carbide) inserts which form the subject of this part of ISO 6987 shall conform to ISO 1832.

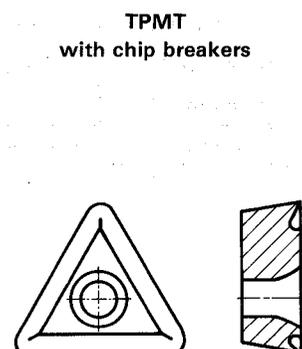
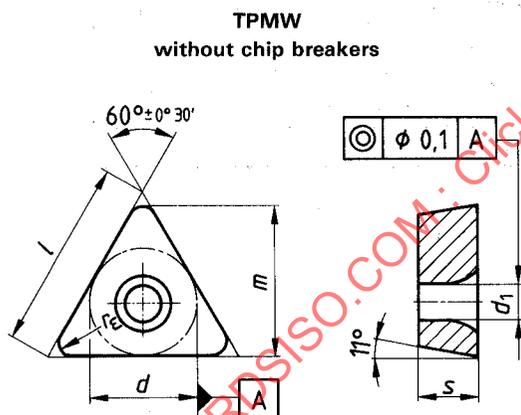
In addition to this designation, one or both of the following may be indicated:

- the symbol of the group of application, in accordance with ISO 513;
- the commercial designation of the hardmetal (carbide) grade.

5.2 Marking

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

- symbol of the group of application, or commercial designation of the hardmetal (carbide) grade (or both, if possible, on large inserts).



6 Measurement

Annex B indicates the methods of measuring the dimension *m* of the indexable inserts covered by this part of ISO 6987.

7 Recommended dimensions

The choice of the more common dimensions is restricted to the values given in tables 3 to 6. It is strongly recommended that these standard inserts be used wherever possible (first preference). When other inserts are required, their dimensions shall be selected from the non-shaded areas of table C.1 (second preference). Inserts having dimensions given in the shaded areas of this table are not recommended.

NOTE – The *m*-dimensions are calculated using the exact values of the corner radius *r_e* given in table 2, rounded to the third decimal place.

Table 2 – Exact values of *r_e*

Designation of <i>r_e</i>	02	04	08	12	16	20	24	32
Exact value of <i>r_e</i> , mm	0,203 2 ^{*)}	0,397	0,794	1,191	1,588	1,984	2,381	3,175
*) Rounded to the fourth decimal place.								

7.1 Triangular inserts

Table 3 – Dimensions of triangular inserts

Dimensions in millimetres

Inserts		<i>l</i> ≈	<i>d</i> 1)	<i>s</i> 1)	<i>m</i> 1)	<i>r_e</i> ±0,1	<i>d₁</i> Js13
TPMW 090202	TPMT 090202	9,6	5,56	2,38	8,131	0,2	2,5
TPMW 090204	TPMT 090204				7,943	0,4	
TPMW 110202	TPMT 110202	11	6,35	2,38	9,322	0,2	2,8
TPMW 110204	TPMT 110204				9,128	0,4	
TPMW 130304	TPMT 130304	13,6	7,94	3,18	11,51	0,4	3,4
TPMW 130308	TPMT 130308				11,113	0,8	
TPMW 16T304	TPMT 16T304	16,5	9,525	3,97	13,891	0,4	4,4
TPMW 16T308	TPMT 16T308				13,494	0,8	

1) Tolerance on *d*, *s* and *m* in accordance with ISO 1832. See annex A.

7.2 Square inserts

SPMW
without chip breakers

SPMT
with chip breakers

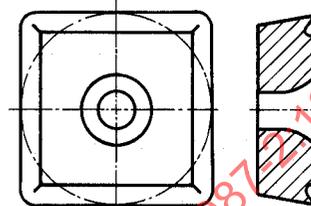
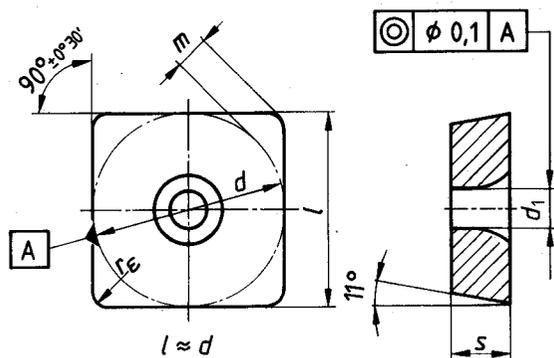


Table 4 – Dimensions of square inserts

Dimensions in millimetres

Inserts		d 1)	s 1)	m 1)	r_ϵ $\pm 0,1$	d_1 Js13
SPMW 090304	SPMT 090304	9,525	3,18	1,808	0,4	4,4
SPMW 090308	SPMT 090308			1,644	0,8	
SPMW 09T304	SPMT 09T304	9,525	3,97	1,808	0,4	4,4
SPMW 09T308	SPMT 09T308			1,644	0,8	

1) Tolerance on d , s and m in accordance with ISO 1832. See annex A.

7.3 Rhombic inserts with 80° included angle

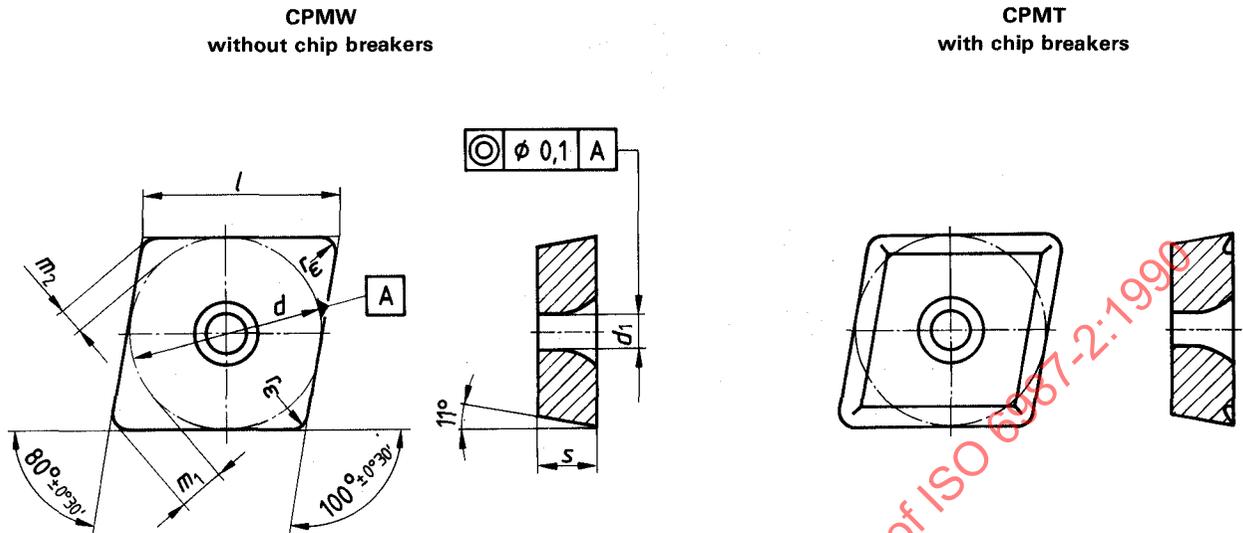


Table 5 — Dimensions of rhombic inserts with 80° included angle

Dimensions in millimetres

Inserts		l	d 1)	s 1)	m_1 1)	m_2 1)	r_6 $\pm 0,1$	d_1 Js13
CPMW 04T102	CPMT 04T102	4,8	4,76	1,98	1,21	0,665	0,2	2,15
CPMW 04T104	CPMT 04T104				1,102	0,606	0,4	
CPMW 050202	CPMT 050202	5,6	5,56	2,38	1,432	0,787	0,2	2,5
CPMW 050204	CPMT 050204				1,324	0,728	0,4	
CPMW 060202	CPMT 060202	6,4	6,35	2,38	1,652	0,908	0,2	2,8
CPMW 060204	CPMT 060204				1,544	0,848	0,4	
CPMW 080304	CPMT 080304	8,1	7,94	3,18	1,986	1,091	0,4	3,4
CPMW 080308	CPMT 080308				1,765	0,97	0,8	
CPMW 090304	CPMT 090304	9,7	9,525	3,18	2,426	1,333	0,4	4,4
CPMW 090308	CPMT 090308				2,206	1,212	0,8	
CPMW 09T304	CPMT 09T304	9,7	9,525	3,97	2,426	1,333	0,4	4,4
CPMW 09T308	CPMT 09T308				2,206	1,212	0,8	

1) Tolerance on d , s , m_1 and m_2 in accordance with ISO 1832. See annex A.

7.4 Round inserts

RPMT
with chip breakers

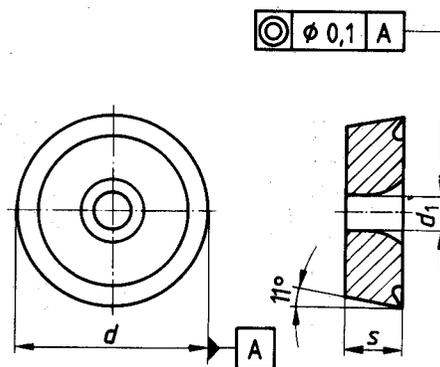


Table 6 — Dimensions of round inserts

Dimensions in millimetres

Insert	d 1)	s 1)	d_1 Js13
RPMT 0803MO	8	3,18	3,4
RPMT 10T3MO	10	3,97	4,4

1) Tolerance on d and s in accordance with ISO 1832. See annex A.

Annex A (normative)

Tolerances for d , m , m_1 , m_2 and s

(Extract from ISO 1832)

Table A.1 – Tolerances on d , m , m_1 and m_2
Dimensions in millimetres

Insert		Tolerance in class M on	
Designation	d	d	m , m_1 and m_2
CPM. 04..	4,76	$\pm 0,05$	$\pm 0,08$
TPM. 09.. CPM. 05..	5,56	$\pm 0,05$	$\pm 0,08$
RPM. 06..	6	$\pm 0,05$	—
TPM. 11.. CPM. 06..	6,35	$\pm 0,05$	$\pm 0,08$
TPM. 13.. CPM. 08..	7,94	$\pm 0,05$	$\pm 0,08$
RPM. 07..	7,94	$\pm 0,05$	—
RPM. 08..	8	$\pm 0,05$	—
TPM. 16.. SPM. 09.. CPM. 09..	9,525	$\pm 0,05$	$\pm 0,08$
RPM. 09..	9,525	$\pm 0,05$	—
RPM. 10..	10	$\pm 0,05$	—
RPM. 12..MO	12	$\pm 0,08$	—
SPM. 12.. CPM. 12..	12,7	$\pm 0,08$	$\pm 0,13$
RPM. 12..00	12,7	$\pm 0,08$	—

Table A.2 – Tolerances on s
Dimensions in millimetres

Insert		Tolerances in class M on s
Designation	s	
CPM. ..T1..	1,98	$\pm 0,05$ ¹⁾
TPM. ..02.. CPM. ..02.. RPM. ..02..	2,38	
TPM. ..03.. SPM. ..03.. CPM. ..03.. RPM. ..03..	3,18	
TPM. ..T3.. SPM. ..T3.. CPM. ..T3.. RPM. ..T3..	3,97	$\pm 0,13$
TPM. ..04.. SPM. ..04.. CPM. ..04.. RPM. ..04..	4,76	

1) As an exception to ISO 1832.