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TECHNICAL REPORT

ISO
TR 6987-3

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

Part 3:

V-shape inserts

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

Partie 3: Plaquettes de forme V



Reference number
ISO/TR 6987-3:1990(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.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future, but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 6987-3, which is a Technical Report of type 2, was prepared by Technical Committee ISO/TC 29, *Small tools*.

ISO 6987-1 and ISO 6987-2 deal with indexable inserts with rounded corners and partly cylindrical fixing hole, with 7° and 11° normal clearance and with the following shapes:

- triangular inserts, T;
- square inserts, S;

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- rhombic inserts, C, with 80° included angle;
- rhombic inserts, D, with 55° included angle;
- round inserts, R.

It was intended to standardize also rhombic V-shape inserts with 35° included angle. However, because of the interaction of tolerances on the clamping of the insert, it appears to be impossible to ensure interchangeability between different suppliers, and thus an International Standard on the subject cannot be published for the time being.

It was felt, however, that the results of the work should be published in the form of a Technical Report in order to present the points of agreement and to give orientations for the future.

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

Annex A of this part of ISO 6987 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 3: V-shape inserts

1 Scope

This Technical Report gives the dimensions of V-shape indexable hardmetal (carbide) inserts with rounded corners, with a partly cylindrical fixing hole. These inserts are intended primarily to be mounted on tools by a countersunk head screw or any other fixing element, such as a pin lock.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 6987. 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 6987 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:—¹⁾ *Indexable inserts for cutting tools — Designation.*

3 Types of inserts

The types of inserts specified in this Technical Report are the following:

- VB: rhombic inserts, with 5° normal clearance and 35° included angle;
- VC: rhombic inserts, with 7° normal clearance and 35° included angle;

- VP: rhombic inserts, with 11° normal clearance and 35° included angle.

These inserts are manufactured with or without chip breakers.

4 Interchangeability

4.1 Tolerances

As indicated in the Foreword, the interchangeability of inserts between one manufacturer and another is not ensured, and so no tolerances are given in this Technical Report.

The interchangeability of inserts is dependent on the following parameters:

- a) the location of the fixing hole axis with respect to the external shape of the insert, in order to guarantee the mounting of inserts on tool-holders;
- b) the shape and dimensions of the fixing hole;
- c) the location of the cutting point with respect to the inscribed circle of the insert according to the intended use of the insert.

Parameter b) is the subject of 4.3.

Parameters a) and c) depend on the following dimensions and tolerances (see figure 1):

- the tolerance on the angle ϵ_r ;

1) To be published. (Revision of ISO 1832:1985)

- the tolerance on the diameter d of the inscribed circle;
- the coaxiality tolerance, u , between the fixing hole diameter, d_1 , and the inscribed circle;
- the tolerance on the dimension m .

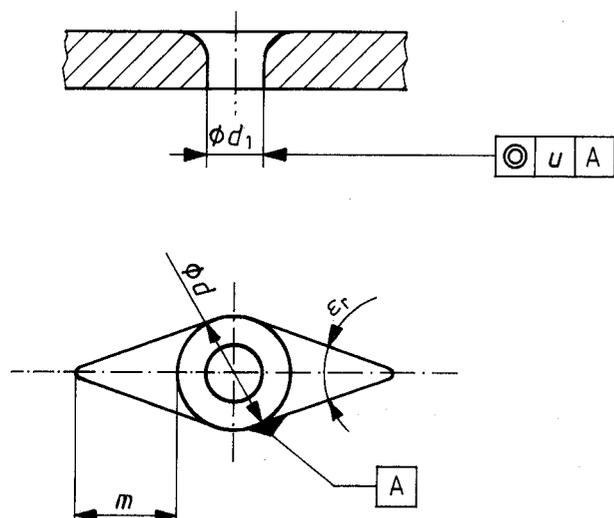


Figure 1

Owing to the interaction of these dimensions, the amount of tolerance to be given to each dimension to achieve economic manufacture means that there can, in some cases, be interference by the insert with the clamping action of the clamping screw or pin when the insert is being secured in the tool-holder.

4.2 Thickness, s

The thickness, s , is defined as the distance between the cutting edge at the corner and the opposite supporting surface of the insert; see figure 2a) and figure 2b).

4.3 Fixing hole

In order to guarantee mounting interchangeability of 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 2a) and table 1 give the defining elements of the fixing hole.

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

$$0,05 d_1 \leq t \leq 0,3 d_1$$

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 discretion but shall satisfy the following requirements:

- the use of screws with a head taper angle β between 40° and 60° shall be possible;
- the angle of the tangent theoretical taper at point P shall have the value $\varphi \geq 65^\circ$;
- 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 discretion.

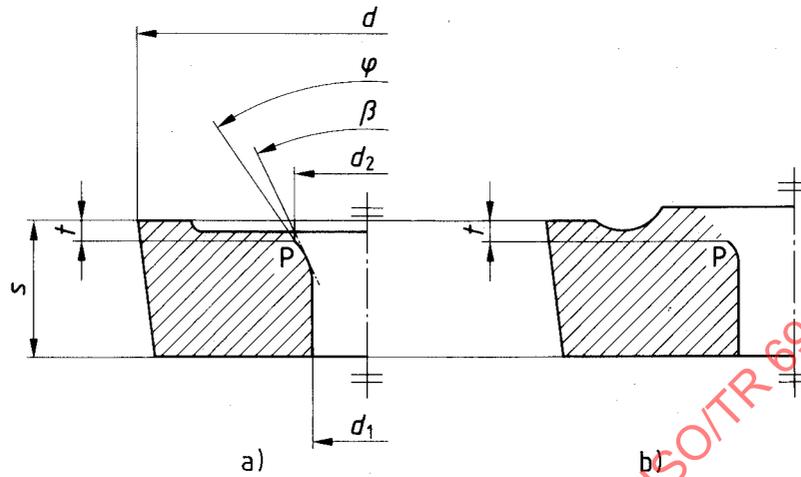


Figure 2

Table 1

Dimensions in millimetres

| | | | |
|------------|------|------|-------|
| d | 6,35 | 7,94 | 9,525 |
| d_1 JS13 | 2,8 | 3,4 | 4,4 |
| d_2 JS13 | 3,75 | 4,5 | 6 |

5 Designation

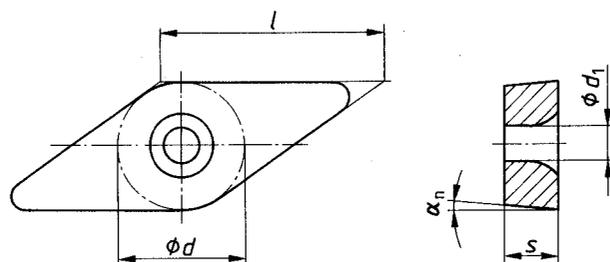
Inserts which are the subject of this Technical Report shall be designated in accordance with the requirements of ISO 1832.

6 Recommended dimensions

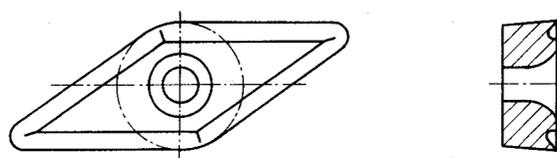
For the time being V-shape inserts are produced with the following clearance values, lengths of cutting edge and thicknesses:

- clearance, α_n : 5°, 7° and 11°;
- length of cutting edge, l : 11 mm, 13 mm and 16 mm;
- thickness, s : 3,18 mm, 3,97 mm and 4,76 mm.

Table 2 recommends some insert dimensions, shown in figure 3, which are considered to cover the main applications of these inserts.



a) Indexable insert without chip breaker (V..W.....)



b) Indexable insert with chip breaker (V..T.....)

Figure 3

Table 2

Dimensions in millimetres

| Insert | l | d | s | d_1 | α_n |
|------------|------|-------|------|-------|------------|
| VB..1103.. | 11,1 | 6,35 | 3,18 | 2,8 | 5° |
| VC..1103.. | | | | | 7° |
| VP..1103.. | | | | | 11° |
| VB..1303.. | 13,8 | 7,94 | 3,18 | 3,4 | 5° |
| VC..1303.. | | | | | 7° |
| VP..1303.. | | | | | 11° |
| VB..13T3.. | 13,8 | 7,94 | 3,97 | 3,4 | 5° |
| VC..13T3.. | | | | | 7° |
| VP..13T3.. | | | | | 11° |
| VB..1604.. | 16,6 | 9,525 | 4,76 | 4,4 | 5° |
| VC..1604.. | | | | | 7° |
| VP..1604.. | | | | | 11° |

Annex A
(informative)

Bibliography

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

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