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**Precision superabrasives — Limit  
deviations and run-out tolerances  
for grinding wheels with diamond or  
cubic boron nitride**

*Superabrasifs de précision — Écartes limites et tolérances de  
battement pour les meules à base de diamant et de nitrure de bore*

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## 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 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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 5, *Grinding wheels and abrasives*.

This second edition cancels and replaces the first edition (ISO 22917:2004), which has been technically revised with the following changes:

- a) form E added;
- b) dimensions for  $d_{\min}$  revised;
- c) dimensions for  $l_1$  partly revised.

# Precision superabrasives — Limit deviations and run-out tolerances for grinding wheels with diamond or cubic boron nitride

## 1 Scope

This International Standard applies to all rotating grinding precision tools with diamond or cubic boron nitride with metal, vitrified or resinoid bonded cores, and circular bores for mounting the grinding tool on a clamping flange as well as to grinding points with cylindrical spindle for mounting in collets. It contains the significant limit deviations and run-out tolerances of these grinding tools.

## 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 286-1, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 1: Basis of tolerances, deviations and fits*

ISO 286-2:2010, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 286-1 and the following apply.

NOTE Some of the terms are defined in a more restricted sense than in common usage.

### 3.1 size

number expressing, in a particular unit, the numerical value of a linear dimension

#### 3.1.1

##### basic size

##### nominal size

size from which the *limits of size* (3.1.3) are derived by the application of the upper and lower *deviations* (3.2)

#### 3.1.2

##### actual size

size of a feature, obtained by measurements

#### 3.1.3

##### limits of size

two extreme permissible sizes of a feature, between which the *actual size* (3.1.2) should lie, the limits of size being included

##### 3.1.3.1

##### maximum limit of size

greatest permissible size of a feature

3.1.3.2

**minimum limit of size**

smallest permissible size of a feature

3.2

**deviation**

algebraic difference between a *size* (3.1) (actual size, limit of size, etc.) and the corresponding *basic size* (3.1.1)

3.2.1

**limit deviations**

upper deviation and lower deviation

3.2.1.1

**upper deviation**

algebraic difference between the *maximum limit of size* (3.1.3.1) and the corresponding basic size

3.2.1.2

**lower deviation**

algebraic difference between the *minimum limit of size* (3.1.3.2) and the corresponding basic size

3.3

**size tolerance**

difference between the *maximum limit of size* (3.1.3.1) and the *minimum limit of size* (3.1.3.2), i.e. the difference between the *upper deviation* (3.2.1.1) and the *lower deviation* (3.2.1.2)

Note 1 to entry: The tolerance is an absolute value without sign.

**4 Limit deviations and run-out tolerance abbreviations**

See Table 1.

**Table 1 — Limit deviations and run-out tolerance abbreviations**

Symbol	Designation	
	Abrasive product	Mounted points
$T_D$	Limit deviations of outside diameter	Limit deviations of outside diameter
$T_E$	Limit deviations of thickness at bore	
$T_H$	Limit deviations of bore diameter	
$T_J$	Limit deviations of contact surface diameter	
$T_K$	Limit deviations of recess diameter	
$T_L$		Limit deviations of overall length
$T_{L4}$		Limit deviations of reduced length of spindle
$T_{PL}$	Limit deviations of circular run-out tolerance, axial	
$T_R$	Limit deviations of the radii	
$T_{RL}$	Limit deviations of circular run-out tolerance, radial	Limit deviations of circular run-out tolerance, radial
$T_{Sd}$		Limit deviations of spindle diameter
$T_{S1}$		Limit deviations of reduced diameter of spindle
$T_T$	Limit deviations of overall thickness	Limit deviations of thickness
$T_U$	Limit deviations of thickness of superabrasive section	

Table 1 (continued)

Symbol	Designation	
	Abrasive product	Mounted points
$T_W$	Limit deviations of rim width	
$T_X$	Limit deviations of depth of superabrasive section	Limit deviations of depth of superabrasive section
$T_\alpha$	Limit deviations of angles	

## 5 Straight, recessed, tapered and hubbed grinding wheels

### 5.1 Grinding wheels for peripheral grinding

#### 5.1.1 Designations

See [Table 2](#).

Table 2 — Designations for grinding wheels for peripheral grinding

Designation	Sketch	Basic core shape
Straight peripheral wheel		1
Single hubbed wheel		3
Wheel tapered one side		4

Table 2 (continued)

Designation	Sketch	Basic core shape
Grinding wheel recessed on one side		6
Grinding wheel recessed on both sides		9
Double hubbed wheel		14

5.1.2 Limit deviations and run-out tolerances for grinding wheels for peripheral grinding

5.1.2.1 Limit deviations of the outside diameter,  $T_D$ , circular run-out tolerance, axial,  $T_{PL}$ , and circular run-out tolerance, radial,  $T_{RL}$

The limit deviations of the outside diameter,  $T_D$ , the circular run-out tolerance, axial,  $T_{PL}$ , and circular run-out tolerance, radial,  $T_{RL}$ , as specified in Table 3, apply to the respective range of diameters,  $D$ .

Table 3 — Limit deviations and run-out tolerances of the outside diameter for grinding wheels for peripheral grinding

Dimensions in millimetres

Outside diameter $D$	$T_D$	$T_{PL}$	$T_{RL}$
$D \leq 3$	$\pm 0,3$	0,05	0,03
$3 < D \leq 6$	$\pm 0,3$		
$6 < D \leq 30$	$\pm 0,3$		
$30 < D \leq 120$	$\pm 0,3$		0,05
$120 < D \leq 400$	$\pm 0,5$		
$D > 400$	$\pm 0,8$		

### 5.1.2.2 Limit deviations of the bore diameter, $T_H$

The limit deviations of the bore diameters,  $T_H$ , as specified in [Table 4](#), correspond to the tolerance zone H7 in accordance with ISO 286-2:2010, Table 6, and apply to the respective range of bore diameters,  $H$ .

**Table 4 — Limit deviations and run-out tolerances of the bore diameter for grinding wheels for peripheral grinding**

Dimensions in millimetres

Bore diameter $H$	$T_H$
$H \leq 3$	+0,010 0
$3 < H \leq 6$	+0,012 0
$6 < H \leq 10$	+0,015 0
$10 < H \leq 18$	+0,018 0
$18 < H \leq 30$	+0,021 0
$30 < H \leq 50$	+0,025 0
$50 < H \leq 80$	+0,030 0
$80 < H \leq 120$	+0,035 0
$120 < H \leq 180$	+0,040 0
$180 < H \leq 250$	+0,046 0
$250 < H \leq 315$	+0,052 0
$315 < H \leq 400$	+0,057 0
$400 < H \leq 500$	+0,063 0

### 5.1.2.3 Limit deviations of overall thickness, $T_T$ , and of thickness of superabrasive section, $T_U$

The limit deviations of the overall thickness,  $T_T$ , and of the thickness of the superabrasive section,  $T_U$ , as specified in [Table 5](#), apply to the respective ranges of thickness,  $T$  and  $U$ .

**Table 5 — Limit deviations of the overall thickness and the thickness of the superabrasive section for grinding wheels for peripheral grinding**

Dimensions in millimetres

Thicknesses <i>T</i> and <i>U</i>	$T_T$	$T_U$
$T$ or $U < 30$	$\pm 0,2$	$\pm 0,2$
$30 < T$ or $U \leq 120$	$\pm 0,5$	$\pm 0,3$
$120 < T$ or $U \leq 400$	$\pm 0,8$	$\pm 0,5$
$400 < T$ or $U \leq 500$	$\pm 1,0$	$\pm 0,8$

**5.1.2.4 Limit deviations of depth of superabrasive section,  $T_X$**

The limit deviations of the depth of superabrasive section,  $T_X$ , as specified in [Table 6](#), apply to the respective range of depths of the superabrasive section,  $X$ .

**Table 6 — Limit deviations of the depth of the superabrasive section for grinding wheels for peripheral grinding**

Dimensions in millimetres

Depth of superabrasive section <i>X</i>	$T_X^a$
$0,5 \leq X \leq 1$	$+0,2$ $0$
$1 < X \leq 6$	$+0,2$ $-0,1$
$6 < X \leq 30$	$+0,3$ $-0,2$

<sup>a</sup> Excluding electroplated single layer.

**5.1.2.5 Limit deviations of thickness at bore,  $T_E$**

For grinding wheels with one recess (see type 6), or grinding wheels with two recesses (see type 9), the limit deviations of thickness at bore,  $T_E$ , as specified in [Table 7](#), apply to the respective range of thickness at bore,  $E$ .

**Table 7 — Limit deviations of thickness at bore for grinding wheels for peripheral grinding**

Dimensions in millimetres

Thickness at bore <i>E</i>	$T_E$
$E \leq 6$	$\pm 0,3$
$6 < E \leq 30$	$\pm 0,3$
$30 < E \leq 120$	$\pm 0,3$

**5.1.2.6 Limit deviations of contact surface diameter,  $T_J$ , and of recessed diameter,  $T_K$**

The limit deviations of contact surface diameter,  $T_J$ , (see types 3, 4, 14) and of the recessed diameter,  $T_K$ , (see types 6, 9), as specified in [Table 8](#), apply to the respective range of outside diameters,  $D$ .

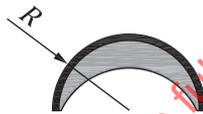
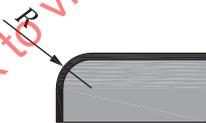
**Table 8 — Limit deviations of contact surface diameter and recessed diameter for grinding wheels for peripheral grinding**

Dimensions in millimetres

Outside diameter $D$	$T_I, T_K$
$6 \leq D \leq 120$	$\pm 1$
$D > 120$	$\pm 2$

**5.1.2.7 Limit deviations of the radii,  $T_R$** 

The limit deviations of the radii,  $T_R$ , as specified in [Table 9](#) (see, e.g. shapes of abrasive sections F, FF and Q, shown in [Figures 1 to 3](#)), apply to the respective range of radii,  $R$ .

**Figure 1 — Shape F****Figure 2 — Shape FF****Figure 3 — Shape Q****Table 9 — Limit deviations of radii for grinding wheels for peripheral grinding**

Dimensions in millimetres

Radius $R$	$T_R$
$R \leq 3$	$\pm 0,2$
$3 < R \leq 6$	$\pm 0,2$
$6 < R \leq 30$	$\pm 0,2$

**5.1.2.8 Limit deviations of angles,  $T_\alpha$** 

The limit deviations of angles,  $T_\alpha$ , as specified in [Table 10](#) (see, e.g. the shape of abrasive sections B and E — [Figures 4 and 5](#)), apply to the respective range of angles,  $\alpha$ .

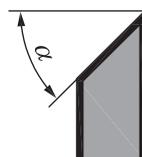
**Figure 4 — Shape B**



Figure 5 — Shape E

Table 10 — Limit deviations of angles for grinding wheels for peripheral grinding

Values in degrees

Angle $\alpha$	$T_\alpha$
$\alpha \leq 50$	$\pm 0,5$
$50 < \alpha \leq 120$	$\pm 1$

## 5.2 Grinding wheels for face grinding

### 5.2.1 Designations

See [Table 11](#).

Table 11 — Designations for grinding wheels for face grinding

Designation	Sketch	Basic core shape
Straight grinding wheel		1
Cylinder wheel		2

Table 11 (continued)

Designation	Sketch	Basic core shape
Single hubbed wheel		3
Wheel tapered one side		4
Straight cup wheel		6
Double cup wheel		9
Concave double-angle cup wheel		10

Table 11 (continued)

Designation	Sketch	Basic core shape
Taper cup wheel		11
Taper cup wheel		12
Taper cup wheel		13

5.2.2 Limit deviations and run-out tolerances for grinding wheels for face grinding

5.2.2.1 Limit deviations of the outside diameter,  $T_D$ , circular run-out tolerance, axial,  $T_{PL}$ , and circular run-out tolerances, radial,  $T_{RL}$

The limit deviations of the outside diameter,  $T_D$ , the circular run-out tolerances, axial,  $T_{PL}$ , and the circular run-out tolerances, radial,  $T_{RL}$ , as specified in Table 12, apply to the respective range of outside diameters,  $D$ .

**Table 12 — Limit deviations and run-out tolerances of the outside diameter for grinding wheels for face grinding**

Dimensions in millimetres

Outside diameter $D$	$T_D$	$T_{PL}, T_{RL}$
$D \leq 30$	$\pm 0,3$	0,05
$30 < D \leq 120$	$\pm 0,4$	
$120 < D \leq 300$	$\pm 0,5$	
$D > 300$	$\pm 0,8$	0,05

**5.2.2.2 Limit deviations of the bore diameter,  $T_H$** 

The limit deviations of the bore diameter,  $T_H$ , as specified in [Table 13](#), correspond to the tolerance zone H7 in accordance with ISO 286-2:2010, Table 6, and apply to the respective range of bore diameters,  $H$ .

**Table 13 — Limit deviations and run-out tolerances of the bore diameter for grinding wheels for face grinding**

Dimensions in millimetres

Bore diameters $H$	$T_H$
$H \leq 3$	+0,010 0
$3 < H \leq 6$	+0,012 0
$6 < H \leq 10$	+0,015 0
$10 < H \leq 18$	+0,018 0
$18 < H \leq 30$	+0,021 0
$30 < H \leq 50$	+0,025 0
$50 < H \leq 80$	+0,030 0
$80 < H \leq 120$	+0,035 0
$120 < H \leq 180$	+0,040 0
$180 < H \leq 250$	+0,046 0
$250 < H \leq 315$	+0,052 0
$315 < H \leq 400$	+0,057 0
$400 < H \leq 500$	+0,063 0

**5.2.2.3 Limit deviations of the overall thickness,  $T_T$ , of the thickness of superabrasive section,  $T_U$ , and rim width,  $T_W$**

The limit deviations of the overall thickness,  $T_T$ , of the thickness of superabrasive section,  $T_U$ , and rim width,  $T_W$ , as specified in [Table 14](#), apply to the respective range of nominal size of the overall thickness,  $T$ , the thickness of superabrasive section,  $U$ , and rim width,  $W$ .

For  $T < 0,03 D$  of basic core shape 1 to 4, the limit deviation,  $T_T$ , shall only apply in the positive range.

**Table 14 — Limit deviations of the overall thickness, the thickness of the superabrasive section and the rim width for grinding wheels for face grinding**

Dimensions in millimetres

Range of nominal size $T, U, W$	$T_T, T_U, T_W$
$T$ or $U$ or $W \leq 30$	$\pm 0,3$
$30 < T$ or $U$ or $W \leq 120$	$\pm 0,3$
$120 < T$ or $U$ or $W \leq 400$	$\pm 0,3$
$T$ or $U$ or $W > 400$	$\pm 0,3$

**5.2.2.4 Limit deviations of the thickness at bore,  $T_E$**

The limit deviations of the thickness at bores,  $T_E$ , for grinding wheels with one side recessed (see basic core shapes 6, 11, 12, 13, 15) or grinding wheels with two sides recessed, as specified in [Table 15](#), apply to the respective range of thickness at bore,  $E$ .

For  $E < 0,2 T$  of basic core shape 6 to 15, the limit deviations,  $T_E$ , shall only apply in the positive range.

**Table 15 — Limit deviations of thickness at bore for grinding wheels for face grinding**

Dimensions in millimetres

Thickness at bore $E$	$T_E$
$E \leq 6$	$\pm 0,1$
$6 < E \leq 30$	$\pm 0,2$
$30 < E \leq 120$	$\pm 0,3$
$120 < E \leq 230$	$\pm 0,5$

**5.2.2.5 Limit deviations of the depth of superabrasive section,  $T_x$**

The limit deviations of the depth of superabrasive section,  $T_x$ , as specified in [Table 16](#), apply to the respective depth of superabrasive section,  $X$ .

**Table 16 — Limit deviations of the depth of the superabrasive section for grinding wheels for face grinding**

Dimensions in millimetres

Depth of superabrasive section $X$	$T_X$
$0,5 \leq X \leq 1$	+0,2 0
$1 < X \leq 6$	+0,2 -0,1
$6 < X \leq 30$	+0,3 -0,2

**5.2.2.6 Limit deviations of the contact surface diameter,  $T_J$ , and of the recess diameter,  $T_K$**

The limit deviations of the contact surface diameter,  $T_J$ , and of the recess diameter,  $T_K$ , as specified in [Table 17](#), apply to the respective range of outside diameter,  $D$ .

**Table 17 — Limit deviations of contact surface diameter and recessed diameter for grinding wheels for face grinding**

Dimensions in millimetres

Outside diameter $D$	$T_J, T_K$
$D \leq 400$	$\pm 1$
$D > 400$	$\pm 2$

**6 Mounted points**

**6.1 Designation**

See [Table 18](#).

**Table 18 — Designation of mounted points**

Designation	Sketch	Basic core shape
Mounted points		1