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

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

Reference number
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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 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_α	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

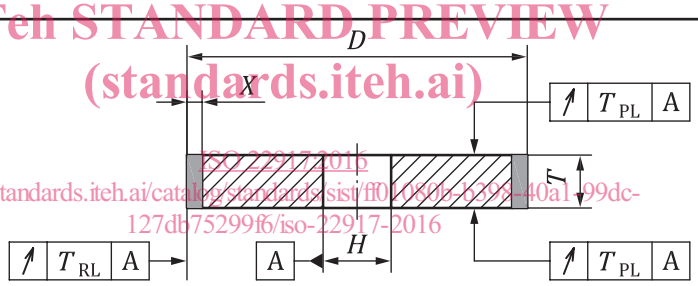
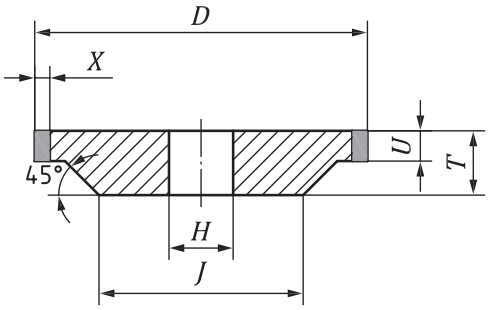
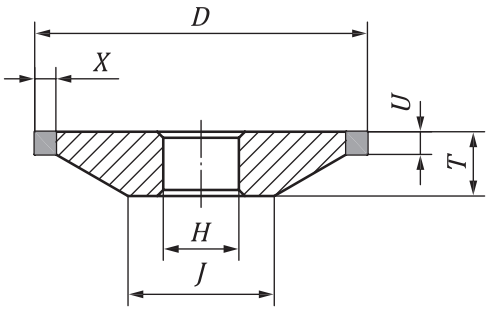
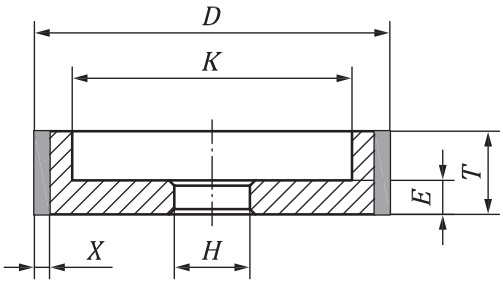
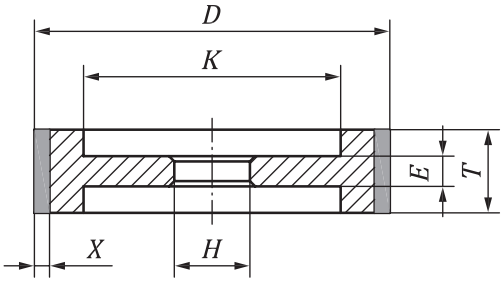
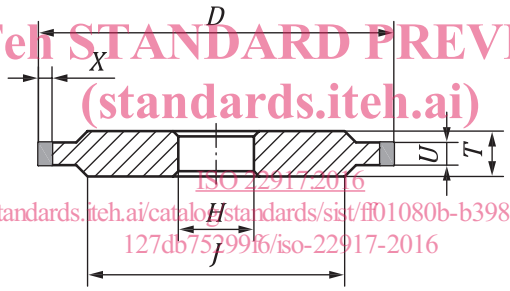
Designation	Sketch	Basic core shape
Straight peripheral wheel		1
Single hubbed wheel		3
Wheel tapered one side		4

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}
$D \leq 3$	±0,3	0,05	0,03
$3 < D \leq 6$	±0,3		
$6 < D \leq 30$	±0,3		
$30 < D \leq 120$	±0,3		
$120 < D \leq 400$	±0,5		0,05
$D > 400$	±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 T and U	T_T	T_U
T or U < 30	±0,2	±0,2
30 < T or U ≤ 120	±0,5	±0,3
120 < T or U ≤ 400	±0,8	±0,5
400 < T or U ≤ 500	±1,0	±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 X	T_x[a]
0,5 ≤ X ≤ 1	$^{+0,2}_{0}$
1 < X ≤ 6	$^{+0,2}_{-0,1}$
6 < X ≤ 30	$^{+0,3}_{-0,2}$

[a] 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 E	T_E
E ≤ 6	±0,3
6 < E ≤ 30	±0,3
30 < E ≤ 120	±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_J, T_K
$6 \leq D \leq 120$	±1
$D > 120$	±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.

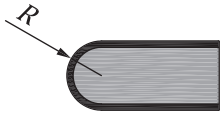


Figure 1 — Shape F

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
$R \leq 3$	±0,2
$3 < R \leq 6$	±0,2
$6 < R \leq 30$	±0,2

5.1.2.8 Limit deviations of angles, T_α

The limit deviations of angles, T_α, 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, α.

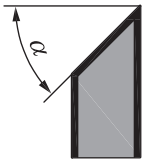


Figure 4 — Shape B