

Form deviations
Concepts Classification system

DIN
4760

Gestaltabweichungen, Begriffe, Ordnungssystem

Partly supersedes
July 1960 edition

1 Purpose

This standard defines concepts and lays down classification system for distinguishing the various form deviations of a surface.

2 Concepts

2.1 Real surface

The real surface is the surface which separates the object from the medium surrounding it.

Note: The inner surface of porous materials (e.g. cellular plastics, sintered materials) is not included in this definition.

2.2 Actual surface

The actual surface is the metrologically determinable, approximate reproduction of the real surface of a form element.

Note: Different measuring methods or measuring conditions (e.g. tip radius) may give different actual surfaces.

2.3 Geometrical surface

The geometrical surface is an ideal surface, the nominal form of which is defined by the drawing and/or other technical documentation.

2.4 Form deviations

Form deviations are the totality of all deviations of the actual surface from the geometrical surface.

It is necessary to distinguish between form deviations which can be ascertained only by observing the surface as a whole, and deviations which are recognizable on only a portion of the surface (see figure 1).

Form deviations are divided into six classes (see table 1).

2.4.1 Class 1 form deviations (Shape deviations)

Class 1 form deviations are those which are ascertainable on observing the entire actual surface of a form element.

2.4.2 Class 2 to 5 form deviations

Class 2 to 5 form deviations are those deviations of the actual surface which are determinable on a portion of the actual surface of a form element (see figure 1).

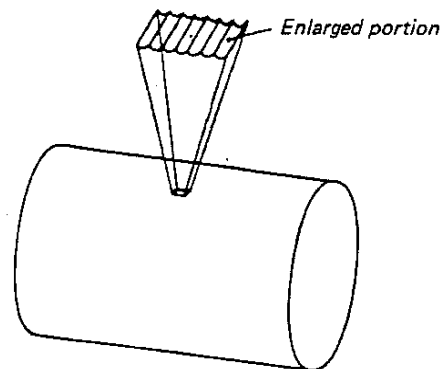


Figure 1. Portion of the actual surface for assessment of class 2 to 5 form deviations.

2.4.2.1 Class 2 form deviations (Waviness)

Class 2 form deviations are mainly periodically occurring deviations of the actual surface of a form element such that the ratio of the wave pitch to the wave depth is generally between 1000 : 1 and 100 : 1. In the majority of cases several different wave pitches are identifiable (see table 1).

2.4.2.2 Class 3 to 5 form deviations (Roughness)

Class 3 to 5 form deviations are regularly or irregularly recurring deviations of the actual surface of a form element such that the pitch-to-depth ratio is generally between 100 : 1 and 5 : 1 (see table 1).

2.4.3 Class 6 form deviations





Class 6 form deviations are deviations governed by the structure of the material (see table 1).

Note: These form deviations are not detectable by the surface measurement methods commonly in use at the present time.

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3 Classification system for form deviations

Table 1.

Form deviation (shown exaggerated as profile section)	Examples of type of deviation	Examples of causation
Class 1: Shape deviations 	Deviations from straightness, flatness, roundness, etc.	Faults in machine tool guideways, deflection of machine or workpiece, incorrect clamping of workpiece, hardening distortion, wear
Class 2: Waviness 	Undulations (see DIN 4761)	Eccentric clamping, deviations in the geometry or running of a cutter, vibration of the machine tool or tool chatter
Class 3: Roughness 	Grooves (see DIN 4761)	Form of tool cutting edge, feed or infeed of tool
Class 4: Roughness 	Score marks, flaking, protruberances (see DIN 4761)	Chip formation process (segmental chip, continuous chip, built-up edge), deformation of material during blasting, bud formation during electrolytic treatment
Class 5: Roughness Note: No longer capable of straightforward representation in pictorial form	Crystalline structure	Crystallization processes, modification of surface through chemical action (e.g. acid treatment), corrosion processes
Class 6: Note: No longer capable of straightforward representation in pictorial form	Lattice structure of material	

The class 1 to 4 form deviations represented above are usually superimposed on the actual surface.

Example:



Standards referred to

DIN 4761 Surface character; geometrical characteristics of surface texture, concepts, symbols

Further standards

DIN 4762 Part 1 (at present at the stage of draft) Surface roughness; concepts

DIN 4768 Part 1 Determination of surface roughness R_a , R_z , R_{max} with electric contact (stylus) instruments; basic data

DIN 4771 Measurement of the profile height P_t of surfaces

DIN 4774 Measurement of waviness depth with electrical contact (stylus) instruments

DIN 7184 Part 1 Tolerances of form and position; concepts, indications on drawings

DIN ISO 1101 Part 1 (at present at the stage of draft) Technical drawings; geometrical tolerancing; form, orientation, location and run-out tolerances; general, definitions, symbols, indications on drawings

Previous editions

DIN 7183 Part 1: 06.44

DIN 4760: 02.52, 07.60

Amendments

Compared with the July 1960 edition, the following amendments have been made:

- a) This standard has been revised in both standardization and editorial terms in the light of the planned revision of DIN 4762 Part 1.
- b) Clause 3 "Detection of form deviations" of the July 1960 edition will not be included in the planned revision. The concepts "vertical section", "oblique section", "tangential section" and "equidistant section" defined therein have been taken over into DIN 4762 Part 1 (at present at the stage of draft), which is largely in agreement with ISO DIS 4287 Part 1. The other particulars in clause 3 of the July 1960 edition have been deleted without substitution.

International Patent Classification

G 01 B 5/28