SLOVENSKI STANDARD
SIST EN 10049:2006

01-januar-2006

Meritve srednje vrednosti hrapavosti Ra in števila konic RPc na ravnih kovinskih izdelkih

Measurement of roughness average Ra and peak count RPc on metallic flat products

Messung des arithmetischen Mittenrauwertes Ra und der Spitzenzahl RPc an metallischen Flacherzeugnissen

Mesure de la rugosité moyenne Ra et du nombre de pics RPc sur les produits plats métalliques

Ta slovenski standard je istoveten z: **EN 10049:2005**

ICS:

17.040.20	Lastnosti površin	Properties of surfaces

SIST EN 10049:2006 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 10049

November 2005

ICS 17.040.20

English Version

Measurement of roughness average Ra and peak count RPc on metallic flat products

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Messung des arithmetischen Mittenrauwertes Ra und der Spitzenzahl RPc an metallischen Flacherzeugnissen

This European Standard was approved by CEN on 30 September 2005.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This European Standard (EN 10049:2005) has been prepared by Technical Committee ECISS/TC 13 “Flat products for cold working - Qualities, dimensions, tolerances and specific tests”, the secretariat of which is held by IBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2006, and conflicting national standards shall be withdrawn at the latest by May 2006.

The European Committee for Iron and Steel Standardization (ECISS) had charged the Technical Committee 13 (Secretariat Belgium) with preparing a European Standard on the measuring of roughness as a revision of Euronorm 49.

The reason for the existence of this European Standard is that general roughness measurement rules as described in ISO standards (see Clause 2) are not practical for metallic flat products for the following reasons:

- the practical use of EN ISO 4288 is not convenient for flat products, because the choice of the cut-off (λc) is dependent on the *Ra* to be measured; the product range is quite wide and the transition point for *Ra* is 2 μm in EN ISO 4288 (EN ISO stipulates a cut-off (λc) of 0,8 mm for *Ra* < 2μm and a cut-off (λc) of 2,5 mm for *Ra* > 2μm);
- in the automotive industry, the use of a cut-off (λc) of 2,5 mm is based on requirements related to paint appearance.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard defines the measurement conditions for surface roughness parameters of metallic flat products, both uncoated (cold and hot rolled pickled steel) and coated with metallic coatings (e.g. zinc, aluminium, tin, chromium) [see subclause 3.1].

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 3274, *Geometrical product specifications (GPS) - Surface texture: Profile method - Nominal characteristics of contact (stylus) instruments (ISO 3274:1996)*

EN ISO 5436-1, *Geometrical Product Specifications (GPS) - Surface texture: Profile method; Measurement standards - Part 1: Material measures (ISO 5436-1:2000)*

EN ISO 11562:1997, Geometrical product specifications (GPS) - Surface texture: Profile method - Metrological characteristics of phase correct filters (ISO 11562:1996)

3 Terms and definitions

For the purposes of this European Standard the following terms and definitions apply.

3.1
application group products

3.1.1
application group 1 product
metallic flat product mainly used in the automotive industry, uncoated or coated with metallic coatings (e.g. zinc, aluminium)

3.1.2
application group 2 product
metallic flat product mainly used for applications other than those of the automotive industry (e.g. tinplate or chromium coated steel for packaging, uncoated or coated cold rolled steel, pickled hot rolled steel)

3.2
surface profile
profile that results from the intersection of the real surface by a specified plane

NOTE See EN ISO 4287.

3.3
primary profile (P-profile)
digital form of the surface profile after application of the profile filter λs for suppressing the very short wavelength components due to noise and vibrations

NOTE 1 See EN ISO 3274 and EN ISO 11562.

NOTE 2 The primary profile is the basis for the evaluation of the primary profile parameter.

3.4
roughness profile (R-profile)
profile derived from the primary profile by suppressing the long wave components, using the profile filter λc

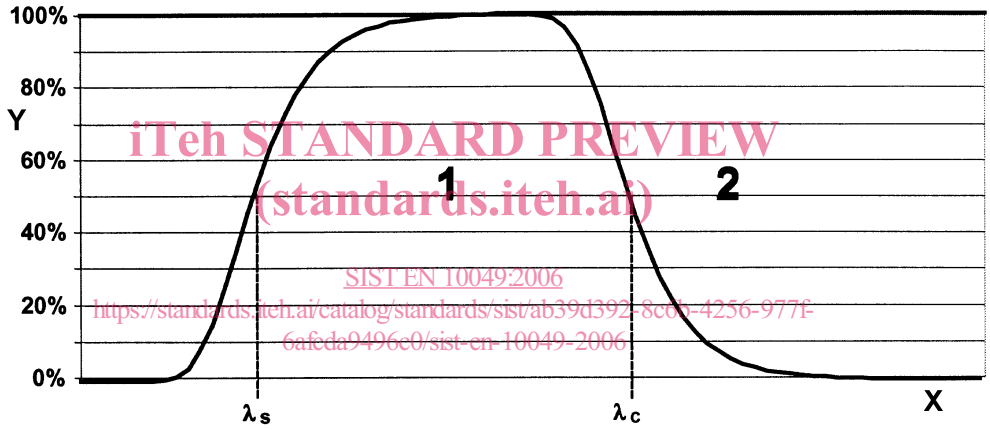
NOTE 1 See EN ISO 3274 and EN ISO 11562.

3.5
λc profile filter
filter determining the intersection between the roughness and waviness components

3.6
λs profile filter
filter determining the intersection between the roughness and the even shorter wave components present in a surface

3.7
transmission band
range of wavelengths between the profile filters λs and λc

NOTE The transmission characteristic is shown in Figure 1.



Key

X-axis	wavelength (logarithmic scale)
Y-axis	transmission ratio
1	roughness
2	waviness

Figure 1 — Transmission characteristic

3.8
mean line of the roughness profile
line corresponding to the longwave profile component suppressed by the profile filter λc

NOTE See EN ISO 11562:1997 subclause 3.2.

3.9
evaluation length *lm*
length in the direction of the X-axis used for assessing the profile under evaluation

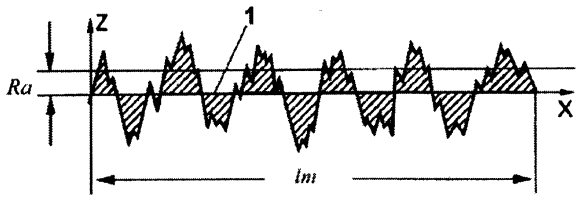
3.10
travel length *lt*
length in the direction of the X-axis physically used by the instrument

NOTE Some instruments may require a travel length l_t longer than the evaluation length *lm* because of start and end effects.

3.11
roughness average *Ra*
arithmetic mean of the absolute ordinates values *Z(x)* of the roughness profile

NOTE 1 *Ra* is expressed in microns.

NOTE 2 A schematic representation of Ra is given in Figure 2.



Key

1 Mean line

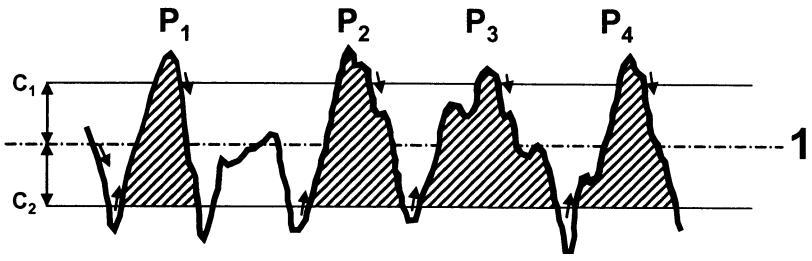
Figure 2 — Schematic representation of the roughness average *Ra*

3.12
peak count *RPc*
number of profile peaks over the full evaluation length *lm*

NOTE 1 *RPc* is expressed as an absolute number per cm.

NOTE 2 For the purpose of this standard, the height discrimination is performed by consecutively intersecting a lower section line c_2 (in upwards direction) and an upper section line c_1 (in downwards direction). See Figure 3.

NOTE 3 For the purpose of this standard, *RPc* is calculated over the full evaluation length *lm*.



Key

1 Mean line

Figure 3 — Peak count *RPc*

3.13
surface types

3.13.1
stochastic surface
surface not showing a lateral pattern

NOTE 1 Stochastic surfaces can be generated by mill rolls obtained e.g. by grinding, Shot Blast Texturing (SBT), Electro Discharge Texturing (EDT), Electro Chemical Deposition (ECD), some types of Electron Beam Texturing (EBT), chemical processes (e.g. pickling).

NOTE 2 Isotropic surface is a synonym of stochastic surface.

3.13.2
non-stochastic surface
surface showing a typical lateral pattern

NOTE 1 Non-stochastic surfaces can be generated by mill rolls obtained e.g. by Laser Texturing (LT) and Electron Beam Texturing (EBT).

NOTE 2 A lateral pattern is clearly observable by using a simple optical magnifier, with e.g. a magnification x 30.

NOTE 3 Non-isotropic surface is a synonym of non-stochastic surface.

4 Measuring instrument

4.1 General

The instrument used is a stylus instrument conforming to EN ISO 3274. The device is generally composed of a pick-up system, a traverse unit and an evaluation device.

4.2 Pick-up system

The datum system is the reference system for the roughness measurement (see Figure 4).

A double-skid system is used for practical measurements (see Figure 5). The skid dimensions are as follows:

— *Rs,x*: 50 mm;

— *Rs,y*: 3 mm;

— SA: 4.5 mm;

— AB: 13 mm.

By mutual agreement, a single skid system can also be used (see Figure 6).

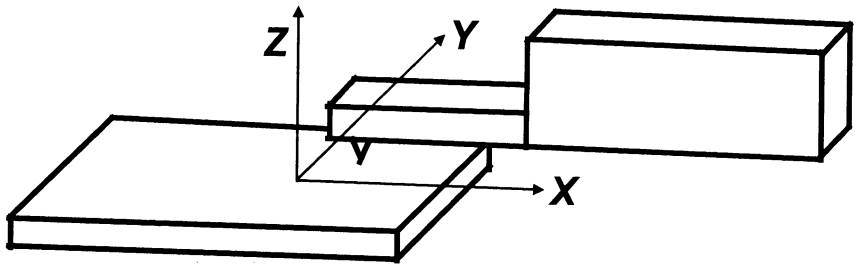


Figure 4 — Datum system (either table or pick-up moving)