



SLOVENSKI STANDARD

SIST EN 10049:2014

01-junij-2014

Nadomešča:
SIST EN 10049:2006

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

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Ta slovenski standard je istoveten z: EN 10049:2013

ICS:

17.040.20	Lastnosti površin	Properties of surfaces
77.140.50	Ploščati jekleni izdelki in polizdelki	Flat steel products and semi-products

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10049

November 2013

ICS 01.040.17; 17.040.20

Supersedes EN 10049:2005

English Version

**Measurement of roughness average R_a and peak count RP_c on
metallic flat products**

Mesure de la rugosité moyenne R_a et du nombre de pics
 RP_c sur les produits plats métalliques

Messung des arithmetischen Mittenrauwertes R_a und der
Spitzenzahl RP_c an metallischen Flacherzeugnissen

This European Standard was approved by CEN on 29 August 2013.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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 CEN-CENELEC Management Centre has the same status as the official versions.

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

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 10049:2013) has been prepared by Technical Committee ECISS/TC 109 "Flat products for cold working - Qualities, dimensions, tolerances and specific tests", the secretariat of which is held by AFNOR.

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 2014, and conflicting national standards shall be withdrawn at the latest by May 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 10049:2005.

The whole document was technically revised.

The European Committee for Iron and Steel Standardization (ECISS) has given Technical Committee 109 (Secretariat France) the task to prepare a European Standard on the measuring of roughness as a revision of EN 10049:2005.

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 (λ_c) is dependent on the R_a to be measured; the product range is quite wide and the transition point for R_a is 2 μm in EN ISO 4288 (EN ISO stipulates a cut-off (λ_c) of 0,8 mm for $R_a < 2\mu\text{m}$ and a cut-off (λ_c) of 2,5 mm for $R_a > 2\mu\text{m}$);
- in the automotive industry, the use of a cut-off (λ_c) of 2,5 mm is based on requirements related to paint appearance.

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

EN 10049:2013 (E)

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 3.1).

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.

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

EN ISO 16610-21, *Geometrical product specifications (GPS) — Filtration — Part 21: Linear profile filters: Gaussian filters (ISO 16610-21)*

3 Terms and definitions

For the purposes of this document, 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 1 to entry: See EN ISO 4287.

3.3 primary profile (P-profile)

digital form of the surface profile after sampling and applying a profile filter λ_s to suppress very short wavelength components due to noise and vibrations

Note 1 to entry: The measuring device is a stylus instrument conforming to EN ISO 3274 or an optical roughness measurement system.

Note 2 to entry: The profile filter λ_s is referred to in EN ISO 16610-21.

3.4 roughness profile (R-profile)

profile derived from the primary profile by suppressing the long wave components, using the profile filter λ_c

Note 1 to entry: See EN ISO 3274 and EN ISO 16610-21.

3.5

λ_c profile filter

filter determining the intersection between the roughness and waviness components

3.6

λ_s profile filter

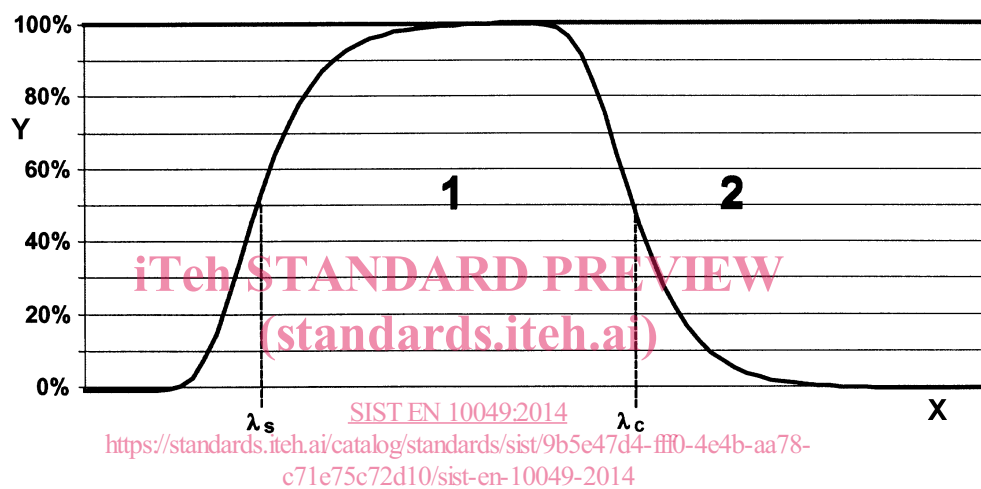
filter determining the intersection between the roughness and the even shorter wave components present in a surface

3.7

transmission band

range of wavelengths between the profile filters λ_s and λ_c

Note 1 to entry: 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

centre line of the roughness profile

centre line of the roughness profile separating the enclosed area of the roughness profile into two equal areas below and above this line

Note 1 to entry: See EN ISO 16610-21.

3.9

evaluation length l_m

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

3.10

travel length l_t

length in the direction of the X-axis physically used by the instrument

Note 1 to entry: Some instruments may require a travel length l_t longer than the evaluation length l_m because of start and end effects.

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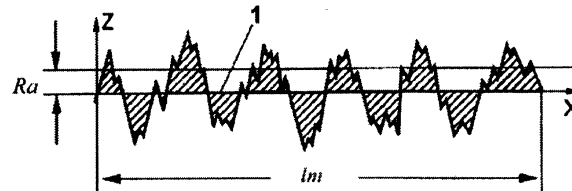
3.11

roughness average R_a

arithmetic mean of the absolute ordinates values $Z(x)$ of the roughness profile

Note 1 to entry: R_a is expressed in micrometer.

Note 2 to entry: A schematic representation of R_a is given in Figure 2.

**Key**

1 centre line

Figure 2 — Schematic representation of the roughness average R_a

3.12

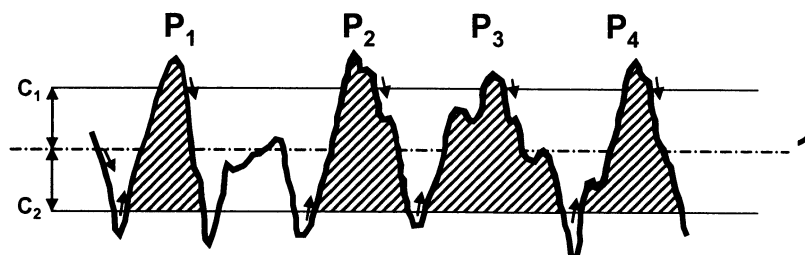
peak count RP_c

number of profile peaks over the full evaluation length l_m

Note 1 to entry: RP_c is expressed as an absolute number per cm.

Note 2 to entry: 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 to entry: For the purpose of this standard, RP_c is calculated over the full evaluation length l_m .

**Key**

1 centre line

Figure 3 — Peak count RP_c

3.13 surface types

3.13.1 stochastic surface

surface not showing a lateral pattern

Note 1 to entry: 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 to entry: Isotropic surface is a synonym of stochastic surface.

3.13.2 non-stochastic surface

surface showing a typical lateral pattern

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

Note 2 to entry: A lateral pattern is clearly observable by using a simple optical magnifier, with e.g. a magnification $\times 30$.

Note 3 to entry: Non-isotropic surface is a synonym of non-stochastic surface.

4 Measuring instrument

4.1 General

The instrument to use is either a stylus instrument conforming to EN ISO 3274 or an optical roughness measurement system. The device is generally composed of a measuring head, a traverse unit and an evaluation device. When using an optical roughness measurement system the calibration shall assure that the measured values are aligned with the reference stylus method values.

All the following subclauses are related to measurements performed using the stylus instrument. For such an instrument, the measuring head is usually called pick-up system.

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:

- $R_{s,x}$: 50 mm;
- $R_{s,y}$: 3 mm;
- SA: 4.5 mm;
- AB: 13 mm.

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