



**SLOVENSKI STANDARD**  
**SIST EN 10209:2023**

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**Hladno valjani ploščati izdelki iz maloogljčnih jekel za emajliranje - Tehnični dobavni pogoji**

Cold rolled low carbon steel flat products for vitreous enamelling - Technical delivery conditions

Kaltgewalzte Flacherzeugnisse aus weichen Stählen zum Emaillieren - Technische Lieferbedingungen

Produits plats laminés à froid, en acier doux pour émaillage par vitrification - Conditions techniques de livraison

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## Cold rolled low carbon steel flat products for vitreous enamelling - Technical delivery conditions

Produits plats laminés à froid, en acier doux pour émaillage par vitrification - Conditions techniques de livraison

Kaltgewalzte Flacherzeugnisse aus weichen Stählen zum Emaillieren - Technische Lieferbedingungen

This European Standard was approved by CEN on 28 May 2023.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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<b>Contents</b>	<b>Page</b>
European foreword .....	4
<b>1 Scope</b> .....	<b>5</b>
<b>2 Normative references</b> .....	<b>5</b>
<b>3 Terms and definitions</b> .....	<b>6</b>
<b>4 Designation</b> .....	<b>6</b>
<b>5 Requirements</b> .....	<b>6</b>
5.1 <b>Steelmaking and manufacturing processes</b> .....	<b>6</b>
5.2 <b>Method of deoxidation</b> .....	<b>6</b>
5.3 <b>Chemical composition</b> .....	<b>7</b>
5.4 <b>Suitability for vitreous enamelling</b> .....	<b>7</b>
5.5 <b>Delivery condition</b> .....	<b>7</b>
5.6 <b>Choice of properties</b> .....	<b>8</b>
5.7 <b>Mechanical properties</b> .....	<b>8</b>
5.8 <b>Surface characteristics</b> .....	<b>8</b>
5.8.1 <b>General</b> .....	<b>8</b>
5.8.2 <b>Surface appearance</b> .....	<b>8</b>
5.8.3 <b>Surface finish</b> .....	<b>8</b>
5.9 <b>Stretcher strain marks</b> .....	<b>9</b>
5.10 <b>Weldability</b> .....	<b>9</b>
5.11 <b>Tolerances on dimensions and shape</b> .....	<b>9</b>
<b>6 Tests</b> .....	<b>9</b>
6.1 <b>General</b> .....	<b>9</b>
6.2 <b>Inspection units</b> .....	<b>9</b>
6.3 <b>Number of tests</b> .....	<b>9</b>
6.4 <b>Sampling</b> .....	<b>9</b>
6.5 <b>Test methods</b> .....	<b>10</b>
6.6 <b>Retests</b> .....	<b>10</b>
6.7 <b>Inspection documents</b> .....	<b>10</b>
<b>7 Identification</b> .....	<b>10</b>
<b>8 Packaging</b> .....	<b>10</b>
<b>9 Disputes</b> .....	<b>11</b>
<b>10 Information to be supplied by the purchaser at the time of ordering</b> .....	<b>11</b>
<b>Annex A (normative) Methods for determining the resistance to fish scaling of a steel sheet for enamelling</b> .....	<b>13</b>
<b>A.1 Hydrogen permeation test</b> .....	<b>13</b>
A.1.1 <b>Field of application</b> .....	<b>13</b>
A.1.2 <b>Principle</b> .....	<b>13</b>
A.1.3 <b>Apparatus</b> .....	<b>13</b>
A.1.4 <b>Sampling</b> .....	<b>13</b>
A.1.5 <b>Preparation</b> .....	<b>13</b>

<b>A.1.6</b>	<b>Check the degreasing quality .....</b>	<b>14</b>
<b>A.1.7</b>	<b>Permeation test procedure .....</b>	<b>14</b>
<b>A.1.8</b>	<b>Hydrogen detection .....</b>	<b>14</b>
<b>A.1.9</b>	<b>Evaluation.....</b>	<b>15</b>
<b>A.2</b>	<b>Fish scaling test using special enamel.....</b>	<b>16</b>
<b>Annex B</b>	<b>(normative) Method for determining mass loss (iron loss) due to pickling for steel grades for direct enamelling in accordance with 5.4.2.....</b>	<b>17</b>
<b>B.1</b>	<b>Principle.....</b>	<b>17</b>
<b>B.2</b>	<b>Apparatus .....</b>	<b>17</b>
<b>B.3</b>	<b>Sampling .....</b>	<b>17</b>
<b>B.4</b>	<b>Preparation.....</b>	<b>18</b>
<b>B.5</b>	<b>Weighing.....</b>	<b>18</b>
<b>B.6</b>	<b>Cleaning.....</b>	<b>18</b>
<b>B.7</b>	<b>Checks on degreasing quality.....</b>	<b>18</b>
<b>B.8</b>	<b>Pickling.....</b>	<b>18</b>
<b>B.9</b>	<b>Drying .....</b>	<b>19</b>
<b>B.10</b>	<b>Weighing after cooling.....</b>	<b>19</b>
<b>B.11</b>	<b>Evaluation.....</b>	<b>19</b>
<b>Annex C</b>	<b>(normative) Method for determining the adherence level of enamel applied to a steel sheet.....</b>	<b>20</b>
<b>C.1</b>	<b>Field of application .....</b>	<b>20</b>
<b>C.2</b>	<b>Principle.....</b>	<b>20</b>
<b>C.3</b>	<b>Apparatus .....</b>	<b>20</b>
<b>C.4</b>	<b>Description of the apparatus.....</b>	<b>20</b>
<b>C.5</b>	<b>Procedure .....</b>	<b>20</b>
<b>C.6</b>	<b>Adherence level evaluation .....</b>	<b>21</b>
<b>C.6.1</b>	<b>Flat pieces.....</b>	<b>21</b>
<b>C.6.2</b>	<b>Thinner sheet steel &lt; 0,3 mm.....</b>	<b>21</b>
<b>C.6.3</b>	<b>Deformed pieces .....</b>	<b>21</b>
<b>Annex D</b>	<b>(informative) Characteristics for the selection of enamelling steel grades.....</b>	<b>25</b>
<b>Bibliography</b>	<b>.....</b>	<b>26</b>

**EN 10209:2023 (E)****European foreword**

This document (EN 10209:2023) has been prepared by Technical Committee CEN/TC 459 “ECISS - European Committee for Iron and Steel Standardization”<sup>1</sup>, 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 January 2024 and conflicting national standards shall be withdrawn at the latest by January 2024.

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

This document supersedes EN 10209:2013.

In comparison with the previous edition, the following technical modifications have been made:

- DC07EK steel grade added;
- $r$  value in Mechanical Properties (Table 2) changed;
- Table 2: definition of Tensile test direction more precise;
- Annex A: conditions of the fish scaling test, devices to be used (removal of Strohleim apparatus) redefined.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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

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<sup>1</sup> Through its sub-committee SC 9 “Coated and uncoated flat products to be used for cold forming” (secretariat: AFNOR).

## 1 Scope

This document applies to cold rolled non-coated low carbon steel flat products in rolled widths equal to or over 600 mm and in thicknesses equal to or less than 3 mm, delivered in sheet, wide strip, slit wide strip or cut lengths obtained from slit wide strip or sheet.

It does not apply to cold rolled narrow strip (rolling width < 600 mm) or to cold rolled flat products for which there is a specific standard, in particular the following:

- cold-rolled low carbon steel flat products for cold forming (EN 10130);
- cold-rolled non-oriented electrical steel sheet and strip delivered in fully processed state (EN 10106);
- cold rolled electrical non-alloy and alloy steel sheet and strip delivered in the semi-processed state (EN 10341);
- cold reduced blackplate (EN 10205);
- steel sheet and strip for welded gas cylinders (EN 10120);
- cold-rolled uncoated non-alloy mild steel narrow strip for cold forming (EN 10139);
- cold-rolled structural steels for general purposes;
- cold-rolled flat products made of high yield strength for cold forming (EN 10268).

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 10021, *General technical delivery conditions for steel products*

EN 10027-1, *Designation systems for steels — Part 1: Steel names*

EN 10027-2, *Designation systems for steels — Part 2: Numerical system*

EN 10049, *Measurement of roughness average Ra and peak count R<sub>Pc</sub> on metallic flat products*

EN 10079:2007, *Definition of steel products*

EN 10131, *Cold rolled uncoated and zinc or zinc-nickel electrolytically coated low carbon and high yield strength steel flat products for cold forming — Tolerances on dimensions and shape*

EN 10204, *Metallic products — Types of inspection documents*

EN ISO 377, *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing (ISO 377)*

EN ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature (ISO 6892-1)*

ISO 10113, *Metallic materials — Sheet and strip — Determination of plastic strain ratio*

**EN 10209:2023 (E)****3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 10079:2007 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp/>
- IEC Electropedia: available at <https://www.electropedia.org/>

**4 Designation**

**4.1** Steel names shall be attributed in accordance with EN 10027-1; numerical designations shall be attributed in accordance with EN 10027-2.

All steels reported in Table 2 are non-alloy and alloy quality steels.

**4.2** Products conforming to this document shall be designated, in order, in the following way:

- a) product designation (e.g. strip, sheet or “slit strip cut longitudinally”);
- b) number of this document (EN 10209);
- c) name or numerical designation of the steel, shown in Table 2;
- d) where appropriate, the symbol relating to surface finish (see Table 1).

Examples of conventional designations:

Designation of a steel sheet with the symbolic designation DC01EK and the numerical designation 1.0390 with rough surface finish (r):

Sheet EN 10209 DC01EK r or

Sheet EN 10209 — 1.0390 r

Designation of a wide strip of steel with the symbolic designation DC06ED and the numerical designation 1.0872 with normal surface finish (m):

Wide strip EN 10209 — DC06ED m or

Wide strip EN 10209 — 1.0872 m.

**5 Requirements****5.1 Steelmaking and manufacturing processes**

Unless otherwise agreed at the time of ordering, the production methods shall be left to the discretion of the manufacturer.

The purchaser shall be informed of these processes if specified in the purchase order.

**5.2 Method of deoxidation**

See Table 2.



### 5.3 Chemical composition

The maximum values for the chemical compositions based on ladle analysis shall be as given in Table 2.

### 5.4 Suitability for vitreous enamelling

**5.4.1** Qualities DC01EK, DC04EK, DC05EK, DC06EK and DC07EK are suitable for one or two coats of conventional enamelling.

**5.4.2** Qualities DC03ED, DC04ED and DC06ED are suitable for direct enamelling, as well as for the two coats – one fire process and for the special applications of two coat enamelling for sag resistance.

**5.4.3** The following methods of test are defined in order to determine the suitability of the steel for enamelling:

- hydrogen permeation test (see Annex A) (alternatively, if agreed at the time of ordering, an enamelling test as described in A.2 may be specified);

NOTE These two tests enable the risk of fish scaling following enamelling to be assessed.

- iron loss test for qualities of steel for direct enamelling as described in 5.4.2 (see Annex B).

**5.4.4** An enamel adherence test (see Annex C) is also defined (pretreatment and enamelling conditions shall be agreed at the time of ordering).

**5.4.5** The application of the methods of test described in Annex A, Annex B and Annex C may be the subject of an agreement at the time of ordering.

### 5.5 Delivery condition

**5.5.1** Products specified in this document should be supplied in the skin-passed condition. If agreed at the time of ordering non-skin-passed products may be supplied.

**5.5.2** The products are normally delivered oiled. In this case, both the surfaces are preserved by a layer of neutral non-drying oil, free of foreign bodies and uniformly spread in such a way that under normal conditions of packaging, transportation, handling and storage the products will show no corrosion for up to three months.

If the conditions of transportation or storage are such that special protection against corrosion is required, the purchaser shall inform the manufacturer at the time of the ordering.

The layer of oils shall be capable of being removed by alkaline solutions or normal solvents.

The choice of protective oils may be the subject of special agreement.

The product can be supplied protected by specific coatings that are compatible with enamelling process without degreasing upon agreement between supplier and purchaser.

If the purchaser does not require the surfaces to be oiled, this shall be clearly indicated at the time of the ordering.

NOTE If the order is for unoiled products, the manufacturer is not responsible for the risk of rust. The purchaser is also advised that there is a greater risk of the appearance of light scratches during handling, transportation, and application.

## EN 10209:2023 (E)

## 5.6 Choice of properties

The products covered by this document shall correspond to the requirements of Table 1 and Table 2.

Subject to agreement between the supplier and the purchaser, they may be supplied with particular suitability for the production of a specific part; in this case a maximum rejection percentage may be set by mutual agreement and acceptance on the basis of mechanical properties would not apply.

## 5.7 Mechanical properties

The mechanical properties given in Table 2 only apply to skin-passed products. These mechanical properties are valid for the period specified in Table 2 from the date on which the products are made available.

The date of availability shall be notified to the purchaser with reasonable prior notice compatible with the validity of the mechanical properties.

## 5.8 Surface characteristics

### 5.8.1 General

The surface characteristics consist of the surface appearance and surface finish.

### 5.8.2 Surface appearance

The products are supplied with a surface appearance which does not adversely affect suitability for forming, the application of an enamel coating and the uniform appearance of the enamelled surface on the exposed surface.

When supplied as wide strip and slit strip, the percentage of surface defects may be higher than when supplied as sheet and cut lengths. This shall be taken into account by the purchaser and the permissible percentage of surface defects shall be set by special agreement at the time of ordering.

Unless otherwise agreed, a single surface of the product shall comply with the specified requirements. The other surface shall be such that during subsequent treatment it does not have a deleterious effect on the better surface.

### 5.8.3 Surface finish

The surface finish may be normal or rough.

In the absence of a requirement in the order, products shall be supplied with the normal surface finish.

The limiting figures for average surface roughness for the two types of finish are given in Table 1.

The measurements shall be made in accordance with EN 10049.

If specially agreed at the time of ordering, other ranges for surfaces are specified for specific end uses.

**Table 1 — Surface finishes and standard roughness**

Surface finish	Symbol	Roughness
Normal	m	$0,6 \mu\text{m} < R_a \leq 1,9 \mu\text{m}$
Rough	r	$R_a > 1,6 \mu\text{m}$

## 5.9 Stretcher strain marks

All the products are generally subjected to a light skin-pass after annealing at the manufacturer's works to avoid the formation of stretcher strain marks during subsequent forming. The tendency to form such marks may reappear a certain time after the skin-pass. It is therefore in the purchaser's interest to form the products as soon as possible.

Quality DC06EK, DC06ED and DC07EK products do not exhibit stretcher strain marks after deformation. For the other qualities the absence of stretcher strain marks may be guaranteed for six months after the products are made available.

## 5.10 Weldability

The material is specified as suitable for normal welding procedures as long as the products are degreased beforehand. The welding procedure shall be specified at the time of ordering (see Clause 10 h)).

## 5.11 Tolerances on dimensions and shape

Tolerances on dimensions and shape shall be as given in EN 10131.

# 6 Tests

## 6.1 General

6.1.1 The purchaser shall specify at the time of ordering his requirements for:

- type of inspection and testing: specific or non-specific, see EN 10021;
- type of inspection document, see EN 10204.

6.1.2 Specific inspection and testing shall be carried out in accordance with 6.2, 6.3, 6.4, 6.5 and 6.6.

6.1.3 Specific inspection and testing may not be specified either for the product analysis or the surface finish.

## 6.2 Inspection units

The inspection unit is 30 t or a fraction of 30 t products of the same grade and nominal thickness.

When a wide coil exceeds 30 t, it constitutes a single inspection unit, as do its products.

## 6.3 Number of tests

For each inspection unit a tensile test shall be carried out, and if required, a determination of  $r$  and of the suitability for enamelling shall be performed (see Table 2 and Annex A, Annex B and Annex C).

## 6.4 Sampling

The requirements of EN ISO 377 and EN 10021 shall apply and shall be supplemented by the following specific requirements.

For sheet and cut lengths the selection of products to be tested and the position of the samples in the products is left to the discretion of the inspection representative.

In the case of wide strip and slit wide strip, the sample should preferably be taken from the outer end.

If the width of the product permits, the test pieces for the tensile test shall be taken perpendicular to the direction of rolling at a distance of at least 50 mm from the edge of the product.