BS EN 10169:2022

BSI Standards Publication

Continuously organic coated (coil coated) steel flat products — Technical delivery conditions

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National foreword

This British Standard is the UK implementation of EN 10169:2022. It supersedes BS EN 10169:2010+A1:2012, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/109, Coated and Uncoated Flat Products to be Used for Cold Forming.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

Continuously organic coated (coil coated) steel flat products - Technical delivery conditions

Produits plats en acier revêtus en continu de matières organiques (prélaqués) - Conditions techniques de livraison

Kontinuierlich organisch beschichtete (bandbeschichtete) Flacherzeugnisse aus Stahl - Technische Lieferbedingungen

This European Standard was approved by CEN on 24 January 2022.

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European foreword

This document (EN 10169:2022) has been prepared by Technical Committee CEN/TC 459/SC 9 "Coated and uncoated flat products to be used for cold forming", 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of an identical text or by endorsement, at the latest by September 2022, and conflicting national standards shall be withdrawn at the latest by September 2022.

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 10169:2010+A1:2012.

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

— addition of the requirement about a maximum six-month duration between production and processing of the coil coated product;

— addition of the corrosion resistance category RC5+ corresponding to very high corrosivity category C5 combining RC5-I and RC5-M that have been removed from this document;

— addition of the UV resistance category R_{uv5};

— addition of third party supervision for natural weathering tests if a certificate is required by the purchaser;

— definition of a four-year test duration for corrosion resistance category RC5+;

— definition of requirements for natural outdoor UV radiation resistance tests;

— removal of Geleen from the list of natural outdoor corrosivity exposure sites;

— editorial improvements and updating of normative references.

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 organisations 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, Turkey and the United Kingdom.

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1 Scope

This document specifies requirements for continuously organic coated (coil coated) steel flat products. It particularly specifies the performance requirements.

The products covered are wide strip, sheet cut from wide strip, slit wide strip, strip rolled in widths less than 600 mm and cut lengths (from sheet or strip).

NOTE National provisions can set up relationships between the performances of the coatings as required in this document and the outdoor atmospheres and ambiances required for a relevant building under study.

This document is not applicable to continuously organic coated flat products made of:

— tin mill products;

— electrical steels.

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 10020, *Definition and classification of grades of steel*

EN 10021, *General technical delivery conditions for steel products*

EN 10025-1, *Hot rolled products of structural steels - Part 1: General technical delivery conditions*

EN 10025-2, *Hot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10048, *Hot rolled narrow steel strip - Tolerances on dimensions and shape*

EN 10051, *Continuously hot-rolled strip and plate/sheet cut from wide strip of non-alloy and alloy steels - Tolerances on dimensions and shape*

EN 10079, *Definition of steel products*

EN 10111, *Continuously hot rolled low carbon steel sheet and strip for cold forming - Technical delivery conditions*

EN 10130, *Cold rolled low carbon steel flat products for cold forming - Technical delivery conditions*

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 10139, *Cold rolled uncoated mild steel narrow strip for cold forming - Technical delivery conditions*

EN 10140, *Cold rolled narrow steel strip - Tolerances on dimensions and shape*

EN 10143, *Continuously hot-dip coated steel sheet and strip - Tolerances on dimensions and shape*

EN 10152, *Electrolytically zinc coated cold rolled steel flat products for cold forming - Technical delivery conditions*

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

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EN 10268, *Cold rolled steel flat products with high yield strength for cold forming - Technical delivery conditions*

EN 10338, *Hot rolled and cold rolled non-coated products of multiphase steels for cold forming - Technical delivery conditions*

EN 10346, *Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions*

EN 13523-1, *Coil coated metals - Test methods - Part 1: Film thickness*

EN 13523-2, *Coil coated metals - Test methods - Part 2: Gloss*

EN 13523-3, *Coil coated metals - Test methods - Part 3: Colour difference and metamerism - Instrumental comparison*

EN 13523-4, *Coil coated metals - Test methods - Part 4: Pencil hardness*

EN 13523-5, *Coil coated metals - Test methods - Part 5: Resistance to rapid deformation (impact test)*

EN 13523-6, *Coil coated metals - Test methods - Part 6: Adhesion after indentation (cupping test)*

EN 13523-7, *Coil coated metals - Test methods - Part 7: Resistance to cracking on bending (T-bend test)*

EN 13523-8, *Coil coated metals - Test methods - Part 8: Resistance to salt spray (fog)*

EN 13523-10, *Coil coated metals - Test methods - Part 10: Resistance to fluorescent UV radiation and water condensation*

EN 13523-12, *Coil coated metals - Test methods - Part 12: Resistance to scratching*

EN 13523-19, *Coil coated metals - Test methods - Part 19: Panel design and method of atmospheric exposure testing*

EN 13523-21, *Coil coated metals - Test methods - Part 21: Evaluation of outdoor exposed panels*

EN 13523-26, *Coil coated metals - Test methods - Part 26: Resistance to condensation of water*

EN ISO 2815, *Paints and varnishes - Buchholz indentation test (ISO 2815)*

EN ISO 4618, *Paints and varnishes - Terms and definitions (ISO 4618)*

EN ISO 4628-2, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 2: Assessment of degree of blistering (ISO 4628-2)*

EN ISO 4628-4, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 4: Assessment of degree of cracking (ISO 4628-4)*

EN ISO 4628-5, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 5: Assessment of degree of flaking (ISO 4628-5)*

EN ISO 8044, *Corrosion of metals and alloys - Vocabulary (ISO 8044)*

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EN ISO 12944-2, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 2: Classification of environments (ISO 12944-2)*

ISO 4997, *Cold-reduced carbon steel sheet of structural quality*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in EN 10020, EN 10021, EN 10079, EN 10204, EN ISO 4618, EN ISO 8044, EN ISO 12944-2 and the following apply.

ISO and IEC maintain terminological 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/

3.1
accessibility
ease of access to the steel components for the purpose of inspection and maintenance without any work over and above that concerned with routine inspection

3.2
ambience
environmental conditions which prevail in the interior of the building

Note 1 to entry: These conditions determine the corrosivity category of the ambience and include different parameters such as the air temperature, the relative humidity, the operating conditions in the building (e.g. use of aggressive chemical products, refrigerated areas).

Note 2 to entry: The atmosphere surrounding the building can influence the ambience.

Note 3 to entry: Annex A gives an example of classification of types of ambience.

3.3
building interior application
application in buildings for which the concerned construction products (i.e. components of the building fabric) are submitted to the influence of interior ambiences without significant exposure of any side of the product to the influence of exterior atmospheres

Note 1 to entry: Building products include, for example: liner trays, ribbed profiles for roofing and cladding, curved profiles, brake-pressed profiles, interior wall panels for partitions, ceiling panels, suspended frames (for suspended ceilings), factory foamed (or with mineral wool) sandwich panels for cold rooms or rooms with controlled ambience, interior door frames, interior metal doors, interior metal windows and for ceilings.

Note 2 to entry: Some coil coated products can be used for interior applications having special performance requirements, e.g. lighting. In such cases, these particular requirements should also be considered in consultation with the manufacturer.

Note 3 to entry: For interior building elements, it is important to consider the risk of corrosive attack on the reverse side of the element. This can be especially important in double-skin assemblies (e.g. built up insulated cladding) where the reverse side of the interior element is not easily accessible for maintenance and/or in situations where the interior element is expected to provide long-term durability.

Note 4 to entry: Besides the requirements written in this document, there can be other international or national requirements or regulations regarding fire, safety, food contact etc. that can be considered at the time of enquiry and order.

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3.4
building exterior application
application in buildings for which the concerned products are submitted to the influence of exterior atmospheres

Note 1 to entry: Building products include, for example, ribbed profiles for roofing and cladding, curved profiles, brake-pressed profiles, concealed fix roofing and cladding, standing seam roofing, corrugated sheeting, cladding goods, sandwich panels for roofing and cladding, roof tiles, accessories (flashings, trims), rainwater goods (gutters, down pipes), metal doors and garage doors.

Note 2 to entry: For exterior building elements, it is important to consider the risk of corrosive attack on internal, i.e. reverse side surfaces. In particular, buildings with wet or chemically polluted internal environments can require a reverse side organic coating selected to provide enhanced corrosion protection.

Note 3 to entry: This can be especially important in double-skin assemblies (e.g. built-up insulated cladding) where the reverse side of the exterior element is not easily accessible for maintenance and/or in situations where the exterior element is expected to provide long-term durability.

Note 4 to entry: Besides the requirements written in this document, other international or national requirements regarding reaction to fire, safety etc. can be agreed on at the time of enquiry and order.

3.5
coating flexibility
ability of a coating to follow without damaging the deformation of the substrate to which it is applied

Note 1 to entry: The flexibility is determined during cold forming of the coated product by the T-bend test.

Note 2 to entry: Cold forming is the process where the main forming is done without heating the working piece.

3.6
coating material
material comprising organic polymers, i.e. synthetic resin or plastics, to which pigments, additives and solvents (if required) have generally been added, suitable for coil coating

Note 1 to entry: These can be paints (in liquid or powder form) that when applied form an opaque film or plastic film providing protective, decorative and/or specific properties.

3.7
coating systems

3.7.1
coating system
combination of the coatings applied on either the top side or the reverse side consisting of one or more coats of one or more coating materials, the designation of which is derived from the relevant coating material

3.7.2
multiple-coat system
system comprising a priming coat, possibly intermediate coat(s) and a top coat with particular requirements on appearance, corrosion protection, formability, etc.

3.8
nominal organic coating thickness
thickness of the organic coating system either on top side or on reverse side

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3.9
nominal thickness of an organic coated product
thickness of the metal substrate including metallic coating and excluding thickness of organic coating system

3.10
coating types

3.10.1
backing coat
coating of any type on reverse side with no particular requirements on appearance, corrosion protection, formability, etc.

Note 1 to entry: In the case of particular requirements, see 3.7.2.

3.10.2
film coating
plastic film applied to the substrate to which generally an adhesive and, if appropriate, a priming coat has been applied beforehand

3.10.3
temporary film coating
strippable plastic film applied to the coated surface in order to afford a temporary protection against mechanical damage (see also 6.1.2.3)

3.10.4
intermediate coat
coat between the priming coat and the top coat

3.10.5
priming coat
first coat of a multiple-coat system

Note 1 to entry: In the case of particular requirements, see 3.7.2.

3.10.6
top coat
finishing coat
final (uppermost) coat of a multiple-coat system

3.11
coil coating
process in which an (organic) coating material is applied on rolled metal strip in a continuous process which includes cleaning, if necessary, and chemical pre-treatment of the metal surface and either: 1) one-side or two-side, single or multiple application of (liquid) paints or coating powders which are subsequently cured and/or 2) laminating with permanent plastic films

Note 1 to entry: Curing processes include those by convective or inductive heating or by radiation.

Note 2 to entry: Laminating with metal strip resulting in a sandwich system is possible.

Note 3 to entry: A single chemical pre-treatment and primer coat is possible.

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3.12
colour
sensation resulting from the visual perception of radiation of a given composition (related to EN 13523-22)

Note 1 to entry: A colour is uniquely characterized for a defined observer and a defined light source as well as illuminating and viewing geometry by the coordinates of a point in a space (colorimetric specification with tristimulous values).

3.13
colour difference
magnitude and character of the visually perceived, i.e. qualitative, difference between two colours under daylight and artificial light respectively, or the magnitude and direction of the (instrumentally) measured and calculated difference of two colours (related to EN 13523-3)

3.14
corrosion protection (interior) category
CPI
category of coating which presents a certain level of corrosion protection, the choice of which depends on the corrosivity category, the period of protection and the accessibility

3.15
corrosion resistance (outdoor) category
RC
category of product which presents a certain level of corrosion resistance, the choice of which depends on the corrosivity category, the period of resistance and the accessibility

Note 1 to entry: Different categories of organic coil coated products for outdoor application are classified based on their level of corrosion resistance. Criteria of classification are related to the level of their artificial (accelerated) and natural outdoor corrosion resistance

Note 2 to entry: These conditions determine the corrosivity category and include both meteorological and pollution parameters (EN ISO 12944-2).

Note 3 to entry: Environmental conditions can apply which are not typical of the region as a whole, e.g. in a rural atmosphere close to a fossil fuel burning power generation plant, areas immediately downwind of the prevailing wind direction can be subjected to an environment closer to urban or even industrial atmospheres. Such special cases should be considered when organic coatings are chosen.

3.16
corrosivity category
C
category which indicates the corrosivity of the environment taking into account both atmospheric conditions prevailing around a constituent element of a structure, and micro-environmental effects and shall be used for the selection of the appropriate product (related to EN ISO 12944-2)

Note 1 to entry: The relationship between corrosivity categories and types of atmospheres is given in Table 6.

3.17
gloss
optical property of a surface, characterized by its ability to reflect light (related to EN 13523-2)

Note 1 to entry: For qualitative purposes, gloss ranges are often described by the terms “matt”, “low gloss” or “semi-matt”, “satin”, “semi-gloss”, “gloss” and “high gloss”.

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3.18
specular gloss
ratio of the luminous flux from an object in the specular direction for a specified source and receptor angle to the luminous flux from polished black glass (related to EN 13523-2)

3.19
master coil
coil from which sheets, cut lengths or two or more smaller coils are produced

3.20
organic coating
dry paint film of the coated product or the plastic film of the film/metal laminate

3.21
period of protection
time between the first exposure of the steel component and the moment at which maintenance works need to be carried out to restore corrosion protection

Note 1 to entry: The need to restore corrosion protection is deemed to arise when failure of the coating has occurred to the point where a significant amount (for example 5 %) of the component surface exhibits corrosion of the substrate.

3.22
reverse side
opposite side of the top side (see 3.26)

3.23
saturated colour
colour with Chroma C* ≥ 40

Note 1 to entry: Chroma C* is defined by CIE 15:2004.

3.24
substrate
base material from rolled steel flat products, with or without metallic coating

3.25
time of wetness
period during which a coated surface is covered by a film of electrolyte that is capable of causing atmospheric corrosion (see EN ISO 12944-2)

Note 1 to entry: Guidance value for time of wetness can be calculated from the temperature and relative humidity by summing the hours where the relative humidity is above 80 % and, at the same time, the temperature is above 0 °C.

3.26
top side
side of the strip with the highest decorative demand and/or corrosion protection and which, in normal production, is uppermost, respectively the exterior side of a coil

3.27
uncoated
condition in which parts of the surface of the substrate (e.g. one side of the strip) remain uncoated

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3.28
UV resistance category
R_{uv}
category of coating which presents a certain level of resistance to degradation by UV radiation

Note 1 to entry: Different categories of organic coil coated products for outdoor application are classified based on their level of UV resistance. Criteria of classification are related to their level of artificial (accelerated) and natural outdoor UV resistance according to the cumulative solar energy of the outdoor exposure site.

3.29
test specimen
sample produced on a full scale production line with the complete paint system

3.30
rural atmosphere
atmosphere prevailing in rural areas and small towns, without significant contamination by corrosive agents such as sulphur dioxide and/or chlorides

Note 1 to entry: See also EN ISO 12944-2.

3.31
urban atmosphere
contaminated atmosphere prevailing in densely populated areas without significant industry

Note 1 to entry: See also EN ISO 12944-2.

Note 2 to entry: It has moderate concentrations of pollutants such as sulphur dioxide and/or chlorides.

3.32
industrial atmosphere
atmosphere contaminated by corrosive pollutants from local and regional industry (mainly sulphur dioxide)

Note 1 to entry: See also EN ISO 12944-2.

3.33
marine atmosphere
atmosphere over and near the sea

Note 1 to entry: See also EN ISO 12944-2.

Note 2 to entry: A marine atmosphere will extend along a certain distance inland, depending on topography and prevailing wind direction. It has a high content of sea-salt aerosols (mainly chlorides).

Note 3 to entry: The following explanations can be used for guidance:

— Low salinity is typical of areas located between 10 km and 20 km from the seashore.

— Moderate salinity is typical of areas located between 3 km and 10 km from the seashore.

— High salinity is typical of areas located from the seashore to 3 km inland.

Note 4 to entry: A distinction can be made between seashore and seafront. Seafront is defined as the place which is submitted to direct attack by seawater and sea-salt aerosols.

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3.34
industrial and marine atmosphere
atmosphere which combines industrial atmosphere (3.32) and marine atmosphere (3.33) conditions

Note 1 to entry: See also EN ISO 12944-2.

Note 2 to entry: In a given type of atmospheric environment, various corrosivity categories can be registered depending on the location, i.e.:

— open air: both climatic influences and corrosive agents can act on metallic materials;

— under shelter: except rain, sunlight irradiation and solar gain, other climatic influences and corrosive agents can act on metallic materials.

4 Designation

For the steel substrates covered by this document (see 6.1.1), the steel names are allocated in accordance with EN 10027-1, the steel numbers are allocated in accordance with EN 10027-2.

The products covered by this document shall be designated as follows in the order given:

a) type of product (e.g. strip, sheet or cut length, see EN 10079);

b) reference to this document, i.e. EN 10169:2022;

c) complete designation of the substrate, i.e.:

   1) steel name or number;

   2) type and nominal mass of the metal coating;

   3) number of the standard for the substrate;

   4) dimensions and tolerances;

d) symbol “OC” for organic coated, when the coating material is not specified;

e) symbol for the organic coating material on the top side and, if applicable, that on the reverse side (see Table B.1);

f) nominal thickness, in µm, of the organic coating on the top side and, if applicable, on the reverse side;

NOTE 1 The information concerning the coating on the top side is separated from that relative to the reverse side by a slash mark.

NOTE 2 As the nature of the coating material on the reverse side is at the discretion of the manufacturer, it is not stated in the designation.

g) if applicable, product flexibility (see 6.3.2);

h) if applicable, corrosion protection category CPI (see Table 5) or corrosion resistance category RC (see Table 7) of the top side followed by the one of the reverse side when required;

i) if applicable, UV resistance category, R_{uv}, (see Table 8) of the top side.

Where appropriate, additional information to the designation as specified in Clause 4 shall be given to describe clearly the delivery requirements (see 5.1).

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