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Cold-reduced electrolytic chromium/chromium oxide-coated steel

Fer chromé électrolytique laminé à froid
[Revision of first edition (ISO 11950:1995)]

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO/DIS 11950:2013 was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 9, *Tinplate and blackplate*.

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Cold-reduced electrolytic chromium/chromium oxide-coated steel

1 Scope

This International Standard specifies requirements for single and double cold-reduced electrolytic chromium/chromium oxide-coated steel (ECCS) in the form of sheets or coils.

In general, single cold-reduced ECCS is specified in nominal thicknesses that are multiples of 0,005 mm, from 0,15 mm up to and including 0,60 mm. Double cold-reduced ECCS is specified in nominal thicknesses that are multiples of 0,005 mm, from 0,10 mm up to and including 0,36 mm.

This International Standard applies to coils and sheets cut from coils in nominal minimum rolling widths of 600 mm¹⁾.

In addition, the general technical delivery requirements of ISO 404 are applicable.

2 Normative references

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

ISO 404, *Steel and steel products – General technical delivery condition*

ISO 4288, *Geometrical Product Specifications (GPS) – Surface texture : Profile method – Rule and procedures for the assessment of surface texture*

ISO 6508-1:2005, *Metallic materials – Rockwell hardness test – Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)*.

ISO 6892-1:2009, *Metallic materials - Tensile testing – Part 1: Method of test at room temperature*.

ISO/TR 9769, *Steel and iron – Review of available methods of analysis*

ISO 10474, *Steel and steel products – Inspection documents*

ISO 11951, *Cold-reduced blackplate in coil form for the production of electrolytic tinplate or electrolytic chromium / chromium oxide-coated steel*

3 Definitions

For the purposes of this International Standard, the following definitions apply:

1) Nominal minimum rolling widths of 500 mm may be applied by agreement between the purchaser and the manufacturer.

- 3.1
blackplate**
Cold-reduced low-carbon mild steel, applied for manufacturing ECCS (refer to ISO 11951)
- 3.2
electrolytic chromium/chromium oxide-coated steel (ECCS)**
cold-reduced low-carbon mild steel sheet or coil, electrolytically treated to produce on both surfaces a duplex film of metallic chromium adjacent to the steel substrate with a top layer of hydrated chromium oxide or hydroxide .
- 3.3
single cold-reduced**
term used to describe those products in which the blackplate has been reduced to the desired thickness in a cold-reduction mill and subsequently annealed and temper rolled.
- 3.4
double cold-reduced**
term used to describe those products in which the blackplate has had a second major reduction after annealing.
- 3.5
standard grade ECCS sheet**
material in sheet form which is the product of line inspection. It is suitable, under normal conditions of storage, for established lacquering and printing over the entire sheet and is:
- a) free from surface imperfections which render the material unsuitable for the intended use;
 - b) free from damage which render the material unsuitable for the intended use;
 - c) compliant to the requirements as specified in this International Standard.
- 3.6
batch annealed; box annealed (BA)**
annealed by the process in which the cold-reduced strip is annealed in coil form, within a protective atmosphere, for a predetermined time-temperature cycle.
- 3.7
continuously annealed (CA)**
annealed by the process in which cold-reduced coils are unwound and annealed in strip form within a protective atmosphere.
- 3.8
finish**
appearance of the surface of ECCS, governed by the surface roughness (*Ra*) of the steel base which result from controlled preparation of the work rolls during the final stages of rolling.
- 3.8.1
matt finish**
finish resulting from the use of temper-mill work rolls with dull surface textured by Shot Blast, EDT(Electro Discharge Texturing), EBT (Electron Beam Texturing) and so on,
- 3.8.2
smooth finish**
finish resulting from the use of temper-mill work rolls that have been ground to a low roughness.
- 3.8.3
stone finish**
finish characterized by a directional pattern, resulting from the use of final-mill work rolls that have been ground to a higher level of roughness than those used for the smooth finish.

3.9**coil**

rolled flat strip product which is wound into regularly superimposed laps so as to form a coil with almost flat sides.

3.10**longitudinal bow; line bow**

residual curvature in the strip remaining along the direction of rolling.

3.11**transverse bow; cross bow**

mode of curvature in the sheet such that the distance between its edges parallel to the direction of rolling is less than the sheet width.

3.12**centre fullness; centre buckle, full centre**

intermittent vertical displacement or wave in the strip occurring other than at the edges (see Figure 8).

3.13**edge wave**

intermittent vertical displacement occurring at the strip edge when the strip is laid on a flat surface.

3.14**feather edge; transverse thickness profile**

Variation in thickness, characterized by a reduction in thickness close to the edges, at right angles to the direction of rolling.

3.15**Edge camber**

deviation of edge of coil from a straight line forming its chord.

3.16**burr**

metal displaced beyond the plane of the surface of the strip by shearing action.

3.17**rolling width**

width of the rolled strip perpendicular to the direction of rolling.

3.18**pallet**

base platform on which a coil is placed to facilitate ready transportation.

3.19**stillage platform**

base platform on which sheets are stacked to facilitate packing and ready transportation.

3.20**consignment**

quantity of material of the same specification made available for dispatch at the same time.

3.21**bulk package; bulk**

packaging unit comprising a stillage platform, the sheets and packaging material. (See pallet.)

3.22**line inspection**

final inspection of the finished product performed by instruments and/or visual examination at normal production-line speeds.

3.23

anvil effect

effect which a hard anvil can produce on the numerical hardness value obtained when a hardness test is performed on very thin sheet supported on such an anvil.

4 Classification

Steel grades for this international standard are generally classified as non-alloy quality steels.

5 Information to be supplied by the purchaser

5.1 Designation

For the purposes of this International Standard, ECCS is designated in terms of a steel grade classification based either on the Rockwell HR30Tm hardness values or on the tensile properties. For the hardness requirement, the steel grade designations are given in Table A.1 for single cold-reduced ECCS and in Table A.2 for double cold-reduced ECCS. For the tensile properties requirement, the steel grade designations are given in Table B.1.

ECCS covered by this International Standard shall be designated by the following characteristics in the given sequence:

- a) the number of this International Standard;
- b) the steel grade designation in accordance with Table A.1, Table A.2 or Table B.1;
- c) the type of annealing used by the manufacturer (see 6.2);
- d) the type of finish (see 6.3);
- e) the dimensions, in millimetres:
 - for coils, thickness x width;
 - for sheets, thickness x width x length.

NOTE 1 By agreement, the symbol "x C" after width may be designated for coils.

NOTE 2 By agreement, the symbol "w" may be designated after number of width to show the rolling width.

EXAMPLE

Single cold-reduced ECCS sheet, in accordance with this International Standard, steel grade T61, continuously annealed (CA), stone finish, with a thickness of 0,22 mm, a width of 800 mm and a length of 900 mm shall be designated:

ISO 11950 – T61 - CA - stone - 0,22 x 800 x 900

Double cold-reduced ECCS coil, in accordance with this International Standard, steel grade T75, continuously annealed (CA), stone finish, with a thickness of 0,18 mm and a width of 750 mm shall be designated:

ISO 11950 - T75 - CA - stone - 0,18 x 750

ECCS coil, in accordance with this International Standard, steel grade TH415, continuously annealed (CA), stone finish (ST), with a thickness of 0,20 mm, a width of 750 mm shall be designated:

ISO 11950 - TH415 - CA - ST - 0,20 x 750 x C

ECCS sheet, in accordance with this International Standard, steel grade TS520, batch annealed (BA), stone finish, with a thickness of 0,14 mm, a rolling width of 844 mm and a length of 755 mm shall be designated:

ISO11950 - TS520 - BA - stone - 0,14 x 844w x 755

5.2 Mandatory information

The following information shall be given in the enquiry and order to assist the manufacturer in supplying the correct material:

- a) the designation as given in 5.1;
- b) the quantity, expressed on an area or mass basis;
- c) end use;
- d) any further special requirements.

NOTE Appropriate classifications are suitable for shaping operations such as stamping, drawing, folding, beading and bending, and assembly work such as joint forming and welding. The end use should be borne in mind when the classification is selected.

5.3 Options

In addition to the information in 5.2, the purchaser may wish to provide further information to the manufacturer to ensure that the order requirements are consistent with the end use of the product.

The purchaser shall inform the manufacturer of any modifications to his fabrication operations that will significantly affect the way in which the ECCS is used.

NOTE When ordering cold-reduced ECCS, the purpose of manufacture for which the material is intended should be stated. When double cold-reduced ECCS is used for built-up can bodies, the rolling direction should be around the circumference of the can so as to minimize the hazard of flange cracking. In such cases, the direction of rolling should be clearly designated on the contract.

6 Manufacturing features

6.1 Manufacture

Continuously cast, fully-killed steel is applied except when otherwise specified. The examples of the steel types of ECCS are shown in Annex C.

The steel type of ECCS shall be designed to secure food safety if ECCS is used for food application. The purchasers should be aware of existing national regulations which may impose limitations on some elements.

The methods of manufacture ECCS are the province of the manufacturer and are not specified in this International Standard.

6.2 Annealing

Annealing of ECCS shall be either batch annealing (BA) or continuous annealing (CA), and shall be specified by the purchaser at the time of enquiry and order.

6.3 Finish

ECCS is usually available in the finishes as indicated in Table 1.