SLOVENSKI STANDARD

SIST EN 10341:2006

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Nadomeģ a:

SIST EN 10126:1997

SIST EN 10165:1997

Hladno valjana elektroploļ evina in trakovi iz nelegiranega in legiranega jekla, dobavljena v neģarjenem konļ nem stanju

Cold rolled electrical non-alloy and alloy steel sheet and strip delivered in the semi-processed state

Kaltgewalztes Elektroblech und -band aus unlegierten und legierten Stählen im nicht schlussgeglühten Zustand

Bandes et tôles magnétiques laminées a froid en acier non allié et en acier allié livrées a l'état semi-fini

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English Version

Cold rolled electrical non-alloy and alloy steel sheet and strip delivered in the semi-processed state

Bandes et tôles magnétiques laminées à froid en acier non allié et en acier allié livrées à l'état semi-fini

Kaltgewalztes Elektroblech und -band aus unlegierten und legierten Stählen im nicht schlussgeglühten Zustand

This European Standard was approved by CEN on 20 April 2006.

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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.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 10341:2006) has been prepared by Technical Committee ECISS/TC 24 “Electrical steel sheet and strip qualities - Qualities, dimensions, tolerances and specific tests”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by November 2006, and conflicting national standards shall be withdrawn at the latest by November 2006.

This document supersedes EN 10126:1995 and EN 10165:1995.

This document is based on IEC 60404-8-3:2005 which was technically changed.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This document has been prepared by merging EN 10126:1995 and EN 10165:1995, taking into consideration corresponding decisions of IEC/TC 68 on relevant IEC documents IEC 60404-8-2:1998 and IEC 60404-8 -3:1998 which are being merged at the same time. The merged document published as IEC 60404-8-3:2005 was the basis of this European Standard.

The intention of this merging was to specify no longer non-alloy and alloy steel grades for cold rolled electrical steel sheet and strip, but to leave the type of steel open. Therefore, it has been decided to use a new letter "K" instead of previous used "D" or "E" for the designation of electrical steels specified in this European Standard.

The dew point of the gas used for the heat treatment specified in 7.1.1 is + 20 °C ± 2 °C at atmospheric pressure. This is the value stated in EN 10165:1995 but it differs from the temperature of + 35 °C stated in EN 10126:1995.

As the final annealing of cold-rolled electrical non-alloy and alloy steel sheet and strip delivered in the semi-processed state is the responsibility of the purchaser, attention is drawn to the importance of this treatment for the properties of the material.

For this reason the magnetic properties in Table 1 are given for a reference condition (see 7.1.1) obtained by a suitable heat treatment. To ensure that the properties in use are equivalent to those specified, it is important that the heat treatment carried out by the user is equivalent to that used to define the reference condition.

It is recognized that these materials may be used in the semi-processed state, in which case the magnetic properties are not subject to the specifications of this standard.

1 Scope

This document specifies cold-rolled electrical non-oriented non-alloy[1)] or alloy[2)] steel sheet and strip delivered in nominal thicknesses of 0,50 mm and 0,65 mm in the semi-processed condition, that is without final heat treatment; in particular, it specifies general requirements, magnetic properties, geometric characteristics and tolerances and technological characteristics, as well as the inspection procedure.

This document applies to material intended for the construction of magnetic circuits.

These magnetic materials correspond respectively to subclauses C21 and B2 of IEC 60404-1:2000.

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 10021, *General technical delivery requirements for steel and iron products*

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

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

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

EN 10251, *Magnetic materials - Methods of determination of the geometrical characteristics of electrical steel sheet and strip*

EN 60404-2, *Magnetic materials — Part 2: Methods of measurement of the magnetic properties of electrical steel sheet and strip by means of an Epstein frame (IEC 60404-2:1996)*

IEC 60050-121:1998, *International Electrotechnical Vocabulary — Part 121: Electromagnetism*

IEC 60050-221:1990, *International Electrotechnical Vocabulary — Part 221: Magnetic materials and components*

IEC 60404-1:2000, *Magnetic materials — Part 1 : Classification*

IEC 60404-13, *Magnetic materials — Part 13 : Methods of measurement of density, resistivity and stacking factor of electrical steel sheet and strip*

3 Terms and definitions

For the purposes of this document, the definitions of the principal terms relating to magnetic properties given in IEC 60050-121:1998 and IEC 60050-221:1990 apply. In addition, the following terms and definitions apply.

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1) Non-alloy steel is that steel the basic constituent of which is iron containing alloying elements in amounts smaller than the limiting values fixed by EN 10020.

2) Alloy steel is that steel the basic constituent of which is iron containing alloying elements in amounts equal to or greater than the limiting values fixed by EN 10020.

3.1
edge camber
greatest distance between a longitudinal edge of the sheet or strip and the line joining the two extremities of the measured length of this edge

3.2
flatness
property of a sheet or a length of strip which is characterized by the wave factor, i.e. the relation of the height of the wave to its length

3.3
residual curvature
permanent curvature in the direction of rolling of an unwound strip

3.4
internal stresses
stresses which are characterized by a deviation in relation to the line of cutting

4 Classification and designation

4.1 Classification

The steel grades covered by this document are classified according to the specified value of maximum specific total loss in watts per kilogram at 1,5 T after a reference heat treatment (see 7.1.1) and according to the nominal thickness of the material (0,50 mm, 0,65 mm).

4.2 Designation

4.2.1 For the steel grades covered by this document, the steel names are allocated in accordance with EN 10027-1. The steel numbers are allocated in accordance with EN 10027-2.

The steel name comprises the following in the order given:

1) the letter M for electrical steel;

2) one hundred times the specified value of maximum specific total loss at 50 Hz, in watts per kilogram, corresponding to the nominal product thickness, at 1,5 T;

3) one hundred times the nominal thickness of the material, in millimetres;

4) the letter K for non-alloy or alloy electrical steel sheet or strip delivered in the semi-processed state.

EXAMPLE M660-50K for electrical non-alloy or alloy steel sheet or strip with a specified maximum specific total loss at 1,5 T of 6,60 W/kg at 50 Hz and a nominal thickness of 0,50 mm, supplied in a semi-processed state.

5 Information to be supplied by the purchaser

5.1 Mandatory information

The following information shall be supplied by the purchaser at the time of enquiry and order:

a) quantity;

b) type of product (strip or sheet);

c) number of this European Standard (EN 10341);

d) steel name or number (see 4.2.1);

e) dimensions of sheets or strips required (including any limitations on the external diameter of a coil) (see 6.2 and 7.2.2);

f) limitations on the mass of a bundle of sheets or of a coil (see 6.2);

g) type of inspection document when specific inspection is specified (see 8.1).

5.2 Options

A number of options are specified in this standard and listed below. If the purchaser does not indicate his wish to implement one of these options, the products shall be supplied in accordance with the basis specification of this standard (see 5.1).

1) permissibility of welds and its marking (see 6.2);

2) surface condition (see 6.4);

3) suitability test for punching and cutting (see 6.5);

4) conventional density (see Table 1, footnote c);

5) anisotropy of loss and magnetic polarization (see 7.1.4);

6) thickness difference perpendicular to the direction of rolling for narrow strips and its measurement (see 7.2.1 and 8.4.3.1);

7) width tolerances for nominal widths > 1 250 mm (see Table 2, footnote a);

8) density values deviating from those given in Table 1 (see 7.3.1);

9) stacking factor (see 7.3.2);

10) acceptance unit other than 20 t (see 8.1);

11) test temperature other than (23 ± 5) °C (see 8.4.1);

12) marking of the products (see Clause 9).

6 General requirements

6.1 Production process

The production process of the steel and its chemical composition are left to the discretion of the manufacturer.

6.2 Form of supply

The material is supplied in bundles in the case of sheets and in coils in the case of strip.

The mass of bundles of sheets or coils shall be agreed at the time of enquiry and order.

The most usual values for internal diameter of coils are approximately 508 mm and 610 mm. The recommended value is approximately 508 mm. The external diameter shall be the subject of an agreement at the time of enquiry and order.

Sheets which make up each bundle shall be stacked so that the side faces are substantially flat and approximately perpendicular to the top face.

Strip shall be of constant width and wound in such a manner that the edges are superimposed in a regular manner and that the side faces of the coil are substantially flat.

Coils shall be sufficiently tightly wound that they do not collapse under their own weight.

Strip may exhibit welds resulting from the removal of defective zones if agreed at the time of enquiry and order. If necessary, the marking of welds may be agreed at the time of enquiry and order.

For coils containing repair welds, each part of the strip shall be of the same grade.

The edges of parts welded together shall not be so much out of alignment as to affect the further processing of the material.

6.3 Delivery condition

Material supplied with trimmed edges shall not have any burrs which will adversely affect its further application or use.

As the result of the method of manufacture and delivery in the form of coils, material may, in the delivery condition, exhibit residual curvature in the rolling direction as well as certain internal stresses. Precautions shall be taken by the user to reduce or eliminate the effect of these factors on the application or use of the material.

The material may be supplied without an insulating coating or with a thin insulating coating which may act as an “anti-stick” coating during anneal.

6.4 Surface condition

The surfaces shall be smooth and clean, free from grease and rust. Dispersed defects such as scratches, blisters, cracks, etc. are permitted if they are within the limits of tolerance on thickness and if they are not detrimental to the correct use of the supplied material.

The surface condition and in particular the roughness of the material may be agreed at the time of enquiry and order.

6.5 Suitability for cutting

The material shall be able to be cut or punched at any point and in the usual shapes, thus ensuring accurate working with the correct cutting tools. If there are special requirements with regard to a suitability test for punching or cutting, these shall be established by agreement at the time of enquiry and order.

7 Technical requirements

7.1 Magnetic properties

7.1.1 Reference condition

Magnetic properties are specified in Table 1. Annex A gives additional magnetic properties for information.

The magnetic properties (magnetic polarization and specific total loss) only apply to test specimens in the reference condition which is obtained by the following heat treatment.

Test strips shall be subjected to a heat treatment in a decarburizing atmosphere at the temperature specified in Table 1 and shall be maintained for 2 h at this temperature. The heating rate shall not exceed 200 °C/h. The cooling rate from the temperatures specified in Table 1 to 550 °C shall not exceed 120 °C/h. The gas necessary for decarburization shall have a volume fraction of 20 % H_2, 80 % N_2 with water vapour, the dew point being + 20 °C ± 2 °C at atmospheric pressure.

NOTE In special cases, it may be appropriate for the manufacturer to recommend a non-standard reference treatment, for example in a non-decarburizing atmosphere for steels with a very low carbon content.

The establishment of the decarburizing atmosphere requires the removal of air from the annealing furnace before raising the temperature. This removal is effected by continuously purging the furnace with an inert protective gas. The flow and pressure of the decarburizing gas shall be regulated to ensure good decarburization at any point on the test specimen and a complete renewal of the atmosphere in the furnace several times during the heat treatment.

The test strips should not have any contact with each other.

7.1.2 Magnetic polarization

The specified values for the minimum magnetic polarization for magnetic field strengths H of 2 500 A/m, 5 000 A/m and 10 000 A/m shall be as given in Table 1.

The magnetic polarization shall be determined in an alternating magnetic field (expressed as a peak value) at 50 Hz.