Grain-oriented electrical steel strip and sheet delivered in the fully processed state

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 10107:2022 sisaldab Euroopa standardi EN 10107:2022 ingliskeelset teksti.	This Estonian standard EVS-EN 10107:2022 consists of the English text of the European standard EN 10107:2022.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 07.09.2022.	Date of Availability of the European standard is 07.09.2022.
Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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EUROPEAN STANDARD

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EN 10107

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English Version

Grain-oriented electrical steel strip and sheet delivered in the fully processed state

Bandes et tôles en acier électrique à grains orientés livrées à l'état fini

Kornorientiertes Elektroband und -blech im schlussgeglühten Zustand

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

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 10107:2022) has been prepared by Technical Committee CEN/TC 459 “ECISS – European Committee for Iron and Steel Standardization”[1], 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of an identical text or by endorsement, at the latest by March 2023, and conflicting national standards shall be withdrawn at the latest by March 2023.

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 10107:2014.

This edition includes the following significant technical changes with respect to the previous edition:

— insertion of a third class of electrical steels for magnetic domain refined high permeability grades;

— introduction of the Single Sheet Testing (SST) method as reference measurement method for this third class of material together with a conversion factor for transposition of the SST measurement results to the Epstein measurement results;

— update of the electrical steel range to take account of the current offers and demands of grades.

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, Türkiye and the United Kingdom.

[1] Through its sub-committee SC 8 “Steel sheet and strip for electrical applications” (secretariat: DIN).

Introduction

The insertion of a third class of electrical steels for magnetic domain refined high permeability grades is the main reason of this revision. Most of the technologies of magnetic domain refinement result in material that does not withstand the stress relief annealing after cutting without changing the magnetic properties (i.e. the specific total loss). In the case of this material, the Epstein method according to EN 60404-2, requiring the annealing of the Epstein strip samples, is not suitable. Therefore, the Single Sheet Tester (SST) method specified in IEC 60404-3 is employed.

The introduction of the SST as the reference measurement method for these magnetic domain refined high permeability grades was preceded by intense discussions within IEC/TC 68.

The specific total loss measured by use of the SST specified in IEC 60404-3 tends to be larger than the value measured by the use of Epstein frame in accordance with EN 60404-2. The magnetic polarization at H = 800 A/m measured by use of the SST tends to be a little lower than the value measured by the use of Epstein frame.

The significant difference between Epstein and SST loss results made it necessary to introduce a Conversion Factor, F_c, applied to the SST results. This Conversion Factor is to create continuity in the quality characteristics ratio of conventional grain-oriented electrical steel grades and of high permeability grades (Epstein related loss values) to the magnetic domain refined high permeability grades (SST related loss values), particularly over the transition zone between these grades. Otherwise, it might be confusing to the users of this specification standard that the higher quality materials measured by the SST method are listed with seemingly higher values of the specific total loss, compared with the lower Epstein values measured on the lower quality grades.

Considerations of the widely spread grades of grain-oriented electrical steel led to the consented value of F_c = 0,925 to be applied to the loss values at 1,7 T measured by the SST method.

The magnetic polarization for H = 800 A/m is the value taken from the SST measurement without conversion to an equivalent Epstein value.

Consequently, the magnetic domain refined high permeability grades have been listed in a new Table 3 as a new class of grain-oriented electrical steel strip and sheet.

1 Scope

This document defines the steel grades of grain-oriented electrical steel strip and sheet in nominal thicknesses of 0,20 mm, 0,23 mm, 0,27 mm, 0,30 mm and 0,35 mm. In particular, it gives general requirements, magnetic properties, geometric characteristics, tolerances and technological characteristics, as well as inspection procedures.

This document applies to Goss textured grain-oriented electrical steel strip and sheet supplied in the final annealed condition in coils or sheets and intended for the construction of magnetic circuits.

The grades are grouped into three classes:

— conventional grades;

— high permeability grades;

— magnetic domain refined high permeability grades.

They correspond to Class C22 of IEC 60404-1.

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 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 strip and sheet by means of an Epstein frame*

EN IEC 60404-11, *Magnetic materials - Part 11: Methods of measurement of the surface insulation resistance of electrical steel strip and sheet*

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

EN ISO 7799, *Metallic materials - Sheet and strip 3 mm thick or less - Reverse bend test (ISO 7799)*

IEC 60050-121, *International electrotechnical vocabulary — Part 121: Electromagnetism*

IEC 60050-221, *International electrotechnical vocabulary — Part 221: Magnetic materials and components*

IEC 60404-3, *Magnetic materials — Part 3: Methods of measurement of the magnetic properties of electrical steel strip and sheet by means of a single sheet tester*