SLOVENSKI STANDARD
SIST EN ISO 643:2013

01-junij-2013

Nadomešča:
SIST EN ISO 643:2004

Jekla - Mikrografsko določevanje navidezne velikosti kristalnih zrn (ISO 643:2012)

Steels - Micrographic determination of the apparent grain size (ISO 643:2012)

Stahl - Mikrophotographische Bestimmung der scheinbaren Korngröße (ISO 643:2012)

Aciers - Détermination micrographique de la grosseur de grain apparente (ISO 643:2012)

Ta slovenski standard je istoveten z: EN ISO 643:2012

ICS:

77.040.99	Druge metode za preskušanje kovin	Other methods of testing of metals
77.080.20	Jekla	Steels

SIST EN ISO 643:2013 **en,fr**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 643

December 2012

ICS 77.040.99

Supersedes EN ISO 643:2003

English Version

Steels - Micrographic determination of the apparent grain size (ISO 643:2012)

Aciers - Détermination micrographique de la grosseur de grain apparente (ISO 643:2012)

Stahl - Mikrophotographische Bestimmung der scheinbaren Korngröße (ISO 643:2012)

This European Standard was approved by CEN on 10 December 2012.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN ISO 643:2012) has been prepared by Technical Committee ISO/TC 17 "Steel" in collaboration with Technical Committee ECISS/TC 101 “Test methods for steel (other than chemical analysis)” 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of an identical text or by endorsement, at the latest by June 2013, and conflicting national standards shall be withdrawn at the latest by June 2013.

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

This document supersedes EN ISO 643:2003.

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Endorsement notice

The text of ISO 643:2012 has been approved by CEN as a EN ISO 643:2012 without any modification.

INTERNATIONAL STANDARD

ISO 643

Third edition
2012-12-15

Steels — Micrographic determination of the apparent grain size

Aciers — Détermination micrographique de la grosseur de grain apparente

Reference number
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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 643 was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 7, *Methods of testing (other than mechanical tests and chemical analysis)*.

This third edition cancels and replaces the second edition (ISO 643:2003), of which it constitutes a minor revision. A note was added after the first paragraph of 7.1.2.

Steels — Micrographic determination of the apparent grain size

1 Scope

This International Standard specifies a micrographic method of determining apparent ferritic or austenitic grain size in steels. It describes the methods of revealing grain boundaries and of estimating the mean grain size of specimens with unimodal size distribution. Although grains are three-dimensional in shape, the metallographic sectioning plane can cut through a grain at any point from a grain corner, to the maximum diameter of the grain, thus producing a range of apparent grain sizes on the two-dimensional plane, even in a sample with a perfectly consistent grain size.

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.

ISO 3785, *Steel — Designation of test piece axes*

ISO 14250, *Steel — Metallographic characterization of duplex grain size and distributions*

ASTM E112, *Standard Test Methods for Determining Average Grain Size*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
grain
closed polygonal shape with more or less curved sides, which can be revealed on a flat cross-section through the sample, polished and prepared for micrographic examination

A distinction is made between:

3.1.1
austenitic grain
crystal with a face-centered cubic crystal structure which may, or may not, contain annealing twins

3.1.2
ferritic grain
crystal with a body-centered cubic crystal structure which never contains annealing twins[1)]

1) Ferritic grain size is generally estimated for non-alloy steels with a carbon content of 0,25 % or less. If pearlite islands of identical dimensions to those of the ferrite grains are present, the islands are then counted as ferrite grains.

3.2
index
positive, zero or possibly negative number G which is derived from the mean number m of grains counted in an area of 1 mm^2 of the section of the specimen

NOTE By definition, G = 1 where m = 16; the other indices are obtained by the formula

$$m = 8 \times 2^G$$

3.3
intercept
N
number of grains intercepted by a test line, either straight or curved

See Figure 1.

NOTE Straight test lines will normally end within a grain. These end segments are counted as 1/2 an interception. $\overline{N}$ is the average of a number of counts of the number of grains intercepted by the test line applied randomly at various locations. $\overline{N}$ is divided by the true line length, L_T, usually measured in millimetres, in order to obtain the number of grains intercepted per unit length, $\overline{N}_L$.

3.4
intersection
P
number of intersection points between grain boundaries and a test line, either straight or curved

See Figure 1.

NOTE $\overline{P}$ is the average of a number of counts of the number of grain boundaries intersected by the test line applied randomly at various locations. $\overline{P}$ is divided by the true line length, L_T, usually measured in millimetres, in order to obtain the number of grain boundary intersections per unit length, $\overline{P}_L$.

4 Symbols and abbreviated terms

The symbols used are given in Table 1.

5 Principle

The grain size is revealed by micrographic examination of a polished section of the specimen prepared by an appropriate method for the type of steel and for the information sought.

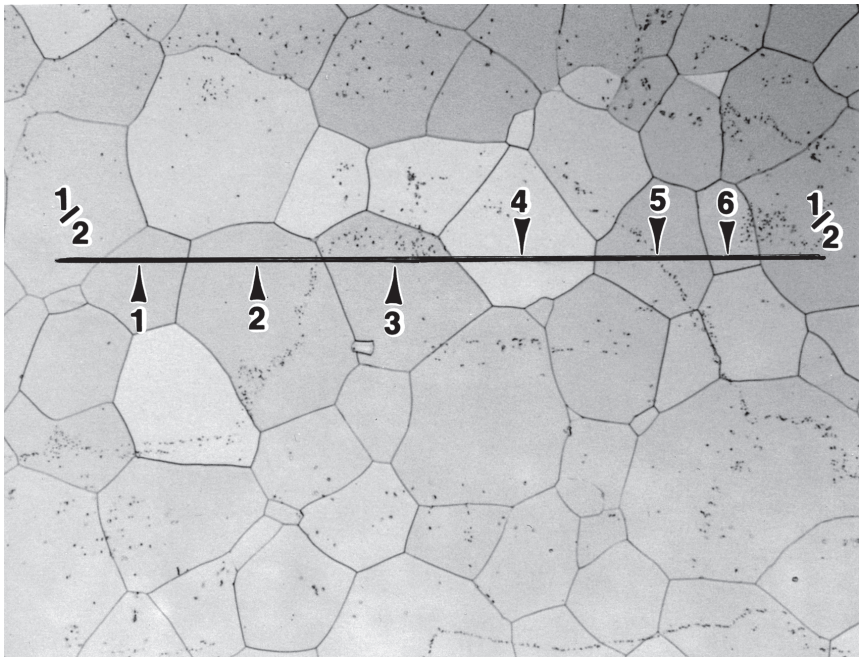
NOTE If the order or the International Standard defining the product does not stipulate the method of revealing the grain, the choice of this method is left to the manufacturer.

This average size is characterized either

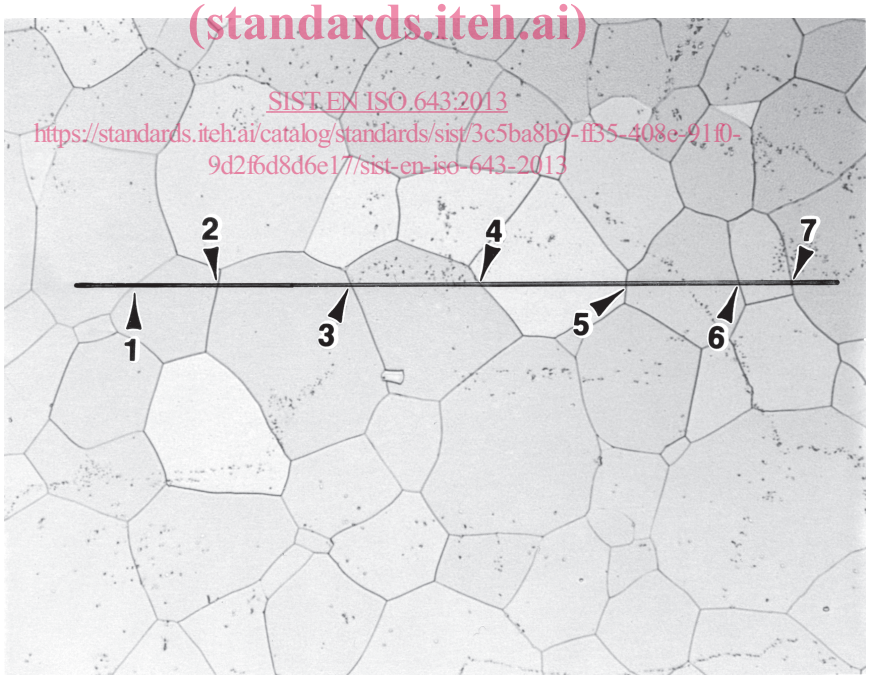
a) by an index obtained

- usually by comparison with standard charts for the measurement of grain size;
- or by counting to determine the average number of grains per unit area;

b) or by the mean value of the intercepted segment.



Interception, N, counts for a straight line on a single-phase grain structure where the arrows point to 6 intercepts and two line segments ending within grain ($2 \times 1/2 = 1$ N) and $N = 7$



Intersection, P, counts for a straight test line placed over a single-phase grain structure where the arrows point to 7 intersection points and $P = 7$

Figure 1 — Examples of intersection, P, and interception, N