

SLOVENSKI STANDARD SIST EN ISO 643:2004

01-marec-2004

Jekla - Mikrografsko določevanje navidezne velikosti kristalnih zrn (ISO 643:2003)

Steels - Micrographic determination of the apparent grain size (ISO 643:2003)

Stahl - Mikrophotographische Bestimmung der scheinbaren Korngröße (ISO 643:2003)

Aciers - Détermination micrographique de la grosseur de grain apparente (ISO 643:2003) (standards.iteh.ai)

Ta slovenski standard je istoveten z: EN ISO 643:2003

https://standards.iteh.ai/catalog/standards/sist/94ba0b86-06c5-4023-9d87-

abae066e8922/sist-en-iso-643-2004

<u>ICS:</u>

77.040.99	Druge metode za	
	preskušanje kovin	
77 080 20	lekla	

Other methods of testing of metals Steels

SIST EN ISO 643:2004

en



iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 643:2004 https://standards.iteh.ai/catalog/standards/sist/94ba0b86-06c5-4023-9d87abae066e8922/sist-en-iso-643-2004

SIST EN ISO 643:2004

EUROPEAN STANDARD NORME EUROPÉENNE EUROPÄISCHE NORM

EN ISO 643

February 2003

ICS 77.040.99

English version

Steels - Micrographic determination of the apparent grain size (ISO 643:2003)

Aciers - Détermination micrographique de la grosseur de grain apparente (ISO 643:2003)

Stahl - Mikrophotographische Bestimmung der scheinbaren Korngröße (ISO 643:2003)

This European Standard was approved by CEN on 21 January 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovak Republic, Spain, Sweden, Switzerland and United Kingdom.

<u>SIST EN ISO 643:2004</u> https://standards.iteh.ai/catalog/standards/sist/94ba0b86-06c5-4023-9d87abae066e8922/sist-en-iso-643-2004



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

© 2003 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members. Ref. No. EN ISO 643:2003 E



EN ISO 643:2003 (E)

CORRECTED 2003-04-30

Foreword

This document (EN ISO 643:2003) has been prepared by Technical Committee ISO/TC 17 "Steel" in collaboration with Technical Committee ECISS/TC 2 "Steel - Physico-chemical and non-destructive testing", 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 August 2003, and conflicting national standards shall be withdrawn at the latest by August 2003.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice Teh STANDARD PREVEW The text of ISO 643:2003 has been approved by CEN as EN ISO 643:2003 without any modifications. (standards.iteh.ai)

NOTE Normative references to International Standards are listed in Annex ZA (normative).

https://standards.iteh.ai/catalog/standards/sist/94ba0b86-06c5-4023-9d87abae066e8922/sist-en-iso-643-2004

Annex ZA (normative)

Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE Where an International Publication has been modified by common modifications, indicated by (mod.), the relevant EN/HD applies.

Publication	Year	<u>Title</u>	<u>EN</u>	Year
ISO 3785	1976	Steel - Designation of test piece axes	EN ISO 3785	1995

iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN ISO 643:2004</u> https://standards.iteh.ai/catalog/standards/sist/94ba0b86-06c5-4023-9d87abae066e8922/sist-en-iso-643-2004



iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 643:2004 https://standards.iteh.ai/catalog/standards/sist/94ba0b86-06c5-4023-9d87abae066e8922/sist-en-iso-643-2004

INTERNATIONAL STANDARD

ISO 643

Second edition 2003-02-15

Steels — Micrographic determination of the apparent grain size

Aciers — Détermination micrographique de la grosseur de grain apparente

iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN ISO 643:2004</u> https://standards.iteh.ai/catalog/standards/sist/94ba0b86-06c5-4023-9d87abae066e8922/sist-en-iso-643-2004



Reference number ISO 643:2003(E)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 643:2004

https://standards.iteh.ai/catalog/standards/sist/94ba0b86-06c5-4023-9d87abae066e8922/sist-en-iso-643-2004

© ISO 2003

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office Case postale 56 • CH-1211 Geneva 20 Tel. + 41 22 749 01 11 Fax + 41 22 749 09 47 E-mail copyright@iso.org Web www.iso.org Published in Switzerland

Contents

Forewo	ord	iv
1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	Symbols and abbreviated terms	2
5	Principle	2
6 6.1 6.2 6.3	Selection and preparation of the specimen Test location Revealing ferritic grain boundaries Revealing austenitic and prior-austenitic grain boundaries	5 5 5 5
7 7.1 7.2	Characterization of grain size Characterization by an index Characterization by the intercept method	10 10 11
8 Annex	Test report A (informative) Summary of methods for revealing ferritic, austenitic or prior-austenitic grain boundaries in steels to an classific or and an another steels to an all steels to all steels	14 15
Annex	B (normative) Determination of grain size — Standard charts taken from ASTM E112	16
Annex	C (normative) Evaluation method ST EN ISO 643:2004 https://standards.iteh.ai/catalog/standards/sist/94ba0b86-06c5-4023-9d87- abae066e8922/sist-en-iso-643-2004	31

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.

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

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 second edition cancels and replaces the first edition (ISO 643:1983), which has been technically revised. (standards.iteh.ai)

<u>SIST EN ISO 643:2004</u> https://standards.iteh.ai/catalog/standards/sist/94ba0b86-06c5-4023-9d87abae066e8922/sist-en-iso-643-2004

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 ARD PREVIEW

ISO 3785, Steel — Designation of test piece axes ds.iteh.ai)

ISO 14250, Steel — Metallographic characterization of duplex grain size and distributions <u>SIST EN ISO 643:2004</u>

ASTM E112, Standard Test Methods for Determining Average Grain Size 23-9d87abae066c8922/sist-en-iso-643-2004

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 twins¹)

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

Ν

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

Р

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

See Figure 1.

(standards.iteh.ai)

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 \underline{P}_{43} usually measured in millimetres, in order to obtain the number of grain boundary intersections pertunit length \underline{P}_{ap} dards/sist/94ba0b86-06c5-4023-9d87abae066e8922/sist-en-iso-643-2004

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*