BSI Standards Publication

Steels — Micrographic determination of the apparent grain size

National foreword

This British Standard is the UK implementation of EN ISO 643:2024. It is identical to ISO 643:2024. It supersedes BS EN ISO 643:2020, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/101/7, Methods of physical and metallographic testing.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Published by BSI Standards Limited 2024

ISBN 978 0 539 24745 9

ICS 77.040.99

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2024.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD **EN ISO 643**

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2024

ICS 77.040.99

Supersedes EN ISO 643:2020

English Version

Steels - Micrographic determination of the apparent grain size (ISO 643:2024)

Aciers - Détermination micrographique de la grosseur de grain apparente (ISO 643:2024)

Stahl - Mikrophotographische Bestimmung der erkennbaren Korngröße (ISO 643:2024)

This European Standard was approved by CEN on 2 September 2024.

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Ref. No. EN ISO 643:2024 E

European foreword

This document (EN ISO 643:2024) has been prepared by Technical Committee ISO/TC 17 "Steel" in collaboration with Technical Committee CEN/TC 459/SC 1 “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of an identical text or by endorsement, at the latest by March 2025, and conflicting national standards shall be withdrawn at the latest by March 2025.

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 ISO 643:2020.

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The text of ISO 643:2024 has been approved by CEN as EN ISO 643:2024 without any modification.

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical ISO/TC 17, *Steel*, Subcommittee SC 7, *Methods of testing (other than mechanical tests and chemical analysis),* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 459, *ECISS - European Committee for Iron and Steel Standardization,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fifth edition cancels and replaces the fourth edition (ISO 643:2019), which has been technically revised.

The main changes are as follows:

— the test temperature of McQuaid-Ehn method has been modified for case hardening steels to 950 °C (see A.4);

— subclause 7.2 has been modified with reference to new Annex B and amended Table 2;

— Annex B from the third edition (ISO 643:2012) has been reinstated, now with new ISO grain size charts instead of ASTM charts;

— parts of the old Annex B (evaluation method) have been revised and moved to the main body of the standard (subclause 7.3) and the remainder of the annex has been renumbered as Annex C;

— new Annexes D and E have been added.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Steels — Micrographic determination of the apparent grain size

WARNING — This document calls for the use of substances and/or procedures that may be injurious to health if adequate safety measures are not taken. This document does not address any health hazards, safety or environmental matters associated with its use. It is the responsibility of the user of this document to establish appropriate health, safety and environmentally acceptable practices.

1 Scope

This document specifies micrographic methods 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

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Grains

3.1.1
grain
closed polygonal shape with more or less curved sides, which can be revealed on a flat section through the sample, polished and prepared for micrographic examination

Note 1 to entry: In ISO 4885[1] grain is defined as “space lattice formed by atoms with regular interstices".

Note 2 to entry: If any other constituent (e.g. pearlite) of similar dimensions to the grains of interest is present, that constituent can be counted as grains of interest.

3.1.2
austenitic grain
crystal with a face-centred cubic crystal structure which may, or may not, contain annealing twins

3.1.3
ferritic grain
crystal with a body-centred cubic crystal structure which never contains annealing twins