

Microstructure of cast irons - Part 1: Graphite  
classification by visual analysis (ISO 945-1:2019)

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EUROPEAN STANDARD

**EN ISO 945-1**

NORME EUROPÉENNE

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English Version

## Microstructure of cast irons - Part 1: Graphite classification by visual analysis (ISO 945-1:2019)

Microstructure des fontes - Partie 1: Classification du  
graphite par analyse visuelle (ISO 945-1:2019)

Mikrostruktur von Gusseisen - Teil 1:  
Graphitklassifizierung durch visuelle Auswertung (ISO  
945-1:2019)

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

## European foreword

This document (EN ISO 945-1:2019) has been prepared by Technical Committee ISO/TC 25 "Cast irons and pig irons" in collaboration with Technical Committee CEN/TC 190 "Foundry technology" 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of an identical text or by endorsement, at the latest by January 2020, and conflicting national standards shall be withdrawn at the latest by January 2020.

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 945-1:2018.

According to the CEN-CENELEC Internal Regulations, the national standards organizations 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, Turkey and the United Kingdom.

## Endorsement notice

The text of ISO 945-1:2019 has been approved by CEN as EN ISO 945-1:2019 without any modification.

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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.

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 documents 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](http://www.iso.org/directives)).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 25, *Cast irons and pig irons*.

This third edition cancels and replaces the second edition (ISO 945-1:2017), of which it constitutes a minor revision. The changes compared with the previous edition are as follows:

- [Figures 3](#) and [4](#) have been corrected to a diameter of 120 mm to allow a direct comparison with the microscope display screen;
- [Figures 3](#) and [4](#) have been corrected so that the maximum graphite sizes conform with [Table 1](#).

A list of all parts in the ISO 945 series can be found on the ISO website.

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](http://www.iso.org/members.html).

## Introduction

Microstructure designation is a useful feature that provides a means of classifying the graphite form, distribution and size in cast irons.

Graphite classification by visual analysis is a well-established method which is well recognized within the foundry industry as a means of quickly determining the overall graphite microstructure of a cast iron casting.

# Microstructure of cast irons —

## Part 1: Graphite classification by visual analysis

### 1 Scope

This document specifies a method of classifying the microstructure of graphite in cast irons by comparative visual analysis.

The purpose of this document is to provide information about the method of graphite classification. It is not intended to give information on the suitability of cast-iron types and grades for any particular application.

The particular material grades are specified mainly by mechanical properties and, in the case of austenitic and abrasion resistant cast irons, by their chemical composition. The interpretation of graphite form and size does not allow a statistically valid statement on the fulfilment of the requirements specified in the relevant material standard.

### 2 Normative references

There are no normative references in this document.

### 3 Terms and definitions

No terms and definitions are listed in this document.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 4 General

#### 4.1 Designation system for classifying graphite in cast irons

When cast iron materials are examined under a microscope in accordance with this document, the graphite shall be classified by the following:

- a) its form, designated by Roman numbers I to VI (see [Figure 1](#) and [Annex A](#));
- b) its distribution, designated by capital letters A to E (see [Figure 2](#) and [Annex B](#)); the graphite distribution designation is only specified for grey cast irons (form I);
- c) its size, designated by numbers 1 to 8 (see [Figures 3, 4](#) and [5](#) and [Table 1](#)).

NOTE [Figures 1](#) to [5](#) show only the outlines and not the structure of the graphite.