
Microstructure of cast irons —
Part 1:
Graphite classification by visual
analysis

Microstructure des fontes —

Partie 1: Classification du graphite par analyse visuelle
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Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 General	1
4.1 Designation system for classifying graphite in cast irons.....	1
4.2 Form.....	2
4.3 Distribution.....	3
4.4 Size.....	4
4.5 Visual classification of graphite.....	23
5 Sampling and sample preparation	23
5.1 Samples taken from a casting.....	23
5.2 Sample preparation.....	23
6 Procedure for graphite classification	23
6.1 Procedure for visual classification of graphite.....	23
6.2 Evaluation of the analysis results.....	24
7 Reference images	24
7.1 General.....	24
7.2 Reference images for graphite form.....	24
7.3 Reference images for the distribution of graphite (form I).....	24
7.4 Reference images for graphite size.....	24
8 Designation of graphite by form, distribution and size	25
8.1 Designation system.....	25
8.2 Designation of different graphite sizes within a casting.....	25
8.3 Designation of mixed graphite forms, distributions and sizes.....	26
8.4 Designation of unclassified graphite forms.....	26
8.5 Nodule count.....	26
9 Report	27
Annex A (informative) Typical graphite forms in cast-iron materials — Examples of photomicrographs	28
Annex B (informative) Distribution of flake (lamellar) graphite (form I) — Examples of photomicrographs	29
Annex C (informative) Common terminology and main occurrences concerning graphite in cast irons	30
Bibliography	32

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html. (standards.iteh.ai)

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

This second edition cancels and replaces the first edition (ISO 945-1:2008), which has been technically revised. It also incorporates the Technical Corrigendum ISO 945-1:2008/Cor.1:2010. Figures 3, 4 and 5 have been corrected to a diameter of 120 mm to allow a direct comparison with the microscope display screen.

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

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.

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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:

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

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.

4.2 Form

Magnification $\times 100$

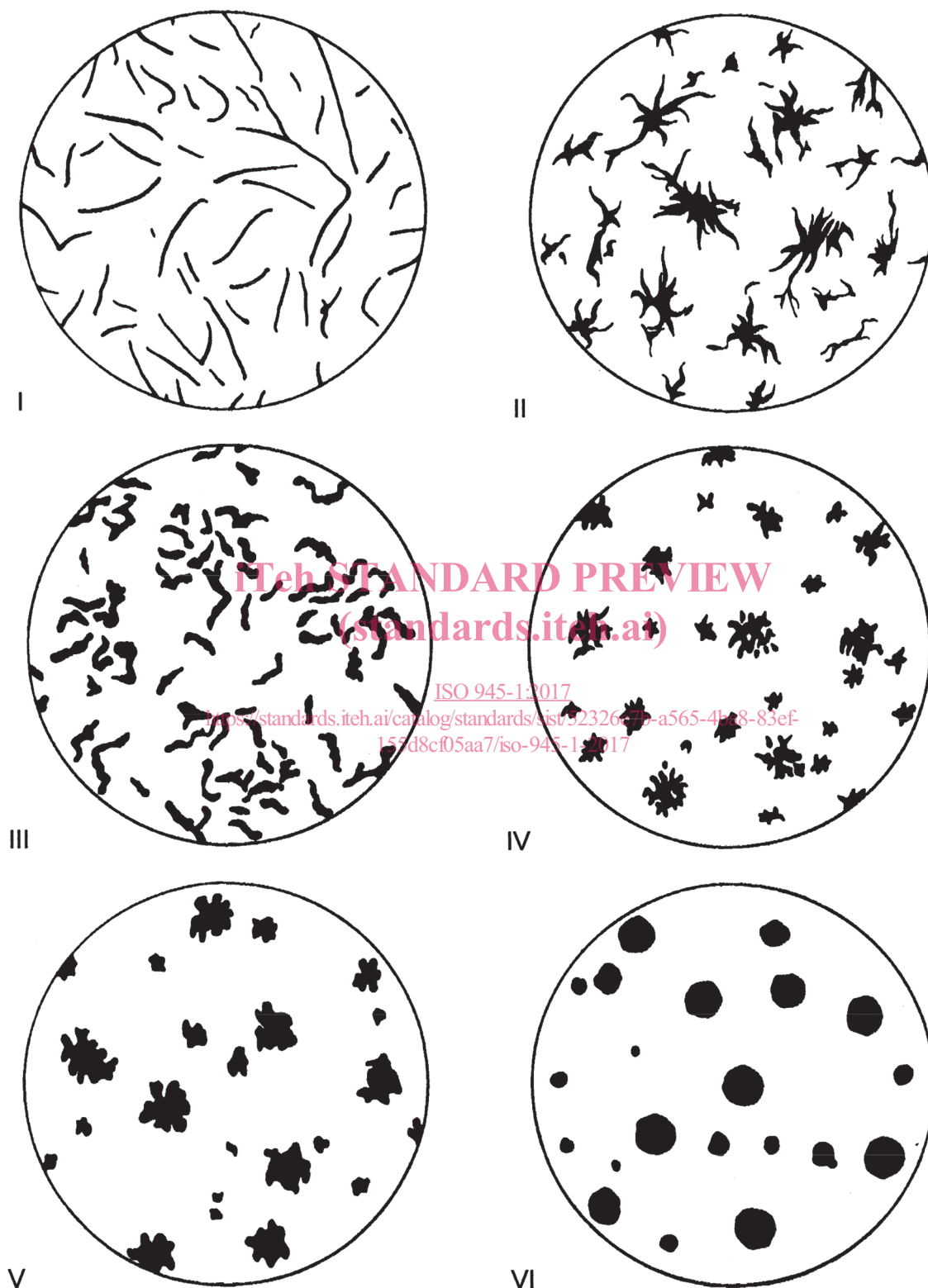


Figure 1 — Reference images for principal graphite forms in cast irons

4.3 Distribution

Magnification $\times 100$

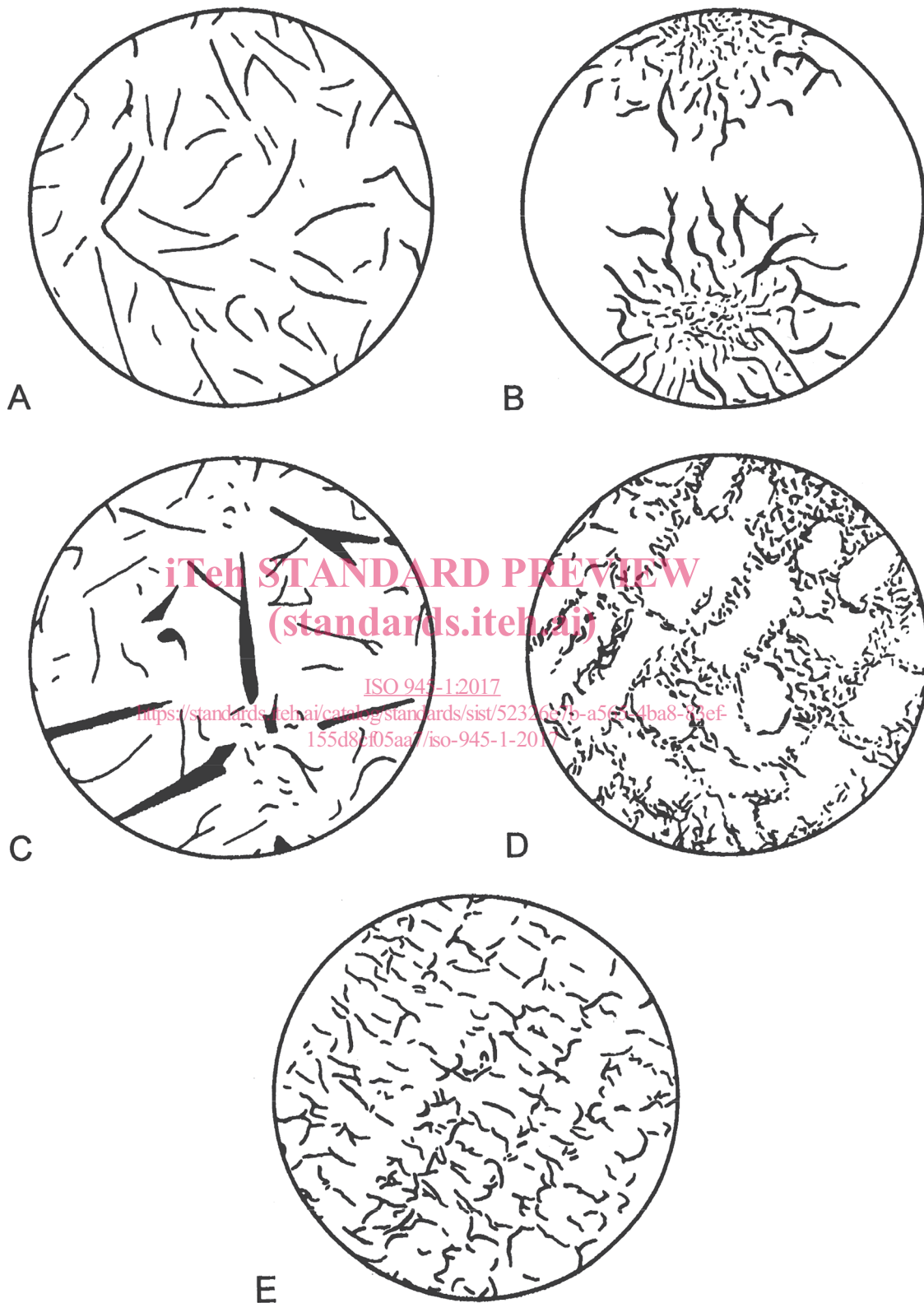


Figure 2 — Reference images for graphite distribution (form I)

4.4 Size

Magnification $\times 100$



1

100 μm

a) Reference image for graphite size 1: ≥ 1 mm (form I)

Magnification $\times 100$



2

100 μm

b) Reference image for graphite size 2: 0,5 mm to < 1 mm (form I)



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3

$\overline{\hspace{1.5cm}}$
100 μm

c) Reference image for graphite size 3: 0,25 mm to < 0,5 mm (form I)

Magnification $\times 100$



4

100 μm

d) Reference image for graphite size 4: 0,12 mm to < 0,25 mm (form I)