
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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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 945-1 was prepared by Technical Committee ISO/TC 25, *Cast irons and pig irons*.

Together with ISO 945-2, this first edition of ISO 945-1 cancels and replaces ISO 945:1975, which has been technically revised to take into account the expanding range of cast-iron alloys available. In addition, photomicrographs have been included together with schematic images to aid classification.

ISO 945 consists of the following parts, under the general title *Microstructure of cast irons*:

- *Part 1: Graphite classification by visual analysis*

Graphite classification by image analysis will be the subject of a future Part 2.

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 part of ISO 945 specifies a method of classifying the microstructure of graphite in cast irons by comparative visual analysis.

The purpose of this part of ISO 945 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 grade is specified by results from tensile tests or hardness testing and, in the case of austenitic 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. The structure of the metallic matrix (e.g. ferrite, pearlite) has a significant effect on the material properties. Such an interpretation is not the purpose of this part of ISO 945.

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2 General

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2.1 Designation system for classifying graphite in cast irons

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When cast-iron materials are examined under a microscope in accordance with this part of ISO 945, the graphite shall be classified by

- a) its form, designated by Roman numerals 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 iron (form I);
- c) its size, designated by Arabic numerals 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.

FORM

Magnification $\times 100$

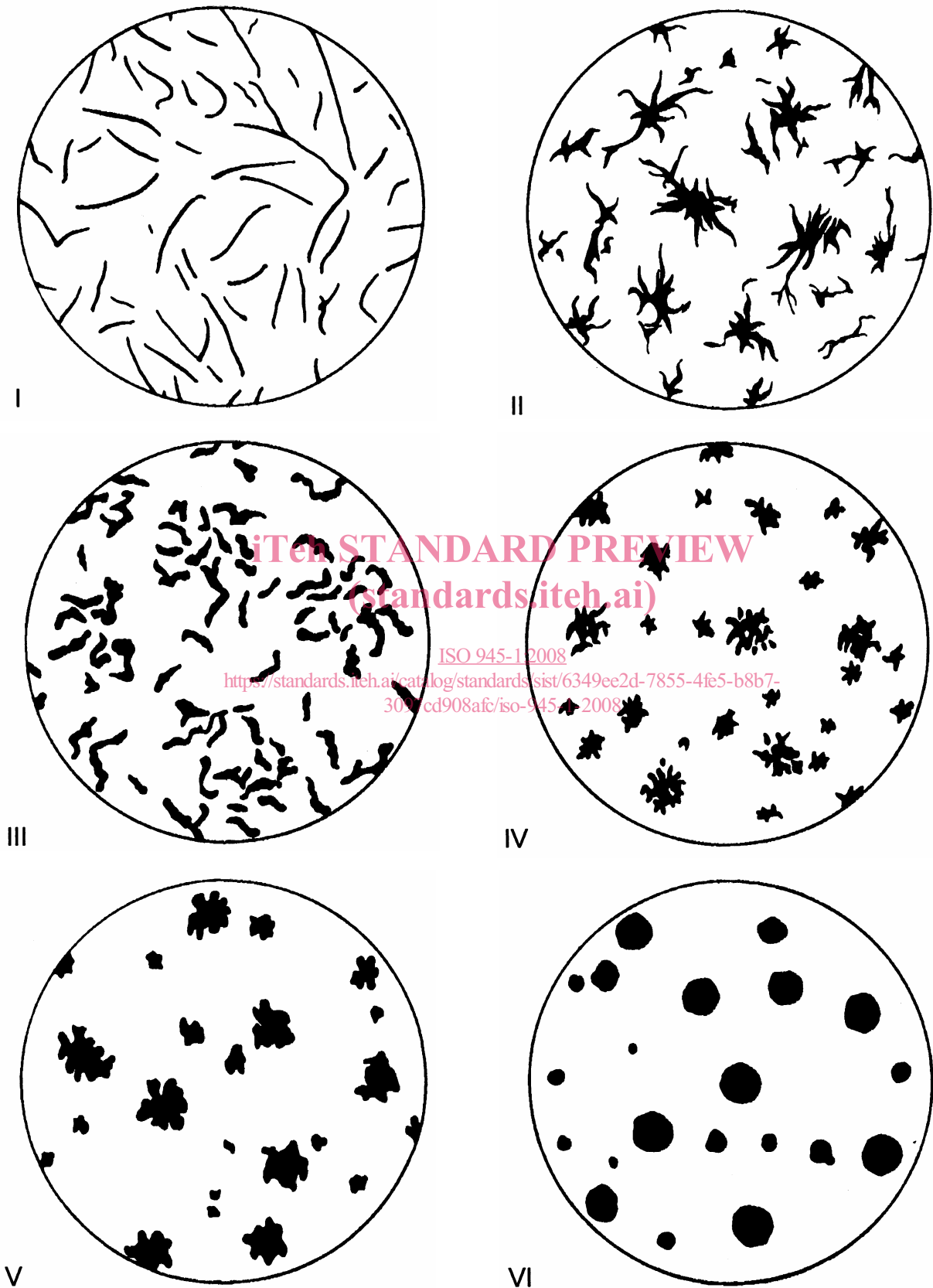


Figure 1 — Principal graphite forms in cast-iron materials — Reference images

DISTRIBUTION

Magnification $\times 100$

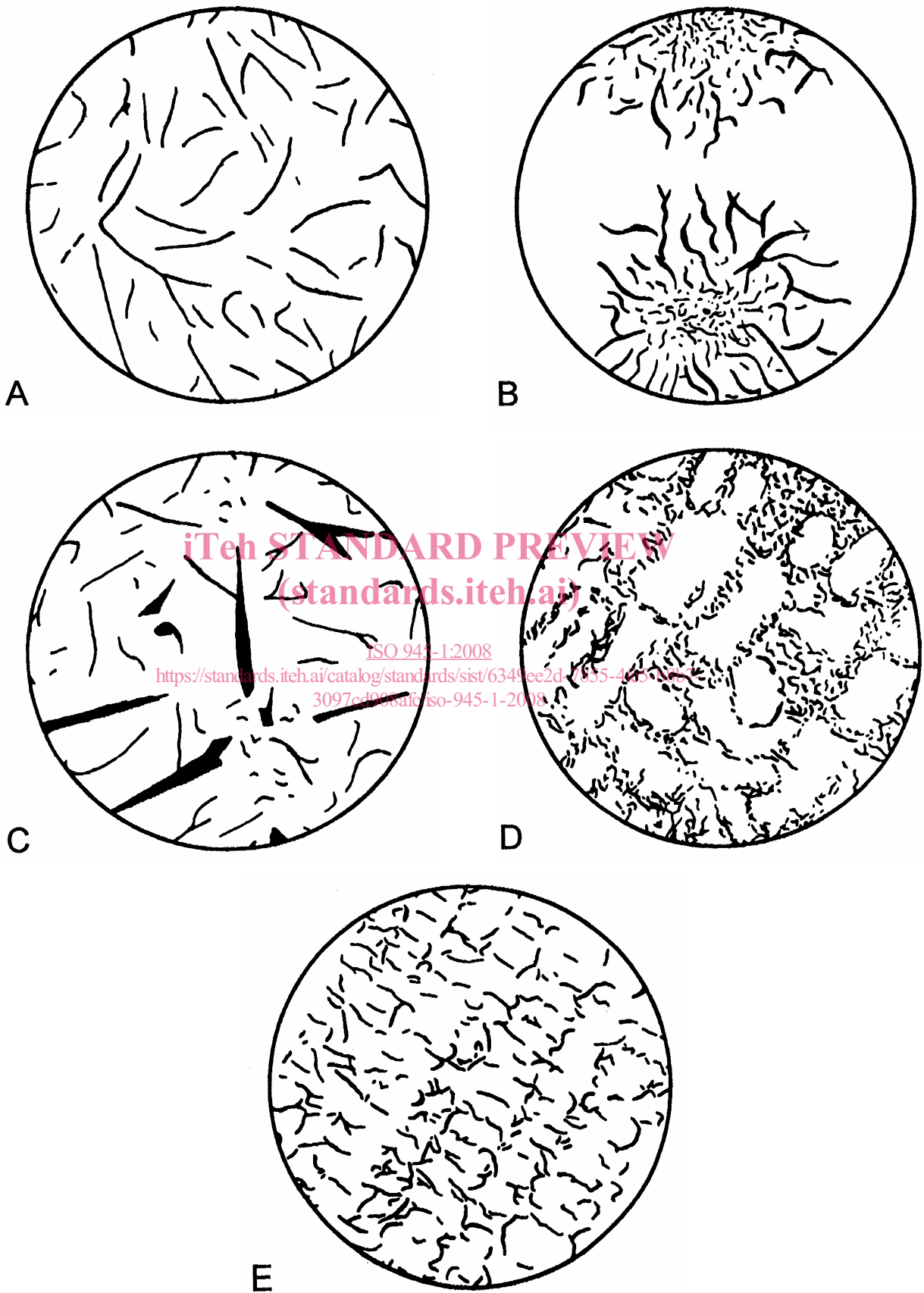
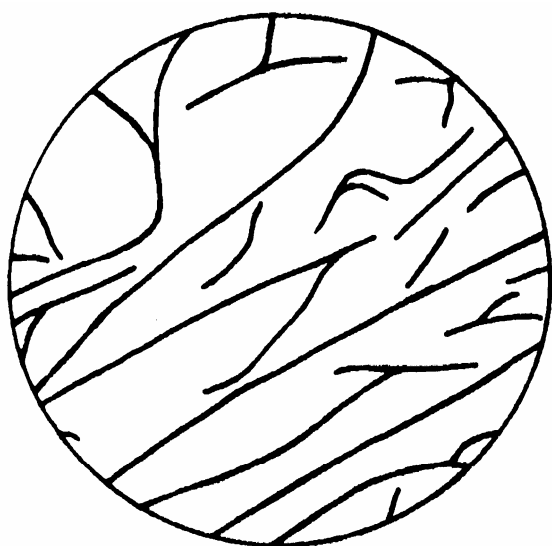


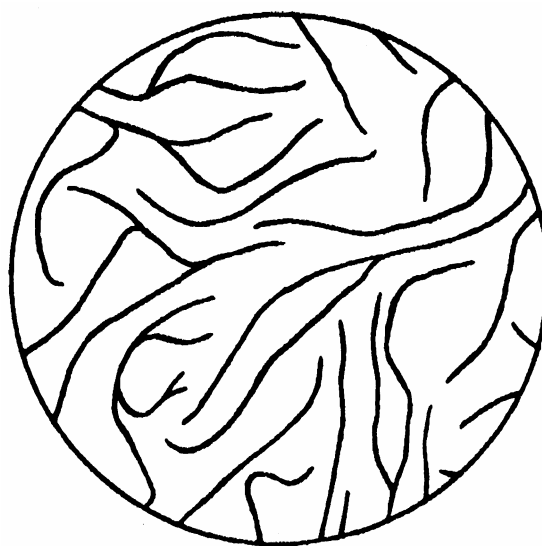
Figure 2 — Reference images for graphite distribution (form I)

SIZE

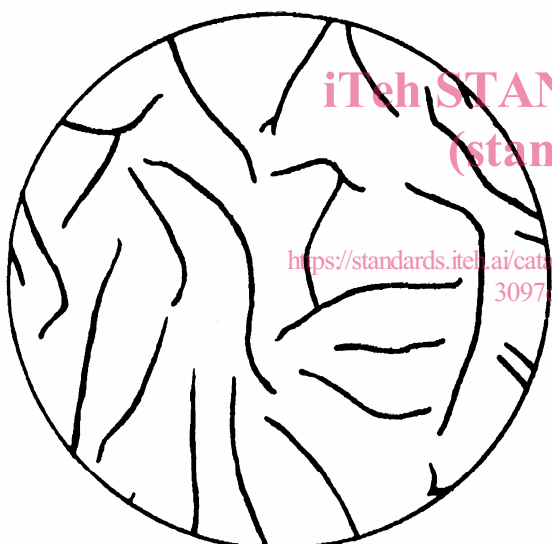
Magnification $\times 100$



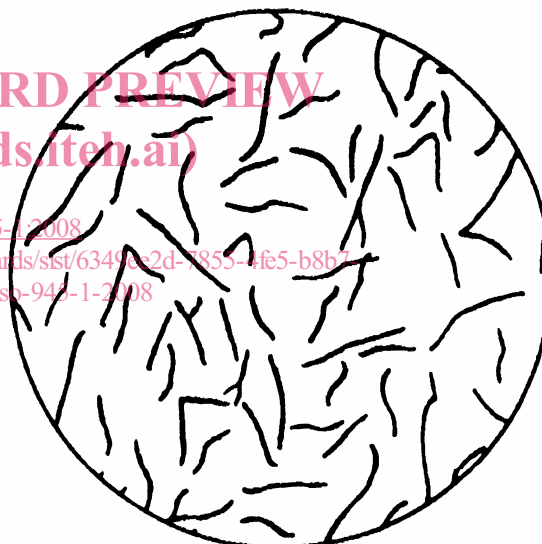
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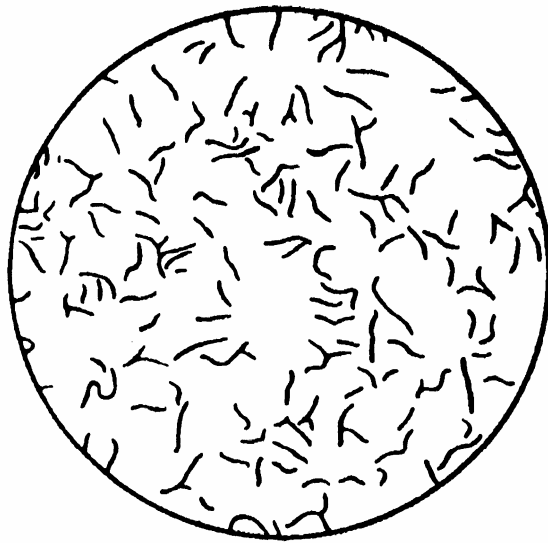
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a) Sizes 1 to 4

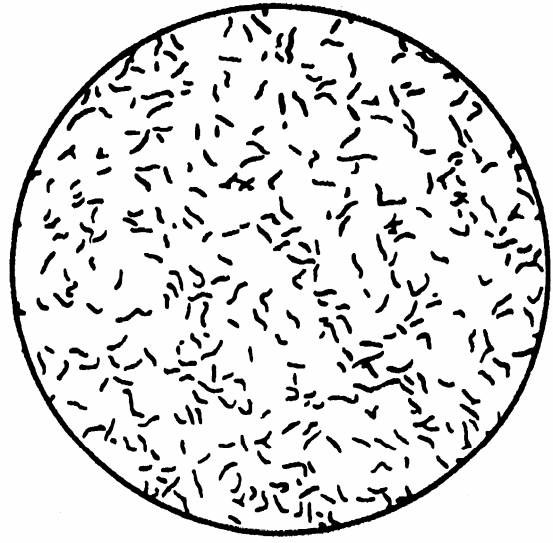
Figure 3 — Reference images for graphite size (form I)

SIZE

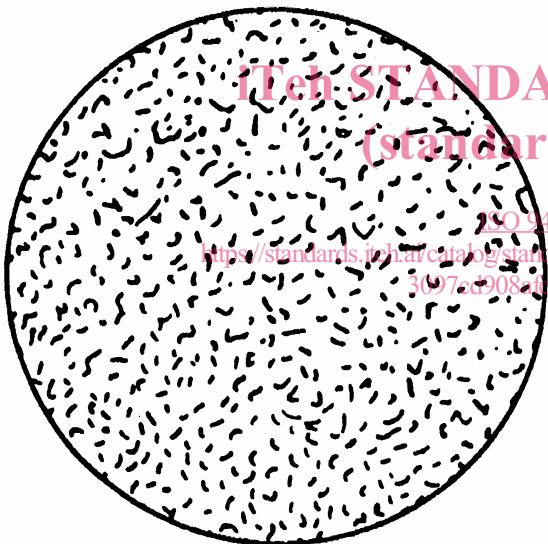
Magnification ×100



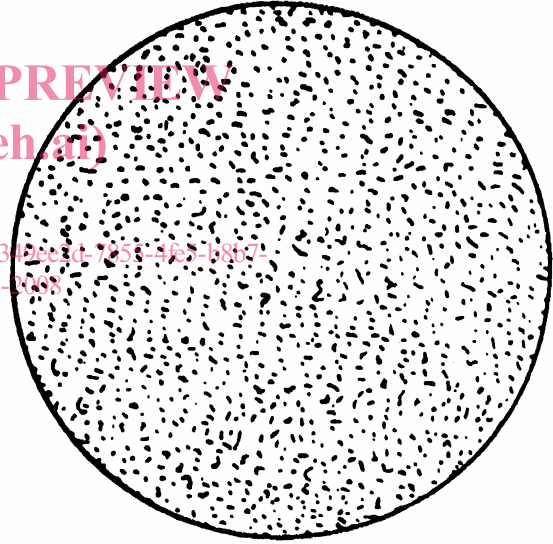
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b) Sizes 5 to 8

Figure 3 — Reference images for graphite size (form I)