NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB/T 9441-2021

Metallographic test method for spheroidal graphite cast iron

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Foreword

This Document was drafted as per the rules specified in GB/T 1.1-2020 Directives for Standardization - Part 1.Rules for the Structure and Drafting of Standardizing Documents.

This Document replaced GB/T 9441-2009 Metallographic Test for Spheroidal Graphite Cast Iron. Compared with GB/T 9941-2009, the major technical content changes of this Standard are as follows besides t he structural adjustment and editorial modifications.

--- Add the terms maximum Feret diameter (see 3.1 of this Edition) and particle roundness (see 3.2 of this Edition);

--- Add the calculation formula of graphite particle roundness (see 3.2 of this Edition);

--- Add the terms of spheroidal graphite (see 3.3 of this Edition) and number of graphite particle count (see 3.6 of this Edition);

--- Add the sampling provisions of castings (see 5.2 of this Edition);

--- Change the definition and calculation formula of nodularity of cast iron (see 4.1 of this Edition; 4.1.1 of 2009 Edition);

--- Change the rating and evaluation method of nodularity (see 7.1 of this Edition; 4.1 of

2009 Edition); and change the reference diagram of the nodularity

rating (see Appendix

E of this Edition; Figures 1 ~ 6 in 4.1.1 of 2009 Edition);

--- Change the method of evaluating the nodularity by the image method (see 7.1.4 of this Edition; 4.1.4 of 2009 Edition);

--- Delete the ferrite count rating of dispersed distribution (see 4.4 of 2009 Edition);

--- Add the nodularity rating chart of spheroidal graphite cast iron (see Appendix E of this Edition);

--- Add the comparison chart for the evaluation of graphite particle count (see Appendix F of this Edition);

--- Change the rating graph of graphite particle size (see Figure G.1 of this Edition; Figures 1 ~ 12 in 4.2.3 of 2009 Edition);

--- Add the rating chart of pearlite content (see Appendix H of this Edition);

--- Add the rating chart of steadite content (see Appendix I of this Edition);

--- Add the rating chart of carbide content (see Appendix J of this Edition).

This document uses the redrafting method to modify and adopt ISO 945-4.2019 Microstructure

of Cast Irons - Part 4.Test Method for Evaluating Nodularity in Spheroidal Graphite Cast Iron.

Compared with ISO 945-4.2019, this Document has many adjustments in structure. Appendix

A lists the comparison list of clause numbers between this Document and ISO 945-4.2019.See

Appendix B for other technical differences and other causes between this Document and ISO

945-4.2019.

Compared with ISO 945-4.2019, this Document made the following editorial modifications.

--- Change the document name from ISO 945-4.2019 Microstructure of Cast Irons - Part 4.

Test Method for Evaluating Nodularity in Spheroidal Graphite Cast Iron to

Metallographic Test Method for Spheroidal Graphite Cast Iron.

--- Add the Appendixes A, B and C.

This Document was proposed by and under the jurisdiction of National Technical Committee

on Casting of Standardization Administration of China (SAC/TC 54).

The historical editions replaced by this Document are as follows.

--- GB/T 9441-1988 was first-time published in 1988; it was first-time revised in 2009.

--- It is the second-time revised hereby.

Metallographic Test Method

for Spheroidal Graphite Cast Iron

1 Scope

This Document specifies the nodularity calculation, metallographic sample preparation,

inspection rules, inspection items and rating charts, result representation and inspection report

of spheroidal graphite cast iron.

2 Normative References

The provisions in following documents become the provisions of this Document through

reference in this Document. For the dated documents, only the versions with the dates indicated

are applicable to this Document; for the undated documents, only the latest version (including

all the amendments) is applicable to this Document.

GB/T 5611 Foundry Terminology

GB/T 13298 Inspection Methods of Microstructure for Metals

3 Terms and Definitions

For the purposes of this Document, the terms and definitions given in GB/T 5611 and the

following apply.

3.1 Maximum Feret diameter

The maximum straight-line distance lm between any two points on the outline of the outer

edge

of the graphite particle.

Figure 1 - Schematic Diagram of Maximum Feret Diameter of Graphite Particle

3.2 Particle roundness

The graphite particle area is divided by the circular area of the graphite particle with the maximum Feret diameter.

4 Calculation of Nodularity

The nodularity is equal to the area of spheroidal graphite particles (particle roundness rho >=

0.60) divided by the total area of all graphite particles.

5 Metallographic Specimen Preparation

The metallographic specimen shall be taken from the test block or casting which is cast at the same time as the casting and conducted heat treatment in the same furnace (such as during

heat treatment).

When sampling on castings, the sampling site shall avoid the casting surface and areas affected by cooling.

6 Inspection Rules

Select the field of view randomly; the diameter of the field of view or the equivalent

diameter is 1.20mm. When magnified by 100 times, the graphite particles with the maximum

Feret diameter lm less than 1.0mm are not counted.

When inspecting the nodularity, graphite particle size rating and graphite particle count, at least 5 fields of view shall be selected; and the total number of inspected graphite particles shall

be no less than 500.

7 Inspection Item