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GB/T 7216-2009

Replacing GB/T 7216-1987

Metallographic test for gray cast iron

灰铸铁金相检验

(ISO 945-1:2008 Microstructure of cast irons -

Part 1: Graphite classification by visual analysis, MOD)

Issued on: October 30, 2009 **Implemented on: April 1, 2010**

Issued by: General Administration of Quality Supervision, Inspection and Quarantine;

Standardization Administration Committee.

Table of Contents

Foreword

This Standard is modified on the basis of adopting ISO 945-1:2008 “Microstructure of cast irons - Part 1: Graphite classification by visual analysis”.

Compared with ISO 945-1:2008, the technical differences are as follows:

- Modify and adopt the I-type graphite of ISO 945-1:2008, and make editorial changes in structure;

- Add F-type graphite distribution shape to replace C’-type in Appendix B of ISO 945-1:2008;

- Add instructions on F-type in instructions on graphite distribution shapes;

- Add determination methods of pearlite number, carbide number, phosphorus eutectic number, and eutectic number as well as corresponding evaluation figures.

This Standard replaces GB/T 7216-1987 “Gray cast iron metallography”.

Compared with GB/T 7216-1987, main technical changes are as follows:

- Change the name of the standard to “Metallographic test for gray cast iron”;

- Delete item “Name” in Table 2 of previous standard; add item “Graphite’s actual length”; the graphite’s length picture is replaced by I-type graphite’s length picture of ISO 945-1:2008;

- Add result representation;

- Add test report;

- Replace C-type graphite’s picture;

- Delete inspection item “pearlite spacing”;

- Delete “matrix structure characteristics”;

- Delete “carbide distribution shape”;

- Delete “phosphide eutectic distribution shape”;

Metallographic test for gray cast iron

1 Scope

This Standard specifies the evaluation method of gray cast iron microstructure under optical microscope.

This Standard makes provisions in pearlite number, carbide number, phosphorus eutectic number, and eutectic number. It also lists corresponding evaluation figures.

This Standard is applicable to the microstructure that is used to evaluate ordinary and low-alloy gray cast irons.

2 Normative references

The following standards contain the provisions which, through reference in this Standard, constitute the provisions of this Standard. For dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard. However, the parties who enter into agreement based on this Standard are encouraged to investigate whether the latest versions of these documents are applicable. For undated reference documents, the latest versions apply to this Standard.

GB/T 9439 Grey Iron Castings

GB/T 13298 Metal - Inspection Method of Microstructure

3 Sample preparation

3.1 Metallographic sample shall be extracted on the test block or casting that is casted and heat-treated in same furnace with the casting, according to the provisions in GB/T 9439.

3.2 Preparation of metallographic sample shall be conducted according to the provisions in GB/T 13298. During the process of metallographic sample extracting and preparing, it shall prevent structural changes, graphite flake or graphite trailing. The sample surface shall be smooth. Huge scratches are not allowed.

4 Inspection items and evaluation figures

4.1 Graphite distribution shape

4.1.1 Inspect graphite distribution shape under polishing state. Firstly observe the whole plane under inspection. Evaluate it according to most of graphite field distribution shapes and compare with corresponding evaluation figures. Magnification is 100 times.

4.1.2 If there are different shapes of graphite in a same sample, it shall observe and estimate the percentage of each shape of graphite and successively indicate it in report.

4.1.3 There are 6 graphite distribution shapes, as shown in Table 1.

Table 1

Graphite type	Instruction	Figure No.
A	Flake graphite is evenly and non-directionally distributed.	1
B	Flake and small curly graphite gather and are distributed like a daisy.	2
C	New-born, huge and straight flake graphite.	3[a]
D	Small and curly flake graphite is non-directionally distributed in dendrite.	4
E	Flake graphite is directionally distributed in secondary branch of dendrite.	5[b]
F	New-born star (or spider-like) graphite.	6[c]

[a] If there are only huge and straight flake graphite, it shall be C-type graphite.

[b] If it is only directionally distributed in secondary branch of dendrite, it shall be E-type graphite.

[c] If there are only new-born star (or spider-like) graphite, it shall be F-type graphite.

Appendix A

(Informative)

Phosphorus eutectic type

A.1 According to its composition, phosphorus eutectic can be divided into four types: binary phosphorus eutectic, ternary phosphorus eutectic, binary phosphorus eutectic carbide composite and ternary phosphorus eutectic carbide composite.

A.2 The sample in polishing state is eroded by 2%~5% nital and observed in 500 times of magnification. Phosphorus eutectic's types and topographies are shown in Table A.1, Figure A.1 ~ A.4.

Table A.1 Phosphorus eutectic type

Type	Structure and characteristics	Figure No.
Binary phosphorus eutectic	Granules of austenite grain decomposition product are evenly distributed on iron phosphide.	A.1
Ternary phosphorus eutectic	Granules of austenite grain decomposition product, granular and strip carbonizations are evenly distributed on iron phosphide.	A.2
Binary phosphorus eutectic carbide composite	Binary phosphorus eutectic and huge blocky carbides.	A.3
Ternary phosphorus eutectic carbide composite	Ternary phosphorus eutectic and huge blocky carbides.	A.4

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