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GB/T 10561-2005 / ISO 4967:1998(E)

Replacing GB/T 10561-1989

Steel - Determination of content of nonmetallic inclusions

- Micrographic method using standard diagrams

钢中非金属夹杂物含量的测定

标准评级图显微检验法

(ISO 4967:1998, IDT)

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Foreword

This Standard is identical to ISO 4967:1998 (E) "Steel - Determination of content of nonmetallic inclusions - Micrographic method using standard diagrams".

This Standard replaces GB/T 10561-1989 "Steel - Determination of content of non-metallic inclusion - Micrographic method using standard diagrams".

This Standard is identical to translating ISO 4967:1998 (E).

For ease of use, this Standard made the following editorial modifications to ISO 4967:1998:

- a) REPLACE the word "International Standard" with "this Standard";
- b) USE "." to replace "," as the decimal point;
- c) DELETE the foreword of the International Standard.
- d) ADD the Annex NA.

Compared with GB/T 10561-1989, main changes of this Standard are as follows:

- a) CHANGE the standard name from "Steel - Determination of content of non-metallic inclusion - Micrographic method using standard diagrams" to "Steel - Determination of content of nonmetallic inclusions - Micrographic method using standard diagrams";
- b) BROADENED the scope of the standard (see Clause 1);
- c) ADD the clause "Principle" (see Clause 2);
- d) ADD the chart diagram analysis method (see Annex D);
- e) MODIFY the rating limits, width parameters, sampling dimensions, rating rules, shape and dimensions of field (see Table 1, Table 2, Clause 3, Subclauses 5.1 and 5.2.3);
- f) CHANGE the standard chart diagram from JK diagrams and ASTM diagrams TO a set of ISO chart diagrams (see Annex A);
- g) CHANGE the sampling method and sampling method for other products to an informative annex (see 2.1.5 and Figure 5 of 1993 edition, Annex NA of this edition).

This Standard has corrected the errors in ISO 9001:1998, mainly as follows:

- a) In Table 1, the total length of B2 inclusions is changed from “342 μm ” to “343 μm ”;
- b) In Table 2, the “>” symbol is added before the numbers in the “Minimum width” column of the thick series;
- c) REPRODUCE Figure 1, Figure 2, Figure 3, Figure 6;
- d) In the examples of method A in 6.2, the original “B 2s” is changed to “B 2.5s”;
- e) Above the figure of DS inclusions in Annex A, the original diameter “> 13 μm ~ 76 μm ” to “13 μm ~ 76 μm ”;
- f) In Table C.1 of Annex C, “1” of group A thick series inclusions with a field number 8 is changed to “—”;
- g) In Table C.1 of Annex C, “—” of group D thick series inclusions with a field number 12 is changed to “1 s”
- h) In Table C.2 of Annex C, “1” of group D thick series inclusions with a field index of 1 is changed to “2”;
- i) In C.3.1 of Annex C, replace “(see 6.2)” with “(see 6.3)”;

- j) In the formula of C.4 of Annex C, replace the original “
$$C_i = \left[\sum_{i=0.5}^{3.5} f_i \times n_i \right] \frac{1000}{S}$$
”

with “
$$C_i = \left[\sum_{i=0.5}^{3.0} f_i \times n_i \right] \frac{1000}{S}$$
”.

In this Standard, Annex A is a normative annex, Annexes B, C, D, NA are informative annexes.

This Standard is proposed by China Iron and Steel Association.

This Standard is under the jurisdiction of National Technical Committee on Steel of Standardization Administration of China.

Drafting organizations of this Standard: Shanghai 5th Steel Co., Ltd. of Baosteel Group, China Metallurgical Information and Standardization Institute, Fushun Special Steel (Group) Co., Ltd., Dalian Jinniu Co., Ltd.

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This Standard was first issued in March 1989.

Steel - Determination of content of nonmetallic inclusions

- Micrographic method using standards diagrams

1 Scope

This Standard specifies a micrographic method of determining the nonmetallic inclusions in rolled or forged steel products having a reduction ratio of at least 3 using standard diagrams. This method is widely used to assess the suitability of a steel for a given use. However, since it is difficult to achieve reproducible results owing to the influence of the test operator, even with a large number of specimens, precautions should be taken when using the method.

NOTE: For certain types of steel (e.g., free cutting steels), the standardized diagrams described in this Standard may not be applicable.

This Standard also provides for the determination of nonmetallic inclusions by image analysis technologies (see Annex D).

2 Principle

The method consists of comparing the observed field to the chart diagrams defined in this Standard and taking in consideration separately each type of inclusion. In the case of image analysis, fields will be rated according to the relationships given in Annex D.

The chart pictures correspond to square fields of view, each with an area of 0.50 mm², as obtained with a longitudinal plane-of-polish and as observed at 100 x.

According to the shape and distribution of the inclusions, the standard diagrams are divided into five main groups, bearing the reference A, B, C, D and DS.

These five groups represent the most commonly observed inclusion types and morphologies:

- Group A (sulfide type): highly malleable, individual grey particles with a wide range of aspect ratios (length/width) and generally rounded ends;
- Group B (aluminate type): numerous non-deformable, angular, low aspect ratio (generally < 3), black or bluish particles (at least three) aligned in the deformation direction;
- Group C (silicate type): highly malleable, individual black or dark grey particles

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