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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 13305-2024

Replacing GB/T 13305-2008

Method for determining content of the alpha-phase in stainless steels

不锈钢中α-相含量测定法

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Table of Contents

1 Scope
2 Normative references
3 Terms and definitions
4 Selection and preparation of specimens
4.1 General
4.2 Sampling method
4.2.1 Sampling method for round steel and square steel
5 Determination method of alpha-phase content
5.1 General
5.2 Metallographic method
5.2.1 General
5.2.2 Comparison method with standard rating chart
6 Test report

Foreword

This document was drafted in accordance with the provisions of GB/T 1.1-2020 "Directives for standardization - Part

1.Rules for the structure and drafting of standardizing documents". This document replaces GB/T 13305-2008 " Method for determining content of the alpha- phase in stainless steels". Compared with GB/T 13305-2008, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

a) ADD the term and definition of "alpha-phase in stainless steel" (see Chapter 3);

b) CHANGE the schematic diagram of steel sampling method (see Figure 1; Figures 1 ~ 5 of the 2008 edition);

c) ADD the corrosion method of cupric chloride hydrochloric acid alcohol solution [see 4.3a)];

d) ADD the mean value, standard deviation, confidence level, relative error formula for the determination of alpha-phase content in austenitic-ferritic duplex stainless steel (see 5.2.1.2;

4.1.2 of the 2008 edition);

e) CHANGE the magnification of the determination of alpha-phase content in austenitic

stainless steel (see 5.2.2.1;

4.1.1 of the 2008 edition);

f) CHANGE the comparison method rating limit table for the determination of alpha- phase content in austenitic stainless steel (see 5.2.2.1;

4.1.1 of the 2008 edition);

g) ADD the table of alpha-phase types and contents in austenitic-ferritic duplex stainless steel (see 5.2.2.2);

h) ADD the key operating instructions and calculation formulas for the quantitative grid determination method (see 5.2.3);

i) ADD the key operating instructions for the automatic image analysis determination method (see 5.2.4);

1 Scope

GB/T 13305-2024 is the Chinese national standard on method for determining content of the alpha-phase in stainless steels, in the field of metallurgy. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 28 May 2024 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 December 2024. Classification: ICS 77.040.99, CCS H24. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document specifies the selection and preparation of specimens for the determination of alpha-phase content in stainless steel, the determination method, the test report. This document is applicable to the determination of alpha-phase content in austenitic stainless steel and austenitic-ferritic duplex stainless steel.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in the text. Among them, for dated references, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies to this document.

GB/T 1954 Methods of measurement for ferrite content in austenitic Cr-Ni stainless steel weld metals

GB/T 13298 Inspection methods of microstructure for metals

GB/T 15749 Measuring method in quantitative metallography

GB/T 18876.1 Standard practice for determining the metallographical constituent and inclusion content of steels and other metals by automatic image analysis - Part

1.Determining the inclusion or second-phase constituent content of steels and other metals by automatic

GB/T 30067 Standard terminology relating to metallography YB/T 4402 Micrographic method for determining content of delta-ferrite in martensitic stainless steel

3 Terms and definitions

The terms and definitions defined in GB/T 30067 and the following terms and definitions apply to this document. 3.1 alpha-phase in stainless steel The ferrite phase in stainless steel, which has a body-centered cubic (bcc) crystal structure.

4.1 General

4.1.1 The specimens are cut from the steel in the delivery state. The sampling location and quantity shall be in accordance with the relevant product standards or agreements.

4.1.2 The test surface of the specimen of rolled steel is a longitudinal section parallel to the rolling direction, wherein one side shall coincide with its axis.

4.1.3 The specimens shall be cut mechanically in a cold state. If cutting is done by gas cutting or hot cutting, the metal melting zone, plastic deformation zone, heat affected zone shall be completely removed. The distance between the cutting surface and the inspection surface depends on the cutting method, which is generally not less than

0.5 mm.

4.2.1 Sampling method for round steel and square steel

4.2.2 Sampling method for steel pipes The sampling method for steel pipes is shown in Figure 1d).

4.2.3 Sampling method for steel plates, steel strips, flat steels The sampling method for steel plates, steel strips, flat steels is shown in Figures 1e) and 1f).

4.3 Specimen preparation and etching The specimen preparation shall be carried out in accordance with GB/T 13298.It is recommended to use one of the following etching methods for specimen etching, which shall be based on the clear display of alpha-phase structure.

5.1 General

5.1.1 The following method is usually used to determine the alpha-phase content of steel. The method used is determined by the product standard or the agreement between the two parties.

5.1.2 The choice of determination method and its accuracy depend on the product type, microstructure, shape of the component.

5.2.1 General

5.2.1.1 Determination of alpha-phase content in austenitic stainless steel The determination of alpha-phase content in austenitic stainless steel adopts the most severe field of view method. Place the specimen under the bright field of the metallographic microscope for observation; first use a lower magnification to fully observe the entire inspection surface; select the field of view with the highest alpha-phase content on the inspection surface for evaluation; ensure that the actual field of view is a square with a side length of

0.24 mm.

5.2.2 Comparison method with standard rating chart

5.2.2.1 Determination of alpha-phase content in austenitic stainless steel Select the field of view with the highest alpha-phase content on the entire inspection surface; compare it with the standard rating chart.

5.2.3 Quantitative grid determination method The quantitative grid determination method is used to determine the alpha-phase content in accordance with GB/T 15749.

5.3 Ferrite meter determination method For special cases such as on-site rapid inspection, the ferrite meter can be used to evaluate the alpha-phase content in stainless steel after mutual agreement. This method cannot be used as an arbitration method. The ferrite meter and its own proofing samples shall be calibrated regularly (usually no more than one year), using a Magni meter or a secondary standard sample. Before the measurement, a standard sample with the same alpha-phase content as the sample to be tested shall be used to calibrate the ferrite meter. The surface oil and rust layer of the inspection surface shall be removed.