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## GB/T 33165-2016

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### Quantitative Analysis Method of Centre Segregation for High Carbon Steel Wire Rod

高碳钢盘条中心偏析定量分析方法

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## Foreword

This Standard was drafted as per the rules specified in GB/T 1.1-2009.

This Standard was proposed by China Iron and Steel Industry Association.

This Standard shall be under the jurisdiction of National Technical Committee for Standardization of Steel (SAC/TC 183).

Drafting organizations of this Standard: Wuhan Iron and Steel Co., Ltd., China Metallurgical Information and Standardization Institute, and Tianjin Iron and Steel (Group) Co., Ltd.

Chief drafting staffs of this Standard: Sun Yiqiang, Wu Lixin, Wang Zhifen, Chen Shihua, Yan Chengming, Han Rongdong, Deng Zhaojun, Zhang Long, and Luo Chunmin.

# Quantitative Analysis Method of Centre Segregation for High Carbon Steel Wire Rod

## 1 Scope

This Standard specifies the terms, principle, instrument and auxiliary equipment, standard sample, specimen preparation, measuring conditions and methods, and result analysis for quantitative analysis of center segregation for high carbon steel wire rod by using spectrometer.

This Standard is applicable to the high carbons steel hot-rolled wire rod with carbon content greater than 0.65%.

## 2 Normative References

The following documents are essential to the application of 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) are applicable to this document.

GB/T 4930 Microbeam Analysis - Electron Probe Microanalysis - Guidelines for the Specification of Certified Reference Materials (Crms)

GB/T 13298 Inspection Methods of Microstructure for Metals

GB/T 15074 General Guide of Quantitative Analysis by EPMA

GB/T 21636 Microbeam Analysis - Electron Probe Micro Analysis (EPMA) - Vocabulary

GB/T 27025 General Requirements for the Competence of Testing and Calibration Laboratories

GB/T 30067 Standard Terminology Relating to Metallography

## 3 Terms and Definitions

The following terms and definitions and those stipulated in GB/T 21636 and GB/T 30067 are applicable to this document.

## 5 Instrument and Auxiliary Equipment

The testing laboratory shall meet the requirements of GB/T 27025; and have the following instrument and auxiliary equipment:

- a) Electron probe analyzer or scanning electron microscope for installing spectrometer accessories.
- b) Metallographic specimen preparation device, including specimen embedding, grinding, polishing and corrosion device.
- c) Metallographic microscope.
- d) Ultrasonic cleaning device.

## 6 Standard Sample

### 6.1 Selection of standard sample

It is recommended to use the carbon element standard sample that conforms to the provisions of GB/T 4930; the number of standard sample shall be no less than 3; the carbon element content range in standard sample shall cover the carbon element content of the specimen.

### 6.2 Treatment of standard sample

The standard sample needs re-polishing before use; check the surface by the metallographic microscope to confirm whether there is contamination or other defects that affect the measurement. The surface of standard sample shall not spray or coat the covering layer, the standard sample shall be grounding by adopting conductive double-side adhesive, conductive copper foil tape or liquid silver glue sample connecting stage.

## 7 Specimen Preparation

Take the cross-section of wire rod as the specimen, then make the metallographic polishing specimen as per GB/T 13298. After acid leaching the specimen into 2%~4% nitric acid alcohol solution, use glass knife, scalpel or other sharp tools to make parallel scratch mark on two sides of the segregation area, the scratch is approximately tangent to the edge of segregation area (see Figure 1). Through polishing again, the corrosion layer is completely removed from the specimen, while the scratch mark is retained.

## **Appendix B**

**(Informative)**

### **Factors Affecting the Measuring Uncertainty of the Element Content by Spectrometer**

**B.1** Sample contamination: including the water stains on the polishing surface, dust, and other contaminants.

**B.2** Sample electric charge accumulation: mainly caused by not grounding, poor grounding of the sample; or too high current and voltage.

**B.3** Measurement repeatability: including the fluctuation of measuring valued caused by the fluctuation of accelerated voltage, beam, and detector.

**B.4** Working curve: the linearity of working curve affects the measuring results.

**B.5** Standard sample: the uncertainty and nonuniformity of element content in standard sample affect the measuring results.

**B.6** Rounding off on the measuring results: the rounding off on measuring value affects the measuring results.

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Accountable person and shareholder: Wayne Zheng

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Contact: Wayne Zheng, [Sales@ChineseStandard.net](mailto:Sales@ChineseStandard.net)

Linkin: <https://www.linkedin.com/in/waynezhengwenrui/>

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