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## GB/T 223.82-2007

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### **Steel and Iron – Determination of Hydrogen Content – Inert Gas Impulse Fusion Heat Conductivity Method**

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## Foreword

Appendix A in this Part of GB/T 223 is informative.

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

This Part shall be under the jurisdiction of National Technical Committee for Standardization of Steel.

Drafting organization of this Part: Institute of Metal Research of Chinese Academy of Science.

Chief drafting staffs of this Part: Zhu Yuejin, Jiang Zhimin, and Li Sujuan.

# **Steel and Iron – Determination of Hydrogen Content – Inert Gas Impulse Fusion Heat Conductivity Method**

## **1 Scope**

This Part of GB/T 223 specifies using inert gas impulse fusion heat conductivity method to determine the hydrogen content in the steel and iron.

This method is applicable to determination of hydrogen content with mass fraction of 0.20 µg/g~30.0 µg/g in the steel and iron.

## **2 Normative References**

The provisions in following documents become the provisions of this Part of GB/T 223 through reference in this Part. For dated references, the subsequent amendments (excluding corrigendum) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 6379.1 Accuracy (Trueness and Precision) of Measurement Methods and Results - Part 1: General Principles and Definitions (GB/T 6379.1-2004, ISO 5725-1:1994, IDT)

GB/T 6379.2 Accuracy (Trueness and Precision) of Measurement Methods and Results - Part 2: Basic Method for the Determination of Repeatability and Reproducibility of a Standard Measurement Method (GB/T 6379.2-2004, ISO 5725-2:1994, IDT)

GB/T 14265 Rule of Chemical Analysis for Hydrogen, Oxygen, Nitrogen, Carbon and Sulfur in Metals Materials

GB/T 20066 Steel and Iron - Sampling and Preparation of Samples for the Determination of Chemical Composition (GB/T 20066-2006, ISO 14284: 1996, IDT)

## **3 Principles**

Place the prepared test materials into the sampling port, put into the degasses graphite crucible; fuse in the flowing inert gas at high temperature; the precipitated hydrogen is

The used apparatus must be calibrated regularly; in case one of the following abnormal circumstances, the apparatus must be re-calibrated, so that ensure the reliability and effectiveness of the measurement:

- 1) Apparatus is contaminated by poisoning, when do any samples or standard samples, it always drags a tail; after remove the contamination to calibrate;
- 2) Emergent failure influencing the analytical results appear, after eliminating the failure to calibrate;
- 3) After major parameters are changed, calibrate the apparatus.

## **7.2 Calibration procedures**

Prepare minimum four paralleling hydrogen standard substance/standard sample in steel with appropriate dimensions and mass at 0.5g~2.5g, its hydrogen content is close to or slightly greater than that in the unknown sample. Measure each standard sample at least twice as per the Measurement (8), then calibrate the apparatus as per the average value of measurement. Use the third or fourth standard sample to check the calibration state. If the two measurement results are not out-of-tolerance, then the calibration is thought effective. Otherwise, re-calibrate the apparatus.

# **8 Measurement**

## **8.1 Analytical procedures**

Set the apparatus in the operating state; prepare the sample as per Clause 6, the sample mass is at 0.5g~2.5g, weigh, input the sample amount; put the sample into the sample-loading appliance. Start the analysis cycle according to the operation instructions of apparatus, finish each complete analysis process.

## **8.2 Analytical conditions (recommended)**

- 1) Degassing power 3000W or current 850A;
- 2) Analyzing power 2500W or current 700A;
- 3) Analyzing time 90s.

# **9 Result Calculation**

The hydrogen content shall be calculated by mass fraction in  $\mu\text{g/g}$ .

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