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GB/T 42670-2023

Test method for Rockwell hardness of carbon materials

炭素材料洛氏硬度测定方法

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Foreword

This document was issued on 6 August 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 March 2024.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

This document was drafted in accordance with the rules provided in GB/T 1.1-2020 Directives

for Standardization - Part 1: Rules for the Structure and Drafting of Standardizing Documents.

Please be noted that certain content of this document may involve patents. The institution

issuing this document does not undertake the responsibility of identifying these patents.

This document was proposed by China Iron & Steel Association.

This document shall be under the jurisdiction of National Technical Committee on Steel of

Standardization Administration of China (SAC/TC 183).

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Test Method for Rockwell Hardness of Carbon Materials

1 Scope

GB/T 42670-2023 adapts the Rockwell hardness test to carbon materials. Rockwell was devised for metals, and carbon materials - graphite electrodes, carbon brushes, seals, carbon-carbon composites - behave differently under an indenter: they are porous, they are often anisotropic because of how they were formed, and they crush and fracture locally rather than deforming plastically. Applying the metals procedure unmodified gives numbers that scatter widely and cannot be compared between laboratories, yet hardness remains a quick and useful production check on whether a batch was baked and graphitised as intended. This document describes the principle, the instruments and equipment, the specimens, the test procedures, the precision and the test report for determining the Rockwell hardness of carbon materials, specifying the conditions under which the value is meaningful. Under CCS Q52, it is written for the producers of graphite and carbon products, for the aluminium and steel industries that consume electrodes, and for the quality laboratories that use hardness as a routine indicator of process control.

This document describes the principle, instrument and equipment, specimens, test procedures,

precision and test report of the test method for Rockwell hardness of carbon materials.

This document is applicable to the determination of Rockwell hardness of carbon materials with

aggregate particles less than 0.8 mm. Other carbon materials may take this as a reference.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document

through the normative references in the text. In terms of references with a specified date, only

versions with a specified date are applicable to this document. In terms of references without a

specified date, the latest version (including all the modifications) is applicable to this

document.

GB/T 230.2 Metallic Materials - Rockwell Hardness Test - Part 2: Verification and Calibration of Testing Machines and Indenters

GB/T 1427 Sample Method of Carbon Material

GB/T 8170 Rules of Rounding off for Numerical Values & Expression and Judgement of Limiting Values

JJG 112 Metallic Rockwell Hardness Testing Machines (Scales A, B, C, D, E, F, G, H, K, N, T)

JJG 884 Plastic Rock Well Hardness Testing Machine

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 Rockwell hardness

HR

A method of testing and expressing the hardness of a material.

3.2 Rockwell scale

Different combinations that are formed in accordance with the indenter and test force used.

NOTE: usually Rockwell scale has A, B, C, H, K, L, etc., for example, 80HRL means that the

Rockwell hardness tested with L scale is 80HR.

requirements.

6.2.2 The parallelism deviation of the specimens shall not be greater than 0.10 mm/100 mm.

6.2.3 Under the conditions allowed by the material, the roughness of both end surfaces of the

processed specimen Ra ? 3.2 ?m.

6.2.4 The surface of the processed specimen shall be free of visible cracks, edge-off, unfilled

corners, bulges, pits, holes and other defects.

7 Test Procedures

7.1 Test Preparation

7.1.1 Level the equipment and check the workbench to make sure it is free of dust and dirt.

Check the indenter to make sure it is not rusty or scratched.

7.1.2 In accordance with the stipulations of GB/T 230.2, JJG 112 or JJG 884, calibrate the

equipment.

7.2 Test Process

7.2.1 Place the specimen on the specimen placing table of the equipment, keep it stable, and

adjust the operating panel of lifting, so that the indenter contacts the surface of the specimen to

be tested.

7.2.2 Continue to slowly adjust the operating panel of lifting, until the equipment indenter starts

to load the initial test force on the specimen. The initial test force loading time is less than 2 s,

then, load the main test force. The main test force loading time is 1 s ~ 8 s, and the total test

force holding time is 2 s ~ 6 s, finally, release the main test force and maintain the initial test

force. After the test is completed, read and record the value.

7.2.3 Unload the initial test force, adjust the operating panel of lifting, and adjust the position

of the specimen to other points to be tested. Repeat 7.2.1 and 7.2.2. Each specimen is tested at

least 5 times at different positions on the surface to be tested and take the average value. The

distance between the centers of two adjacent indentations or the distance from the center of the

indentation to the edge of the specimen shall be greater than the diameter of the Rockwell scale

indenter, and the test shall be conducted on the same surface of the specimen.

7.2.4 The results shall retain one decimal place. The rounding-off of the numerical values shall