

ICS 17.040.30

CCS J42



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 43915-2024

Testing method for nano geometric standard samples

纳米几何量标准样板测试方法

Issued on: April 25, 2024

Implemented on: November 1, 2024

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

1 Scope	1
2 Normative references	1
3 Terms and Definitions	1
4 Classification and principle of nanofilm thickness standard sample test method	3
2 Equipment requirements	5
6 Test Environment	6
5 Nanofilm Thickness Standard Sample Test	7
9 Reference	10

Foreword

This document is in accordance with the provisions of GB/T 1:1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting: Please note that some of the contents of this document may involve patents, and the issuing organization of this document does not assume the responsibility for identifying patents: This document is under the jurisdiction of the National Technical Committee for Standardization of Measuring Tools and Instruments (SAC/TC132): This document was drafted by: China Electronics Technology Group Corporation 13th Research Institute, Chengdu Tool Research Institute Co., Ltd., China Aviation Industry The group company Beijing Great Wall Metrology and Testing Technology Research Institute, Shanghai Metrology and Testing Technology Research Institute, Tongji University, Tianjin University, China Metrology Science Research Institute, Guangxi Zhuang Autonomous Region Metrology and Testing Institute, China Testing Technology Research Institute, Suzhou Tianjue Technology Co., Ltd: The main drafters of this document are: Wu Aihua, Fu Xingchang, Li Suoyin, Xu Xiaoqing, Zou Xuefeng, Han Zhiguo, Zhao Lin, Zhang Xiaodong, Feng Yanan, Liang Faguo, Xu Gang, He Yixian, Zhu Zhenyu, Li Qiang, Wan Yu, Lei Lihua, Fu Yunxia, Zeng Yanhua, Guan Yuqing, Deng Xiao, Liu Qinggang, Zhang Heng, Shi Yushu, Su Yixiong, Ran Qing, Cao Kuikang: Nano-geometric standard sample test method

1 Scope

GB/T 43915-2024 gives the test methods for nano geometric reference specimens - the calibration artefacts against which atomic force microscopes, scanning electron microscopes and film thickness instruments are set. Nanometre dimensional metrology is entirely dependent on these artefacts: an AFM reports whatever its scanner calibration says, and the scanner is calibrated on a grating whose own pitch must be traceable, so the

artefact is where the measurement chain touches the metre. The standard classifies and gives the principle of the test methods for each type of artefact - line pitch, line width, step height and film thickness - then the test equipment and its selection and requirements, the test environment, and the test procedure for each artefact type in turn, followed by the data processing, the uncertainty evaluation and the certificate of the specimen. It took effect on 1 November 2024.

This document specifies the classification and principle of the test method for nano-geometric standard samples, test equipment, test environment, test procedures and test data processing: This document is applicable to standard samples of nanowire spacing with a line spacing of 50nm~100nm and nanowires with a line width of 20nm~100nm: Wide standard sample, nano-step height standard sample with step height of 10nm~100nm and nano-film thickness of 2nm~100nm Test of meter film thickness standard sample:

Note: Geometric samples for other size ranges shall refer to this document:

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document: For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document:

GB/T 17163 Basic terms for geometric measuring instruments

GB/T 39516-2020 Micro-nano standard sample (geometric quantity)

3 Terms and definitions

The terms and definitions defined in GB/T 17163, GB/T 39516-2020 and the following apply to this document: 3:

1 It has nanometer-scale geometric features such as line spacing, line width, step height and film thickness, and is used as a standard for nanometer size measurement: Template:

4 Test method classification and principle

1 Classification and principles of nanowire spacing standard sample test methods 4:1:

1 Classification of Nanowire Spacing Standard Sample Test Methods The test methods are divided into the following two categories:

- a) Electron microscopy;
- b) Scanning probe method: 4:1:

2 Electron Microscopy Testing Principle By scanning the surface of the standard sample with a focused electron beam with a certain energy, various electrons such as secondary electrons and back-reflected electrons can be excited: After receiving and processing these signals, the image acquisition system and data processing system can obtain the characteristic information of the standard sample: The principle of micromirror method testing is shown in Figure 1:

chinastandards.org · PREVIEW