

ICS 77.040.10

CCS H 22



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

GB/T 46428.1-2025

**Metallic materials - Miniature specimens of plate and rod - Part
1: Fatigue test method**

金属材料 板状、棒状微型试样 第1部分：疲劳试验方法

Issued on: October 31, 2025

Implemented on: May 1, 2026

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

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document is Part 1 of GB/T 46428 "Metallic Materials - Plate and Rod Micro Specimens". GB/T 46428 has been published as... Part 2.

1.Fatigue Testing Methods. Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed by the China Iron and Steel Association. This document is under the jurisdiction of the National Steel Standardization Technical Committee (SAC/TC183). This document was drafted by: Southwest Jiaotong University, Metallurgical Industry Information and Standardization Research Institute, Chengdu Micro-Tess Technology Co., Ltd., and National Energy Administration. Group New Energy Technology Research Institute Co., Ltd., Shenzhen Sansi Zongheng Technology Co., Ltd., Tianjin University, Suzhou Thermal Power Research Institute Co., Ltd. Company, China Aviation Testing Technology (Dachang) Co., Ltd., National Standard (Beijing) Inspection and Certification Co., Ltd., and Guohe General (Qingdao) Testing and Evaluation Co., Ltd. Limited Liability Company, Taihang National Laboratory. The main drafters of this document are. Cai Lixun, Bao Chen, Hou Huining, Huang Maobo, Du Jinfeng, Li Xian, Liu Jie, Chen Gang, Qi Shuang, Li Lulin, and Wang Wei. Li Zhutie, Dong Li, Xiao Huairong, Zhou Chao, Lin Qiang, Fan Minyu, Liang Bo, Zhang Hongju, Liang Xibing, Lei Liming, Guo Bicheng, Li Linping, Li Bingbing, Huang Ping Zhou Fengluan, Ning Wenlei, Zang Haoliang, Yang

Guangjun, Yu Jingtai.

GB/T 46428 "Micro Specimens of Metallic Materials (Plate and Rod Shapes)" establishes a series of standards for the mechanics of micro specimens, specifically for plate and rod-shaped micro specimens. The test method standard, GB/T 46428, is proposed to consist of three parts.

1. Fatigue Testing Methods. The purpose is to standardize fatigue testing methods for plate-shaped and rod-shaped micro-samples of metallic materials.

2. Creep Testing Methods. The purpose is to standardize creep testing methods for plate-shaped and rod-shaped micro-samples of metallic materials.

3. Creep-Fatigue Testing Methods. The purpose is to standardize creep-fatigue testing of plate and rod-shaped micro-specimens of metallic materials. method. Current low-cycle fatigue testing standards all recommend using specimens with uniform cross-sections for constant-amplitude strain-controlled low-cycle cyclic testing, which is unsuitable for easily produced... Thin sheet materials prone to cyclic instability. The method presented in this document uses a funnel-shaped plate specimen to achieve constant-amplitude strain-controlled cyclic testing of thin sheets. The experiment aims to obtain fatigue properties of the material, such as strain amplitude-life relationship and cyclic stress-strain response. Metallic material plate-shaped and rod-shaped micro-samples Part

1 Scope

GB/T 46428.1-2025 is the Chinese national standard covering fatigue testing on specimens too small for the conventional standards - the geometry and its preparation, the alignment and the size effects that shift the result, and the conditions under which the data can be used for design. Part 1 of the series, first edition, under the China Iron and Steel Association. In force from 1 May 2026. Issued on 31 October 2025, it has been in force since 1 May 2026.

This document describes fatigue testing methods for plate-shaped and rod-shaped micro-samples of metallic materials, specifying the principles, samples, and testing apparatus of the test method. The contents of the test setup, test procedures, data processing, and test report. This document applies to funnel-shaped homogeneous, isotropic metallic materials with a stress-strain relationship exhibiting a power law, and a thickness ranging from

0.6 mm to 2 mm. Low-cycle fatigue test of plate-shaped specimens with constant amplitude. Low-cycle fatigue test of rod-shaped specimens shall be conducted in accordance with GB/T 26077.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 10623 Terminology for Testing Mechanical Properties of Metallic Materials

GB/T 12160 Calibration of extensometer systems for uniaxial testing of metallic materials

GB/T 16825.1 Inspection and calibration of static uniaxial testing machines for metallic materials - Part

1.Measurement of tensile and/or compressive stresses by these machines Inspection and calibration of force systems

GB/T 25917.1 Uniaxial fatigue testing systems - Part

1.Dynamic force calibration JJG556 Verification Procedure for Axial Force Fatigue Testing Machine

3 Terms and Definitions

The terms and definitions defined in GB/T 10623 and the following terms and definitions apply to this document.

3.1 The curve showing the relationship between force and gauge length displacement in a single cycle of the experiment.

Note. The displacement of the gauge length segment is the product of the extensometer gauge length and the nominal strain. A typical force-displacement hysteresis loop is shown in Figure 1. Figure