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

GB/T 12443-2026

Replacing GB/T 12443-2017

Metallic materials - Torque-controlled fatigue testing method

金属材料 扭矩控制疲劳试验方法

(English Translation)

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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 replaces GB/T 12443-2017 "Metallic Materials - Torsional Stress Fatigue Test Methods". Compared with GB/T 12443-2017, the main differences are as follows.

The technological changes are as follows.

---High-temperature testing has been added to the scope of application (see Chapter 1, Chapter 1 of the 2017 edition);

---The torque symbol has been changed from "T" to "M" (see 3.10, 2017 edition);

---The length "Lc" of the parallel portion of the specimen has been removed, and the

definitions and symbols for the specified temperature T , monitoring temperature T_i , and triaxial strain have been added (see...).

Chapter 4 (Chapter 4 of the 2017 edition);

---Added descriptions of the experimental principle's requirements for the room temperature range and the morphology of torsional fatigue cracks (see Chapter 5);

---The recommended dimensions for circular cross-section specimens have been added (see 7.2.1);

---Added requirements for the surface roughness of the inner surface of the circular tube specimen (see 8.2, 8.4);

---Added requirements for torque measurement system calibration (see 9.1.1);

---Added requirements for torque sensor calibration intervals (see 9.1.2);

---Added descriptions of test fixtures and examples of Morrison fixtures (see 9.1.3);

---The numerical requirements for axial loads have been changed (see 9.1.5, 2017 version 9.1.5);

---Added requirements for the heating system (see 9.2);

---Added temperature control requirements for high-temperature testing (see 10.3);

---Added requirements for test failure conditions (see 10.7.1, 10.6.1 in the 2017 version);

---Added requirements for the test temperature of the Wöhler curve or SN curve (see Figure A.1);

---A method for evaluating measurement uncertainty has been added (see Chapter 11, Appendix D).

This document is modified to adopt ISO 1352:2021 "Metallic materials - Torque-controlled fatigue test method".

The technical differences between this document and ISO 1352:2021, and the reasons therefor, are as follows.

---ISO 23788 (see 9.1.4, B.4, C.5) has been replaced with the normatively referenced GB/T 34104 to adapt to my country's technical conditions.

Increase operability.

The following editorial changes have been made to this document.

---For ease of use, the symbols and explanations in Chapter 4 are now listed in Table 1, with subsequent table numbers following accordingly; formulas in the standard...

Unified numbering;

---Editorial errors in the international standard have been corrected (see Figure 2, Figure 2 of ISO 1352:2021);

---ISO 12107 has been replaced by GB/T 24176 (see Chapter 6), which is used for informational purposes.

---ISO 4965-1 and ISO 4965-2 have been replaced with GB/T 25917.1 and GB/T 25917.2 (see 9.1.1) for informative reference;

---The ISO/IEC Guide 98-3:2008 (see D.1.2, D.1.4, D.2.3) has been replaced by the informatively referenced GB/T 27418-2017.

---Added informative reference to JJG269-2006 (see 9.1.1).

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).

1 Scope

This document specifies the fatigue resistance of metal specimens under given torque, constant amplitude, nominal elastic stress, and without stress concentration conditions.

Tests are typically conducted at room temperature or in a high-temperature atmosphere, with the actual test temperature recorded, and the sample is loaded along its longitudinal axis.

This document applies to the cutting, preparation, and testing of circular cross-section specimens and circular tube cross-section specimens, excluding structural members and other special types of specimens.

The test does not include low-cycle torsional fatigue tests with constant amplitude angular displacement control, where the failure cycles are typically several thousand.

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 34104 Inspection of coaxiality under load for testing machines of metallic materials

(GB/T 34104-2017, ISO 23788:2012, MOD) testing-Specifications)

3 Terms and Definitions

The following terms and definitions apply to this document.

maximum stress

$\sigma_{\max}$

The maximum algebraic value of shear stress at the outer diameter during stress cycling (see Figure 1).

minimum stress

$\sigma_{\min}$

The minimum algebraic value of shear stress in stress cycle (see Figure 1).

mean stress

σ_m

The static components of stress (see Figure 1).

Note: Half of the algebraic sum of the maximum stress and the minimum stress is given in formula (1).

$\sigma_m =$

$\frac{\sigma_{\max} + \sigma_{\min}}{2}$

stress amplitude

σ_a

Dynamic components of shear stress (see Figure 1).

Note: Half of the algebraic difference between the maximum stress and the minimum stress, see formula (2).