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

GB/T 32967-2026

Replacing GB/T 32967.1-2016

**Metallic materials - High strain rate torsion test at room
temperature**

金属材料 高应变速率室温扭转试验方法

(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 32967.1-2016 "Metallic materials - High strain rate torsion test - Part 1: Room temperature test method".

Compared with GB/T 32967.1-2016, the main technical changes in the "Law" are as follows, except for structural adjustments and editorial modifications.

---Added methods and content for equipment calibration (see 8.1);

---The formula for calculating strain in an elastic bar has been modified (see 9.1, 2016 version 9.1);

---The conditions for the experiment to satisfy dynamic equilibrium have been changed (see 9.2.3, 2016 version of 9.2.3);

---The technical requirements for the output rod length have been changed (see A.5.2, 2016 version of A.5.2);

---The requirements for strain gauge mounting location have been changed (see B.3, 2016 version of B.3).

This document adopts ISO 23838:2022 "Metallic materials, high strain rate, room temperature torsion test method".

The following minimal editorial changes have been made to this document.

---Corrected the error in the position of the d2 label in Figure 3 (see Chapter 7).

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).

Introduction

In structural impact processes such as stamping, high-speed cutting, and automobile collisions, the metal materials in the structure not only experience complex stress states but also undergo significant changes.

The strain rate is high, reaching a maximum of 10^4 s^{-1} . Under these extreme loading conditions, the material's strength is significantly higher than under quasi-static conditions. (Metal) the shear mechanical properties of materials, such as yield strength, flow stress, and failure strain, are fundamental parameters for structural shear failure analysis and are also essential for constructing this analysis.

Basic data on structural relationships. The shear mechanical properties of many metallic materials are related to strain rate, just like their mechanical properties under uniaxial

loading.

Therefore, obtaining the shear mechanical properties of metallic materials at high strain rates through high strain rate torsion tests is important for the engineering design of metallic structures.

It plays a very important role in structural optimization, processing, and evaluation. Further information can be found in ISO 26203-1 and ISO 26203-2.

The Hopkinson test technique is one of the main experimental methods for studying the mechanical properties of materials at medium to high strain rates ($\geq 10^2 \text{ s}^{-1}$).

The method is based on the following two assumptions. a) the propagation of one-dimensional elastic stress waves in an elastic rod; b) the uniformity of stress/strain along the length of the short specimen.

distributed.

The basic principle of this test method is. a short sample is clamped between two relatively long elastic rods, and elastic stress waves are propagated through the elastic rods to...

Loading and testing are achieved. On one hand, the propagation of waves in the elastic rod enables dynamic loading of the specimen; on the other hand, the load and...

The displacements at both ends can be calculated from the elastic strain measured by strain gauges attached to the elastic rod. (Elastic split Hopkinson torsion) the rod, a type of split Hopkinson rod, can be used to solve dynamic torsion test problems and is widely used to accurately obtain the strain rate of materials.

Stress-strain curves near 10^3 s^{-1} .

This document provides a test method for split Hopkinson torsion bars.

High strain rate room temperature torsion test method for metallic materials

1 Scope

This document specifies the symbols, experimental principles, and experimental procedures for conducting high strain rate torsion tests on metallic materials using a split Hopkinson torsion bar.

The test includes equipment, test specimens, test procedures, test data processing, evaluation of the validity of test results, and test reports.

2 Normative references

This document has no normative references.