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

GB/T 2039-2024

**Metallic materials - Uniaxial creep testing method in tension
(English Translation)**

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Foreword

This document was drafted in accordance with the rules given in GB/T 1.1-2020, Directives for standardization - Part 1. Rules for the structure and drafting of standardizing documents.

This document replaces GB/T 2039-2012 Metallic materials - Uniaxial creep testing method in tension. Compared with GB/T 2039-2012, except for structural adjustment and editorial changes, the main technical changes are as follows.

-- Change the scope. continuous creep test, interrupted creep test, creep-rupture (endurance) test measuring only the rupture time, and test to verify passability under a given stress (see Chapter 1; Chapter 1 of the 2012 edition);

-- Add and modify some terms, definitions and symbols (see Chapter 3; Chapter

3 of the 2012 edition);

-- Modify Figure 1 to "Schematic diagram of stress-extension curve" (see Figure 1; Figure 1 of the 2012 edition);

-- Modify some symbols and descriptions in Table 1 (see Chapter 4; Chapter 4 of the 2012 edition);

-- Modify the content of "Extension and elongation measurement device" (see 6.2; 6.2 of the 2012 edition);

-- Add requirements for the cold end temperature of thermocouples and indirect temperature measurement methods (see 6.3.2.1);

-- Change the requirements on the use temperature and time of different types of thermocouples in the original informative Appendix A to the main text (see 6.3.3; Appendix A of the 2012 edition);

-- Modify the determination of reference length L_r (see 7.5; 7.5 of the 2012 edition);

-- Add combined test (see 8.3.3);

-- Add the calculation formula for stress concentration factor K_t (see Appendix C).

This document adopts ISO 204.2023 Metallic materials - Uniaxial tension creep testing in tension - Method of test by modification.

This document has the following structural adjustments compared to ISO 204.2023.

-- Appendix D corresponds to Appendix E of ISO 204.2023;

-- Appendix E corresponds to Appendix D of ISO 204.2023.

The technical differences between this document and ISO 204.2023 and their reasons are as follows.

-- Use the normative references GB/T 228.2, GB/T 12160 and GB/T 16825.2 to replace ISO 6892-2, ISO 9513 and ISO 7500-2 respectively; add the normative references to GB/T 4989, GB/T 8170, GB/T 10623, JJF 1637, JJG

141, JJG 276 and JJG 617, and delete the normative reference to ISO 6892-1 to adapt to our country's technical conditions;

-- In 6.1, add requirements for the coaxiality of the testing machine and calibration cycle of the testing machine to ensure the accuracy of the test results;

-- Since the stability of the strain measurement device is greatly affected by the test cycle and environmental conditions, change the calibration cycle of the extensometer in the strain measurement device in 6.2 from 3 years to 1 year;

-- Since the uniform temperature zone of the heating furnace directly affects the creep test results, add the calibration of the uniform temperature zone of the heating furnace in 6.3.5.

This document also makes the following editorial modifications.

-- Change the standard name to "Metallic materials - Uniaxial creep testing method in tension".

1 Scope

This document specifies the following methods.

- a) continuous creep test with continuous monitoring of elongation;
- b) interrupted creep test with periodic measurement of percentage elongation;
- c) creep rupture (endurance) test in which usually only the rupture time is measured;
- d) For verification test at a given stress and exceeding the predetermined time, neither percentage extension nor percentage elongation is recorded.

Note: Creep testing can be carried out until the test sample breaks, or be stopped before breaking.

This document applies to creep (endurance) testing on smooth and notched test samples.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the

edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 228.2, Metallic materials - Tensile testing - Part 2. Method of test at elevated temperature (GB/T 228.2-2015, ISO 6892-2:2011, MOD)

GB/T 4989, Extension and compensating cables for thermocouples

GB/T 8170, Rules of rounding off for numerical values & expression and judgment of limiting values

GB/T 10623, Metallic material - Mechanical testing - Vocabulary (GB/T 10623-2008, ISO 23718:2007, MOD)

GB/T 12160, Metallic materials - Calibration of extensometers systems used in uniaxial testing (GB/T 12160-2019, ISO 9513:2012, IDT)

GB/T 16825.2, Verification of static uniaxial testing machines - Part 2. Tension creep testing machines - Verification of the applied force (GB/T 16825.2-2018, ISO 7500-2:2006, IDT)

GB/T 16839.1, Thermocouples - Part 1. EMF specifications and tolerances (GB/T 16839.1-2018, IEC 60584-1:2013, IDT)

JJF 1637, Calibration Specification for Base Metal Thermocouples

JJG 141, Working Noble Metal Thermocouples

JJG 276, Verification Regulation of High-Temperature Creep and Stress-Rupture Testing Machines

JJG 617, Verification Regulation of Digital Temperature Indicators and Controllers

3 Terms and definitions

For the purposes of this document, the following terms and definitions, as well as those given in GB/T 10623, apply.

3.1

reference length

L_r