NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB/T 12160-2019

Metallic materials - Calibration of extensometers systems used in uniaxial testing

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Table of Contents

Foreword

This Standard was drafted in accordance with the rules provided in GB/T 1.1-2009.

This Standard serves as a replacement for GB/T 12160-2002 Calibration of Extensometers Used in Uniaxial Testing. In comparison with GB/T 12160-2002, apart from editorial modifications, the main technical changes are as follows.

---Terms and definitions are added (see Chapter 2);

---Pre-calibration inspection is added (see Chapter 6);

---Uncertainty determination is added (see Chapter 10);

---Annex A "Example of Extensometer Calibration Range" and Annex B "Parameters for Extensometer Classification" are deleted (see Annex A and Annex B of Version 2002);

---Informative Annexes are added (see Annex A, Annex B, Annex C, Annex D, Annex E, Annex F, Annex G and Annex H).

This Standard uses the translation method in the equivalent adoption of ISO 9513.2012 Metallic

Materials - Calibration of Extensometer Systems Used in Uniaxial Testing.

This Standard makes the following editorial modification.

---This Standard includes ISO 9513.2012_Cor 1 and corrects some contents of Figure C.1 and Figure C.2.

This Standard was proposed by China Machinery Industry Federation.

This Standard shall be under the jurisdiction of National Technical Committee 122 on Testing

Machines of Standardization Administration of China (SAC/TC 122).

The drafting organizations of this Standard. SINOTEST Equipment Co., Ltd.; Central Iron &

Steel Research Institute; Wuxi Institute of Measurement and Testing; Shenzhen WANCE testing

Machine Co., Ltd.; Jilin University; Jilin Institute of Metrology.

1 Scope

This Standard specifies a method for the static calibration of extensometer systems used in

uniaxial testing, including axial and diametral extensometer systems, both contacting and non-

contacting.

2 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

equipment used to measure displacement or strain on the surface of a test piece.

3 Symbols and Designations

Symbols used throughout this Standard are given in Table 1 together with their designation.

4 Principle

The calibration of extensometer systems involves a comparison of the readings given by the

extensometer with known variations in length provided by a calibration apparatus.

5 Calibration Equipment

The calibration apparatus, which allows a known displacement It to be applied to the

extensometer, may consist of a rigid frame with suitable coaxial spindles or other fixtures to

which the extensometer can be attached. The calibration apparatus shall comprise a mechanism

for moving at least one of the axial spindles together with a device for accurately measuring the

change in length produced.

6 Pre-calibration Inspection

Records of the pre-calibration inspection shall be kept, identifying the "as-found" condition

of

the extensometer system, when the inspection was performed and who performed it. These pre-

calibration inspection records can take the form of either a written report or a completed "pro-

forma" checklist.

7 Measurement of Extensometer Gauge Length

The gauge length for non-contacting extensometry is established in accordance with the

manufacturer's instructions.

Where an extensometer gauge length is set using a removable gauge, the relative error on the

gauge length, qLe, calculated from Formula (1) shall not exceed the values given in Table 2.

8 Calibration Process

The extensometer shall be placed, wherever feasible, in the calibration apparatus in a similar

orientation to that in which it will be used during uniaxial testing to avoid errors due to loss of

equilibrium or to deformation of any part of the extensometer.

The extensometer shall be attached in a similar way as during uniaxial testing.

9 Classification of the Extensometer System

The required input data for the classification of the extensometer system are.

The collated data are assessed as follows.

10 Uncertainty Determination

Many elements contribute to the uncertainty of the calibration process. The following shall be

assessed and incorporated into the uncertainty budget calculation.

11.1 The time between two calibrations depends on the type of extensometer system, the