Metallic materials - Calibration of extensometer systems used in uniaxial testing (ISO 9513:2012)

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EUROPEAN STANDARD

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Metallic materials - Calibration of extensometer systems used in uniaxial testing (ISO 9513:2012)

Matériaux métalliques - Étalonnage des chaînes extensométriques utilisées lors d'essais uniaxiaux (ISO 9513:2012)

Metallische Werkstoffe - Kalibrierung von Längenänderungs-Messeinrichtungen für die Prüfung mit einachsiger Beanspruchung (ISO 9513:2012)

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Foreword

This document (EN ISO 9513:2012) has been prepared by Technical Committee ISO/TC 164 "Mechanical testing of metals" in collaboration with Technical Committee ECISS/TC 101 “Test methods for steel (other than chemical analysis)” the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2013, and conflicting national standards shall be withdrawn at the latest by June 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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The text of ISO 9513:2012 has been approved by CEN as a EN ISO 9513:2012 without any modification.

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Introduction

This International Standard sets out criteria for the calibration of extensometer systems, covering general principles, the calibration equipment to be used, pre-calibration inspection and the measurement of gaugelength for various types of extensometer systems. Aspects of the calibration process are addressed, as are the assessment of the results, uncertainties, calibration intervals and reporting. Criteria for calibration apparatus, their calibration and grading are addressed, complemented by a Bibliography covering a number of important papers related to extensometer systems and their application [1] to [10]. Work is in progress to develop processes for dynamic extensometer calibration, however these have not reached, at the time of writing of this International Standard, the level of development appropriate for inclusion within this International Standard. For further information, refer to Reference [6].

Informative annexes address calculation of uncertainties of measurement for an extensometer system calibration (Annex A), calibration of calibration apparatus (Annex B) and an example of a calibration report (Annex C). Subsequent annexes address examples of extensometer system configurations (Annex D), laser extensometry (Annex E), video extensometry (Annex F), full field extensometry (Annex G) and calibration of a crosshead measurement system (Annex H).

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1 Scope

This International 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.

2.1
extensometer system
equipment used to measure displacement or strain on the surface of a test piece

NOTE For the purpose of this International Standard, the term “extensometer system” includes the indicator. Some extensometers indicate strain directly (e.g. laser extensometers or digital image correlation techniques). Other extensometers indicate the change in gauge length of a test piece; this is converted into strain by dividing by the relevant gauge length.

2.2
gauge length
portion of a test piece where extension is measured

3 Symbols and designations

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

Table 1 — Symbols and designations

Symbol	Designation	Unit
L_e	Nominal gauge length of extensometer	mm
L'_e	Measured gauge length of extensometer	mm
l_{max}	Maximum limit of calibration range	mm
l_{min}	Minimum limit of calibration range	mm
l_i	Displacement indicated by extensometer	µm
l_t	Displacement given by calibration apparatus	µm
q_{L_e}	Relative gauge length error of the extensometer system	%
q_{rb}	Relative bias error of the extensometer system	%
q_b	Absolute bias error of the extensometer system	µm
r	Resolution of the extensometer system	µm

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