
**Metallic materials — Fatigue testing —
Axial-strain-controlled method**

*Matériaux métalliques — Essais de fatigue — Méthode par déformation
axiale contrôlée*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 12106 was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 5, *Fatigue testing*.

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Introduction

The design of mechanical components subjected to fatigue loadings requires, in a number of industrial sectors (nuclear, aeronautical, mechanical engineering), the knowledge of the behaviour of the materials under reversed strain control conditions (referred to as low-cycle fatigue) when cyclic plasticity is present.

In order to ensure reliability and consistency of results from different laboratories, it is necessary to collect all data using test methodologies that comply with a number of key points.

This International Standard concerns both the generation and the presentation of results for fatigue properties of metallic materials.

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Metallic materials — Fatigue testing — Axial-strain-controlled method

1 Scope

This International Standard specifies a method of testing uniaxially loaded specimens under strain control at constant amplitude, uniform temperature and strain ratio $R_\varepsilon = -1$.

It can also be used as a guide for testing under other conditions.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 9513:1999, *Metallic materials — Calibration of extensometers used in axial testing*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.^[3 to 9]

3.1

stress

instantaneous force divided by the instantaneous cross-sectional area of the gauge length

$$\sigma = F/A$$

NOTE At strain values less than 10 %, the true stress is approximated by the engineering stress, F_F/A_0 .

3.2

gauge length

length between extensometer measurement points

3.3

strain

true total strain

$$\varepsilon = \int_{L_0}^L \frac{dL}{L}$$

where L is the instantaneous length of the gauge section

NOTE At true strain values less than 10 %, ε is approximated by the engineering strain $\Delta L/L_0$.