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International

ISO 1099

Metallic materials — Fatigue testing — Axial force-controlled method

Matériaux métalliques — Essais de fatigue — Méthode par force axiale contrôlée

Fourth edition
2026-10

Reference number
ISO 1099:2026(en)

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Published in Switzerland

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This document was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 4, *Fatigue testing*.

This fourth edition cancels and replaces the third edition (ISO 1099:2017), which has been technically revised.

The main changes are as follows:

— format has been changed to be similar to ISO 22407:2021, ISO 1143:2021 and ISO 1352:2021.

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This document is intended to provide requirements and guidance for conducting axial, constant-amplitude, force-controlled, cyclic fatigue tests on specimens of a metal for the sake of generating fatigue-life data (i.e. stress vs. cycles to failure) for material characterization.

Nominally identical specimens are mounted in an axial force-type fatigue-testing machine and subjected to the required cyclic force conditions that introduce any one of the types of cyclic stress as illustrated in Figure 1. The test waveform should be of constant amplitude and sinusoidal unless otherwise specified.

The force being applied to the specimen is along the longitudinal axis passing through the centroid of each cross-section. The test is continued until the specimen fails or until a predetermined number of stress cycles have been exceeded (see Clauses 4 and 10). Tests are typically conducted at ambient temperature (ideally between 10 °C to 35 °C).

NOTE The results of a fatigue test can be affected by atmospheric conditions and where controlled conditions are required, ISO 554:1976, 2.1 applies.

Caution should be taken regarding the selected test temperature of such isothermal testing so that there are no possible phase changes in the material's microstructure. At elevated temperature creep phenomena can occur. It is recommended to maintain the test temperature, T, at ≤ 0,3 of the melting temperature, T_m, of the material being tested, i.e. the homologous temperature defined as: $T_h = T(K)/T_m(K)$.

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