
**Metallic materials — Fatigue testing —
Variable amplitude fatigue testing —**

Part 1:
**General principles, test method and
reporting requirements**

*Matériaux métalliques — Essais de fatigue — Essais sous
amplitude variable —*

*Partie 1: Principes généraux, méthode d'essai et exigences sur le
rapport d'essai*



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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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The committee responsible for this document is ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 5, *Fatigue testing*.

ISO 12110 consists of the following parts, under the general title *Metallic materials — Fatigue testing — Variable amplitude fatigue testing*:

- *Part 1: General principles, test method and reporting requirements*
- *Part 2: Cycle counting and related data reduction methods*

Metallic materials — Fatigue testing — Variable amplitude fatigue testing —

Part 1: General principles, test method and reporting requirements

1 Scope

This part of ISO 12110 establishes general principles for fatigue testing of laboratory specimens under a sequence of cycles the amplitude of which varies from cycle to cycle.

This sequence of cycles is called loading time history (see 3.7) and is usually derived from loading measurements performed on components or structures submitted to true service loadings.

Detailed description of service loads recording is relevant to each laboratory or industrial sector and is therefore outside the scope of this part of ISO 12110.

The aim of the two parts of ISO 12110 is to set requirements and give some guidance on how to perform a variable amplitude fatigue test in order to produce consistent results for comparison purposes taking into account the typical scatter of fatigue data. Achieving this should help designers to correlate models and experimental data obtained from various sources.

Since this part of ISO 12110 involves mainly loading time histories and control signal generation, one expects it might be applied to strain or fatigue crack growth rate controlled loading conditions as well as to force-controlled loading conditions. This is theoretically true but precautions may be taken when applying this part of ISO 12110 to loading modes other than force-controlled loading mode.

This part of ISO 12110 relates to variable amplitude loading under force control mode which corresponds to most of the variable amplitude fatigue tests performed worldwide at the date of publication of this part of ISO 12110.

This part of ISO 12110 applies to the single actuator loading mode which corresponds to uniaxial loading in many cases.

The variable amplitude loading time histories referred in this part of ISO 12110 are deterministic; that is why this part of ISO 12110 deals with variable amplitude loading instead of random loading.

The following issues are not within the scope of this part of ISO 12110 and therefore will not be addressed.

- constant amplitude tests with isolated overloads or underloads;
- tests on large components or structures;
- environmental effects like corrosion, creep linked to temperature/time interactions leading to frequency and waveform effects;
- multiaxial loading.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1099, *Metallic materials — Fatigue testing — Axial force-controlled method*