



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 37306.1-2019

**Metallic materials -- Fatigue testing -- Variable amplitude fatigue
testing -- Part 1: General principles, test method and reporting
requirements**

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Table of Contents

Foreword

1 Scope

2 Normative references

3 Terms and definitions

4 Test principle

4.1 Control signal generation

4.2 Overview of test methods

5 original loading time history

5.1 General

5.2 Data Filtering

6 loading time history

6.1 General

6.2 Time history sequence

1 --- Load order.

6.3 Cycle counting method

7 program module

8 Conversion matrix and its control signal generation

8.1 Matrix establishment

8.2 Reconstruction of load signals

8.3 Control signal simplification

Foreword

GB/T 37306 "Metal material fatigue test variable amplitude fatigue test" is divided into two parts.

--- Part 1. General, test methods and reporting requirements;

--- Part 2. Loop count and related data reduction methods.

This part is the first part of GB/T 37306.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This part uses the translation method equivalent to ISO 12110-1.2013 "Metal material fatigue test variable amplitude fatigue test Part 1.

General rules, test methods and reporting requirements.

The documents of our country that have a consistent correspondence with the international documents referenced in this part are as follows.

---GB/T 3075-2008 Metal material fatigue test axial force control method (ISO 1099.2006, MOD);

---GB/T 6398-2017 fatigue crack propagation method for metal materials (ISO 12108.2012, MOD);

---GB/T 24176-2009 Metal material fatigue test data statistical program and analysis method (ISO 12107.2003, IDT);

---GB/T 26077-2010 Metal material fatigue test axial strain control method (ISO 12106.2003, MOD);

---GB/T 34104-2017 Metallic material testing machine for testing the coaxiality of the test (ISO 23788.2012, MOD).

This section has made the following editorial changes.

---Using the national standard GB/T 37306.2 "Metal materials fatigue test variable amplitude fatigue test Part 2. Cycle count and phase

The Data Reduction Method replaces the international standard ISO 12110-2 (see 6.3, Chapter 9).

This part was proposed by the China Iron and Steel Association.

This part is under the jurisdiction of the National Steel Standardization Technical Committee (SAC/TC183).

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Metal material fatigue test variable amplitude fatigue test

Part 1. General, test methods and reporting requirements

1 Scope

This part of GB/T 37306 specifies the general rules for the cyclical fatigue test of laboratory

samples for each cycle of amplitude variation.

This section specifies and gives general rules for variable amplitude fatigue tests to generate for comparison when considering the typical dispersion of fatigue data.

Consistent results.

This section is theoretically applicable to strain and force control or loading conditions for controlling fatigue crack growth rate, using this part of the loading

Mode, not force - Appropriate protection should be taken when controlling the loading mode.

This section applies to single actuator loading mode for single axis loading.

The variable loading time history referred to in this section is deterministic, which is why this part deals with variable amplitude loading rather than random loading.

The following items are outside the scope of this section.

- Constant amplitude fatigue test with isolated overload or underload phenomenon;
- Experiment of large parts or structural parts;
- Environmental impacts such as corrosion, temperature/time related creep leading to effects on frequency and waveforms;
- Multi-axis loading.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article.

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

ISO 1099 metal material fatigue test axial force control method
(Metalicmaterials-Fatiguetesting-Axial
Force-controlledmethod)

ISO 12106 Metal material fatigue test axial strain control method
(Metalicmaterials-Fatiguetesting-
Axial-strain-controlledmethod)

ISO 12107 Metal material fatigue test data statistical program and analysis method
Metalicmaterials-Fatigue
testing-Statisticalplanningandanalysisofdata)

ISO 12108 metal material fatigue test fatigue crack growth method
(Metalicmaterials-Fatiguetesting-

Fatiguecrackgrowthmethod)

ISO 23788 Metallic material fatigue testing machine for testing the coaxiality
(Metalicmaterials-Verification ofthe

Alignmentoffatiguetestingmachines)

3 Terms and definitions

The following terms and definitions defined by ISO 1099, ISO 12106, ISO 12107 and ISO 12108 apply to this document.

3.1

Cumulative frequency diagram cumulativefrequencydiagram

A histogram representing the accumulation of each cycle since the start of the test.

Note. The cumulative frequency map is also known as the cumulative spectrum or cumulative distribution.

3.2

Cycle cycle

Periodically repeated force-time/stress-time/strain-time under constant amplitude fatigue loading, or in some other signal applied to the specimen

The smallest segment.

Note. In variable amplitude loading, the definition of the loop varies depending on the counting method used.

3.3

Loop counting method cyclecountingmethod

A method of calculating the number of load time history loops for a given length.

3.4

Loading loading

A general term for applying varying forces, strains, or other controlled quantities on the specimen.

Note. This section mainly refers to the force control loading mode.

3.5