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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 25917.1-2019

Uniaxial fatigue testing systems -- Part 1: Calibration of dynamic force

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Foreword

GB/T 25917 `` Uniaxial Fatigue Test System '' is divided into the following two parts.

--- Part 1. Dynamic force calibration;

--- Part 2. Instruments for dynamic calibration devices.

This part is the first part of GB/T 25917.

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

This section replaces GB/T 25917-2010 "Dynamic Force Calibration of Axial Afterburner Fatigue Testing Machine", compared with GB/T 25917-2010

The technical changes are as follows.

--- Added two calibration methods, Method A and Method B (see Chapter 1);

--- Modified terms, definitions and symbols (see Chapter 3, Chapter 3 of the.2010 edition);

--- Added requirements for static force calibration and frequency calibration (see Chapter 4);

--- Added Method A and Method B test and calculation methods (see Chapters 5 and 6);

--- Deleted the calibration rod and its calibration (see Chapter 5 and Chapter 8 of the.2010 edition);

--- Deleted the performance evaluation and calibration curve of the testing machine (see

Chapter 10 and Chapter 11 of the.2010 edition);

--- Added Appendix A and Appendix B, deleted Appendix A and Appendix B of the.2010 version (see Appendix A and Appendix B, the.2010 version

(Appendix A, Appendix B).

This section uses the translation method equivalent to ISO 4965-1..2012 "Dynamic Force Calibration of Uniaxial Fatigue Tests on Metal Materials Part 1

Points. Test System.

The Chinese documents that have a consistent correspondence with the international documents referenced normatively in this section are as follows.

--- GB/T 16825.1-2008 Inspection of static uniaxial testing machines-Part 1. Force measurement system of tensile and/or compression testing machines

System inspection and calibration (ISO 7500-1..2004, IDT);

--- GB/T 25917.2-2019 Uniaxial fatigue test system Part 2. Instrument for dynamic calibration device (ISO 4965-2.

2012, IDT).

The following editorial changes have been made in this section.

--- In keeping with the existing standard series, the standard name was changed to "Uniaxial Fatigue Test System Part 1. Dynamic Force Calibration".

This section is proposed by China Machinery Industry Federation.

This section is under the jurisdiction of the National Testing Machine Standardization Technical Committee (SAC/TC122).

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Introduction

In the dynamic test, the test force (Ft) on the sample and the indicated force (Fi) of the test system have significant differences. Dynamic error comes from

The inertial force acting on the force sensor and the dynamic error of the electronic

equipment in the force display system. The inertia force is equal to the mass of the fixture

Between the force sensor and the specimen) multiplied by its local acceleration. Therefore, it is related to the following factors.

a) motion amplitude;

b) exercise frequency;

c) Fixture quality.

Correspondingly, the amplitude of the motion depends on the magnitude of the applied force and the mechanical configuration of the test system, including the compliance of the load chain, the specimen, the restraint structure

And installation foundation. For a given frequency within a given range of force values, different combinations of flexibility values will result in different amplitudes of motion [clamp

The fixture with a very flexible specimen may move in the opposite direction (inverted) toward the same fixture holding a very rigid specimen].

For the purposes of this part of GB/T 25917, there is a linear relationship between the displacement of the actuator and the displacement of the applied force.

The calculated correction factor can dynamically calibrate the force measurement system within 1% of the applied force. Use method B and both have

Dynamic calibration device (DCD) with different flexibility can dynamically calibrate the force measurement system in the range of 1% of the applied force, but the condition is

The compliance of the test sample is between those of the two DCDs.

Method A (equivalent sample method) uses DCD with a correction factor generated by calculation to calibrate the dynamic test system.

Within the range of force, the allowed error after correction is 10%. DCD has the same flexibility and quality as the test sample, and the entire loading chain

The same as the actual test. Before starting a series of dynamic tests, determine the indicated force range (deltaFi) and

Correction factor related to test force range (deltaFt). This factor can be used to modify the test results or to improve the test force.

Adjust to reduce the dynamic error to less than 1%. This correction factor depends on the test frequency, so the entire test frequency must be determined in advance

Range.

Method B (flexibility envelope method) uses two DCDs with different flexibility to calibrate the test system using multiple forms of samples. low

The flexibility DCD should have a lower flexibility than the test sample, and the high flexibility DCD should have a higher flexibility than the test sample. Test system

The dynamic envelope of the tested sample about compliance-frequency, the dynamic error is kept within 1% of the applied force range. This assumes that with any

Compared to the compliance of a DCD, the compliance of the loading chain is very small. If this is not the case, if the test machine has multiple compliance values for the load chain,

Perform additional calibration.

Uniaxial fatigue test system

Part 1. Dynamic force calibration

1 Scope

This part of GB/T 25917 describes two ways to determine how a specimen can be tested in uniaxial, sinusoidal, and constant amplitude tests.

The method of the relationship between the dynamic force range (deltaFt) and the test system force value display range (deltaFi) (see the introduction).

These methods can avoid the resonance frequency of the system when the dynamic test system is working.

The range is expected to exceed 1% of the test system.

The dynamic force measurement error is obtained by comparing the peak value of the force displayed by the dynamic force test system with the dynamic force calibration device attached with a resistance strain gauge.

(DCD) measurement. Perform static calibration on the displayed value of the DCD test system in advance (see 5.2.1).

Method A (equivalent to the sample method) dynamic calibration is only applicable to the valid frequency range confirmed from the sample. Frequency-based repair

The positive factor is suitable for correction when the dynamic force measurement error is up to 10% of the dynamic force range. Using this correction factor will make the actual test

The dynamic force measurement error of the sample is reduced to the extent of less than 1% of the dynamic force range.

Method B (flexibility envelope method) dynamic calibration is applicable to the effective frequency range of samples with flexibility between two sets of DCD. because

Method B does not allow the dynamic force measurement error to exceed 1% of the dynamic force range, so method B does not apply a correction factor.