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

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**Metallic materials -- Verification of the alignment of testing
machines**

(English Translation)

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard uses redrafted Law Amendment using ISO 23788:2012 "metal materials fatigue testing machine load coaxiality test." this standard compared with ISO 23788:2012 there are technical differences, the provisions of these differences have been passed in the outer margin of the page margin Set the vertical single (|) were marked, this standard and ISO 23788:2012 technical differences and the reasons are as follows.

--- On normative references, this standard made a technical difference with the adjustment to meet the technical conditions of our country, the situation concentrated Reflected in Chapter 2 "Normative references", the specific adjustments are as follows.

- Replace ISO 7500-1 with GB/T 16825.1 equivalent to international standards (see 5.1);

- Increased reference to GB/T 13992 (see 5.6).

--- As a result of the addition of (11), in Chapter 4 added ϵ_{nb} , max, m_c , i_c symbols and descriptions (see Table 1);

--- In order to accurately calculate the thickness of the center of the sensor bending sensor maximum bending test machine component of the azimuth, an increase of the maximum bending strain Bit angle calculation formula (11) (see 6.3);

--- In order to facilitate the operation, added in the inspection step for the thin rectangular centering sensor equivalent strain instructions [see 7.2d)];

--- In order to more clearly the strain gauge in the sensor surface position, in Figure 3a), 3b), 3c) increased the direction of R, while at Appendix D modifies the formula for the maximum bending strain and adds the formula for the maximum bending strain azimuth and modifies Figure D.1 (see

Figure 3, Figure D.1, equation (D.6), equation (D.7)].

--- For ease of application, an additional footnote a is added in Table 4 (see Table 4).

This standard made the following editorial changes.

--- According to the standard scope of application, the standard name was changed to "metal material testing machine load coaxiality test";

--- For ease of use, Chapter 4 symbols and descriptions in the form of a tabular list;

--- Removed the international standard 6.4 note;

--- Added references [5].

This standard is proposed by China Iron and Steel Association.

This standard by the National Standardization Technical Committee Steel (SAC/TC183) centralized.

This standard drafting unit. Iron and Steel Research Institute, Metallurgical Industry Information Standards Institute, Shanghai Shanghai Co., Ltd. test machine.

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Introduction

This standard refers to the meaning of testing machine loading coaxiality is the consistency of the test fixture geometry loading axis. Deviations from this ideal state guide refer to Appendix A for angular and/or laterally offset (or non-coaxial) loading chains. Different axes have been confirmed in the test sample or coaxiality Undesired bending stress/strain field is introduced into the measuring device (referred to hereinafter as centering sensor). Additional bending stress/strain field will be superimposed on the application Plus,

predetermined uniform stress-strain field. For pure torsion tests, biaxial torsional superposition bending stress/strain will be produced on any of the different axes status.

References [1], [2] and [3] confirm that the different axes of axial fatigue testing machine loading chains will significantly affect the test results.

The main reason for the bending on different axes is the combination of the following inevitably.

- fixture center line inconsistency;
- Sample or the inherent defects of the sensor itself.

Since the bending generated by the testing machine is the same for every sample or centering sensor, since the sample or centering sensor is self-Bending of the body will vary with the specimen and the centering sensor.

Recent studies (references [4], [5]) show that no matter how carefully the sample is processed or the centering sensor device is made, its own inherent curvature Errors always exist. Imperfect (eg, off-center or angular offset) results from its geometric asymmetry with respect to the axial centerline of the test device as well as other measurement errors related to strain gage type, location and performance. The inherent bending error of the centering sensor can be large, sometimes even Exceeds the different axis of the testing machine itself.

This standard, due to the inherent defects in the sensor itself caused the error has been eliminated. This will be centered around the sensor Around its longitudinal axis by 180 ° and subtracting its influence from the measured maximum total bending strain. Made of the same material and the same nominal size the different centering sensors should reasonably produce the same measurement of coaxiality, see Figure 10 in [2].

Metallic materials testing machine load coaxiality test

1 Scope

This standard specifies the test method of measuring the coaxiality of axial testing machine with strain gauge measuring device.

This standard applies to metallic materials with dynamic or static axial tension and (or) pressure testing machine, torsion testing machine and pull the torsion or compression test machine. Can also be used for non-metallic materials testing of similar testing machine.

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version applies to this article Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 16825.1 static uniaxial testing machine test Part 1. Tensile and (or) pressure testing machine testing system and force measurement Calibration (GB/T 16825.1-2008, ISO 7500-1:2004, IDT) GB/T 13992 metal paste resistance strain gauge

3 Terms and definitions

The following terms and definitions apply to this document.

Alignment

Loading chain components (including the sample) load axis line.

Note: Deviation from the consistency will cause the sample to cause additional bending moment.

Alignment sensor alignmentcel Used to test the test machine load coaxiality Finished and paste the strain gauge measuring device.

The alignment gaugeauge A mechanical assembly consisting of a precision machined split rod and a sleeve for inspection of the pass-through of the test machine chuck.

Average axial strain ϵ_o the average axial strain measured at the center of the centering sensor surface by a set of strain gages on the centering sensor at the same cross section.

Note: The average axial strain represents the strain at the geometric center of the cross-section.

Load chain loadtrain Includes components that transfer load between the crosshead and the drive.

Note: The loading chain includes the sample.

Bending strain

ϵ_b

The difference between the strain gauge strain and the average axial strain.