

JJG

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Verification regulation of Tension, Compression and Universal Testing Machines (English Translation)

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1 Scope

This Regulation is applicable to the initial verification, subsequent verification and in-use inspection of tension, compression and universal testing machines (hereinafter referred to as testing machines).

2 Normative References

This Regulation cites the following documents:

JJG 762 Extensometer GB/T 2611-2007 General Requirements for Testing Machines GB/T 3159-2008 Hydraulic Universal Testing Machines GB/T 16825.1-2008 Verification of Static Uniaxial Testing Machines - Part 1:

Tension/Compression Testing Machines - Verification and Calibration of the Force-Measuring System for dated references, only the dated version applies to this Regulation; for undated references, the latest edition (including all amendments) applies to this Regulation.

3 Overview

Tension, compression and universal testing machine is a testing machine that applies force value mechanically or hydraulically; it is mainly composed of an afterburner system, measuring system, safety protection device, etc. It is a testing machine that measures the mechanical properties of materials. It is applicable to the tension, compression and other mechanical property tests of the metallic and non-metallic materials and components; with the help of accessories, it can also be used for bending-proof, bending, shearing and peeling tests, etc.

5.2 Afterburner system

5.2.1

The rack of the testing machine shall have enough test space to facilitate the loading and unloading of specimens, specimen fixtures, standard force gauges and other auxiliary devices.

5.2.2

The test force applied and removed by the testing machine shall be stable, without shock and vibration. The friction force between the oil cylinder and piston of the hydraulic testing machine, under no-load conditions, when the working piston runs within the effective stroke, the change of the indication value of the test force shall be less than 1/2 of the absolute value of the allowable error of the lower measurement limit.

5.2.3

The holding time of the test force shall be no less than 30s. During this period, the variation range of the force indication shall not exceed 0.2% of the maximum force value of the testing machine.

5.3 Force measuring system

5.3.1

The resolution r of the analog indicating device shall be the ratio of the width of the pointer to the distance between the centers of two adjacent scale lines (scale interval).

5.3.2 Resolution of digital indicating device: start the testing machine; under zero load

condition, if the change of the indication value is no more than one increment, the resolution r shall be considered as an increment; if the change of the indication value is greater than one increment, the resolution r is half of the range plus an increment.

5.3.3 The computer display or digital indicating device shall directly display the force value in the unit of force; and shall be able to display the zero point and maximum value of each indication range and the direction of the force (for example: "+" or "-").

5.4 Electrical equipment

The electrical equipment of the testing machine is safe and reliable, and there is no leakage phenomenon. The insulation resistance between the power cord and the chassis shall be greater than 1Mohm.

5.5.1 When the applied test force exceeds 2% to 5% of the maximum test force of the testing

machine, the safety device shall act immediately to stop the testing machine from adding force.

5.5.2 When the moving chuck of the testing machine runs to the limit position of its working

range, the limit device shall act immediately to stop the movement.

corresponding accuracy) for verification. During verification, firstly clamp the test specimen on the chuck and apply an initial force of about 1% of the maximum test force of the testing machine; adjust the zero point of the co-axiality tester; and then apply the test force to 4% of the maximum test force. Note that the maximum force used in the inspection shall not cause plastic deformation of the inspection specimen; and measure the elastic deformation of the opposite sides of the specimen, which shall be measured for three times each in the direction perpendicular to each other. The co-axiality is calculated according to Formula (1). The results of each verification shall meet the requirements of Table 2.

Where:

e - Co-axiality between the center line of the upper and lower chucks in the afterburner system and the forcing axis of the testing machine, in %;

ΔL_{avg} - In the same measuring point, and in the same measurement, the arithmetic mean of the deformation on both sides of the inspection specimen, in mm;

ΔL_{max} - In the same measuring point, and in the same measurement, the deformation value of the side with the larger deformation of the inspection specimen, in mm.

6.2.3.2 For testing machines with a test force no greater than 30kN, use a heavy hammer and a matching centering disc for inspection. The center of the centering disc is engraved with a circle of $\phi 2\text{mm}$. During inspection, first hang the cone-shaped heavy hammer at the center of the upper fixture; and fix the centering disc at the center of the lower fixture. Move the movable fixture so that the test space is no less than 500mm; adjust the length of the suspension wire;

and make the hammer tip as close as possible to the surface of the centering disc; and check whether the hammer tip falls within the specified diameter circle.

6.2.4 Zero drift

After the testing machine is preheated, select the minimum measuring range gear of the testing machine; adjust the zero point; observe the change of the zero-point indication of the testing machine within 15 min; and calculate the zero drift z according to Formula (2):

Where:

z - zero drift of force measuring system, in %;

F_{0d} - variation of indication value of zero point of the force measuring system, in N;

FL - lower limit of force measuring range, in N.

Its results shall meet the requirements of Table 3.

NOTE:

The lower limit of the measurement range of the testing machine for gear (including automatic gear) is 20% of the measurement range of each gear;

The lower limit of the measurement range of the un-geared testing machine is determined according to the instruction manual. If the instruction manual does not specify or the regulations are not standardized, it shall be determined by the multiple of the resolution:

Level-0.5 testing machine: 400xr;

Level-1 testing machine: 200xr;

Level-2 testing machine: 100xr.