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Steel wire ropes slings - Fatigue testing method

钢丝绳索具 疲劳试验方法

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1 Scope

This standard specifies the terms and definitions, test principles, test equipment, specimens, test procedures, result evaluation and test reports for the fatigue test of steel wire ropes slings.

This standard applies to the evaluation of the constant-amplitude axial fatigue performance of various steel wire ropes slings. The test of the axial fatigue performance of steel wire ropes slings can also make reference to this standard.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB/T 3075 Metallic materials - Fatigue testing - Axial-force-controlled method

GB/T 3159 Hydraulic universal testing machines

GB/T 8358 Steel wire ropes - Determination of measured breaking force

GB/T 16491 Electronic universal testing machines

GB/T 16826 Electro-hydraulic servo universal testing machines

GB/T 25917.1 Uniaxial fatigue testing systems - Part 1: Calibration of dynamic force

JJG 556 Axial force fatigue testing machines

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Steel wire rope sling

3.6

Grip-secured sling

Sling which uses multiple wire rope clamps or splints to secure the sling at the end of the wire rope by pressing.

3.7

Wedge socket-secured sling

Sling which uses wedge socket and the wedge to secure the end of the steel wire rope.

3.8

Sling with different terminations at two ends

The sling which is secured by different methods at the both ends of steel wire rope.

4 Test principle

Apply a certain range of amplitude and frequency tensile stress to the steel wire sling in the axial direction, to reach the frequency specified by the steel wire sling product or the end of the sling is deformed, cracked, or the main wire rope is wire-broken, strand-broken, rope-broken, or undergoes other failures.

Perform subsequent tensile tests on the specimens that have passed the inspection and reach the breaking force value specified for the type of wire rope sling products, or the end of the sling is deformed or cracked, meanwhile the main wire rope is wire-broken, strand-broken, rope-broken, or undergoes other failures.

5 Test equipment

5.1 The cycle force accuracy of the fatigue testing machine shall not be lower than level 2; it shall be calibrated or verified in accordance with GB/T 25917.1 or JJG 556.

5.2 Tensile test can use hydraulic universal testing machine which meets the requirements of GB/T 3159, electronic universal testing machine which meets the requirements of GB/T 16491 or electro-hydraulic servo universal testing machine which meets the requirements of GB/T 16826.

Table 4 -- Breaking tension requirements of steel wire rope slings after fatigue test

Sling type	Required value of breaking tension of sling
Ferrule-securing sling	Reach 80% of the minimum breaking force of the steel wire rope
Socketing sling	Reach 90% of the minimum breaking force of the steel wire rope
Grip-secured sling	Reach 70% of the minimum breaking force of the steel wire rope
Splicing sling	Reach 70% of the minimum breaking force of the steel wire rope
Wedge socket-secured sling	Reach 70% of the minimum breaking force of the steel wire rope

7.5.3 After the follow-up tensile test is over, visually inspect the specimen. There is no deformation or crack at the end of the sling; the main wire rope has no defects such as broken wires, broken strands, or broken ropes. If necessary, non-destructive testing can be carried out on the specimens after the subsequent tensile test is completed through negotiation between the two parties.

8 Results judgment

The specimen shall meet the following two conditions at the same time, then the test result is valid:

a) The specimen is tested according to the stress amplitude required by the fatigue test, reaches the required number of cycles, meanwhile is qualified by visual inspection;

b) Carry out the follow-up tensile test, reach the required stress value, then the specimen passes the visual inspection again.

9 Safety measures

During the entire test process, the test operator, observers and the entire environment shall take safety measures to ensure the safety of test personnel, observers and the environment. During the test, the steel wire rope may impact or penetrate distant objects, so during the test, adequate protection shall be provided for the specimens, operators and observers.

10 Test report

The test report shall contain the following content:

a) Number of this standard;

b) Marking of steel wire rope specimens (such as structure, twisting method, nominal tensile strength, etc.);

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