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**Fatigue test method for transmission precision roller chain
(English Translation)**

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Foreword

This Standard is identical to the international standard ISO 15654.2004, Fatigue test method for transmission precision roller chains (English version).

Annex A ~ Annex H of this Standard are informative annexes.

This Standard was proposed by China Machinery Industry Federation.

This Standard shall be under the jurisdiction of National Technical Committee 164 on Chain Drives of Standardization Administration of China (SAC/TC 164).

Organization responsible for the drafting of this Standard. Jilin University (former Jilin University of Technology).

Organizations participating in the drafting of this Standard. Hangzhou Donghua Chain Group Co., Ltd., Jiangsu Shuangling Chain Transmission Co., Ltd., Hangzhou Xilin Chain Manufacturing Co., Ltd., Zhejiang Hengjiu Machinery Group Co., Ltd., KMC Chain (Shenzhen) Co., Ltd., Qingdao Zhenghe Industrial Co., Ltd.

Main drafters of this Standard. Meng Xiangbin, Ye Bin, Cao Sujian, Ma Jinhua, Shou Feng, Chen Xinqiang, Jin Yumo.

Participating drafters of this Standard. Wang Hai'ou, Xu Meizhen, Tan Guangcheng, Wang Zhijun, Meng Danhong, He Mingzong, Fu Zhenming, Wang Ying.

Fatigue test method for transmission precision roller chain

1 Scope

This Standard specifies an axial force fatigue test method for transmission roller chains, the tests being of the fluctuating tension type, carried out at room temperature in air, with the force applied along the longitudinal axis of the chain. It also specifies procedures for statistically analyzing the test results and gives formats and elements for presenting the results of fatigue tests and analyses.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, all subsequent amendments (not including errata content) or revisions do not apply to this standard. However, parties to agreements that are based on this Standard are encouraged to study whether the latest versions of these documents can be used. For undated references, the latest edition applies to this Standard.

GB/T 1243-2006, Short-pitch transmission precision roller and bush chains, attachments and associated chain sprockets (ISO 606.2004, IDT)

3 Terms and definitions

Symbols, terms, definitions and units are given in Table 1 and Figure 1.

4 Test principle

Fatigue tests are made on transmission roller chains to determine fatigue properties of chain plates such as those shown on Figure B.1 or to verify conformance to dynamic strength requirements in GB/T 1243 and GB/T 14212.

5 Test apparatus

The test fixtures shall be capable of transmitting an axial force to the test piece without inducing a subsidiary force caused by the fixtures. Universal type fixtures shall be used for fatigue testing of transmission chains.

6 Test specimens

At least 5 free pitches of chain shall be used as a fatigue test specimen, except for chain pitch over 50.8 mm where a minimum of 3 free pitches are acceptable. Free pitches are those chain pitches that do not contact the fixtures.

7 Test procedure

For analyses of fatigue test data, maximum forces shall be corrected to zero minimum force. A test force is obtained by correcting the maximum force to zero minimum force by means of the Johnson-Goodman method [Equation (3)]. The Johnson-Goodman relationship is illustrated by Figure 3.

A longitudinal tensile force shall be applied, sinusoidally varying between the minimum test force determined according to 7.1.1 and the maximum test force determined according to 7.1.2. The fatigue test shall continue to endurance or until the specimen fails without reaching the endurance.

8 Staircase test data analysis

It is customary to tabulate and plot the data as a staircase test progresses to ensure that the rules for constructing a staircase are followed. An example of such a data plot (three levels and 95% confidence level) is shown in Table 3.

The standard deviations of the staircase data shall be calculated using Equation (7).

The fatigue limit of the staircase test shall be calculated using Equation (8).

9 Report of test results

The originator shall provide to the user the following.

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Annex A

(informative)

Survival test with abridged Probit analysis

The purpose of the survival test with abridged Probit analysis is determine the mean fatigue limit and its standard deviation. It may also be used to determine the step size for future staircase testing of the subject chain model.

Annex B

(informative)

Combined test method (CTM)

The purpose of the combined test method (hereinafter referred to as CTM) is to determine the slope of the F-N line and the fatigue limit of a particular chain in a single test series. The CTM also may be used to determine the step size for future staircase testing.

Annex C

(informative)

Justification for adding one step to fatigue limit in staircase analysis

The staircase analyses in this Standard utilize all test points, both failures and run-outs. The calculated minimum fatigue strength (F_b-3S) is always less than the lowest test force. By definition, all responses at the lowest test force must be run-outs.

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