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Metallic materials - Creep-fatigue test method

金属材料 蠕变-疲劳试验方法

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard was proposed by China Iron and Steel Association. This standard is under the jurisdiction of the National Steel Standardization Technical Committee (SAC/TC183). This standard was drafted by: Shanghai Institute of Applied Physics, Chinese Academy of Sciences, East China University of Science and Technology, Institute of Metal Research, Chinese Academy of Sciences, Shanghai Development Electrical Equipment Complete Design Institute Co., Ltd., Metallurgical Industry Information Standards Institute, Shanghai Customs Industrial Products and Raw Materials Testing Technology Xin, Shanghai Jiaotong University, Shanghai Aviation Material Structure Inspection Co., Ltd. The main drafters of this standard. Zhou Bomou, Wang Runzi, Lu Yanling, Qiu Jianke, Shi Kexian, Dong Li, Zhou Yedong, Wu Yiwen, Tian Genqi, Zhang Xiancheng, Li Dehui, Dong Anping, Tu Shandong, Hou Huining.

Mechanical components working in a high-temperature environment may produce creep damage and fatigue damage at the same time, and there are creep and fatigue during the design service period. The component of labor damage should consider the interaction of two types of damage, namely creep-fatigue interaction. In certain industrial fields (such as nuclear power, aviation, Mechanical Engineering), studying the long-term creep-fatigue properties of materials is very important for engineering research and applications. In order to clarify the reliability and consistency of test data in different laboratories, it is necessary to carry out test data compliance with certain key points of this standard collect. Creep-fatigue test method for metallic materials

1 Scope

China's national test method for creep-fatigue in metallic materials. It specifies the terms and definitions, the symbols, the test principle, the equipment and the procedure. Creep and fatigue are separately understood: creep is the slow deformation of a loaded material at high temperature, fatigue is the damage done by cyclic loading. Components that do both at once fail sooner than either mechanism alone predicts, and that is the condition of almost everything hot in a power station or an aero engine. A steam turbine rotor is cycled every time the unit starts and stops, and it sits at temperature for weeks in between; the creep damage accumulated during the hold interacts with the fatigue damage of the cycle, and the interaction is not additive. The test reproduces it by imposing a strain cycle with a hold period at peak strain, which is why the hold time is the parameter that defines the test and the thing that makes it slow and expensive to run.

This standard specifies the terms and definitions, symbols and instructions, test principles, test equipment, test specimens, and methods of the creep-fatigue test method for metallic materials. Test procedures, test records and test reports. This standard is applicable to uniaxial creep-fatigue tests under the conditions of constant stress amplitude and constant strain amplitude of smooth circular cross-section specimens.

2 Normative references

The following documents are essential for the application of this document. For dated reference documents, only the dated version applies to this article Pieces. For the cited documents without date, the latest version (including all amendments) applies to this document.

GB/T 12160 Calibration of Extensometer System for Metal Material Uniaxial Test

GB/T 16825.1 Inspection of static uniaxial testing machine Part

1. Inspection and testing of tensile and/or compression testing machine force measurement system calibration

GB/T 22315 Test method for elastic modulus and Poisson's ratio of metallic materials

GB/T 25917.1 Uniaxial Fatigue Test System Part

3 Terms and definitions

The terms and definitions defined in GB/T 26077 and the following apply to this document.

3.1 Hold time t_{H} In the creep-fatigue test, the test control variables (force, strain) remain unchanged for a period of time. The loading time is usually At the peak of the force and strain of extension and/or compression, but can also be located at other positions within the cycle.

3.2 Total cyclic period t_{aut} The time to complete a test cycle.

Note. t_{aut} is the sum of the load holding time (t_{auh}) and the non-load holding time (t_{aunh}) (that is, steady state and dynamic).

3.3 Crack formation crackformation The process of crack initiation and propagation in the specimen.

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