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Metallic Materials – Measurement of Fracture Toughness at Impact Loading Rates Using Precracked Charpy-Type Test Pieces

金属材料 预裂纹夏比试样冲击加载断裂韧性的测定

(ISO 26843:2015, MOD)

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Standardization Administration of PRC.

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Foreword

This Standard was drafted as per the rules specified in GB/T 1.1-2009.

This Standard uses redrafting method to modify and adopt ISO 26843:2015 *Metallic Materials – Measurement of Fracture Toughness at Impact Loading Rates Using Precracked Charpy-Type Test Pieces*.

There are technical differences between this standard and ISO 26843:2015, and the terms involved in these differences have been identified by vertical single lines (|) on the outer margins. These differences and their reasons are as follows:

--- Introduce the relevant technical background in the "Scope" of the international standard into the "Introduction" to make it easier for standard users to understand the technical content and related background of the standard (see Clause 1 of this Edition; Clause 1 of ISO 26843:2015);

--- With regard to normative references, this Standard has made the adjustments with technical differences to adapt the technical conditions of China. The adjustments are reflected in Clause 2 "Normative References". The specific adjustments are as follows:

- Replace ISO 148-1 by the GB/T 229 modified to adopt international standards (see Clause 3, Clause 4, 5.1, 5.6, 7.1, 9.4.5 of this Edition);
- Replace ISO 148-2 by GB/T 3808 modified to adopt international standards (see 6.1, A.4, C.2.5 of this Edition);
- Replace ISO 14556 by GB/T 19748 modified to adopts international standards (see Introduction, Clause 3, Clause 4, 6.2, 7.1, 9.4.5, A.2, D.2.2 of this Edition);
- Replace ISO12135 by GB/T 21143 modified to adopt international standards (see Clause 3, 5.2, 7.2, 7.6, D.1, D.2.2, F.1, F.2, G.2 of this Edition);
- Replace ISO 26203-2 by GB/T 30069.2 modified to adopt international standards (see 8.6, F.2 of this Edition).

--- Modify the definition of $\Delta\alpha_{max}$, J_g and t_f; clarify the definition of the name of the symbol; make the subsequent legend and formula calculation clearer (see Clause 3 of this Edition);

--- Stipulate that during the prefabricated fatigue crack process, the minimum and maximum force ratio shall be controlled between 0 and 0.1, which is consistent with China's national conditions and consistent with GB/T 21143 (see 5.4 of this Edition);

--- Modify the international standard "difference from the average value of the nine-point initial crack" into "difference from the average value of the nine-point final crack" to make the context consistent and consistent with ISO 12135 and GB/T 21143 (see 9.4.5 of this Edition);

--- Increase the "general" and the classification of three different types of testing machines; it is more in line with China's national conditions and easier for standard users to understand (see Appendix A of this Edition);

--- Modify $t''=f(t')$ in the original table into $f(t')$, keeping the context consistent (see Table C.1 of this Edition);

--- Modify the symbol U_{tot} in the international standard into W_s, keeping consistent with the context of Appendix H (see D.2.2 of this Edition);

--- Modify Formula (E.5) to improve the accuracy of the data (see E.2 of this Edition);

--- Add a technical description of the iterative process, which is easy for standard users to understand and is consistent with GB/T 21143 (see E.3 of this Edition).

This Standard was proposed by China Iron and Steel Industry Association.

This Standard shall be under the jurisdiction of National Technical Committee for Standardization of Steel (SAC/TC 183).

Drafting organization of this Standard: Baoshan Iron & Steel Co., Ltd.; Shanghai Power Equipment Research Institute Co., Ltd.; Lishi (Shanghai) Instruments Co., Ltd.; Shenzhen Wance Testing Machine Co., Ltd.; NCS Testing Technology Co., Ltd.; and China Metallurgical Information and Standardization Institute.

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Metallic Materials – Measurement of Fracture Toughness at Impact Loading Rates Using Precracked Charpy-Type Test Pieces

1 Scope

This Standard stipulates the principles, specimens, testing machines, test procedures and measurements, calculation of fracture mechanical parameters and test reports of instrumental impact and evaluation of fracture toughness of prefabricated cracked Charpy specimens of metal materials by fracture mechanics methods.

This Standard is applicable to the determination of fracture toughness of the prefabricated cracked Charpy-type specimens of metallic materials.

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 document.

GB/T 229 Metallic Materials - Charpy Pendulum Impact Test Method (GB/T 229-2007, ISO 148-1:2006, MOD)

GB/T 3808 Verification of Pendulum-Type Impact Testing Machines (GB/T 3808-2018, ISO 148-2:2008, MOD)

GB/T 19748 Metallic Materials - Charpy V-Notch Pendulum Impact Test - Instrumented Test Method (GB/T 19748-2019, ISO 14556:2015, MOD)

GB/T 21143 Metallic Materials - Unified Method of Test for Determination of Quasi-Static Fracture Toughness (GB/T 21143-2014, ISO 12135:2002, MOD)

GB/T 30069.2 Metallic Materials - Tensile Testing at High Strain Rates - Part 2: Servo-Hydraulic and Other Test Systems (GB/T 30069.2-2016, ISO 26203-2:2011, MOD)

Appendix A

(Normative)

Testing Machine Applicable to Various Types of Test Procedures

A.1 General

The requirements for the general-purpose testing machine that performs the procedures specified in this Standard are as follows.

A.2 Pendulum impact testing machine

A.2.1 The instrumented Charpy pendulum impact testing machine designed according to the provisions of GB/T 19748 has the function of changing the position of the pendulum release, so the testing machine has a variable impact velocity.

A.2.2 Other types of pendulum impact testing machines with fixed anvil/movable hammer blade or fixed hammer blade/movable anvil and fixed or movable specimen may be used.

A.2.3 The release position of the pendulum is variable, so the impact velocity of this type of testing machine is usually variable.

A.2.4 Instrumented hammer blades or anvils may provide force-time or force-displacement curve.

A.3 Drop-weight impact testing machine

It may be equipped with a spring-assisted energy storage device; and there is no limit to the impact velocity of the testing machine or the mass of the drop-weight. The striking hammer blade shall be designed by instrumentation to provide a force-time or force-displacement curve.

A.4 Hydraulic servo high-speed testing machine

It is able to apply force to the specimen; if the system is in open loop mode, then the system may be optimized by simulation test or pre-test to obtain a constant displacement rate. It must be noted that the actuator shall reach the desired rate before the hammer blade strikes the specimen. The hammer blade, anvil and support shall meet the requirements of GB/T 3808.

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