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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 41933-2022

**Plastics - Determination of tension-tension fatigue crack
propagation - Linear elastic fracture mechanics(LEFM)
approach**

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foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules for Standardization Documents" drafting.

This document is modified to adopt ISO 15850.2014 "Determination of plastic tension-tension fatigue crack growth linear elastic fracture mechanics (LEFM) Law".

Compared with ISO 15850.2014, this document has made the following structural adjustments.

--- Adjust the content of the scope described in 6.1.3 of ISO 15850.2014 to Chapter 1 to make the structure more reasonable;

--- Adjust the content of 7.4 of ISO 15850.2014 to 6.5 to make the structure more reasonable.

The technical differences between this document and ISO 15850.2014 and their reasons are as follows.

--- Replaced ISO 527 (all parts) (see 6.1.3, 7.3.4) with normatively referenced GB/T 1040 (all parts) to accommodate

my country's technical conditions, increase operability;

--- Replaced ISO 2818 (see 6.2) with the normatively quoted GB/T 39812 to adapt to my country's technical conditions and increase operability

active;

--- Replaced ISO 291 (see 6.5) with the normatively quoted GB/T 2918 to adapt to my country's technical conditions and increase operability.

The following editorial changes have been made to this document.

--- The explanatory content of the text part is changed to a note (see Chapter 1, 6.1.2, 6.1.3, 7.3);

--- Deleted the term "stress intensity calibration";

--- Replaced ISO 13586 with informative references to GB/T 41932 (see 3.8, 3.12 and Chapter 5);

--- Delete the terms "maximum energy release rate" and "minimum energy release rate", and use them as the definition of the term "energy release rate range"

Note (see 3.13);

--- Replaced ISO 16770 with the informative referenced GB/T 32682 (see 6.1.1);

--- Deleted 10.1 of ISO 15850.2014.

Please note that some contents of this document may refer to patents. The issuing agency of this document assumes no responsibility for identifying patents.

1 Scope

This document describes the measurement of tensile loads on notched specimens by periodically varying between a constant positive minimum value and a constant positive maximum value.

Determine the method of crack growth.

This document applies to the crack length as a function of the number of loading cycles, and the crack length growth rate as a function of the stress intensity at the crack tip.

Determination of the functional relationship between the factor and the energy release rate.

Note 1 to entry. Detect and report possible discontinuities in crack growth.

This document is also applicable to the determination of the crack growth resistance of materials.

Note 2. The results are expressed in terms of the number of cycles leading to crack growth failure or the relationship between the total time and the stress intensity factor, see Appendix A.

This document applies to the determination of tension-tension fatigue crack growth using the linear elastic fracture mechanics (LEFM) method for the following materials.

--- Rigid and semi-rigid thermoplastic moldings, extrusion materials (including filled and short fiber reinforced composites) and sheets;

--- Rigid and semi-rigid thermosetting materials (including filled and short fiber reinforced compounds) and plates.

This document applies only to materials with very limited viscoelastic properties at the frequency of loading used and the duration of the test expected.

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text. Among them, dated references

For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to

this document.

GB/T 1040 (all parts) Determination of tensile properties of plastics

Note. GB/T 1040.1 Determination of tensile properties of plastics Part 1. General principles (GB/T 1040.1-2018, ISO 527-1.2012, IDT);

GB/T 1040.2 Determination of tensile properties of plastics - Part 2. Test conditions for molded and extruded plastics (GB/T 1040.2-2022,

ISO 527-2.2012, IDT);

GB/T 1040.3 Determination of tensile properties of plastics - Part 3. Test conditions for films and sheets (GB/T 1040.3-2006, ISO 527-3.

1995, IDT);

GB/T 1040.4 Determination of tensile properties of plastics - Part 4. Test conditions for isotropic and orthotropic fiber-reinforced composite materials

(GB/T 1040.4-2006, ISO 527-4.1997, IDT);

GB/T 1040.5 Determination of tensile properties of plastics - Part 5. Test conditions for unidirectional fiber-reinforced composite materials (GB/T 1040.5-2008,

ISO 527-5.1997, IDT).

GB/T 2918 Standard environment for conditioning and testing of plastic specimens (GB/T 2918-2018, ISO 291.2008, MOD)

GB/T 39812 Machining preparation of plastic samples (GB/T 39812-2021, ISO 2818.2018, IDT)

3 Terms and Definitions

The following terms and definitions apply to this document.