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

GB/T 44537-2024

**Test method for fracture toughness of fine ceramics at room
temperature - Surface crack in flexure(SCF) method**

精细陶瓷室温断裂韧性试验方法 表面裂纹弯曲梁（SCF）法

(English Translation)

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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 is required.

This document is modified to adopt ISO 18756:2003 "Fine ceramics (advanced ceramics, advanced technical ceramics) - Surface crack bending beam "Determination of Room Temperature Fracture Toughness of Fine Ceramics by (SCF) Method".

The technical differences between this document and ISO 18756:2003 and the reasons are as follows.

The term "fracture toughness value" has been deleted to avoid terminological confusion (see 3.3 of ISO 18756:2003); -the symbol of fracture toughness measured by SCF method K_{Isc} is changed to K_{Ic} , SCF to facilitate the understanding of fracture toughness terminology (see Chapter 4);

ISO 14704 was replaced by the normative reference GB/T 6569 to adapt to my country's technical conditions and increase operability (see 6.2, 7.1.2, 7.1.3);

The requirements for the content of the test report have been increased to increase operability and facilitate the implementation of this document [see a), b),

The following editorial changes were made to this document.

In order to coordinate with the existing standards, the name of the standard is changed to "Test Method for Fracture Toughness of Fine Ceramics at Room Temperature - Surface Crack Bending Beam" (SCF) Act;

Change the description of the difference and relationship between the SCF method and the single-edge pre-cracked beam method to a note (see Chapter 1, ISO 18756:2003 Chapter 1 of);

ISO 15732 is replaced by the informative reference GB/T 23806 (see Chapter 1); -the Note to Chapter 1 of ISO 18756:2003 has been deleted; -the note to the term "stress intensity factor" has been changed (see note 1 to 3.1, note in ISO 18756:2003); -Added a note to the term "stress intensity factor" (see Note 2 to 3.1); -the notes to 3.3, 7.1.2, 8.1.3, 8.1.8 and 8.3.4 of ISO 18756:2003 have been deleted; -Added article titles (see 6.1~6.8, 8.1.1~8.1.10); -ISO 3611 is replaced by the informative reference GB/T 1216 (see 6.3); -Deleted Note 2 of 8.1.1, Note 3 of 8.1.7.2 and Note 1 and Note 2 of 8.4.3 in ISO 18756:2003.-

1 Scope

This document describes a test method for determining the room temperature fracture toughness of fine ceramics using the surface crack bending beam (SCF) method.

This document applies to materials with flat or rising crack growth resistance curves as well as single-phase ceramics, whisker and/or particle reinforced Strong composite ceramic material.

This document is not applicable to continuous fiber reinforced ceramic matrix composites.

Note: The surface crack bending beam (SCF) method in this document is similar to the single-side pre-cracked beam method in GB/T 23806 [2], except that the pre-cracked beam is prepared by different methods.

The two methods have similar test results for materials with flat R curves.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies.

in this document.

GB/T 6569 Test method for flexural strength of fine ceramics (GB/T 6569-2006, ISO 14704:2000, MOD) GB/T 16825.1-2022 Inspection and calibration of static uniaxial testing machines for metallic materials Part 1: Tension and/or compression Inspection and calibration of force measurement systems of testing machines (ISO 7500-1:2018, IDT)
Note. ISO 7500-1:1999, which was normatively referenced in ISO 18756:2003, has been replaced by ISO 7500-1:2018. The referenced content in this document has no change.

3 Terms and definitions

The following terms and definitions apply to this document.

stress intensity factor K_I the magnitude of the elastic stress field in the opening (Type I) crack tip region.

NOTE 1 The stress intensity factor is a function of the applied force, specimen size, geometry, and crack length.

Note 2: Cracks are classified into opening type (Type I) cracks, sliding type (Type II) cracks and tearing type (Type III) cracks according to their mechanical characteristics. K_I represents the

opening type.

(Type I) Stress intensity factor.

Fracture toughness

The ability of a material to resist crack growth.

Precrack

A crack pre-initiated in a specimen prior to fracture testing.

crack front line

A line showing the location of the crack tip.