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Metallic materials—Determination of plane-strain fracture toughness

ICS 77.040.10

Descriptors : metals, surface texture, strain, fracture, destructive testing, determination of content

Reference number : **JIS G 0564 : 1999 (E)**

Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law:

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In the event of any doubts arising as to the contents, the original JIS is to be the final authority.

Metallic materials—Determination of plane-strain fracture toughness

Introduction This Japanese Industrial Standard has been prepared based on **ISO 12737**, *Metallic materials—Determination of plane-strain fracture toughness* issued in 1996 as the first edition without changing the technical contents.

1 Scope This Standard specifies the method for determining the plane-strain fracture toughness of homogeneous metallic materials using a specimen that is notched and precracked by fatigue, and subjected to slowly increasing crack displacement force.

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below. Members of **IEC** and **ISO** maintain registers of currently valid International Standards.

ISO 7500-1 : 1986 *Metallic materials—Verification of static uniaxial testing machines—Part 1 : Tensile testing machines*

ISO 9513 : 1989 *Metallic materials—Verification of extensometers used in uniaxial testing*

3 Definitions For the purposes of this Standard, the following definitions apply.

3.1 plane-strain stress intensity factor, K_I Magnitude of the elastic stress field at the tip of a crack subjected to opening mode displacement (mode I). It is a function of applied force and test specimen size, geometry, and crack length, and has the dimensions of force times length$^{-3/2}$.

3.2 plane-strain fracture toughness, K_{IC} Measure, by the operational procedure of this method, of a material's resistance to crack extension when the state of stress near the crack tip is predominantly plane strain and plastic deformation is limited.

Note : It is the critical value of K_I at which significant crack extension occurs on increasing load with high constraint to plastic deformation.

3.3 crack plane orientation Method for relating the plane and direction of crack extension to the characteristic directions of the product.

Note : A hyphenated code is used wherein the letter(s) preceding the hyphen represent(s) the direction normal to the crack plane and the letter(s) following the hyphen represent(s) the anticipated direction of crack extension (see Fig. 1). For wrought metals, the letter X always denotes the principal direction of grain flow, Z the direction of principal working force, and Y the direction normal to the X-Z plane. If specimen directions do not coincide with the product's characteristic directions, then two letters are used to denote the normal to the crack plane and/