

# JIS

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**JIS Z 2284** : 1998

**Method of elastic-plastic fracture  
toughness  $J_{IC}$  testing for metallic  
materials in liquid helium**

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ICS 77.040.20

**Descriptors** : metals, liquids, helium, elastic deformation, rupture stress, dust-tightness tests

**Reference number** : JIS Z 2284 : 1998 (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:

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

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## Method of elastic-plastic fracture toughness $J_{IC}$ testing for metallic materials in liquid helium

**1 Scope** This Japanese Industrial Standard specifies the method of elastic-plastic fracture toughness  $J_{IC}$  testing for metallic materials at very low temperature in liquid helium based on unloading compliance method.

Remarks : Very low temperature in liquid helium used in this Standard is the boiling point of liquid helium at the atmospheric pressure [approximately 4 K (-269 °C)]. Unless otherwise specified, this is called simply "very low temperature".

**2 Normative references** The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. Normative references described on the most recent editions shall apply.

JIS B 0601 *Surface roughness—Definitions and designation*

JIS B 7507 *Vernier, dial and digital callipers*

JIS B 7721 *Verification of the force measuring system of the tensile testing machine*

JIS G 0303 *General rules for inspection of steel*

JIS G 0306 *Steel forgings—General technical requirements*

JIS Z 2277 *Tensile testing method for metallic materials in liquid helium*

JIS Z 2283 *Method of low cycle fatigue testing for metallic materials in liquid helium*

JIS Z 8401 *Rules for rounding off of numerical values*

**3 Definitions** For the purpose of this Standard, the definitions given in **JIS Z 2277** and **JIS Z 2283** and the following definitions apply:

- a) **J integral ( $J$ )** The integral with respect to an optional line or plane path starting from the lower surface of crack and coming to the upper surface of crack in the form surrounding the tip of crack. It describes the local stress-strain field in the vicinity of the tip of crack.
- b) **elastic-plastic fracture toughness ( $J_{IC}$ )** The breaking resistance at the time when plane strain type ductile tear fracture of mode I starts from the precracking. Without regard to the size of yield, it is the material constant not depending on the shape and dimension of the test piece and the tensile and bending loading methods.
- c) **stress intensity factor ( $K$ )** Dynamic parameter describing a local stress-strain field in the vicinity of the tip of crack when satisfying the small scale yield condition.