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Method of tensile testing for metallic materials in liquid helium

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at the 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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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

Method of tensile testing for metallic materials in liquid helium

1 Scope This Japanese Industrial Standard specifies mainly the method of tensile testing for metallic materials at cryogenic temperatures in liquid helium.

Remarks : Tests are carried out at cryogenic temperatures prepared by boiling point [about 4 K (−269 °C)] of liquid helium under atmospheric pressure, but the agreement between the parties concerned with delivery can permit the test at cryogenic temperatures obtained by other refigerants than liquid helium.

Informative reference : For the tensile test for metallic materials at cryogenic temperatures, special consideration shall be required because of the generation of serration on stress-strain diagram due to an unstable plastic flow (discontinuous yield), because of the rise of temperature of a test piece due to heating caused by deformation of the test piece, and because of the influence on strain speed by material characteristics. This Standard specifies testing apparatus, test piece, testing method and so on with consideration about above-mentioned phenomena.

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards indicated below shall be applied.

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

JIS G 0202 *Glossary of terms used in iron and steel (testing)*

JIS G 0303 *General rules for inspection of steel*

JIS G 0306 *Steel forgings—General technical requirements*

JIS Z 2201 *Test pieces for tensile test for metallic materials*

JIS Z 2241 *Method of tensile test for metallic materials*

3 Definitions For the purposes of this Standard, the definitions given in **JIS G 0202** and the following definitions apply.

a) **test force** The force applied on a test piece to fulfill the purpose of test.

b) **serration** A phenomenon in which the stress-strain diagram in plastic deformation area of a test piece shows serrated form during the process of a tensile test (see Fig. 1).

c) **serration start stress** σ_{SS} A quotient (N/mm^2) of the maximum test force (N), which was given when serration starts during the process of a tensile test, divided by the original cross section of paralleled place (see Fig. 1).

d) **designated straining rate** A quotient of the displacement speed of the crosshead of a testing apparatus divided by the length of paralleled place of a test piece,