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**Steel and steel products—Location
and preparation of samples and
test pieces for mechanical testing**

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In the event of any doubts arising as to the contents,
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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by The Japan Iron and Steel Federation (JISF) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently, **JIS G 0416:2008** is replaced with this Standard.

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Steel and steel products—Location and preparation of samples and test pieces for mechanical testing

Introduction

This Japanese Industrial Standard has been prepared based on the third edition of **ISO 377** published in 2013 with some modifications of the technical contents.

The portions given dotted underlines are the matters in which the contents of the original International Standard have been modified. A list of modifications with the explanations is given in Annex JA.

1 Scope

This Standard specifies identification marks, location and preparation of samples and test pieces intended for mechanical tests taken from steel sections, bars, rods, sheets (including strips in coil and flats) and tubular products as defined in **JIS G 0203**. If agreed in the order, this Standard may also apply to other metallic products.

Where the requirements of the order or product standard differ from those given in this Standard, then the requirements of the order or product standard apply.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 377:2013 *Steel and steel products—Location and preparation of samples and test pieces for mechanical testing* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS G 0201 Glossary of terms used in iron and steel (Heat treatment)

JIS G 0203 Glossary of terms used in iron and steel (Products and quality)

JIS G 0404 Steel and steel products—General technical delivery requirements

3 Terms and definitions

For the purposes of this Standard, the following terms and definitions and those given in **JIS G 0201** and **JIS G 0203** apply.

3.1 test unit

number of pieces or the tonnage of products to be accepted or rejected together, on the basis of the tests to be carried out on sample products in accordance with the requirements of the product standard or order (see figure 1)

3.2 sample product

item (e.g. a sheet of steel) selected from test unit for inspection and/or testing (see figure 1)

3.3 sample

sufficient quantity of material taken from the sample product for the purpose of producing one or more test pieces (see figure 1)

NOTE : In certain cases, the sample may be the sample product.

3.4 rough specimen

part of a sample having undergone mechanical treatment and, if necessary, heat treatments for the purpose of producing a test piece (see figure 1)

3.5 test piece

part of a sample, with specified dimensions, brought to a required condition for submission to a given test (see figure 1)

NOTE : In certain cases, the test piece may be the sample or the rough specimen.

3.6 reference condition

condition of a sample, rough specimen or test piece having undergone a heat treatment, separately from the product, to represent the intended final condition of the product

NOTE : In such cases, the sample, rough specimen or test piece is called the reference sample, reference rough specimen or reference test piece.

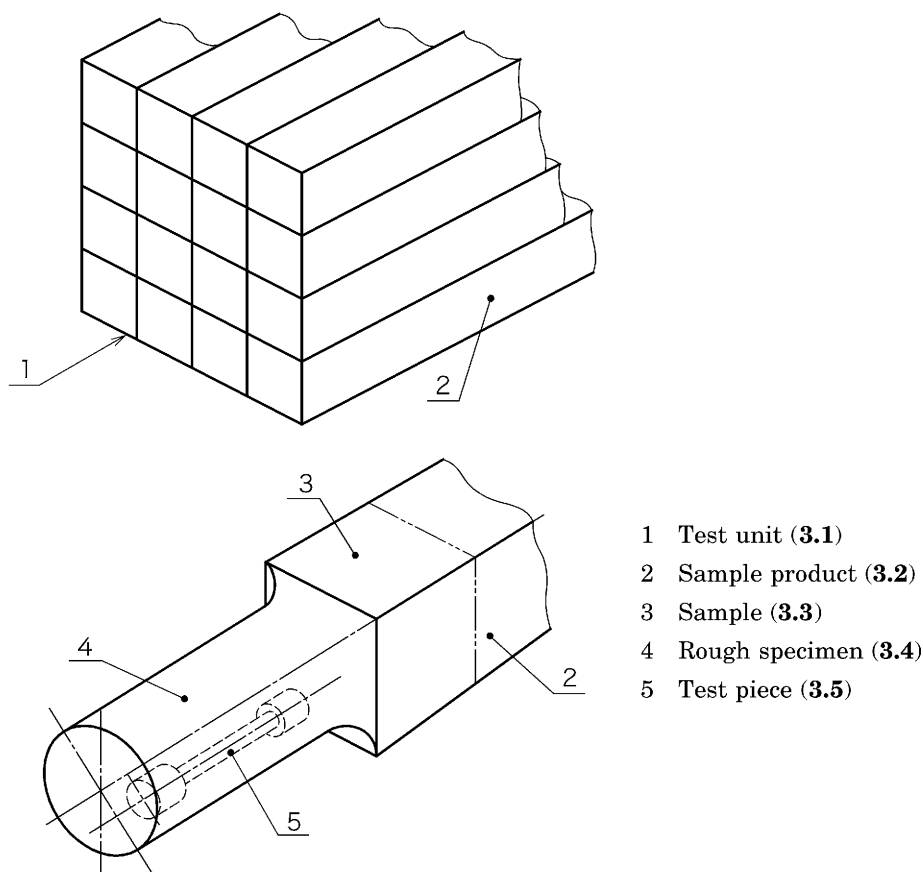


Figure 1 Examples of terms defined in clause 3

4 General requirements

4.1 Representative testing

Samples, rough specimens and test pieces selected in accordance with Annex A shall be considered to be representative of the product.

NOTE : As a result of their production sequence (i.e. melting, casting, hot and/or cold forming, heat treatment, etc.) steel products are not homogeneous. The mechanical properties of samples taken from other locations may be different. The manufacturer should pay attention so that acceptability of the mechanical properties of the test pieces obtained in accordance with this Standard represent the test unit as a whole.

4.2 Identification marks of sample products, samples, rough specimens and test pieces

The identification of sample products, samples, rough specimens and test pieces shall be marked to ensure the traceability to the test unit from which they are taken, and their location and orientation in that product. If, during the preparation of the sample, rough specimen and/or test pieces, removal of the identification marks cannot be avoided, the marks shall be surely retained, for example, by carrying out transfer of these marks before the existing marks are removed or in the case of automatic preparation equipment before the test piece is removed from the equipment. In the case of

“specific inspection” and where requested by the purchaser, the transfer of the identification marks shall be carried out in the presence of the purchaser’s representative.

In the case of fully automatic in line preparation and testing systems, marking of samples, rough specimens and test pieces is not necessary if an adequate control system exists, which clearly defines the procedures to be followed in the event of system failure.

5 Preparation of samples and selection of test pieces

5.1 Location of samples and test pieces and dimensions of samples

The sample shall be selected so that the test piece can be located as indicated in Annex A. The sample shall have sufficient dimensions allowing test pieces required for carrying out specified tests and for any retests which may be necessary.

5.2 Direction of axis of test pieces

The direction of the test piece axis relative to the principle direction of working shall be as specified in the appropriate product standard or order.

5.3 Condition and selection method of samples

5.3.1 General

The product standard shall clarify which property is intended for testing

- a) in the product as-delivered condition (Class A in **7.6 of JIS G 0404**) (see **5.3.2**); or
- b) in the reference condition (Class B in **7.6 of JIS G 0404**) (see **5.3.3**).

5.3.2 Testing in the product as-delivered condition

A sample intended for testing in the product as-delivered condition shall be taken from the product either

- a) after the forming and heat treatment processes;
- b) before the heat treatment process, in which case the heat treatment of the separated sample shall be carried out under the same conditions as that requested to the product.

Separation of the sample shall be carried out in such a manner so as not to change the characteristics of that part of the sample used to provide the test pieces. Where flattening or straightening of the sample is necessary for the preparation of the test piece, it shall be carried out cold unless otherwise specified in the product standard.

5.3.3 Testing in the reference condition

5.3.3.1 Sample

A sample intended for testing in the reference condition shall be separated from the product at the stage of manufacture specified in the product standard or order. Separation of the sample shall be carried out in such a manner so as not to change the characteristics of that part of the sample used to provide the test pieces. When flattening or straightening is necessary, it may be carried out either hot or cold before any heat

treatment. When carried out hot, it shall be at a temperature below the final heat treatment temperature.

5.3.3.2 Rough specimen

A rough specimen intended for testing in the reference condition shall be prepared as follows.

- a) **Machining prior to heat treatment** When the sample is to be made smaller for the process of heat treatment, the product standard shall specify the dimensions to which the rough specimen shall be reduced and the reduction process (e.g. forging, rolling, machining).
- b) **Heat treatment** The heat treatment of the rough specimen shall take place in an environment where the uniformity of the temperature is adequately assured and the temperature is measured by means of a calibrated instrument. The heat treatment shall be in accordance with the requirements of the product standard or of the order.

6 Preparation of test pieces

6.1 Cutting and machining

Cutting and machining of samples and rough specimens for the preparation of test pieces shall be carried out taking such precautions as necessary to avoid superficial work hardening and heating of the material likely to change the mechanical characteristics. After machining, any marks left by the tool which might interfere with the results of the test shall be removed, either by grinding (with ample coolant supply) or by polishing, provided that the chosen method of finishing maintains the dimensions and shape of the test piece within the tolerances specified in the standard for appropriate test.

The tolerances on the dimensions of the test pieces shall be in accordance with specifications concerning the test piece or the test method.

6.2 Reference heat treatment

When the required reference heat treatment is to be carried out on the test piece, the provisions for heat treatment shall be the same as for the rough specimen [see 5.3.3.2 b)].