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Malleable iron castings

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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 the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS G 5702 : 1988**, **JIS G 5703 : 1988** and **JIS G 5704 : 1988** were abolished and thus have been replaced with **JIS G 5705 : 2000**.

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Malleable iron castings

Introduction This Japanese Industrial Standard has been prepared based on the first edition of **ISO 5922 Malleable cast iron**, published in 1981, in order to conform the corresponding parts (marking, mechanical properties, and test methods) with the International Standard without any modification of the technical contents. However, the specified contents, which are relating to the mechanical characteristics and test methods but are not specified in the corresponding International Standard, have been supplemented as the Japanese Industrial Standard and furthermore, the specified items (dimensions, appearance, and test method), which are not specified in the corresponding International Standard, have been supplemented as the Japanese Industrial Standard.

In this Standard, the portions underlined with dots are the items not specified in the corresponding International Standard.

1 Scope This Japanese Industrial Standard specifies requirements by malleable iron castings. It also gives a classification on the basis of mechanical properties.

This Standard is applicable only to malleable iron castings that were cast into sand moulds or moulds with comparable thermal diffusivity.

Remarks : The International Standard corresponding to this Standard is as follows.

ISO 5922 : 1981 *Malleable cast iron*

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 normative references shall apply.

JIS G 1211 *Iron and steel—Methods for determination of carbon content*

JIS Z 2202 *Test pieces for impact test for metallic materials*

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

JIS Z 2242 *Method of impact test for metallic materials*

JIS Z 2243 *Brinell hardness test—Test method*

3 Definition and characteristics

3.1 malleable iron castings The material of malleable iron castings is a heat-treated iron-carbon alloy, which solidifies in the as-cast condition with a graphite-free structure. That is, the total carbon content is present in the combined form as cementite (Fe_3C).

3.2 Classification Two groups of malleable iron castings are specified, differentiated by chemical composition, temperature and time cycles of the annealing process, the annealing atmosphere, and the properties and microstructure resulting therefrom.

3.2.1 whiteheart malleable iron castings The microstructure of whiteheart malleable iron castings is dependent on section size, as follows:

- a) small section size = ferrite (+ pearlite + temper carbon);
- b) large section size:
 - surface zone = ferrite
 - intermediate zone = pearlite + ferrite + temper carbon
 - core zone = pearlite (+ ferrite) + temper carbon

The microstructure shall not contain flake graphite.

3.2.2 blackheart and pearlitic malleable iron castings The microstructure of blackheart malleable iron casting has a matrix essentially of ferrite. The microstructure of pearlitic malleable iron castings has a matrix, according to the grade specified, of pearlite or other transformation products of austenite. Graphite is present in the form of temper carbon nodules.

The microstructure shall not contain flake graphite.

3.3 Designation The types of malleable iron castings covered by this Standard shall be designated as follows:

- a) The types of malleable iron castings are designated by a letter string as follows.
 - FCMW for whiteheart malleable iron castings
 - FCMB for blackheart malleable iron castings
 - FCMP for pearlitic malleable iron castings

This designation shall be followed by one space.

- b) The minimum tensile strength given by the test piece with 12 mm diameter shall be designated using two figures, which can be obtained by dividing the value measured with the unit of N/mm² by ten. For instance, if the minimum tensile strength is 350 N/mm², the designation would become 35.

These figures shall be followed by a hyphen (-).

- c) The minimum elongation shall be designated with two figures given by the test piece with 12 mm diameter. If the minimum elongation is less than 10 %, a naught (0) should be prefixed. For instance, if it is 4 %, the designation should be 04, and if 12 %, the designation be 12.

Example of actual designation

When the test piece of whiteheart malleable iron castings, measuring 12 mm in diameter, is measured 400 N/mm² of the minimum tensile strength and measured 5 % minimum elongation, the designation shall be as follows.

FCMW 40-05

4 Production The method of producing malleable iron castings and its chemical composition and heat treatment are left to the discretion of the manufacturer, and he/she shall ensure compliance with the property requirements given in this Standard for the grade required in the order.

However, for malleable iron castings to be used in special applications, the chemical composition and heat treatment may be the subject of agreement between the parties concerned with delivery.