



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

④ JIS B 6912 : 2002
(HTTAJ/JSA)

Process of induction hardening and tempering of iron and steel

ICS 25.200; 77.140.01

Reference number : JIS B 6912 : 2002 (E)

PROTECTED BY COPYRIGHT

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 Heat Treatment Trade Association of Japan (HTTAJ)/the Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law. Consequently **JIS B 6912 : 1996** is replaced with this Standard.

In this revision, the material for processing, types of processing, and so on have been revised, and newly the types and symbol of processing, environmental protection to the heat treatment oil and so on, and Annex (normative) : History of sintered ferritic material, and quality and test method of processed goods have been provided.

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.

Date of Establishment: 1968-03-01

Date of Revision: 2002-01-20

Date of Public Notice in Official Gazette: 2002-01-21

Investigated by: Japanese Industrial Standards Committee
Standards Board
Technical Committee on Iron and Steel

JIS B 6912:2002, First English edition published in 2002-10

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

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

© JSA 2002

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

PROTECTED BY COPYRIGHT

Process of induction hardening and tempering of iron and steel

1 Scope This Japanese Industrial Standard specifies the process of induction hardening and tempering or of induction hardening of iron and steel (hereafter referred to as “processing”).

2 Normative references The standards listed in Attached Table 1 contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards (including amendments) shall be applied.

3 Definitions For the purposes of this Standard, the definitions given in **JIS B 6905** and the following definitions shall apply.

- a) **induction hardening and tempering** A treatment which, in order to harden the whole or a part of surfaces of iron and steel products, is to heat up to an appropriate temperature higher than A_{C3} or A_{C1} by induction heating, and to cool with an appropriate quenchant (quenching), furthermore, in order to adjust the hardness and to increase toughness, to heat in a usual tempering furnace at an appropriate temperature below A_{C1} , then to cool (tempering). The tempering process involves the induction tempering.
- b) **material for processing** The parts and materials which become the object of processing. The parts are almost or nearly finished iron and steel products that are machines, tools, jigs, equipment or their parts, while the materials are iron and steel and their semi-finished products made by rolling, casting, forging, etc.
- c) **processed goods** The material for processing having been processed according to this Standard.
- d) **distortion** The deviation in shape or dimension for the processed goods from that of the material for processing. The distortion in the direction at a right angle to the longitudinal direction of goods is called “bend”. The deviation shall be expressed as the maximum value in each direction.
- e) **single body** A unit or lot of processed goods.

4 Type and symbol of processing The type and symbol of processing shall be as Table 1 according to the methods of processing.

Table 1 Type and symbol of processing

Type of processing	Symbol ⁽¹⁾
Induction hardening and tempering ⁽²⁾	HQI-HT
Induction hardening and induction tempering	HQI-HTI
Induction hardening	HQI

Notes (1) Symbols shall be based on **JIS B 0122**.

(2) This means ordinary tempering by a tempering furnace.

5 Material for processing

5.1 Grade of material for processing The grade of material for processing shall conform to Table 2, or the quality of the processed goods shall conform to the requirements specified in 8 of this text and 5 of Annex.

Table 2 Grade of material for processing

Standard number	Symbol of grade
a) Carbon and alloy steels for machine structural use	
JIS G 4051	S20C, S22C, S25C, S28C, S30C, S33C, S35C, S38C, S40C, S43C, S45C, S48C, S50C, S53C, S55C, S58C
JIS G 4052	SMn433H, SMn438H, SMn443H SMnC443H SCr430H, SCr435H, SCr440H SCM435H, SCM440H, SCM445H SNC631H
JIS G 4102	SNC236, SNC631, SNC836
JIS G 4103	SNCM240, SNCM431, SNCM439, SNCM447, SNCM625, SNCM630
JIS G 4104	SCr430, SCr435, SCr440, SCr445
JIS G 4105	SCM430, SCM432, SCM435, SCM440, SCM445
JIS G 4106	SMn433, SMn438, SMn443 SMnC443
b) Steels for special use	
JIS G 4303	SUS403, SUS420J1, SUS420J2
JIS G 4311	SUH1, SUH3, SUH4
JIS G 4401	SK1, SK2, SK3, SK4, SK5, SK6, SK7
JIS G 4404	SKS2, SKS5, SKS51, SKS4, SKS41, SKS43, SKS44, SKS3, SKS31
JIS G 4410	SKC3, SKC11, SKC24, SKC31
JIS G 4801	SUP3, SUP6, SUP7, SUP9, SUP9A, SUP10, SUP11A
JIS G 4805	SUJ1, SUJ2, SUJ3, SUJ4, SUJ5
c) Iron and steel castings and forgings	
JIS G 3201	SF440A, SF490A, SF540A, SF590A, SF540B, SF590B, SF640B
JIS G 5101	SC410, SC450, SC480
JIS G 5111	SCC3, SCC5 SCMn1, SCMn2, SCMn3, SCMn5 SCSiMn2 SCMnCr2, SCMnCr3, SCMnCr4 SCMnM3 SCCrM1, SCCrM3 SCMnCrM2, SCMnCrM3 SCNCrM2
JIS G 5121	SCS2
JIS G 5501	FC200, FC250, FC300, FC350
JIS G 5502	FCD400, FCD450, FCD500, FCD600, FCD700, FCD800
JIS G 5704	FCMP440, FCMP490, FCMP540, FCMP590, FCMP690
d) Sintered metal materials for the use of machine structural parts	
JIS Z 2550	SMF4030, SMF4040, SMF5030

5.2 History of material for processing With respect to history of the material for processing, the items given in Table 3 shall have been made clearly.

Table 3 History of material for processing

Item	Remarks
a) Material testing results of material for processing Grade of iron and steel Chemical composition ⁽³⁾ Heat number ⁽³⁾ Tensile test result ⁽³⁾ Hardness test result ⁽³⁾ Hardenability test result ⁽³⁾ Metallographic test result ⁽³⁾ Density test result of sintered metallic materials ⁽³⁾	 Grain size, decarburized layer, nonmetallic inclusion, micro- and macro-structure.
b) Category of method of manufacture of material for processing Casting Sintering ⁽⁴⁾ Forging Rolling Extrusion Press working Drawing Form rolling Press fitting Shrink fitting Welding Machining	 Includes discrimination of hot and cold working. Includes discrimination of hot and cold working. Includes discrimination of hot and cold working. Includes discrimination of hot and cold working. Includes discrimination of hot and cold working. Includes discrimination of hot and cold working. Includes discrimination of hot and cold working. Includes rectification by overlaying.
c) Whether applying preheat treatment or not and category of treatment method of material for processing Normalizing Direct quenching from forging Full annealing Spheroidizing Stress relieving Quenching and tempering Carburizing ⁽⁵⁾ Nitrocarburizing ⁽⁵⁾	Heating temperature, holding time and cooling method shall be made clear, as necessary.
d) Surface finish conditions of material for processing, and whether applying rectification or not and its degree⁽³⁾ Cutting method and its conditions Whether applying rectification or not, and its degree	 Includes discrimination of hot and cold working.

Notes ⁽³⁾ It may be omitted when this will not interfere the processing.

⁽⁴⁾ Sintered ferritic material shall be in accordance with Annex (normative).

- 5.3 Appearance, shape and dimensions of material for processing** With respect to the appearance, shape and dimensions of the material for processing, the items given in Table 4 shall have been made clear.

Table 4 Appearance, shape and dimensions of material for processing

[illegible]

Note (6) Each definition of deviations shall conform to **JIS B 0621**.

5.4 Verifying material for processing With respect to acceptance of the material for processing, the items which are necessary for processing specified in **5.1** to **5.3**, shall be identified between purchaser and supplier. If necessary, quality of the material for processing shall be made clear by the methods specified in **JIS G 0565**, **JIS G 0566** and **JIS Z 2343** or other appropriate methods.

6 Processing equipment

6.1 Induction heating equipment The induction heating equipment used for induction hardening shall be as given in the following: