

JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS B 1054-2 : 2013

(ISO 3506-2 : 2009)

(JFRI/JSA)

**Mechanical properties of corrosion-resistant stainless steel fasteners—
Part 2: Nuts**

ICS 21.060.20

Reference number : **JIS B 1054-2 : 2013 (E)**

PROTECTED BY COPYRIGHT

Date of Establishment: 2001-01-20

Date of Revision: 2013-05-20

Date of Public Notice in Official Gazette: 2013-05-20

Investigated by: Japanese Industrial Standards Committee
Standards Board
Technical Committee on Machine Elements

JIS B 1054-2:2013, First English edition published in 2013-09

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 2013

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

Contents

	Page
Introduction.....	1
1 Scope.....	1
2 Normative references	2
3 Symbols	3
4 Designation, marking and finish	3
4.1 Designation.....	3
4.2 Marking.....	5
4.3 Finish	6
5 Chemical composition	7
6 Mechanical properties	8
7 Test methods	10
7.1 Hardness HBW, HRC or HV.....	10
7.2 Proof load	10
Annex A (informative) Description of the groups and grades of stainless steels	11
Annex B (informative) Stainless steel composition specifications (Extract from ISO 683-13:1986)	14
Annex C (informative) Stainless steels for cold heading and extruding (Extract from ISO 4954:1993)	17
Annex D (informative) Austenitic stainless steels with particular resistance to chloride induced stress corrosion (Extract from EN 10088-1:2005)	19
Annex E (informative) Mechanical properties at elevated temperatures; application at low temperatures	20
Annex F (informative) Time-temperature diagram of intergranular corrosion in austenitic stainless steels, grade A2 (18/8 steels)	22
Annex G (informative) Magnetic properties for austenitic stainless steels	23
Annex JA (informative) Stainless steel grades and chemical composition (comparison table between JIS and ISO Standards)	24

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 Research Institute for Screw Threads and Fasteners (JFRI)/Japanese Standards Association (JSA) 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 B 1054-2**:2001 is replaced with this Standard.

This **JIS** document is protected by the Copyright Law.

Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, applications for a patent after opening to the public or a utility model rights. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, applications for a patent after opening to the public or the utility model rights.

JIS B 1054 series consists of the following 4 parts under the general title “*Mechanical properties of corrosion-resistant stainless steel fasteners*”:

Part 1: Bolts, screws and studs

Part 2: Nuts

Part 3: Set screws and similar fasteners not under tensile stress

Part 4: Tapping screws

Mechanical properties of corrosion-resistant stainless steel fasteners— Part 2: Nuts

Introduction

This Japanese Industrial Standard has been prepared based on the second edition of **ISO 3506-2** published in 2009 without any modifications of the technical contents.

Annex JA in this Standard is not contained in the corresponding International Standard.

1 Scope

This Standard specifies the mechanical properties of nuts made of austenitic, martensitic and ferritic steel grades of corrosion-resistant stainless steels, when tested over an ambient temperature range of 10 °C to 35 °C. Properties vary at higher or lower temperatures.

This Standard applies to nuts:

- with nominal thread diameter $D \leq 39$ mm;
- of **ISO** general purpose metric threads based on **JIS B 0205-1** with diameters and pitches in accordance with **JIS B 0205-2** and **JIS B 0205-3**;
- of any shape;
- with width across flats as specified in **JIS B 1002** (except for those shaded);
- with nominal heights $m \geq 0.5D$.

It does not apply to nuts requiring properties such as

- locking abilities, and
- weldability.

NOTE : The designation system of this Standard can be used for sizes outside the limits given in this clause (e.g. $D > 39$ mm), provided that all applicable mechanical and physical requirements of the property classes are met.

This Standard does not define corrosion or oxidation resistance in particular environments. However, some information on materials for particular environments is given in Annex D. Regarding definitions of corrosion and corrosion resistance, see **ISO 8044**.

The aim of this Standard is the classification of corrosion-resistant stainless steel nuts into property classes. Some materials can be used at temperatures down to -200 °C, some can be used at temperatures up to $+800$ °C in air. Information on the influence of temperature on mechanical properties is found in Annex E.

Corrosion and oxidation performances and mechanical properties for use at elevated or sub-zero temperatures can be agreed on between the user and the manufacturer in each particular case. Annex F shows how the risk of intergranular corrosion at elevated temperatures depends on the carbon content.

All austenitic stainless steel fasteners are normally non-magnetic in the annealed condition; after cold working, some magnetic properties can be evident (see Annex G).

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

ISO 3506-2:2009 *Mechanical properties of corrosion-resistant stainless steel fasteners—Part 2: Nuts* (IDT)

The 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 B 0205-1 *ISO general purpose metric screw threads—Part 1: Basic profile*

NOTE : Corresponding International Standard: ISO 68-1:1998 *ISO general purpose screw threads—Basic profile—Part 1: Metric screw threads* (IDT)

JIS B 0205-2 *ISO general purpose metric screw threads—Part 2: General plan*

NOTE : Corresponding International Standard: ISO 261:1998 *ISO general purpose metric screw threads—General plan* (IDT)

JIS B 0205-3 *ISO general purpose metric screw threads—Part 3: Selected sizes for screws, bolts and nuts*

NOTE : Corresponding International Standard: ISO 262:1998 *ISO general purpose metric screw threads—Selected sizes for screws, bolts and nuts* (IDT)

JIS B 1002 *Dimensions of widths across flats*

NOTE : Corresponding International Standard: ISO 272:1982 *Fasteners—Hexagon products—Widths across flats* (MOD)

JIS B 1047 *Passivation of corrosion-resistant stainless-steel fasteners*

NOTE : Corresponding International Standard: ISO 16048:2003 *Passivation of corrosion-resistant stainless-steel fasteners* (IDT)

JIS B 1052-2 *Mechanical properties of fasteners—Part 2: Nuts with specified proof load values—Coarse thread*

NOTE : Corresponding International Standard: ISO 898-2:1992 *Mechanical properties of fasteners—Part 2: Nuts with specified proof load values—Coarse thread* (IDT)

JIS B 1052-6 *Mechanical properties of fasteners—Part 6: Nuts with specified proof load values—Fine pitch thread*

NOTE : Corresponding International Standard: ISO 898-6:1994 *Mechanical properties of fasteners—Part 6: Nuts with specified proof load values—Fine pitch thread* (IDT)

JIS B 1092 *Fasteners—Quality assurance system*

NOTE : Corresponding International Standard: ISO 16426:2002 *Fasteners—Quality assurance system* (IDT)

JIS G 0573 *Method of 65 per cent nitric acid test for stainless steels*

NOTE : Corresponding International Standard: ISO 3651-1:1998 *Determination of resistance to intergranular corrosion of stainless steels—Part 1: Austenitic and ferritic-austenitic (duplex) stainless steels—Corrosion test in nitric acid medium by measurement of loss in mass (Huey test)* (MOD)

JIS G 0575 *Method of copper sulfate-sulfuric acid test for stainless steels*

NOTE : Corresponding International Standard: ISO 3651-2:1998 *Determination of resistance to intergranular corrosion of stainless steels—Part 2: Ferritic, austenitic and ferritic-austenitic (duplex) stainless steels—Corrosion test in media containing sulfuric acid* (MOD)

JIS Z 2243 *Brinell hardness test—Test method*

NOTE : Corresponding International Standard: ISO 6506-1:2005 *Metallic materials—Brinell hardness test—Part 1: Test method* (MOD)

JIS Z 2244 *Vickers hardness test—Test method*

NOTE : Corresponding International Standard: ISO 6507-1:2005 *Metallic materials—Vickers hardness test—Part 1: Test method* (MOD)

JIS Z 2245 *Rockwell hardness test—Test method*

NOTE : Corresponding International Standard: ISO 6508-1:2005 *Metallic materials—Rockwell hardness test—Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)* (MOD)

3 Symbols

For the purpose of this Standard, the following symbols apply.

D	nominal thread diameter
m	height of the nut (nominal value)
P	pitch of the thread
R_{eL}	lower yield stress
$R_{p0.2}$	stress at 0.2 % permanent strain
s	width across flats
S_p	stress under proof load
μ_r	permeability value in a magnetic field

4 Designation, marking and finish

4.1 Designation

The designation system for stainless steel grades and property classes for nuts is given in figure 1. The designation of the material consists of two blocks, which are

separated by a hyphen. The first block designates the steel grade and the second block, the property class.

The designation of the steel grade (first block) consists of the letters

- A: austenitic stainless steel,
- C: martensitic stainless steel, or
- F: ferritic stainless steel

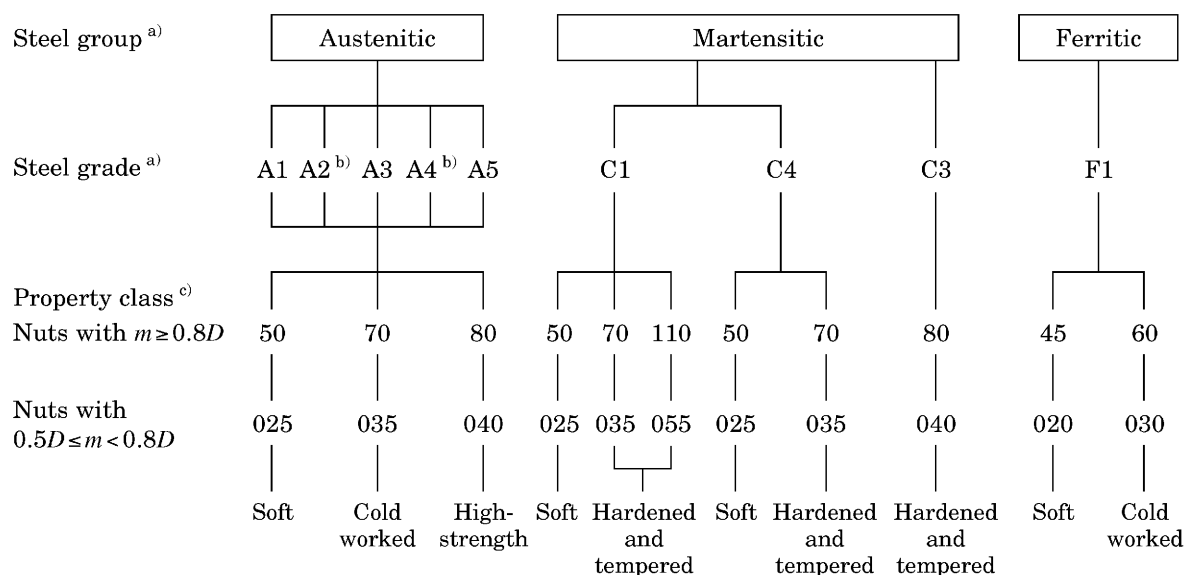
which indicates the group of steel and a digit, which indicates a range of chemical compositions within this steel group (see table 1).

The designation of the property class (second block) consists of two digits for nuts with height $m \geq 0.8D$ (style 1 or style 2 or hexagon flange nuts), representing 1/10 of the stress under proof load, and three digits for nuts with height $0.5D \leq m < 0.8D$ (thin nuts/style 0), the first digit “0” indicating that the nut has a reduced loadability and the following digits representing 1/10 of the stress under proof load. The following are examples for the designation of material.

Example 1 A2-70 indicates: austenitic stainless steel, cold worked, minimum 700 MPa stress under proof load (nut with $m \geq 0.8D$).

Example 2 C4-70 indicates: martensitic stainless steel, hardened and tempered, minimum 700 MPa stress under proof load (nut with $m \geq 0.8D$).

Example 3 A2-035 indicates: austenitic stainless steel, cold worked, minimum 350 MPa stress under proof load (nut with $0.5D \leq m < 0.8D$).



Notes ^{a)} The steel groups and steel grades classified in figure 1 are described in Annex A and specified by the chemical composition given in table 1.

^{b)} Low carbon austenitic stainless steels with carbon content not exceeding 0.03 % may additionally be marked with an "L".

Example: A4L-80

^{c)} Nuts passivated in accordance with **JIS B 1047** may additionally be marked with a "P".

Example: A4-80P

Figure 1 Designation system for stainless steel grades and property classes for nuts

4.2 Marking

4.2.1 General

Nuts manufactured according to the requirements of this Standard shall be designated in accordance with the designation system described in 4.1 and marked in accordance with 4.2.2 and 4.2.3. However, the designation system described in 4.1 and the provisions for marking according to 4.2.3 shall be used only if all relevant requirements of this Standard are met.

NOTE : For marking of left-hand threads, see **JIS B 1052-2**.

4.2.2 Manufacturer's identification mark

A manufacturer's identification mark shall be included during the manufacturing process on all nuts which are marked with a property class symbol, provided this is possible for technical reasons. Manufacturer's identification marking is also recommended on nuts which are not marked with a property class symbol.

4.2.3 Nuts

All nuts of nominal thread diameter $D \geq 5$ mm shall be clearly marked in accordance with figure 1, as shown in figure 2 or figure 3. The marking is mandatory and shall include the steel grade and property class. Marking of only one nut face is acceptable and shall be by indentation only, when applied to the bearing surface of the nuts. Alternatively, marking on one side of the nuts is permissible.

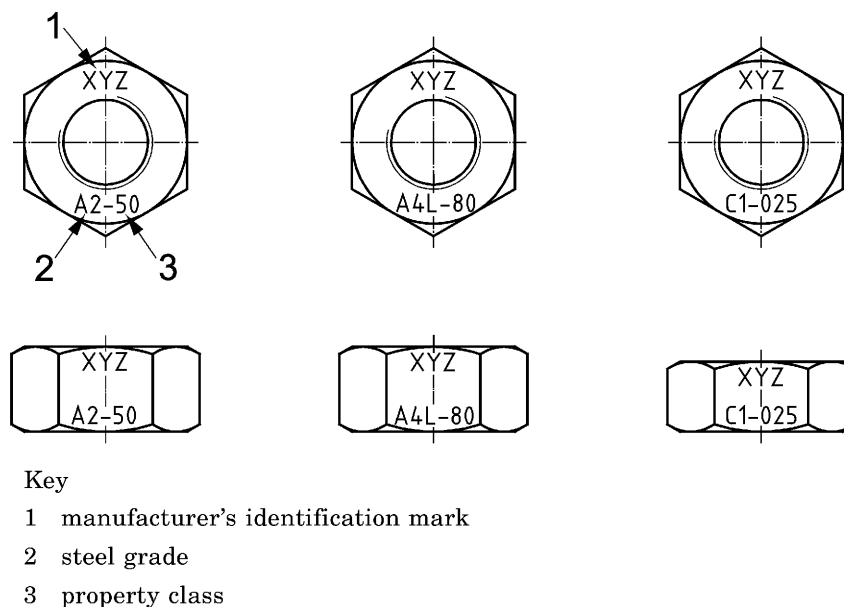


Figure 2 Marking with material designation and manufacturer's identification mark

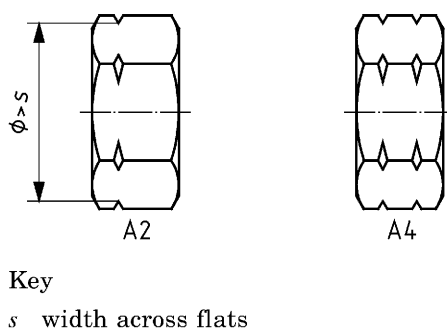


Figure 3 Alternative groove marking (for steel grades A2 and A4 only)

When the marking is made with grooves (see figure 3) and the property class is not indicated, property class 50 or 025 will apply.

It is possible that certain nuts would not fulfil the proof load requirements because of fine pitch thread or the geometry of the nut. These nuts may be marked with the steel grade, but shall not be marked with the property class.

4.2.4 Packages

All packages for all types of nuts of all sizes shall be marked (e.g. through labelling). The marking or labelling shall include the manufacturer's and/or distributor's identification and the marking symbol for the steel grade and property class according to figure 1 and the manufacturing lot number, as defined in **JIS B 1092**.

4.3 Finish

Unless otherwise specified, nuts in accordance with this Standard shall be supplied clean and bright. For maximum corrosion resistance, passivation is recommended. When passivation is required, it shall be performed in accordance with **JIS B 1047**.

Nuts that are passivated may additionally be marked with the symbol “P” after the symbols for steel grade and property class [see Note ^{c)} of figure 1].

For nuts manufactured to a specific order, the additional marking should be applied to both the fastener and the label. For nuts delivered from stock, the additional marking should be applied to the label.

5 Chemical composition

The chemical compositions of stainless steels suitable for nuts in accordance with this Standard are given in table 1.

NOTE : The chemical compositions given in table 1 correspond with the chemical compositions given in **JIS B 1054-1**, table 1, for the relevant steel grades.

The final choice of the chemical composition within the specified steel grade is at the discretion of the manufacturer, otherwise by prior agreement between the purchaser and the manufacturer.

In applications where risk of intergranular corrosion is present, testing in accordance with **JIS G 0573** or **JIS G 0575** is recommended. In such cases, stabilized stainless steels of grades A3 and A5 or stainless steels of grades A2 and A4 with carbon content not exceeding 0.03 % are recommended.