



JAPANESE  
INDUSTRIAL  
STANDARD

Translated and Published by  
Japanese Standards Association

---

---

**JIS B 1051** : 2014

(ISO 898-1 : 2013)

(JFRI/JSA)

**Mechanical properties of fasteners  
made of carbon steel and alloy  
steel—Bolts, screws and studs  
with specified property classes—  
Coarse thread and fine pitch thread**

---

ICS 21.060.10

Reference number : **JIS B 1051 : 2014 (E)**

B 1051 : 2014 (ISO 898-1 : 2013)

Date of Establishment: 1972-06-01

Date of Revision: 2014-09-22

Date of Public Notice in Official Gazette: 2014-09-22

Investigated by: Japanese Industrial Standards Committee  
Standards Board

Technical Committee on Machine Elements

---

JIS B 1051:2014, First English edition published in 2015-02

Translated and published by: Japanese Standards Association  
Mita MT Building, 3-13-12, Mita, Minato-ku, Tokyo, 108-0073 JAPAN

---

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

© JSA 2015

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

AT

This is a preview. [Click here to purchase the full publication.](#)

## Contents

	Page
Introduction.....	1
1 Scope.....	1
2 Normative references .....	2
3 Terms and definitions .....	5
4 Symbols and abbreviated terms .....	6
5 Designation system for property classes .....	8
6 Materials .....	8
7 Mechanical and physical properties .....	10
8 Applicability of test methods .....	16
8.1 General .....	16
8.2 Loadability of fasteners .....	16
8.3 Manufacturer's test/inspection .....	17
8.4 Supplier's test/inspection.....	17
8.5 Purchaser's test/inspection.....	17
8.6 Feasible tests for groups of fasteners and machined test pieces .....	17
9 Test methods .....	26
9.1 Tensile test under wedge loading of finished bolts and screws (excluding studs).....	26
9.2 Tensile test for finished bolts, screws and studs for determination of tensile strength, $R_m$ .....	30
9.3 Tensile test for full-size bolts, screws and studs for determination of elongation after fracture, $A_f$ , and stress at 0.004 $8d$ non-proportional elongation, $R_{pf}$ .....	32
9.4 Tensile test for bolts and screws with reduced loadability due to head design .....	35
9.5 Tensile test for fasteners with waisted shank .....	36
9.6 Proof load test for finished bolts, screws and studs.....	38
9.7 Tensile test for machined test pieces .....	40
9.8 Head soundness test .....	43
9.9 Hardness test .....	44
9.10 Decarburization test.....	46
9.11 Carburization test .....	49
9.12 Retempering test .....	51
9.13 Torsional test .....	52
9.14 Impact test for machined test pieces.....	53

9.15	Surface discontinuity inspection .....	53
10	Marking .....	54
10.1	General .....	54
10.2	Manufacturer's identification mark .....	54
10.3	Marking and identification of fasteners with full loadability .....	54
10.4	Marking and identification of fasteners with reduced loadability .....	58
10.5	Marking of packages .....	59
Annex A (informative)	Relationship between tensile strength and elongation after fracture .....	60
Annex B (informative)	Influence of elevated temperatures on mechanical properties of fasteners .....	61
Annex C (informative)	Elongation after fracture for full-size fasteners, $A_f$ .....	62

## 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 1051**:2000 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 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 utility model rights.

# Mechanical properties of fasteners made of carbon steel and alloy steel— Bolts, screws and studs with specified property classes—Coarse thread and fine pitch thread

## Introduction

This Japanese Industrial Standard has been prepared based on the fifth edition of **ISO 898-1** published in 2013 without any modifications of the technical contents.

The portions with dotted underlines are the matters not given in the corresponding International Standard.

## 1 Scope

This Standard specifies mechanical and physical properties of bolts, screws and studs made of carbon steel and alloy steel when tested at an ambient temperature range of 10 °C to 35 °C. Fasteners (the term used when bolts, screws and studs are considered all together) that conform to the requirements of this Standard are evaluated at that ambient temperature range. They might not retain the specified mechanical and physical properties at elevated temperatures (see Annex B) and/or lower temperatures.

**NOTE 1** Fasteners conforming to the requirements of this Standard are used in applications ranging from -50 °C to +150 °C. Users are advised to consult an experienced fastener metallurgist for temperatures outside the range of -50 °C to +150 °C and up to a maximum temperature of +300 °C when determining appropriate choices for a given application.

**NOTE 2** Information for the selection and application of steels for use at lower and elevated temperatures is given, for example, in **EN 10269**, **ASTM F2281** and in **ASTM A320/A320M**.

Certain bolts and screws might not fulfil the tensile or torsional requirements of this Standard because the geometry of their heads reduces the shear area in the head compared to the stress area in the thread. These include bolts and screws having a low or countersunk head (see **8.2**).

This Standard is applicable to bolts, screws and studs

- made of carbon steel or alloy steel,
- having triangular **ISO** metric screw thread in accordance with **JIS B 0205-1**,
- with coarse pitch thread M1.6 to M39, and fine pitch thread M8×1 to M39×3,
- with diameter/pitch combinations in accordance with **JIS B 0205-2** and **JIS B 0205-3**, and
- having thread tolerances in accordance with **JIS B 0209-1**, **JIS B 0209-2** and **JIS B 0209-4**.

It is not applicable to set screws and similar threaded fasteners not under tensile stress (see **JIS B 1053**).

It does not specify requirements for such properties as

- weldability,
- corrosion resistance,
- resistance to shear stress,
- torque/clamp force performance (for test method, see **JIS B 1084**), or
- fatigue resistance.

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

ISO 898-1:2013 *Mechanical properties of fasteners made of carbon steel and alloy steel—Part 1: Bolts, screws and studs with specified property classes—Coarse thread and fine pitch thread* (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 standard contains 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 0143 *Fasteners—Bolts, screws, studs and nuts—Symbols and descriptions of dimensions*

NOTE : Corresponding International Standard: ISO 225:2010 *Fasteners—Bolts, screws, studs and nuts—Symbols and descriptions of dimensions* (IDT)

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 0205-4 *ISO general purpose metric screw threads—Part 4: Basic dimensions*

NOTE : Corresponding International Standard: ISO 724:1993 *ISO general purpose metric screw threads—Basic dimensions* (IDT)

JIS B 0209-1 *ISO general purpose metric screw threads—Tolerances—Part 1: Principles and basic data*

NOTE : Corresponding International Standard: ISO 965-1:1998 *ISO general-purpose metric screw threads—Tolerances—Part 1: Principles and basic data* (IDT)

JIS B 0209-2 *ISO general purpose metric screw threads—Tolerances—Part 2: Limits of sizes for general purpose external and internal screw threads—Medium quality*

NOTE : Corresponding International Standard: ISO 965-2:1998 *ISO general purpose metric screw threads—Tolerances—Part 2: Limits of sizes for general purpose external and internal screw threads—Medium quality* (IDT)

JIS B 0209-4 *ISO general purpose metric screw threads—Tolerances—Part 4: Limits of sizes for hot-dip galvanized external screw threads to mate with internal screw threads tapped with tolerance position H or G after galvanizing*

NOTE : Corresponding International Standard: ISO 965-4:1998 *ISO general purpose metric screw threads—Tolerances—Part 4: Limits of sizes for hot-dip galvanized external screw threads to mate with internal screw threads tapped with tolerance position H or G after galvanizing* (IDT)

JIS B 1001 *Diameter of clearance holes and counterbores for bolts and screws*

NOTE : Corresponding International Standard: ISO 273:1979 *Fasteners—Clearance holes for bolts and screws* (MOD)

JIS B 1041 *Fasteners—Surface discontinuities—Part 1: Bolts, screws and studs for general requirements*

NOTE : Corresponding International Standard: ISO 6157-1:1988 *Fasteners—Surface discontinuities—Part 1: Bolts, screws and studs for general requirements* (IDT)

JIS B 1043 *Fasteners—Surface discontinuities—Part 3: Bolts, screws and studs for special requirements*

NOTE : Corresponding International Standard: ISO 6157-3:1988 *Fasteners—Surface discontinuities—Part 3: Bolts, screws and studs for special requirements* (IDT)

JIS B 1044 *Fasteners—Electroplated coatings*

NOTE : Corresponding International Standard: ISO 4042:1999 *Fasteners—Electroplated coatings* (IDT)

JIS B 1046 *Fasteners—Non-electrolytically applied zinc flake coatings*

NOTE : Corresponding International Standard: ISO 10683:2000 *Fasteners—Non-electrolytically applied zinc flake coatings* (IDT)

JIS B 1048 *Fasteners—Hot dip galvanized coatings*

NOTE : Corresponding International Standard: ISO 10684:2004 *Fasteners—Hot dip galvanized coatings* (IDT)