



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS B 1187 : 2017

(JFRI/JSA)

**Hexagon head screws with captive
washer**

ICS 21.060.10

Reference number : JIS B 1187 : 2017 (E)

PROTECTED BY COPYRIGHT



Documents

Document Sharing Hub

16 S

Date of Establishment: 1977-10-01

Date of Revision: 2017-03-21

Date of Public Notice in Official Gazette: 2017-03-21

Investigated by: Japanese Industrial Standards Committee

Standards Board for ISO area

Technical Committee on Machine Elements

JIS B 1187 : 2017, First English edition published in 2017-07

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 2017

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	1
3 Terms and definitions	2
4 Classification	2
4.1 Division	2
4.2 Expression of classification	5
5 Shape and dimensions	6
6 Screw thread	6
7 Fitting condition of washer	6
8 Mechanical properties	6
8.1 Mechanical properties of steel screws	6
8.2 Mechanical properties of brass screws	7
8.3 Mechanical properties of washers	7
9 Material	8
9.1 Material of screws	8
9.2 Material of washers	8
10 Surface condition	8
11 Surface treatment	9
12 Inspection	9
12.1 Inspection on shape and dimensions	9
12.2 Inspection on thread	9
12.3 Inspection on fitting condition of washer	9
12.4 Inspection on mechanical properties	9
12.5 Inspection on surface condition	10
12.6 Acceptability	10
13 Designation of product	10
14 Marking	11
14.1 Marking on product	11
14.2 Marking on package	11

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 1187:2006** 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.

Hexagon head screws with captive washer

Introduction

This Japanese Industrial Standard was established in 1977 and has gone through four revisions since then. The last revision was made in 2006 and the revision at this time has been made for the purpose of responding to establishment or revision of Japanese Industrial Standards related to this Standard.

No corresponding International Standard has been established at this point.

1 Scope

This Standard specifies the steel and brass hexagon head screws with captive washer for general purposes. The hexagon head screws specified in this Standard are screws manufactured by mounting a washer onto the screw blank before rolling the threads so that the washer does not fall from the screw.

NOTE 1 The steel hexagon head screws with captive washer are steel hexagon head screws assembled with steel washers, and the brass hexagon head screws with captive washer are brass hexagon head screws assembled with brass or phosphor bronze washer. In this Standard, the steel hexagon head screws with captive washer and the brass hexagon head screws with captive washer are referred to as the steel screws with washer and the brass screws with washer, respectively, and simply as the screws with washer where they are generically referred to regardless of the type.

NOTE 2 In this Standard, when the hexagon head screws in the screw-washer assemblies are made reference to separately from the washer, they are referred to as the steel screws or brass screws, depending on the type of the screw, and simply as the screws, where they are generically referred to regardless of the type. The steel washers and brass or phosphor bronze washers of various types to be assembled on the screws are referred to as the steel washers or copper alloy washers, respectively, and simply as the washers, where they are generically referred to regardless of the type.

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 0101 *Screw threads and fasteners — Vocabulary*

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

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

- JIS B 0209-3 *ISO general purpose metric screw threads — Tolerances — Part 3 : Deviations for constructional screw threads*
- JIS B 0601 *Geometrical Product Specifications (GPS) — Surface texture : Profile method — Terms, definitions and surface texture parameters*
- JIS B 1012 *Cross recesses for screws*
- JIS B 1041 *Fasteners — Surface discontinuities — Part 1 : Bolts, screws and studs for general requirements*
- JIS B 1044 *Fasteners — Electroplated coatings*
- JIS B 1046 *Fasteners — Non-electrolytically applied zinc flake coatings*
- JIS B 1051 *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*
- JIS B 1071 *Fasteners — Methods of verification for size and geometry*
- JIS B 1091 *Fasteners — Acceptance inspection*
- JIS B 1251 *Spring lock washers*
- JIS G 3141 *Cold-reduced carbon steel sheet and strip*
- JIS G 3311 *Cold rolled special steel strip*
- JIS G 3506 *High carbon steel wire rods*
- JIS G 4802 *Cold-rolled steel strip for springs*
- JIS H 3100 *Copper and copper alloy sheets, plates and strips*
- JIS H 3110 *Phosphor bronze and nickel silver sheets, plates and strips*
- JIS H 3260 *Copper and copper alloy wires*
- JIS H 3270 *Copper beryllium alloy, phosphor bronze and nickel silver rods, bars and wires*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS B 0101** apply.

4 Classification

4.1 Division

The screws with washer specified in this Standard are divided into steel screws with washer and brass screws with washer, each of which is further classified as follows.

- a) **Steel screws with washer** The steel screws with washer are classified by the com-

bination of the type of steel screw and the type of steel washer marked with ○, as given in Table 1. Further, the type of steel screw is classified by the combination of the manufacturing process of head and the shape and size of head.

- b) **Brass screws with washer** The brass screws with washer are classified by the combination of the type of brass screw and the type of copper alloy washer marked with ○, as given in Table 2. Further, the type of brass screw is classified by the combination of the manufacturing process of head and the shape and size of head.

Copyrighted material

Table 1 Screw-washer combinations for steel screws with washer

Type of steel screw		Property class	Type of steel washer								Range of nominal diameter <i>d</i> mm
Classification according to head manufacturing process	Classification according to shape and size of head		Plain washer		Spring lock washer ^{c)}	External toothed lock washer	Conical spring washer ^{d)}	Spring lock washer and small round ^{c)}	Spring lock washer and polished round ^{c)}	External toothed lock washer and polished round	
			Small round	Polished round							
Trimmed type	Hexagon head screw ^{a)}	4.8, 6.8, 8.8	○	○	○*	○	○*	○*	○*	○	5 to 12 ^{e)}
	Small hexagon head screw ^{b)}		○	○	○	○	○	○	○	○	8 to 12
Upset type	Small hexagon head screw ^{b)}	4.8, 6.8, 8.8	○	○	○	○	○	○	○	○	8 to 12
	Hexagon head screw ^{a)}		○	○	○*	○	○*	○*	○*	○	4 to 12 ^{e)}
Upset type	Cross recessed hexagon head screw ^{a)}	4.8	○	○	○	○	○	○	○	○	4 to 8

— For the purpose of simplifying the classification, the upset type hexagon head screws, with washer, of 10 mm to 12 mm in nominal diameter and the trimmed type small hexagon head screws with washer should not be used wherever possible. It is preferable that the trimmed type hexagon head screws with washer should be used in place of the former and the upset type small hexagon head screws with washer in place of the latter.

Notes ^{a)} For the hexagon head screws and cross recessed hexagon head screws, the ratio s/d of width across flats (s) to nominal diameter (d) of screw thread shall be 1.45 or more. Where the hexagon head bolts of the above size range are to be distinguished from smaller-sized screws, they are referred to as the ordinary head screws.

^{b)} The ratio s/d of small hexagon head screws is less than 1.45, except for those of nominal diameter 8 mm, for which the ratio is 1.45 or more.

^{c)} The spring lock washers that are used in combination with steel screws are general-purpose captive steel washers or heavy-duty captive steel washers. The former is used with the steel screws of property classes 4.8 and 6.8 and the latter with the steel screws of property class 8.8 and of nominal diameter of screw thread 6 mm or more.

These general-purpose and heavy-duty captive washers are equivalent to the general-purpose and heavy-duty washers specified in **JIS B 1251** in sectional shape and dimensions but different in inside and outside diameters.

^{d)} The conical spring washers that are used in combination with steel screws are light-duty captive steel washers or heavy-duty captive steel washers. The former is used with the steel screws of property classes 4.8 and 6.8 and the latter with the steel screws of property class 8.8 and of nominal diameter of screw thread 6 mm or more.

These light-duty and heavy-duty captive washers are equivalent to the Class 1 light-duty and Class 1 heavy-duty washers specified in **JIS B 1251** in thickness and outside diameter, but different in inside diameter.

^{e)} For steel screws of property class 8.8 that are combined with any captive washer marked with an asterisk in the table, the nominal diameter of screw thread shall be 6 mm to 12 mm.

Table 2 Screw-washer combinations for brass screws with washer

Type of brass screw		Type of copper alloy washer							Range of nominal diameter d mm
Classification according to head manufacturing process	Classification according to shape and size of head	Plain washer		Spring lock washer ^{c)}	External toothed lock washer	Spring lock washer and small round ^{c)}	Spring lock washer and polished round ^{c)}	External toothed lock washer and polished round	
		Small round	Polished round						
Trimmed type	Hexagon head screw ^{a)}	○	○	○	○	○	○	○	5 to 12
	Small hexagon head screw ^{b)}	○	○	○	○	○	○	○	8 to 12
Upset type	Small hexagon head screw ^{b)}	○	○	○	○	○	○	○	8 to 12
	Hexagon head screw ^{a)}	○	○	○	○	○	○	○	4 to 12
Upset type	Cross recessed hexagon head screw ^{a)}	○	○	○	○	○	○	○	4 to 8
Notes ^{a)} For the hexagon head screws and cross recessed hexagon head screws, the ratio s/d of width across flats (s) to nominal diameter (d) of screw thread shall be 1.45 or more. Where the hexagon head bolts of the above size range are to be distinguished from smaller-sized screws, they are referred to as the ordinary head screws. ^{b)} The ratio s/d of small hexagon head screws is less than 1.45, except for those of nominal diameter 8 mm, for which the ratio is 1.45 or more. ^{c)} The spring lock washers that are used in combination with brass screws are general-purpose captive phosphor bronze washers. These general-purpose captive washers are equivalent to the general-purpose washers specified in JIS B 1251 in sectional shape and dimensions but different in inside diameter.									

4.2 Expression of classification

The screws with washer shall be expressed by the combination of the type of screw and the type of washer as shown in the examples below.

Example 1 When a polished round plain washer is assembled on a trimmed type