



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS B 1124 : 2021

(JFRI/JSA)

Drilling screws with tapping screw thread

ICS 21.060.10

Reference number : JIS B 1124 : 2021 (E)

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B 1124 : 2021

Date of Establishment: 2003-04-20

Date of Revision: 2021-12-20

Date of Public Notice in Official Gazette: 2021-12-20

Investigated by: Japanese Industrial Standards Committee

Standards Board for ISO area

JIS B 1124 : 2021, First English edition published in 2022-07

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

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Printed in Japan

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Foreword

This Japanese Industrial Standard has been 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 a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS B 1124** : 2015), which has been technically revised.

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Drilling screws with tapping screw thread

Introduction

This Japanese Industrial Standard has been prepared based on **ISO 15481** : 1999, Edition 1, **ISO 15482** : 1999, Edition 1 and **ISO 15483** : 1999, Edition 1, and **ISO 15480** : 2019, Edition 2 by integrating them into one standard without modifying the technical contents for corresponding parts (profiles/dimensions, product specifications and product designations).

Annex JA in this Standard is added to provide the requirements that correspond to manufacturing/usage of the products in Japan, which are not given in the corresponding International Standards. The vertical lines on both sides and dotted underlines indicate additions to the corresponding International Standards. A list of modifications with the explanations is given in Annex JB.

1 Scope

This Standard specifies the characteristics of drilling screws with tapping screw threads, made of steel, with thread sizes ST2.9 to ST6.3.

It also specifies the characteristics of some drilling screws having profile, size and/or material not specified in the corresponding International Standards.

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

ISO 15480 : 2019 *Fasteners — Hexagon washer head drilling screws with tapping screw thread*

ISO 15481 : 1999 *Cross recessed pan head drilling screws with tapping screw thread*

ISO 15482 : 1999 *Cross recessed countersunk head drilling screws with tapping screw thread*

ISO 15483 : 1999 *Cross recessed raised countersunk head drilling screws with tapping screw thread* (Overall evaluation : MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standards and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

Part or all of the provisions of the following standards, 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 0143 *Fasteners — Bolts, screws, studs and nuts — Symbols and descriptions of dimensions*

NOTE Normative reference in the corresponding International Standard : ISO 225 *Fasteners — Bolts, screws, studs and nuts — Symbols and descriptions of dimensions*

JIS B 1007 *Tapping screws thread*

NOTE Normative reference in the corresponding International Standard : ISO 1478 *Tapping screws thread*

JIS B 1010 *Designation system for fasteners*

JIS B 1012 *Cross recesses for screws*

NOTE Normative reference in the corresponding International Standard : ISO 4757 *Cross recesses for screws*

JIS B 1013 *Countersunk head screws — Head configuration and gauging*

NOTE Normative reference in the corresponding International Standard : ISO 7721 *Countersunk head screws — Head configuration and gauging*

JIS B 1021 *Tolerances for fasteners — Part 1 : Bolts, screws, studs and nuts — Product grades A, B and C*

NOTE Normative reference in the corresponding International Standard : ISO 4759-1 *Tolerances for fasteners — Part 1 : Bolts, screws, studs and nuts — Product grades A, B and C*

JIS B 1044 *Fasteners — Electroplated coatings*

NOTE Normative reference in the corresponding International Standard : ISO 4042 *Fasteners — Electroplated coatings*

JIS B 1045 *Fasteners — Preloading test for the detection of hydrogen embrittlement — Parallel bearing surface method*

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

JIS B 1059 *Drilling screws with tapping screw thread — Mechanical and functional properties*

NOTE Normative reference in the corresponding International Standard : ISO 10666 *Drilling screws with tapping screw thread — Mechanical and functional properties*

JIS B 1071 *Fasteners — Methods of verification for size and geometry*

JIS B 1091 *Fasteners — Acceptance inspection*

NOTE Normative reference in the corresponding International Standard : ISO 3269 *Fasteners — Acceptance inspection*

JIS B 1099 *Fasteners — General requirements for bolts, screws, studs and nuts*

NOTE Normative reference in the corresponding International Standard : ISO 8992 *Fasteners — General requirements for bolts, screws, studs and nuts*

*JIS G 4315 Stainless steel wires for cold heading and cold forging***3 Terms and definitions**

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

4 Classification

The drilling screws are classified as given in Table 1.

Table 1 Classification of drilling screws

Type	Thread size	Corresponding International Standard (informative)
Hexagon washer head drilling screw	ST2.9 to ST6.3	ISO 15480
Cross recessed pan head drilling screw		ISO 15481
Cross recessed countersunk head drilling screw		ISO 15482
Cross recessed raised countersunk head drilling screw		ISO 15483

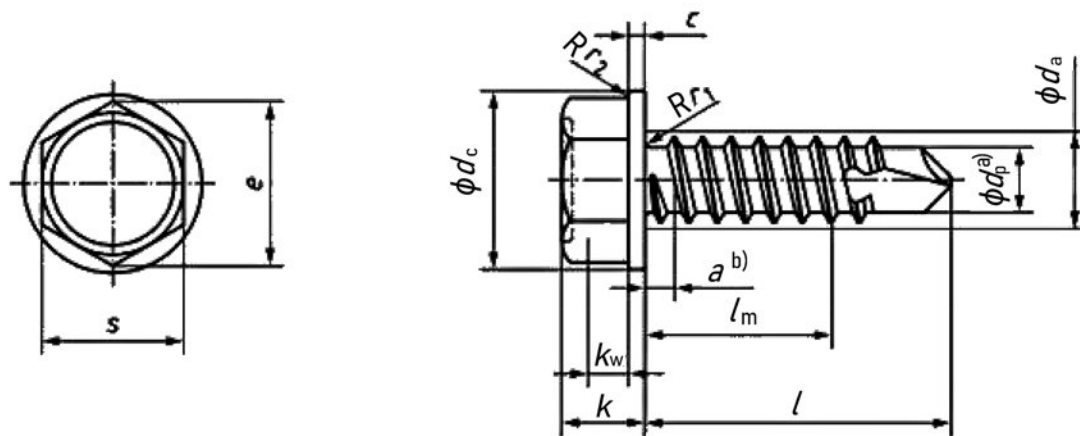
Refer to Annex JA for the specifications of cross recessed trumpet head drilling screws, and drilling screws of thread sizes 5 and 6.

5 Profiles/dimensions, product specifications and designations of products

The profiles/dimensions and product specifications of drilling screws are as given in Table 2. The designations of products are in accordance with **JIS B 1010**. Examples of designations of products are shown in respective tables indicated in Table 2.

Table 2 Profiles/dimensions, product specifications and designations of products of drilling screws

Type	Profile/dimension	Product specification	Designation of product (Example)
Hexagon washer head drilling screw	Figure 1 and Table 3	Table 4	Table 5
Cross recessed pan head drilling screw	Figure 2 and Table 6	Table 7	Table 8
Cross recessed countersunk head drilling screw	Figure 3 and Table 9	Table 10	Table 11
Cross recessed raised countersunk head drilling screw	Figure 4 and Table 12	Table 13	Table 14
Symbols for profiles/dimensions are in accordance with JIS B 0143 .			



Note ^{a)} The function of the drilling point (diameter d_p) is in accordance with **JIS B 1059**.

Note ^{b)} a is the distance from the position of core diameter of the first full thread to the bearing surface.

Figure 1 Profile of hexagon washer head drilling screw

Table 3 Dimensions of hexagon washer head drilling screws

Unit: mm

Thread size			ST2.9	ST3.5	ST4.2	ST4.8	ST5.5	ST6.3	
$P^a)$			1.1	1.3	1.4	1.6	1.8	1.8	
a	max.		1.1	1.3	1.4	1.6	1.8	1.8	
d_a	max.		3.5	4.1	4.9	5.6	6.3	7.3	
d_c	max.		6.3	8.3	8.8	10.5	11.0	13.5	
	min.		5.8	7.6	8.1	9.8	10.0	12.2	
c	min.		0.4	0.6	0.8	0.9	1.0	1.0	
e	min.		4.28	5.96	7.59	8.71	8.71	10.95	
k	nom. = max.		2.8	3.4	4.1	4.3	5.4	5.9	
	min.		2.5	3.0	3.6	3.8	4.8	5.3	
$k_w^{b)}$	min.		1.3	1.5	1.8	2.2	2.7	3.1	
r_1	min.		0.1	0.1	0.2	0.2	0.25	0.25	
r_2	max.		0.2	0.25	0.3	0.3	0.4	0.5	
s	nom. = max.		4.00 ^{c)}	5.50	7.00	8.00	8.00	10.00	
	min.		3.82	5.32	6.78	7.78	7.78	9.78	
Drilling range (sheet or plate thickness) ^{d)}	from		0.7	0.7	1.75	1.75	1.75	2.0	
	to		1.9	2.25	3.0	4.4	5.25	6.0	
Nomi- nal Length	l		$l_m^{e)}$						
	min. max.		min.						
9.5	8.75	10.25	3.25	2.85	Screws with too short lengths.				
13	12.1	13.9	6.6	6.2	4.3	3.7			
16	15.1	16.9	9.6	9.2	7.3	5.8	5.0		
19	18.0	20.0	12.5	12.1	10.3	8.7	8.0	7.0	
22	21.0	23.0		15.1	13.3	11.7	11.0	10.0	
25	24.0	26.0		18.1	16.3	14.7	14.0	13.0	
32	30.75	33.25	Lengths to be agreed between the purchaser and the manufacturer.		23.0	21.5	21.0	20.0	
38	36.75	39.25			29.0	27.5	27.0	26.0	
45	43.75	46.25					34.5	34.0	33.0
50	48.75	51.25					39.5	39.0	38.0
Note ^{a)} P is the pitch of the thread.									
Note ^{b)} k_w is the wrenching height.									
Note ^{c)} $s = 5$ mm for hexagon head tapping screws (JIS B 1123), and $s = 4$ mm for hexagon washer head tapping screws (JIS B 1126). In this Standard, $s = 4$ mm shall apply.									
Note ^{d)} In order to determine the nominal length l needed for the application, it can be necessary to add an air gap (if present) to the individual sheet or plate thickness.									
Note ^{e)} l_m is the distance from the bearing face of the head to the last major diameter of the thread.									

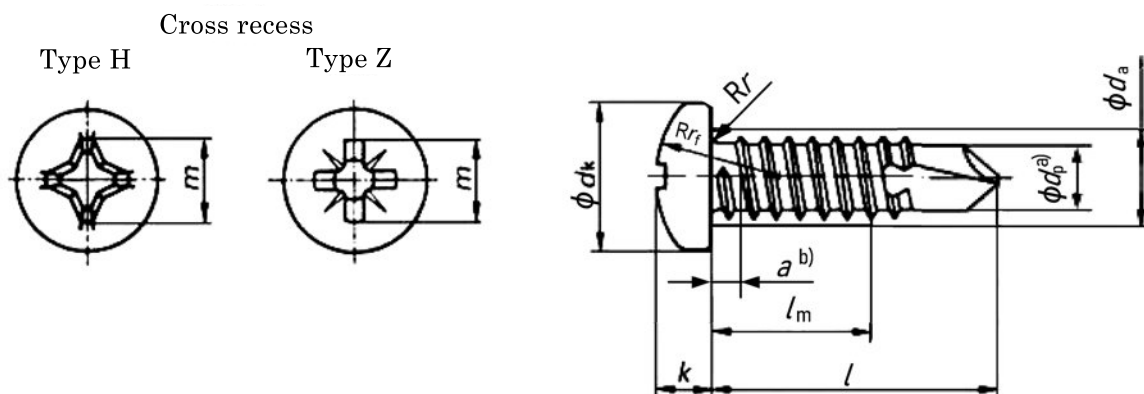
Table 4 Product specifications of hexagon washer head drilling screws

Material		Steel
General requirements		JIS B 1099
Thread		JIS B 1007
Mechanical properties and performance		JIS B 1059
Tolerances	Product grade	A
	Standard	JIS B 1021
Finish — Coating		As processed (no coating) Requirements for electroplating are in accordance with JIS B 1044 . ~~Requirements for non-electrolytically applied zinc flake coatings are in accordance with JIS B 1046.~~ Additional requirements, or other finishes or coatings shall be as agreed between the purchaser and the manufacturer.
Acceptance inspection		Acceptance inspection is in accordance with JIS B 1091 .

The product specifications of stainless steel hexagon washer head drilling screws are in accordance with Annex JA.

Table 5 Examples of designations of products for hexagon washer head drilling screws

Example	
Product	Hexagon washer head drilling screw with thread size ST3.5, and nominal length $l = 16$ mm
Designation	Hexagon washer head drilling screw JIS B 1124 — ISO 15480 — ST3.5 × 16



Note ^{a)} The function of the drilling point (diameter d_p) is in accordance with **JIS B 1059**.

Note ^{b)} a is the distance from the position of core diameter of the first full thread to the bearing surface.

Figure 2 Profile of cross recessed pan head drilling screw

Table 6 Dimensions of cross recessed pan head drilling screws

Unit: mm

Thread size				ST2.9	ST3.5	ST4.2	ST4.8	ST5.5	ST6.3
$P^a)$				1.1	1.3	1.4	1.6	1.8	1.8
a		max.		1.1	1.3	1.4	1.6	1.8	1.8
d_a		max.		3.5	4.1	4.9	5.6	6.3	7.3
d_k		max.		5.60	7.00	8.00	9.50	11.00	12.00
		min.		5.30	6.64	7.64	9.14	10.57	11.57
k		max.		2.4	2.6	3.1	3.7	4.0	4.6
		min.		2.15	2.35	2.8	3.4	3.7	4.3
r		min.		0.1	0.1	0.2	0.2	0.25	0.25
r_f		approx.		5	6	6.5	8	9	10
Cross recess	Recess No.			1	2			3	
	Type H	m	ref.	3.0	3.9	4.4	4.9	6.4	6.9
		Pene- tration q	max.	1.8	1.9	2.4	2.9	3.1	3.6
			min.	1.4	1.4	1.9	2.4	2.6	3.1
	Type Z	m	ref.	3.0	4.0	4.4	4.8	6.2	6.8
		Pene- tration q	max.	1.75	1.9	2.35	2.75	3.0	3.5
			min.	1.45	1.5	1.95	2.3	2.55	3.05
	Drilling range (sheet or plate thickness) ^{b)}			from	0.7	0.7	1.75	1.75	1.75
to				1.9	2.25	3.0	4.4	5.25	6.0
l				$l_m^c)$					
Nominal length	min.	max.	min.						
9.5	8.75	10.25	3.25	2.85	Screws with too short lengths.				
13	12.1	13.9	6.6	6.2	4.3	3.7			
16	15.1	16.9	9.6	9.2	7.3	5.8	5.0		
19	18.0	20.0	12.5	12.1	10.3	8.7	8.0	7.0	
22	21.0	23.0	Lengths to be agreed between the pur- chaser and the man- ufacturer.	15.1	13.3	11.7	11.0	10.0	
25	24.0	26.0		18.1	16.3	14.7	14.0	13.0	
32	30.75	33.25			23.0	21.5	21.0	20.0	
38	36.75	39.25			29.0	27.5	27.0	26.0	
45	43.75	46.25					34.5	34.0	33.0
50	48.75	51.25		39.5			39.0	38.0	
Note ^{a)} P is the pitch of the thread.									
Note ^{b)} In order to determine the nominal length l needed for the application, it can be necessary to add an air gap (if present) to the individual sheet or plate thickness.									
Note ^{c)} l_m is the distance from the bearing face of the head to the last major diameter of the thread.									

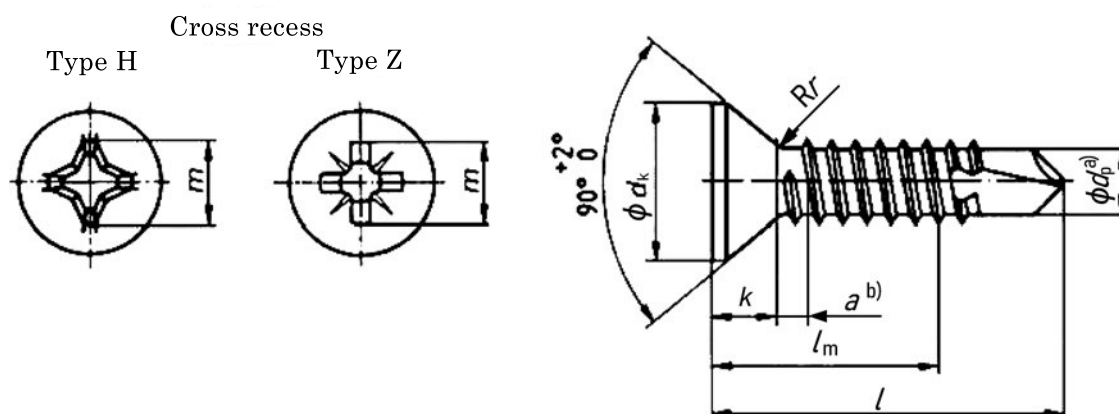
Table 7 Product specifications of cross recessed pan head drilling screws

Material		Steel
General requirements		JIS B 1099
Thread		JIS B 1007
Cross recess		JIS B 1012
Mechanical properties and performance	Standard	JIS B 1059
Tolerances	Product grade	A
	Standard	JIS B 1021
Finish — Coating		As processed (no coating) Requirements for electroplating are in accordance with JIS B 1044 . Requirements for non-electrolytically applied zinc flake coatings are in accordance with JIS B 1046 . Additional requirements, or other finishes or coatings shall be as agreed between the purchaser and the manufacturer.
Acceptance inspection		Acceptance inspection is in accordance with JIS B 1091 .

The product specifications of stainless steel cross recessed pan head drilling screws are in accordance with Annex JA.

Table 8 Examples of designations of products for cross recessed pan head drilling screws

Example	
Product	Type Z cross recessed pan head drilling screw with thread size ST3.5, and nominal length $l = 16$ mm
Designation	Type Z cross recessed pan head drilling screw JIS B 1124 — ISO 15481 — ST3.5 × 16 — Z



Note ^{a)} The function of the drilling point (diameter d_p) is in accordance with **JIS B 1059**.

Note ^{b)} a is the distance from the position where the diameter of the countersunk head is equal to the maximum outside diameter of thread specified in **JIS B 1007** to the position of core diameter of the first full thread.

Figure 3 Profile of cross recessed countersunk head drilling screw