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**Tapping screw and washer assemblies  
with plain washers**

*Vis à tôle à rondelle plate imperdable*

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ISO 10510:2011

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10510 was prepared by Technical Committee ISO/TC 2, *Fasteners*, Subcommittee SC 10, *Product standards for fasteners*.

This second edition cancels and replaces the first edition (ISO 10510:1999), of which it constitutes a minor revision.

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# Tapping screw and washer assemblies with plain washers

## 1 Scope

This International Standard specifies the requirements for tapping screws and plain washer assemblies with thread sizes from ST2,2 to ST9,5 inclusive, flat seating heads and mechanical properties as specified in ISO 2702.

The plain washers are captive, i.e. prevented from disassembly and free to rotate.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1478, *Tapping screws thread*

ISO 1479, *Hexagon head tapping screws*

ISO 1481, *Slotted pan head tapping screws* [ISO 10510:2011](https://standards.iteh.ai/catalog/standards/sist/4b5f00aa-b014-4a23-8ae5-10511e83f175-iso-10510-2011)

ISO 2702, *Heat-treated steel tapping screws — Mechanical properties*

ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

ISO 7049, *Cross-recessed pan head tapping screws*

ISO 10669, *Plain washers for tapping screw and washer assemblies — Normal and large series — Product grade A*

## 3 Dimensions

The dimensions of the assembled screws shall conform to the designated product standards for loose parts with the following exceptions:

- screws shall have a shank of such diameter,  $d_s$ , that the washer with dimensions in accordance with ISO 10669 is free to rotate;
- the permitted distance from the underside of the head to the first full thread shall be increased by the maximum thickness of the washer as specified in ISO 10669;
- the transition diameter,  $d_a$ , shall be reduced by the difference between the nominal and thread rolling diameter.

For the dimensions, see Figures 1 to 4 and Table 1.

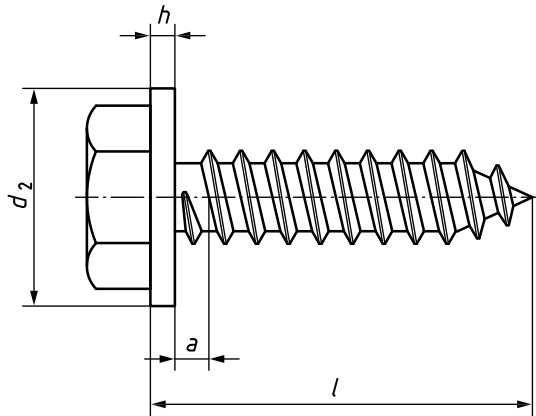
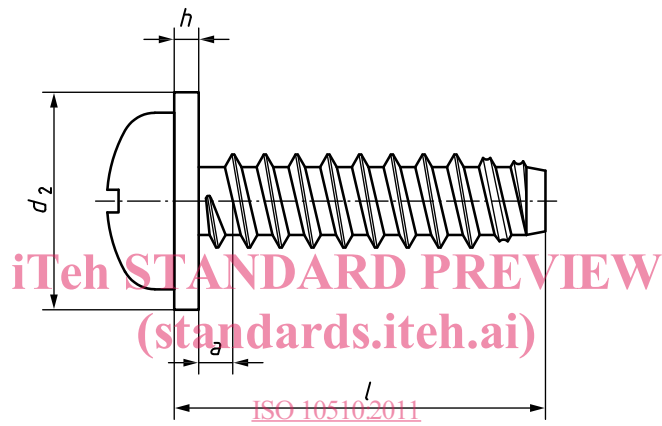


Figure 1 — Hexagon head tapping screw, for example with cone end (type C)



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Figure 2 — Cross-recessed pan head tapping screw, for example with flat end (type F)

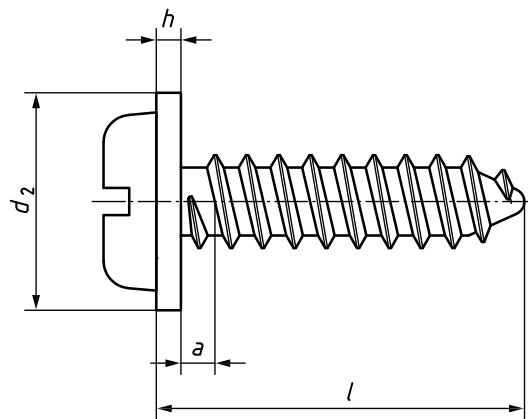


Figure 3 — Slotted pan head tapping screw, for example with rounded end (type R)

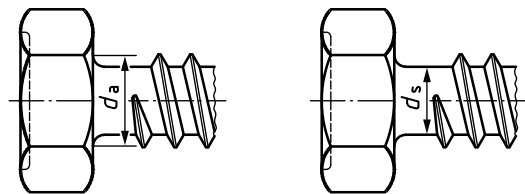


Figure 4 — Transition diameter,  $d_a$ , and shank diameter,  $d_s$

Table 1 — Dimensions

Dimensions in millimetres

Thread size	$a^b$ max.	$d_a$ max.	Washer dimensions <sup>a</sup>			
			Normal series Type N		Large series Type L	
			$h$ nom.	$d_2$ max.	$h$ nom.	$d_2$ max.
ST2,2	0,8	2,1	1	5	1	7
ST2,9	1,1	2,8	1	7	1	9
ST3,5	1,3	3,3	1	8	1	11
ST4,2	1,4	4,03	1	9	1	12
ST4,8	1,6	4,54	1	10	1,6	15
ST5,5	1,8	5,22	1,6	12	1,6	15
ST6,3	1,8	5,93	1,6	14	1,6	18
ST8	2,1	7,76	1,6	16	2	24
ST9,5	2,1	9,43	2,0	20	2,5	30

<sup>a</sup> Dimensions extracted from ISO 10669, for information only.

<sup>b</sup> Dimension  $a$  measured after assembly, with washer in contact with the screw bearing face or underhead radius.

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#### 4 Specifications and reference standards

ISO 10510:2011

The mechanical properties of the screw component of the tapping screw and washer assembly shall be those specified in ISO 2702. Following assembly and heat treatment, the washer component shall have a hardness of 90 HV to 320 HV.

Vickers hardness testing shall be carried out in accordance with ISO 6507-1.

Test force: HV 10 for nominal thickness  $h \leq 1,2$  mm

Test force: HV 30 for nominal thickness  $h > 1,2$  mm

Prior to assembly, suitable precautions shall be taken to prevent detrimental case hardening of the washer during heat treatment, e.g. copper plating.

#### 5 Designation

The designation of a tapping screw and washer assembly shall consist of:

- a) the description of the components;
- b) the reference to this International Standard, i.e. ISO 10510;
- c) the thread size and nominal length of the tapping screw;
- d) the type of thread end in accordance with ISO 1478;
- e) the screw symbol specifying the type of screw (see Table 2);
- f) the washer symbol specifying the type of washer (see Table 3).

**Table 2 — Symbols for the screws**

Reference International Standard		Symbol
ISO 1479	Hexagon head tapping screws	S1
ISO 7049	Cross recessed pan head tapping screws	S2
ISO 1481	Slotted pan head tapping screws	S3

**Table 3 — Symbols for the washers**

Reference International Standard		Type of washer	Symbol
ISO 10669	Plain washers for tapping screw and washer assemblies	Normal	N
		Large	L

EXAMPLE 1

A hexagon head tapping screw and washer assembly with a screw size of ST4,2 × 16, with rounded end (R) in accordance with ISO 1478, screw type in accordance with ISO 1479 (symbol S1), and a plain washer, normal series, in accordance with ISO 10669 (symbol N) is designated as follows:

**Tapping screw and washer assembly ISO 10510 – ST4,2 × 16 – R – S1 – N**

EXAMPLE 2

A cross-recessed pan head tapping screw and washer assembly with a screw size of ST 4,2 × 16, with rounded end (R) in accordance with ISO 1478, screw type with cross recess type Z in accordance with ISO 7049 (symbol S2) and a plain washer, normal series, according to ISO 10669 (symbol N) is designated as follows:

**Tapping screw and washer assembly ISO 10510 – ST4,2 × 16 – R – Z – S2 – N**

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