



SLOVENSKI STANDARD
oSIST prEN ISO 2702:2022
01-april-2022

Vežni elementi - Toplotno obdelani pločevinski vijaki - Mehanske in fizikalne lastnosti (ISO/DIS 2702:2022)

Fasteners - Heat-treated tapping screws - Mechanical and physical properties (ISO/DIS 2702:2022)

Mechanische Verbindungselemente – Wärmebehandelte Blechschräuben – Mechanische und physikalische Eigenschaften (ISO/DIS 2702:2022)

Fixations - Vis à tôle traitées thermiquement - Caractéristiques mécaniques et physiques (ISO/DIS 2702:2022)

Ta slovenski standard je istoveten z: prEN ISO 2702

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ICS:

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DRAFT INTERNATIONAL STANDARD

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Fasteners — Heat-treated tapping screws — Mechanical and physical properties

ICS: 21.060.10

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 2, *Fasteners*, Subcommittee SC 13, *Fasteners with non-metric thread*.

This fourth edition cancels and replaces the third edition (ISO 2702:2011), which has been technically revised.

The main changes are as follows:

- document newly structured with regard to requirements and test methods;
- new [Table 1](#) for mechanical and physical properties and related test methods (see [5.1](#));
- maximum case-hardened depth increased to 0,12 mm for ST2,2 and ST2,6 (see [5.3](#));
- maximum core hardness changed from 370 HV back to 390 HV and core hardness test specified more precisely (see [5.4](#) and [6.4](#));
- new clauses for ductility and ductility test added (see [5.8](#) and [6.8](#));
- new test method for case-hardened depth determination ~~test method~~ added (see [6.3](#));
- new [Clause 7](#) ~~added~~ for finspection added;
- new [Clause 8](#) for marking and labelling added ~~as new Clause 8~~.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Fasteners — Heat-treated tapping screws — Mechanical and physical properties

1 Scope

This document specifies the mechanical and physical properties of heat treated tapping screws made of steel, with thread sizes ST2,2 to ST9,5 in accordance with ISO 1478, together with the related test methods.

Tapping screws are designed to form mating threads in sheet metals, without their own threads being deformed. Tapping screws are not intended to be pretensioned by design, even though they can experience varying degrees of low-level tensile stress after installation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1891-4, *Fasteners — Vocabulary — Part 4: Control, inspection, delivery, acceptance and quality*

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

ISO 16228, *Fasteners — Types of inspection documents*

3 Terms and definitions

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

tapping screw

sheet metal screw

screw with thread in accordance with ISO 1478 which, when driven into a hole, creates its own mating threads in the materials of the parts being assembled (usually thin metallic sheets) without deforming its own thread

4 Materials

Tapping screws shall be made from cold heading steel that can be case-hardened (see e.g. ISO 4954, EN 10263-3, GB/T 6478, SAE J 933, JIS G 3507).

5 Mechanical and physical properties

5.1 General

When tested in accordance with [Clause 6](#), tapping screws shall meet the specified mechanical and physical properties specified in this clause, see [Table 1](#).

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The requirements of this Clause shall apply to fasteners as delivered by the supplier, i.e. without alteration from the as-delivered condition. In case of alteration or further processing performed by the purchaser, the purchaser shall assume responsibility for conformance of all characteristics altered by such processing.

Table 1 — Mechanical and physical properties and related test methods

Property		Related test method
Material	4	—
Surface hardness	5.2	6.2
Case-hardened depth	5.3	6.3
Core hardness	5.4	6.4
Microstructure	5.5	6.5
Thread-forming ability	5.6	6.6
Torsional strength	5.7	6.7
Ductility ^a	5.8	6.8
^a Only as a routine test for in-process control.		

5.2 Surface hardness

The minimum surface hardness after heat treatment shall be 450 HV 0,3.

Upon request of the purchaser before the order, maximum surface hardness can be specified to mitigate the risk of environmental hydrogen embrittlement.

5.3 Case-hardened depth

The case-hardened depth, CHD, shall conform to the values specified in [Table 2](#).
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Table 2 — Case-hardened depth

Thread	Case-hardened depth CHD	
	mm	
	min.	max.
ST2,2 ST2,6	0,04	0,12
ST2,9 ST3,3 ST3,5	0,05	0,18
ST3,9 ST4,2 ST4,8 ST5,5	0,10	0,23
ST6,3 ST8 ST9,5	0,15	0,28

5.4 Core hardness

The core hardness after heat treatment of the tapping screws shall be:

- 270 HV 5 to 390 HV 5 for threads ≤ ST3,9;
- 270 HV 10 to 390 HV 10 for threads > ST3,9.

Upon request of the purchaser before the order, maximum core hardness can be limited to a lower value to mitigate the risk of environmental hydrogen embrittlement.

5.5 Microstructure

The microstructure shall show no band of free ferrite between the case-hardened zone and the core.

5.6 Thread-forming ability

When tested in accordance with 6.6, tapping screws shall form a mating thread without deforming their own thread when driven into the test plate.

5.7 Torsional strength

When tested in accordance with 6.7, tapping screws shall meet the minimum breaking torque values specified in Table 3.

Table 3 — Minimum breaking torque

Thread	Minimum breaking torque
	Nm
ST2,2	0,45
ST2,6	0,9
ST2,9	1,5
ST3,3	2,0
ST3,5	2,7
ST3,9	3,4
ST4,2	4,4
ST4,8	6,3
ST5,5	10,0
ST6,3	13,6
ST8	30,5
ST9,5	68,0

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5.8 Ductility

When tested in accordance with 6.8, the head of the tapping screw shall not separate from the shank, (see "Pass" in Figure 4 b).

6 Test methods

6.1 General

When tested at ambient temperature by the methods specified in this clause, tapping screws shall meet the requirements specified in Clause 5.

6.2 Surface hardness test

The surface hardness test shall be carried out in accordance with ISO 6507-1, using a Vickers indenter with a test force of 2,942 N (HV 0,3). The impression of the pyramid shall be made on a flat surface, preferably on the screw head.

Surface hardness shall be in accordance with 5.2.

6.3 Case-hardened depth determination

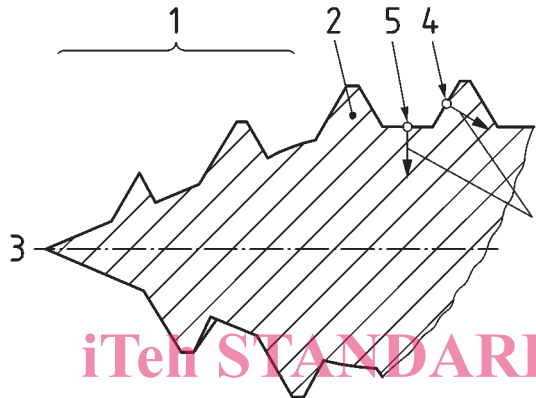
The case-hardened depth (CHD) shall be determined on a longitudinal section of the screw. Hardness determination shall be carried out in accordance with ISO 6507-1. A Vickers indenter with a test force of 2,942 N (HV 0,3) shall be used.

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A hardness plot shall be performed perpendicular to the surface, beginning at the thread flank midpoint between crest and root (see point 4 in [Figure 1 a](#)) for screws with thread above ST4,2 or, in the case of smaller tapping screws up to and including ST4,2, beginning at the root of the thread (see point 5 in [Figure 1 a](#)).

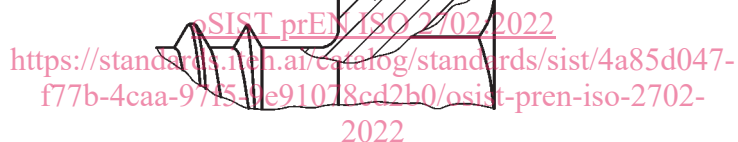
When the threaded area does not allow a reliable measurement (e.g. complete carburization in the threads), the bearing surface under the head of the screw shall be taken as reference location for case-hardened depth determination (see [Figure 1 b](#)).

The case-hardened depth shall be the distance from the surface to the point at which the hardness recorded is 420 HV 0,3, (see [Figure 1 c](#)).



a) Case-hardened depth determination in the thread

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b) Case-hardened depth determination in the head bearing surface