ISO/FDIS 3506-4:2024(en)

ISO-<u>/TC-</u>2/WG 17 Secretariat:-DIN <u>Date:</u>2024-09-26xx

Fasteners-_— Mechanical properties of corrosion-<u>-</u>resistant stainless steel fasteners —-

iTeh Standards

Tapping screws with specified grades and hardness classes

Fixations — Caractéristiques mécaniques des fixations en acier inoxydable résistant àla<u>à</u> la corrosion —Part 4: Vis à tôle

Partie 4: Vis à tôle de grades et classes de dureté spécifiées

Part 4:

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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 <u>www.iso.org/directiveswww.iso.org/directives</u>).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <u>www.iso.org/patents.</u> ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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, <u>Fasteners</u>, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 185 <u>Fasteners</u>, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 3506-4:2009), which has been technically revised.

The main changes are as follows:

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- annexes common to several parts of the ISO 3506 series have been withdrawn from this document and are now included in the new Part 6 of ISO 3506 which is to be used with this document;
- austenitic stainless steel of grade A8 and duplex (austenitic-ferritic) stainless steels of grades D2 to D8 for hardness classes 20H, 25H and 30H have been added (see Figure 1);
- operational temperature ranges have been clarified (see <u>Clause 1);</u>
- terms and definitions have been added (see <u>Clause 3);</u>

— — wording for surface conditions and corrosion resistance have been improved (see <u>5.3 and 5.4);</u>

— manufacturer's, supplier's and purchaser's inspections have been added (see <u>Clause 7);</u>

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ISO 3506-1, Fasteners — Mechanical properties of corrosion- resistant stainless steel fasteners — Part 1: Bolts, screws and studs with specified grades and property classes
ISO 3506-2, Fasteners — Mechanical properties of corrosion- resistant stainless steel fasteners — Part 2: Nuts with specified grades and property classes
ISO 3506-3, Mechanical properties of corrosion-resistant stainless steel fasteners — Part 3: Set screws and similar fasteners not under tensile stress
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— — applicability of test methods has been added, and hardness test, torsional test and drive te	st methods
have been improved (see Clause 8);	

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— marking and labelling have been improved (see Clause 9);

— structure and content of this document have been brought in line with other parts of ISO 3506 published recently.

A list of all parts in the ISO 3506 series can be found on the ISO website.

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 www.iso.org/members.html

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ISO 3506-1, Fasteners — Mechanical properties of corrosionresistant stainless steel fasteners — Part 1: Bolts, screws and studs with specified grades and property classes

ISO 3506-2, Fasteners — Mechanical properties of corrosionresistant stainless steel fasteners — Part 2: Nuts with specified grades and property classes

ISO 3506-3, Mechanical properties of corrosion-resistant stainless steel fasteners — Part 3: Set screws and similar fasteners not under tensile stress

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Introduction

The properties of stainless steel fasteners result from the chemical composition of the material (especially corrosion resistance) and from the mechanical properties due to the manufacturing process. Austenitic, ferritic and duplex (austenitic-ferritic) stainless steel fasteners are generally manufactured by cold working; they consequently do not have homogeneous local material properties when compared to quenched and tempered fasteners.

Austenitic-ferritic stainless steels referred to as duplex stainless steels were originally invented in the 1930s and have been increasingly used since the 1980s. This document was revised to reflect their standardization for fasteners.

All duplex stainless steels show improved resistance to stress corrosion cracking compared to the commonly used A2 to A5 austenitic grades. Most duplex grades also show higher levels of pitting corrosion resistance, where D2 matches at least A2 and where D4 matches at least A4.

<u>ISO 3506-6 provides general rules and additional technical information on suitable stainless steels and their</u> properties (detailed properties of stainless steel grades, corrosion behaviour with regards to pitting, crevice and intergranular corrosion, magnetic properties, etc.).

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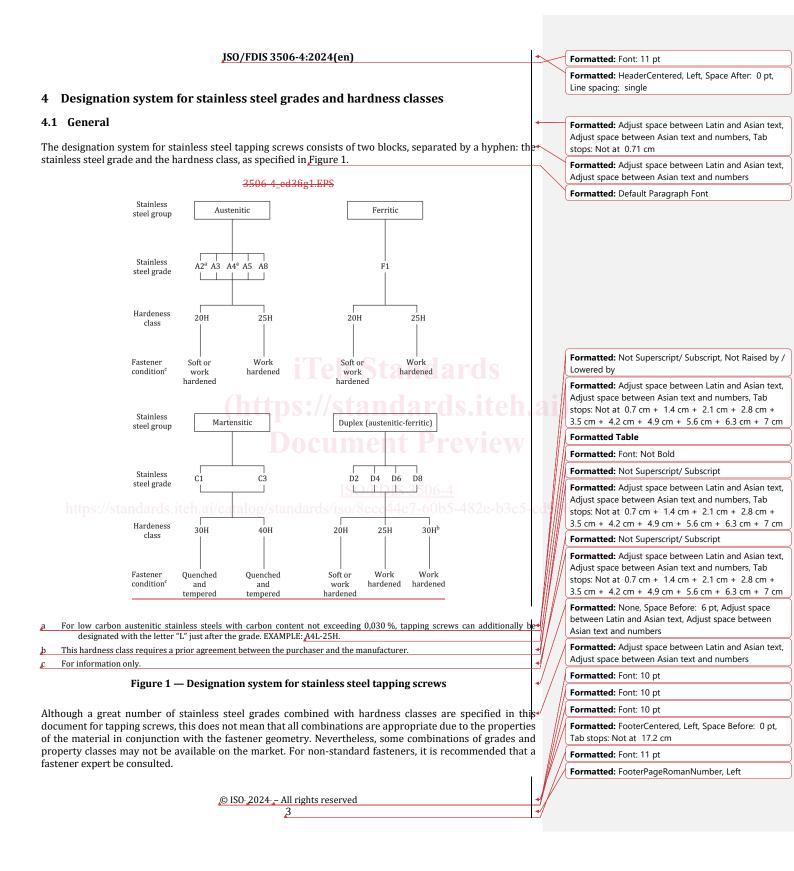
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Fasteners — Mechanical properties of corrosion—resistant stainless steel fasteners —	5	
Part 4: Tapping screws with specified grades and hardness classes		Formatted: Main Title 2, Adjust space between Latin and Asian text, Adjust space between Asian text and numbers
1 Scope		
This document specifies the mechanical and physical properties of tapping screws made of corrosion resistar austenitic, martensitic, ferritic and duplex stainless steels, with specified grades and hardness classes.	t	
ISO 3506–6 provides general rules and additional technical information on suitable stainless steels and their properties (detailed properties of stainless steel grades, corrosion behaviour with regards to pitting, crevic and intergranular corrosion, magnetic properties, etc.).	r e	
WARNING — Tapping screws conforming to the requirements of this document are tested at th ambient temperature range of 10 °C to 35 °C and are used in applications ranging from -20 °C t +150 °C. It is possible that they do not retain the specified mechanical and physical properties at lowe	o r	Formatted: Adjust space between Latin and Asian text, Adjust space between Asian text and numbers
and/or elevated temperatures. Therefore, it is the responsibility of the user to determine th appropriate choices based on service environment conditions of the assembly (see also <u>Clauses 5 an</u> 6).		Formatted: Default Paragraph Font
This document applies to tapping screws with threads ST2,2 to ST8, in accordance with ISO 1478.		Formatted: Default Paragraph Font
This document does not apply to tapping screws with special properties, such as weldability.	/	Formatted: Default Paragraph Font
2 Normative references		
The following documents are referred to in the text in such a way that some or all of their content constitute 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.		
<std>ISO 1478, Tapping screws thread</std>		
<std>Iso 1891 4, Tapping screws thread</std>		
Fasteners — Vocabulary — Part 4: Control, inspection, delivery, acceptance and quality 	•	Formatted: Default Paragraph Font
<std>ISO 3506 6, Fasteners — Mechanical properties of corrosion-resistant stainless steel fasteners — Par 6: General rules for the selection of stainless steels and nickel alloys for fasteners</std>	t	Formatted: Adjust space between Latin and Asian text, Adjust space between Asian text and numbers, Tab stops: Not at 0.7 cm + 1.4 cm + 2.1 cm + 2.8 cm +
<std>ISO 6507 1, Metallic materials Vickers hardness test Part 1: Test method</std>	\backslash	3.5 cm + 4.2 cm + 4.9 cm + 5.6 cm + 6.3 cm + 7 cm
<std>ISO 16228, Fasteners Types of inspection documents</std>		Formatted: Default Paragraph Font
<u>Metallic materials — Vickers hardness test — Part 1: Test method</u>		
Fasteners — Types of inspection documents		
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3 Terms and definitions	/	Formatted	
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For the purposes of this document, the following terms and definitions apply.		Commented [eXtyles8]: The term "sheet metal screw	v" h[]
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— — ISO Online browsing platform: available at <u>https://www.iso.org/obphttps://www.iso.org/obp</u>		Formatted	 []
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— — IEC Electropedia: available at <u>https://www.electropedia.org/</u> https://www.electropedia.org/		Formatted	
<u>3.1 3.1</u>		Formatted	
tapping screw		Formatted	
sheet metal screw		Formatted	
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 metal sheets) without deforming its own thread		Formatted	
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3.2_3.2 stainless steel		Formatted	
steel with at least 10,5 % (mass fraction) of chromium (Cr) and maximum 1,2 % (mass fraction) of carbon (C)		Formatted	
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3.3 3.3 I leh Standards		Formatted	
austenitic stainless steel		Formatted	
stainless steel (3.2) with high amounts of chromium and nickel which usually cannot be hardened by heat / treatment, providing excellent resistance to corrosion, good ductility, and usually low or non-magnetic		Formatted	
properties		Formatted	
ISOURCE: ISO 3506-1:2020 3.61 Document Preview		Formatted	 []
[SOURCE: <u>ISO 3506-1;2020, 3.6]</u>		Formatted	 []
<u>3.4</u> <u>3.4</u>	}	Formatted	 []
martensitic stainless steel stainless steel (3.2) with high amounts of chromium but very little nickel or other alloying elements, which		Formatted	
can be hardened by heat treatment for increasing strength but with reduced ductility, and with highly		Formatted	 []
magnetic properties	}	Formatted	 []
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3.5_3.5 ferritic stainless steel		Formatted	
stainless steel (3.2) containing less than 0,1 % carbon and typically 11 % to 18 % chromium, which usually	////	Formatted	 []
cannot be hardened by heat treatment, and with highly magnetic properties		Formatted	 []
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3.6 3.6		Formatted	 []
duplex stainless steel stainless steel (3.2) with a micro-structure that includes both austenitic and ferritic phases providing excellent	}	Formatted	 []
resistance to corrosion, containing a higher amount of chromium and a reduced quantity of nickel compared	118	Formatted	 []
to austenitic steel, with high strength, and with magnetic properties	11/2	Formatted	 []
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The marking, labelling, and designation of tapping screws with stainless steel grade and hardness class shall be as specified in Clause 9.						Formatted: HeaderCentered, Space After: 0 pt, Line spacing: single	
be as specified in <u>Clause 9</u> .					Formatted: Default Paragraph Font		
This designation system may be used for sizes outside the diameter limits specified in this document (i.e. for threads <-ST2,2 or >-ST8), provided that all applicable chemical, mechanical, and physical requirements are met.							
4.2 Designation of stainless steel grades (first block)					•	Formatted: Adjust space between Latin and Asian text,	
The designation of stainless steel grade (first block) group:	consists o	f one lette	er which s	pecifies t	he stainless steel		Adjust space between Asian text and numbers, Tab stops: Not at 0.71 cm
							Formatted: Adjust space between Latin and Asian text, Adjust space between Asian text and numbers
— — A for austenitic,							Formatted: Adjust space between Latin and Asian text,
— — C for martensitic,							Adjust space between Asian text and numbers, Tab stops: Not at 0.7 cm + 1.4 cm + 2.1 cm + 2.8 cm + 3.5 cm + 4.2 cm + 4.9 cm + 5.6 cm + 6.3 cm + 7 cm
— — F for ferritic,							Formatted: Adjust space between Latin and Asian text,
— — D for duplex (austenitic-ferritic),							Adjust space between Asian text and numbers
and							Formatted: Adjust space between Latin and Asian text, Adjust space between Asian text and numbers, Tab
— — a digit which specifies the range of chemical c	ompositio	ns within	this stain	less steel	group.		stops: Not at 0.7 cm + 1.4 cm + 2.1 cm + 2.8 cm + 3.5 cm + 4.2 cm + 4.9 cm + 5.6 cm + 6.3 cm + 7 cm
The chemical compositions of stainless steel groups a	nd grades	classified	in Figure	1 are spe	cified in Table 2.	~	Formatted: Default Paragraph Font
4.3 Designation of hardness classes (second	block)					2	Formatted: Default Paragraph Font
The designation of the hardness class (second block)	-	f two part	s, as speci	ified in Ta	ble 1:		Formatted: Adjust space between Latin and Asian text, Adjust space between Asian text and numbers
 — —the number to the left corresponds to 1/10 of the minimum Vickers hardness, and 						Formatted: Adjust space between Latin and Asian text, Adjust space between Asian text and numbers, Tab stops: Not at 0.71 cm	
 — — the letter H to the right represents Vickers had 	rdness.						Formatted: Default Paragraph Font
https://Table 1 — Designation of hardness	classes in	relation	to Vicker	s hardne	ss82e-b3c5-c	193	Formatted 9/iso-fdis-3506-4
Hardness class	20H	25H	30H	40H	1		Formatted
		250	300	400	1	\mathcal{A}	Formatted
Vickers hardness, <u>HV</u> min	200	250	300	400		$ \langle \rangle$	Formatted: Font: Not Bold
	1					\mathcal{N}	Formatted
EXAMPLE 1 A4-25H specifies a tapping screw in aus minimum hardness of 250 HV.	tenitic sta	inless stee	l of grade	A4, work	hardened, with a	▲ / /	Formatted: Font: Not Bold
						\mathcal{N}	Formatted
EXAMPLE 2 C3-40H specifies a tapping screw in marter a minimum hardness of 400 HV.	isitic stainl	ess steel of	grade C3, d	quenched a	and tempered, with	$^{\prime}$	Formatted: Font: Not Bold
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5 Materials							Formatted: Font: Not Bold
5.1 Chemical composition							
Table 2 specifies the limits for chemical composition of the stainless steel grades for fasteners. The chemical						Formatted	
composition shall be assessed in accordance with the relevant International Standards.					~	Formatted	
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