



**International  
Standard**

**ISO 3506-3**

**Fasteners — Mechanical properties  
of corrosion resistant stainless steel  
fasteners —**

**Part 3:  
Set screws (and similar fasteners not  
under tensile stress) with specified  
grades and hardness classes**

*Fixations — Caractéristiques mécaniques des fixations en acier  
inoxydable résistant à la corrosion —*

*Partie 3: Vis sans tête (et fixations similaires non soumises à des  
contraintes de traction) de grades et classes de dureté spécifiés*

**Third edition  
2025-01**

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

[ISO 3506-3:2025](https://standards.iteh.ai/catalog/standards/iso/049d2aca-1516-4c7e-b2f5-493f502154ce/iso-3506-3-2025)

<https://standards.iteh.ai/catalog/standards/iso/049d2aca-1516-4c7e-b2f5-493f502154ce/iso-3506-3-2025>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2025

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

	Page
<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>2</b>
<b>4 Designation system for stainless steel grades and hardness classes</b> .....	<b>2</b>
4.1 General.....	2
4.2 Designation of stainless steel grades (first block).....	3
4.3 Designation of hardness classes (second block).....	3
<b>5 Materials</b> .....	<b>4</b>
5.1 Chemical composition.....	4
5.2 Surface condition (finish and/or coating).....	5
5.3 Corrosion resistance.....	6
5.4 Magnetic properties.....	6
<b>6 Requirements for mechanical and physical properties</b> .....	<b>6</b>
6.1 General.....	6
6.2 Hardness requirements.....	6
6.3 Proof torque requirements for socket set screws.....	6
<b>7 Inspection</b> .....	<b>7</b>
7.1 Manufacturer's inspection.....	7
7.2 Supplier's inspection.....	7
7.3 Purchaser's inspection.....	7
7.4 Delivery of test results.....	7
<b>8 Test methods</b> .....	<b>7</b>
8.1 General.....	7
8.2 Hardness test for set screws.....	7
8.2.1 General.....	7
8.2.2 Test procedure.....	7
8.2.3 Test result and requirement.....	8
8.3 Proof torque test for socket set screws.....	8
8.3.1 General.....	8
8.3.2 Test procedure.....	8
8.3.3 Test result and requirement.....	10
<b>9 Marking and labelling</b> .....	<b>10</b>
9.1 General.....	10
9.2 Marking on the set screws.....	10
9.3 Labelling of the packages.....	11
<b>Bibliography</b> .....	<b>12</b>

## 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 document 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](http://www.iso.org/directives)).

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 [www.iso.org/patents](http://www.iso.org/patents). 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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 2, *Fasteners*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 185 *Fasteners*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 3506-3:2009), which has been technically revised.

The main changes are as follows:

- annexes common to several parts of the ISO 3506 series have been withdrawn from this document and are now included in the new ISO 3506-6 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 class 21H have been added (see [Figure 1](#));
- operational temperature ranges have been clarified (see [Clause 1](#));
- terms and definitions have been added (see [Clause 3](#));
- wording for surface conditions and corrosion resistance have been improved (see [5.2](#) and [5.3](#));
- manufacturer's, supplier's and purchaser's inspections have been added (see [Clause 7](#));
- hardness test and proof torque test methods have been improved (see [Clause 8](#));
- 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](http://www.iso.org/members.html).

## 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 manufacturing process. Austenitic 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.

# iTeh Standards (<https://standards.iteh.ai>) Document Preview

[ISO 3506-3:2025](https://standards.iteh.ai/catalog/standards/iso/049d2aca-1516-4c7e-b2f5-493f502154ce/iso-3506-3-2025)

<https://standards.iteh.ai/catalog/standards/iso/049d2aca-1516-4c7e-b2f5-493f502154ce/iso-3506-3-2025>



# Fasteners — Mechanical properties of corrosion resistant stainless steel fasteners —

## Part 3: Set screws (and similar fasteners not under tensile stress) with specified grades and hardness classes

### 1 Scope

This document specifies the mechanical and physical properties of set screws and similar fasteners not under tensile stress, made of corrosion resistant austenitic and duplex stainless steels, with specified grades and hardness classes.

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, crevice and intergranular corrosion, magnetic properties, etc.).

**WARNING** — Set screws conforming to the requirements of this document are tested at the ambient temperature range of 10 °C to 35 °C and are used in application ranging from -20 °C to +150 °C. It is possible that they do not retain the specified mechanical and physical properties at lower and/or elevated temperatures. Therefore, it is the responsibility of the user to determine the appropriate choices based on service environment conditions of the assembly (see also [Clauses 5](#) and [6](#)).

This document applies to set screws and similar fasteners not under tensile stress

- with ISO metric thread in accordance with ISO 68-1,
- with diameter/pitch combinations in accordance with ISO 261 and ISO 262,
- with nominal thread diameter 1,6 mm to 24 mm,
- with thread tolerances in accordance with ISO 965-1 and ISO 965-2,
- with specified hardness classes, and
- of any shape.

**NOTE** The term set screw is used in the following for all screws and similar fasteners not under tensile stress within the scope of this document.

This document does not apply to screws under tensile stress (see ISO 3506-1). It does not specify requirements for functional properties such as shear strength or weldability.

### 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 965-3, *ISO general purpose metric screw threads — Tolerances — Part 3: Limit deviations for screw threads*

ISO 1891-4, *Fasteners — Vocabulary — Part 4: Control, inspection, delivery, acceptance and quality*

## ISO 3506-3:2025(en)

ISO 3506-6, *Fasteners — Mechanical properties of corrosion-resistant stainless steel fasteners — Part 6: General rules for the selection of stainless steels and nickel alloys for fasteners*

ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method*

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

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method*

ISO 16228, *Fasteners — Types of inspection documents*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

##### **set screw**

headless screw with ISO metric thread designed to be used under compression load

#### 3.2

##### **stainless steel**

steel with at least 10,5 % (mass fraction) of chromium (Cr) and maximum 1,2 % (mass fraction) of carbon (C)

[SOURCE: ISO 3506-1:2020, 3.5]

#### 3.3

##### **austenitic stainless steel**

*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 properties

[SOURCE: ISO 3506-1:2020, 3.6]

#### 3.4

##### **duplex stainless steel**

*stainless steel* (3.2) with a micro-structure that includes both austenitic and ferritic phases providing excellent resistance to corrosion, containing a higher amount of chromium and a reduced quantity of nickel compared to austenitic steel, with high strength, and with magnetic properties

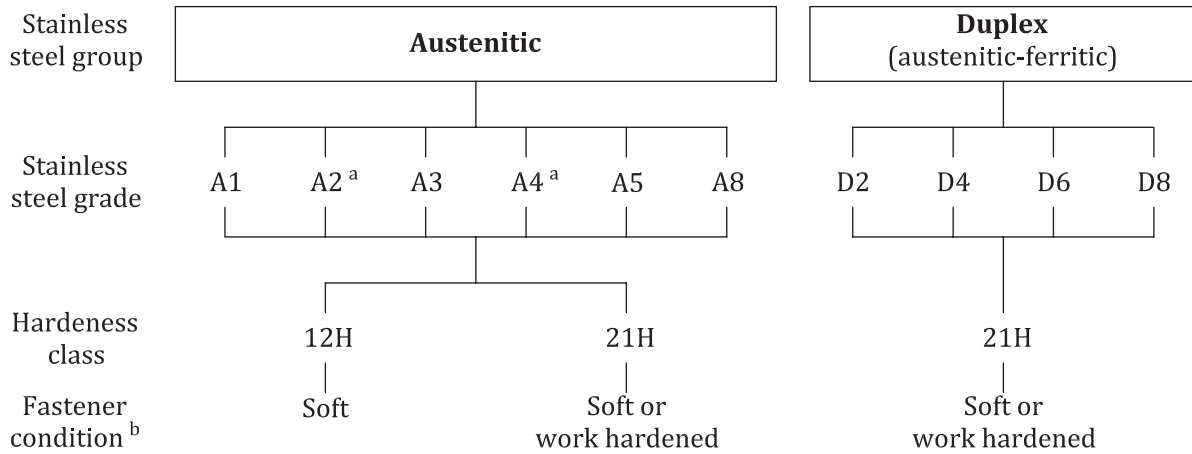
[SOURCE: ISO 3506-1:2020, 3.9]

### 4 Designation system for stainless steel grades and hardness classes

#### 4.1 General

The designation system for stainless steel set screws consists of two blocks, separated by a hyphen: the stainless steel grade and the hardness class, as specified in [Figure 1](#).





- <sup>a</sup> For low carbon austenitic stainless steels with carbon content not exceeding 0,030 %, set screws can additionally be designated with the letter “L” just after the grade. Example: A4L-21H.
- <sup>b</sup> For information only.

Figure 1 — Designation system for stainless steel set screws

The marking, labelling and designation of set screws with stainless steel grade and hardness class shall be as specified in [Clause 9](#).

This designation system may be used for sizes outside the diameter limits specified in this document (e.g. for  $d > 24$  mm), provided that all applicable chemical, mechanical and physical requirements are met.

#### 4.2 Designation of stainless steel grades (first block)

The designation of the stainless steel grade (first block) consists of one letter which specifies the stainless steel group:

- **A** for austenitic,
- **D** for duplex (austenitic-ferritic),

and

- a digit which specifies the range of chemical compositions within this stainless steel group.

The chemical compositions of stainless steel groups and grades classified in [Figure 1](#) are specified in [Table 2](#).

#### 4.3 Designation of hardness classes (second block)

The designation of the hardness class (second block) consists of two parts, as specified in [Table 1](#):

- the number to the left corresponds to 1/10 of the minimum Vickers hardness, and
- the letter H to the right represents Vickers hardness.

Table 1 — Designation of hardness classes in relation to Vickers hardness

Hardness class		12H	21H
Vickers hardness, HV	min.	125	210

EXAMPLE 1 A2-12H specifies a set screw in austenitic stainless steel of grade A2, soft, with a minimum hardness of 125 HV.

## ISO 3506-3:2025(en)

EXAMPLE 2 D4-21H specifies a set screw in duplex stainless steel of grade D4, soft or work hardened, with a minimum hardness of 210 HV.

## 5 Materials

### 5.1 Chemical composition

[Table 2](#) specifies the limits for chemical composition of the stainless steel grades for fasteners. The chemical composition shall be assessed in accordance with the relevant International Standards.

The final choice of the chemical composition within the specified stainless steel grade is at the discretion of the manufacturer, unless otherwise agreed between the purchaser and the manufacturer.

The stainless steel grade suitable for an application shall be selected in accordance with ISO 3506-6. ISO 3506-6 also gives examples of stainless steels related to each grade specified in [Table 2](#) (see also Bibliography for additional material information).

Stainless steel grades A2 and A4, as well as A1 for machined screws (e.g. slotted set screws), are usually available on the market; for other grades, it is recommended that a fastener expert be consulted.

For corrosion resistance, see also [5.2](#) and [5.3](#).

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

[ISO 3506-3:2025](#)

<https://standards.iteh.ai/catalog/standards/iso/049d2aca-1516-4c7e-b2f5-493f502154ce/iso-3506-3-2025>