

Mechanical properties of corrosion-resistant stainless steel fasteners —

Part 1: Bolts, screws and studs

The European Standard EN ISO 3506-1:1997 has the status of a
British Standard

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National foreword

This British Standard is the English language version of EN ISO 3506-1:1997. It is identical with ISO 3506-1:1997. BS EN ISO 3506-1:1998 in conjunction with BS EN ISO 3506-2:1998 supersede BS 6105:1981 which is withdrawn. The UK participation in its preparation was entrusted by Technical Committee FME/9, Bolts, nuts and accessories, to Subcommittee FME/9/1, Mechanical properties of fasteners, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

Attention is drawn to the fact that CEN and CENELEC standards normally include an annex which lists normative references to international publications with their corresponding European publications. The British Standards which implement these international or European publications may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN ISO title page, page 2, the ISO title page, page ii, pages 1 to 22 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Amendments issued since publication

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This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 May 1998

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Contents

	Page
National foreword	Inside front cover
Foreword	2
Foreword	ii
Text of ISO 3506-1	1

English version

Mechanical properties of corrosion-resistant stainless-steel fasteners — Part 1: Bolts, screws and studs

(ISO 3506-1:1997)

Caractéristiques mécaniques des éléments de fixation en acier inoxydable résistant à la corrosion — Partie 1: Vis et goujons
(ISO 3506-1:1997)

Mechanische Eigenschaften von Verbindungselementen aus nichtrostenden Stählen — Teil 1: Schrauben (ISO 3506-1:1997)

This European Standard was approved by CEN on 23 October 1997.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

The text of the International Standard ISO 3506-1:1997 has been prepared by Technical Committee ISO/TC 2 “Fasteners” in collaboration with Technical Committee CEN/TC 185 “Threaded and non-threaded mechanical fasteners and accessories”, the secretariat of which is held by DIN. This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 1998, and conflicting national standards shall be withdrawn at the latest by June 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 3506-1:1997 was approved by CEN as a European Standard without any modification.

NOTE Normative references to International Standards are listed in Annex ZA (normative).

Contents

	Page		Page
Foreword	2	Annex G (informative)	
Introduction	1	Time-temperature-diagram of intergranular corrosion in austenitic stainless steels, grade A2 (18/8 steels)	21
1 Scope	1	Annex H (informative) Magnetic properties for austenitic stainless steels	21
2 Normative references	1	Annex I (informative) Bibliography	22
3 Designation, marking and finish	2	Annex ZA (normative) Normative references to international publications with their relevant European publications	22
4 Chemical composition	4	Figure 1 — Designation system for stainless steel grades and property classes for bolts, screws and studs	3
5 Mechanical properties	7	Figure 2 — Marking of bolts, screws and studs	5
6 Testing	8	Figure 3 — Bolt extensiometer with self-aligning grips	10
Annex A (normative) External thread — Calculation of stress area	14	Figure 4 — Load-elongation curve for determination of stress at 0,2 % permanent strain, $R_{p0,2}$ (see 6.2.3)	10
Annex B (informative) Description of the groups and grades of stainless steels	15	Figure 5 — Determination of elongation after fracture, A (see 6.2.4)	11
Annex C (informative) Stainless steel composition specifications	17	Figure 6 — Apparatus for determination of breaking torque, M_B (see 6.2.5)	12
Annex D (informative) Stainless steel for cold heading and extruding	19	Figure G.1	21
Annex E (informative) Austenitic stainless steels with particular resistance to chloride induced stress corrosion	20	Table 1 — Stainless steel grades — Chemical composition	6
Annex F (informative) Mechanical properties at elevated temperatures; application at low temperatures	20	Table 2 — Mechanical properties for bolts, screws and studs — Austenitic grades	7
		Table 3 — Mechanical properties for bolts, screws and studs — Martensitic and ferritic grades	7
		Table 4 — Minimum breaking torque, $M_{B,min}$ for austenitic grade bolts and screws M1,6 to M16 (coarse thread)	8
		Table 5 — Test programme	8
		Table 6 — Wedge dimensions	12
		Table A.1 — Nominal stress areas for coarse and fine pitch threads	14
		Table B.1 — Ferritic-austenitic steels — Chemical composition	16
		Table C.1	17
		Table D.1	19
		Table E.1	20
		Table F.1 — Influence of temperature on R_{eL} and $R_{p0,2}$	20
		Table F.2 — Application of stainless steel bolts, screws and studs at low temperatures (austenitic steel only)	21

INTERNATIONAL STANDARD

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3506-1

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Mechanical properties of corrosion-resistant stainless-steel fasteners —

Part 1: Bolts, screws and studs

Caractéristiques mécaniques des éléments de fixation en acier inoxydable résistant à la corrosion —

Partie 1: Vis et goujons



Reference number
ISO 3506-1:1997(E)

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.

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.

International Standard ISO 3506-1 was prepared by Technical Committee ISO/TC 2, *Fasteners*, Sub-Committee SC 1, *Mechanical properties of fasteners*.

This first edition, together with ISO 3506-2 and ISO 3506-3, cancels and replaces ISO 3506:1979, which has been technically revised.

ISO 3506 consists of the following parts, under the general title *Mechanical properties of corrosion-resistant stainless-steel fasteners*.

- *Part 1: Bolts, screws and studs;*
- *Part 2: Nuts;*
- *Part 3: Set screws and similar fasteners not under tensile stress.*

Annex A forms an integral part of this part of ISO 3506. Annex B to Annex I are for information only.

Descriptors: Steel products, corrosion resistant steels, stainless steels, fasteners, bolts, screws, studs, specifications, materials specifications, mechanical properties, chemical composition, tests, mechanical tests, test equipment, designation, marking.

Introduction

In the preparation of this part of ISO 3506 special attention has been given to the fundamentally different property characteristics of the stainless steel fastener grades compared with those of carbon steel and low-alloy steel fasteners. Ferritic and austenitic stainless steels are strengthened only by cold working and consequently the components do not have as homogeneous a condition as hardened and tempered parts. These special features have been recognized in the elaboration of the property classes and the test procedures for mechanical properties. The latter differ from the carbon steel and low-alloy steel fastener test procedures with regard to the measurement of the stress at 0,2 % permanent strain (yield stress) and ductility (total extension after fracture).

1 Scope

This part of ISO 3506 specifies the mechanical properties of bolts, screws and studs made of austenitic, martensitic and ferritic grades of corrosion-resistant stainless steels when tested over an ambient temperature range of 15 °C to 25 °C. Properties will vary at higher or lower temperatures.

It applies to bolts, screws and studs

- with nominal thread diameter (d) up to and including 39 mm;
- of triangular ISO metric threads with diameters and pitches in accordance with ISO 68-1, ISO 261 and ISO 262;
- of any shape.

It does not apply to screws with special properties such as weldability.

This part of ISO 3506 does not define corrosion or oxidation resistance in particular environments, however some information on materials for particular environments is given in Annex E. Regarding definitions of corrosion and corrosion resistance see ISO 8044.

The aim of this part of ISO 3506 is a classification into property classes of corrosion resistant stainless steel fasteners. Some materials can be used at temperatures down to – 200 °C, some can be used at temperatures up to + 800 °C in air. Information on the influence of temperature on mechanical properties is found in Annex F.

Corrosion and oxidation performances and mechanical properties for use at elevated or sub-zero temperatures must be the subject of agreement between user and manufacturer in each particular case. Annex G shows how the risk of intergranular corrosion at elevated temperatures depends on the carbon content.

All austenitic stainless steel fasteners are normally non-magnetic in the annealed condition; after cold working, some magnetic properties may be evident (see Annex H).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 3506. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 3506 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 68-1:—, *ISO general purpose screw threads — Basic profile — Part 1: Metric screw threads*¹⁾.

ISO 261:—, *ISO general purpose metric screw threads — General plan*²⁾.

ISO 262:—, *ISO general purpose metric screw threads — Selected sizes for screws, bolts and nuts*³⁾.

ISO 724:1993, *ISO general purpose metric screw threads — Basic dimensions*.

ISO 898-1:—, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*⁴⁾.

¹⁾ To be published. (Revision of ISO 68:1973)

²⁾ To be published. (Revision of ISO 261:1973)

³⁾ To be published. (Revision of ISO 262:1973)

⁴⁾ To be published. (Revision of ISO 898-1:1988)

ISO 3651-1:—, *Determination of resistance to intergranular corrosion stainless steels — Part 1: Austenitic and ferritic-austenitic (duplex) stainless steels — Corrosion test in nitric acid medium by measurement of loss in mass (Huey test)*⁵⁾.

ISO 3651-2:—, *Determination of resistance to intergranular corrosion stainless steels — Part 2: Ferritic, austenitic and ferritic-austenitic (duplex) stainless steels — Corrosion test in media containing sulfuric acid*⁶⁾.

ISO 6506:1981, *Metallic materials — Hardness test — Brinell test*.

ISO 6507-1:1997, *Metallic materials — Hardness test — Vickers test — Part 1: Test method*.

ISO 6508:1986, *Metallic materials — Hardness test — Rockwell test (scales A – B – C – D – E – F – G – H – K)*.

ISO 6892:—, *Metallic materials — Tensile testing at ambient temperature*⁷⁾.

ISO 8044:—, *Corrosion of metals and alloys — Basic terms and definitions*⁸⁾.

3 Designation, marking and finish

3.1 Designation

The designation system for stainless steel grades and property classes for bolts, screws and studs is shown in Figure 1. The designation of the material consists of two blocks which are separated by a hyphen. The first block designates the steel grade, the second block the property class.

The designation of the steel grade (first block) consists of the letters

- A** for austenitic steel or
- C** for martensitic steel or
- F** for ferritic steel

which indicate the group of steel and a digit which indicates a range of chemical compositions within this steel group.

The designation of the property class (second block) consists of 2 digits which indicates 1/10 of the tensile strength of the fastener.

Examples:

- 1) **A2-70** indicates:

austenitic steel, cold worked, minimum 700 N/mm² (700 MPa) tensile strength.

- 2) **C4-70** indicates:

martensitic steel, hardened and tempered, minimum 700 N/mm² (700 MPa) tensile strength.

⁵⁾ To be published. (Revision of ISO 3651-1:1976)

⁶⁾ To be published. (Revision of ISO 3651-2:1976)

⁷⁾ To be published. (Revision of ISO 6892:1984)

⁸⁾ To be published. (Revision of ISO 8044:1988)