

Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs with specified property classes - Coarse thread and fine pitch thread

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN ISO 898-1:2009 sisaldab Euroopa standardi EN ISO 898-1:2009 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 29.05.2009 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 01.04.2009.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN ISO 898-1:2009 consists of the English text of the European standard EN ISO 898-1:2009.

This standard is ratified with the order of Estonian Centre for Standardisation dated 29.05.2009 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 01.04.2009.

The standard is available from Estonian standardisation organisation.

ICS 21.060.10

Võtmesõnad: katsed, kinnitusdetailid, kruvid, mehaanilised omadused, märgistamine, poldid, tehnilised andmed, tikkpoldid, tähistus

Standardite reprodutseerimis- ja levitamiseõigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

Right to reproduce and distribute belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without permission in writing from Estonian Centre for Standardisation.

If you have any questions about standards copyright, please contact Estonian Centre for Standardisation:
Aru str 10 Tallinn 10317 Estonia; www.evs.ee; Phone: 605 5050; E-mail: info@evs.ee

English Version

**Mechanical properties of fasteners made of carbon steel and
alloy steel - Part 1: Bolts, screws and studs with specified
property classes - Coarse thread and fine pitch thread (ISO 898-
1:2009)**

Caractéristiques mécaniques des éléments de fixation en
acier au carbone et en acier allié - Partie 1: Vis, goujons et
tiges filetées de classes de qualité spécifiées - Filetages à
pas gros et filetages à pas fin (ISO 898-1:2009)

Mechanische Eigenschaften von Verbindungselementen
aus Kohlenstoffstahl und legiertem Stahl - Teil 1:
Schrauben mit festgelegten Festigkeitsklassen -
Regelgewinde und Feingewinde (ISO 898-1:2009)

This European Standard was approved by CEN on 28 February 2009.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

This document (EN ISO 898-1:2009) has been prepared by Technical Committee ISO/TC 2 "Fasteners" in collaboration with Technical Committee CEN/TC 185 "Fasteners" 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 October 2009, and conflicting national standards shall be withdrawn at the latest by October 2009.

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

This document supersedes EN ISO 898-1:1999.

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

Endorsement notice

The text of ISO 898-1:2009 has been approved by CEN as a EN ISO 898-1:2009 without any modification.

Contents

Page

Foreword.....	iv
1 Scope	1
2 Normative references	2
3 Terms and definitions	3
4 Symbols and abbreviated terms	4
5 Designation system for property classes	5
6 Materials	6
7 Mechanical and physical properties	8
8 Applicability of test methods.....	12
8.1 General.....	12
8.2 Loadability of fasteners	12
8.3 Manufacturer's control	13
8.4 Supplier's control	13
8.5 Purchaser's control	13
8.6 Feasible tests for groups of fasteners and machined test pieces	14
9 Test methods.....	21
9.1 Tensile test under wedge loading of finished bolts and screws (excluding studs)	21
9.2 Tensile test for finished bolts, screws and studs for determination of tensile strength, R_m	25
9.3 Tensile test for full-size bolts, screws and studs for determination of elongation after fracture, A_f , and stress at 0,004 8 d non-proportional elongation, R_{pf}	27
9.4 Tensile test for bolts and screws not expected to break in free threaded length due to head design	31
9.5 Tensile test for fasteners with waisted shank	32
9.6 Proof load test for finished bolts, screws and studs.....	33
9.7 Tensile test for machined test pieces.....	35
9.8 Head soundness test.....	38
9.9 Hardness test	39
9.10 Decarburization test	41
9.11 Carburization test	44
9.12 Retempering test.....	46
9.13 Torsional test	46
9.14 Impact test for machined test pieces	47
9.15 Surface discontinuity inspection	48
10 Marking	48
10.1 General.....	48
10.2 Manufacturer's identification mark	48
10.3 Marking and designation of fasteners with full loadability	49
10.4 Marking and designation of fasteners which, because of their geometry, have reduced loadability	53
10.5 Marking of packages	53
Annex A (informative) Relation between tensile strength and elongation after fracture	54
Annex B (informative) Influence of elevated temperatures on mechanical properties of fasteners	55
Annex C (informative) Elongation after fracture for full-size fasteners, A_f	56
Bibliography	57

Mechanical properties of fasteners made of carbon steel and alloy steel —

Part 1: Bolts, screws and studs with specified property classes — Coarse thread and fine pitch thread

1 Scope

This part of ISO 898 specifies mechanical and physical properties of bolts, screws and studs made of carbon steel and alloy steel when tested at an ambient temperature range of 10 °C to 35 °C. Fasteners — the term used when bolts, screws and studs are considered all together — that conform to the requirements of this part of ISO 898 are evaluated at that ambient temperature range. They might not retain the specified mechanical and physical properties at elevated temperatures (see Annex B) and/or lower temperatures.

NOTE 1 Fasteners conforming to the requirements of this part of ISO 898 are used in applications ranging from –50 °C to +150 °C. Users are advised to consult an experienced fastener metallurgist for temperatures outside the range of –50 °C to +150 °C and up to a maximum temperature of +300 °C when determining appropriate choices for a given application.

NOTE 2 Information for the selection and application of steels for use at lower and elevated temperatures is given, for example, in EN 10269, ASTM F2281 and in ASTM A 320/A 320M.

Certain fasteners might not fulfil the tensile or torsional requirements of this part of ISO 898-1 because the geometry of their heads reduces the shear area in the head compared to the stress area in the thread. These include fasteners having a low head, with or without external driving feature, a low round or cylindrical head with internal driving feature or a countersunk head with internal driving feature (see 8.2).

This part of ISO 898 is applicable to bolts, screws and studs

- a) made of carbon steel or alloy steel,
- b) having triangular ISO metric screw thread according to ISO 68-1,
- c) with coarse pitch thread M1,6 to M39, and fine pitch thread M8×1 to M39×3,
- d) with diameter/pitch combinations according to ISO 261 and ISO 262,
- e) having thread tolerances according to ISO 965-1, ISO 965-2 and ISO 965-4.

It is not applicable to set screws and similar threaded fasteners not under tensile stresses (see ISO 898-5).

It does not specify requirements for such properties as

- weldability,
- corrosion resistance,
- resistance to shear stress,
- torque/clamp force performance, or
- fatigue resistance.

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

ISO 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

ISO 225, *Fasteners — Bolts, screws, studs and nuts — Symbols and designations of dimensions*

ISO 261, *ISO general purpose metric screw threads — General plan*

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

ISO 273, *Fasteners — Clearance holes for bolts and screws*

ISO 724, *ISO general-purpose metric screw threads — Basic dimensions*

ISO 898-2, *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse thread*

ISO 898-5, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 5: Set screws and similar threaded fasteners not under tensile stresses*

ISO 898-7, *Mechanical properties of fasteners — Part 7: Torsional test and minimum torques for bolts and screws with nominal diameters 1 mm to 10 mm ¹⁾*

ISO 965-1, *ISO general-purpose metric screw threads — Tolerances — Part 1: Principles and basic data*

ISO 965-2, *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads — Medium quality*

ISO 965-4, *ISO general purpose metric screw threads — Tolerances — Part 4: Limits of sizes for hot-dip galvanized external screw threads to mate with internal screw threads tapped with tolerance position H or G after galvanizing*

ISO 4042, *Fasteners — Electroplated coatings*

ISO 4885:1996, *Ferrous products — Heat treatments — Vocabulary*

ISO 6157-1, *Fasteners — Surface discontinuities — Part 1: Bolts, screws and studs for general requirements*

ISO 6157-3, *Fasteners — Surface discontinuities — Part 3: Bolts, screws and studs for special requirements*

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 (scales A, B, C, D, E, F, G, H, K, N, T)*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature ²⁾*

1) Under revision.

2) To be published. (Revision of ISO 6892:1998)

ISO 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system*

ISO 10683, *Fasteners — Non-electrolytically applied zinc flake coatings*

ISO 10684:2004, *Fasteners — Hot dip galvanized coatings*

ISO 16426, *Fasteners — Quality assurance system*