



SLOVENSKI STANDARD

SIST EN 15048-1:2007

01-september-2007

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Non-preloaded structural bolting assemblies - Part 1: General requirements

Garnituren für nicht planmäßig vorgespannte Schraubenverbindungen für den Metallbau
- Teil 1: Allgemeine Anforderungen

Boulonnerie de construction métallique non précontrainte - Partie 1 : Exigences
générales

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Ta slovenski standard je istoveten z: ^{SIST EN 15048-1:2007} EN 15048-1:2007

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ICS:

21.060.10 Sorniki, vijaki, stebelni vijaki Bolts, screws, studs

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 15048-1

April 2007

ICS 21.060.01

English Version

Non-preloaded structural bolting assemblies - Part 1: General requirements

Boulonnerie de construction métallique non précontrainte -
Partie 1 : Exigences générales

Garnituren für nicht planmäßig vorgespannte
Schraubenverbindungen für den Metallbau - Teil 1:
Allgemeine Anforderungen

This European Standard was approved by CEN on 18 September 2006.

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.

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

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Foreword

This document (EN 15048-1:2007) has been prepared by 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 2007, and conflicting national standards shall be withdrawn at the latest by October 2009.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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 United Kingdom.

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EN 15048-1:2007 (E)**Introduction**

Rules for design and execution of bolted connections with non-preloaded low strength or high-strength structural bolts respectively are defined for instance in EN 1993-1-8 (Eurocode 3) and prEN 1090-2.

The parts of this European Standard on structural bolting specify the general requirements which ensure that bolt/nut/washer assemblies are suitable for use in non preloaded structural bolting. They can be used in shear connections and/or in tension connections if no preload is required. Structural fasteners which meet the requirements of this part of this European Standard have been designed to allow tensile loading of at least $f_{ub} \times A_s$ as defined in EN 1993-1-8.

Structural fasteners which meet the requirements of EN 14399-1 are suitable for use in preloaded and non-preloaded structural bolting. This European Standard deals with structural fasteners which are intended for use as non-preloaded assemblies.

Since the tensile resistance of bolt/nut assemblies is very sensitive to differences in manufacture, it is important that the assemblies are supplied by one manufacturer who is always responsible for the function of the assembly. For the same reason it is important that coating of the assemblies is under the control of one manufacturer.

Beside the mechanical properties of the components the functionality of the assembly requires that the required tensile resistance is achieved. For this purpose the tensile test of assemblies is a means to check whether the function of the assembly is fulfilled.

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1 Scope

This part of this European Standard specifies the general requirements for the components of bolt/nut/washer assemblies for non-preloaded structural bolting and for the assemblies themselves. It applies to bolts (including screws, studs and stud bolts) and nuts made of carbon steel, alloy steel and stainless steel with the following property classes:

- bolts made of carbon steel and alloy steel: 4.6, 4.8, 5.6, 5.8, 6.8, 8.8, 10.9;
- nuts made of carbon steel and alloy steel: 4, 5, 6, 8, 10, 12;
- bolts made of austenitic stainless steel: 50, 70, 80;
- nuts made of austenitic stainless steel: 50, 70, 80;
- if appropriate, washers according to hardness class HV 100 or HV 200.

NOTE The property classes 4.8, 5.8 and 6.8 may be subjected to limitations of use, it is recommended to refer to prEN 1090-2.

The standard applies to thread sizes from M12 to M36 and to the associated washers but does not preclude the use of other sizes.

Bolted connections with components according to this European Standard are able to be shear and/or tensile loaded.

Bolts, nuts and washers according to this European Standard are not normally intended for welding.

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2 Normative references

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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.

prEN 1090-2:2005, *Execution of steel structures and aluminium structures - Part 2: Technical requirements for the execution of steel structures*

EN 1993-1-8:2005, *Eurocode 3: Design of steel structures - Part 1-8: Design of joints*

EN 10045-1, *Metallic materials — Charpy impact test — Part 1: Test method*

EN 10204, *Metallic products — Types of inspection documents*

EN 15048-2, *Non-preloaded structural bolting assemblies — Part 2: Suitability test*

EN 20898-2, *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse thread (ISO 898-2:1992)*

EN ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs (ISO 898-1:1999)*

EN ISO 3506-1, *Mechanical properties of corrosion-resistant stainless-steel fasteners — Part 1: Bolts, screws and studs (ISO 3506-1:1997)*

EN ISO 3506-2, *Mechanical properties of corrosion-resistant stainless-steel fasteners — Part 2: Nuts (ISO 3506-2:1997)*

EN ISO 6507-1, *Metallic materials - Vickers hardness test - Part 1: Test method (ISO 6507-1:2005)*

EN ISO 9001, *Quality management systems - Requirements (ISO 9001:2000)*

EN 15048-1:2007 (E)**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in prEN 1090-2:2005 and the following apply.

3.1**assembly**

comprises matching bolt, nut and washer(s) (as necessary) with the same coating if any

3.2**manufacturing lot**

quantity of fasteners of a single designation including product grade, property class and size¹⁾, manufactured from bar, wire, rod or flat product from a single cast, processed through the same or similar steps at the same time or over a continuous time period through the same heat treatment and/or coating process, if any

Same heat treatment or coating process means:

- for a continuous process, the same treatment cycle without any setting modification;
- for a discontinuous process, the same treatment cycle for identical consecutive loads (batches).

NOTE The manufacturing lot may be split into a number of manufacturing batches for processing purposes and then reassembled into the same manufacturing lot.

[ISO 15330:1999]

3.3**assembly lot**

assemblies supplied together as a set comprising:

- bolts from a single manufacturing lot;
- nuts from a single manufacturing lot

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3.4**extended assembly lot**

manufacturing lot of that component that mainly influences the result of the suitability test combined with the other components from the same supplier chosen by a documented method

NOTE The component with the main influence is determined on the basis of test results.

4 Requirements**4.1 Ordering information**

At the time of order the manufacturer shall obtain the following information:

- a) reference to this standard;
- b) the quantities to be delivered;
- c) the complete product designation²⁾;
- d) other requirements as agreed with the purchaser (e. g. low temperature requirements).

1) Size of a bolt means thread diameter and length.

2) The complete product designation of the assembly includes the designation and reference standard(s), if any, or the specification of each component.

4.2 Manufacturing process

4.2.1 Dangerous substances

Materials used in products shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material or permitted in the national regulations of the member state of destination.

4.2.2 Material

Free cutting steel shall not be used for the manufacture of bolts and nuts for structural bolting.

4.2.3 Nuts

Hot dip galvanized nuts shall be galvanized before they are threaded. Nuts shall not be re-threaded after galvanizing.

4.2.4 Bolts

The manufacturing process for bolts of property class 10.9 shall take into account the risk of hydrogen embrittlement, especially during the coating process.

NOTE Appropriate additional processes should be considered when the risk of hydrogen embrittlement cannot be avoided.

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4.2.5 Finish and coating

Finish and coating, if applied, shall be as specified in the relevant coating standards. Coatings shall not impair the mechanical properties or the functional characteristics of the assembly. Coatings of cadmium or cadmium alloy are not permitted.

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Coating of all components of an assembly shall be compatible and shall have equivalent corrosion resistance.

Coating of each component shall be under the control of the manufacturer of the assemblies.

4.3 Delivery conditions

All fasteners shall be supplied to the purchaser either in the original unopened, single sealed container or alternatively in separate sealed containers by the manufacturer of the assemblies. The suitability for tensile loading of the assembly supplied to the purchaser shall be demonstrated by the tensile test according to EN 15048-2.

Containers of bolt/nut assemblies or their components according to this European Standard shall be labelled with the complete designation of the fasteners including:

- additional letters "SB" (for use in Structural Bolting),
- relevant lot number(s) and
- identification of the manufacturer of the assembly.

Washers are usually supplied in separate containers. Assemblies shall be supplied in one of the following alternatives:

- a) Bolts and nuts supplied by one manufacturer. The elements of an assembly shall be packed together in one package that is labelled with an assembly lot number and the manufacturer's identification. The suitability test is to be performed on each assembly lot by use of representative sample testing as specified in 6.3.
- b) Bolts and nuts supplied by one manufacturer. Each element shall be packed in separate packages that are labelled with the manufacturing lot number of the components and the manufacturer's identification. The elements in an assembly are freely interchangeable within the deliveries of one nominal thread diameter. The

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suitability test is to be performed on each extended assembly lot by use of representative sample testing as specified in Table 17.

4.4 Product requirements**4.4.1 Dimensions and tolerances on dimensions, form and position**

Dimensions, tolerances on dimensions, form and position shall be in accordance with the manufacturer's declaration by reference to the relevant European or international product standard.

For coated fasteners the tolerances shall apply to the parts before coating except the threads of hot dip galvanized nut which are cut after coating.

Any suitable thread length may be used. Attention is drawn to the requirements of execution standards.

NOTE For metallic structures EN 1090 applies.

Any suitable head shape and shank dimensions may be used provided that the requirements for tensile resistance are met.

4.4.2 Mechanical characteristics of the components of the assembly**4.4.2.1 General**

The mechanical characteristics of the components shall comply with the specifications in Tables 1 to 4.

4.4.2.2 Bolts

Table 1 — General mechanical characteristics of bolts

Mechanical characteristic	Relevant standard for property class	
	carbon steel and alloy steel 4.6, 4.8, 5.6, 5.8, 6.8, 8.8, 10.9	stainless steel 50, 70, 80
Elongation after fracture	EN ISO 898-1	EN ISO 3506-1
Minimum tensile strength	EN ISO 898-1	EN ISO 3506-1
Lower yield strength or Stress at 0,2 % non-proportional elongation	EN ISO 898-1	EN ISO 3506-1
Stress under proof load	EN ISO 898-1	not applicable
Strength under wedge loading	EN ISO 898-1	not applicable
Hardness	EN ISO 898-1	not applicable

Table 2 — Minimum impact strength of bolts

Characteristic	For property classes		
	carbon steel and alloy steel 4.6, 5.6, 8.8, 10.9	4.8, 5.8, 6.8	stainless steel 50, 70, 80
Impact strength $K_{V,min}$ at -20 °C	27 J	—	27 J ^a
Impact strength $K_{V,min}$ at $+20\text{ °C}$	—	27 J	—

^a Impact strength may be tested at -60 °C , if required, with a minimum impact strength of $K_V = 27\text{ J}$.

4.4.2.3 Nuts

Table 3 — Nuts

Mechanical characteristic	Relevant standard for property class	
	carbon steel and alloy steel 4, 5, 6, 8, 10, 12	stainless steel 50, 70, 80
Stress under proof load	EN 20898-2	EN ISO 3506-2
Hardness	EN 20898-2	not applicable

4.4.2.4 Washers

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Table 4 — Washers

Mechanical characteristic	For all carbon steel, alloy steel and stainless steel bolt property classes	For property classes 8.8 and 10.9 in a single lap joint according to EN 1993-1-8:2005, 3.6.1
Hardness	minimum 100 HV	300 HV to 370 HV

4.4.3 Characteristics of the assembly

4.4.3.1 Appropriate combinations of bolts, nuts and washers

The appropriate combinations of bolts, nuts and washers with regard to product grades given in Table 5 and with regard to property classes given in Table 6 shall be used.

Table 5 — Appropriate combinations of bolts, nuts and washers with regard to product grades according to EN ISO 4759

Bolts	Nuts	Washers
Product grade A or B	Product grade A, B or C	Product grade A or C
Product grade C	Product grade A, B or C	Product grade C