

Mechanical properties of fasteners —

Part 2: Nuts with specified proof load values — Coarse thread

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British Standard

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National foreword

This British Standard has been prepared under the direction of the General Mechanical Engineering Standards Policy Committee and is the English language version of EN 20898-2:1993 *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse thread*, published by the European Committee for Electrotechnical Standardization (CEN). It supersedes BS EN 20898-2:1992 which is withdrawn. EN 20898-2:1993 was produced as a result of international discussion in which the UK took an active part. It is one of a series of standards that are under preparation based on ISO 898.

This Part is identical with ISO 898-2:1992 published by the International Organization for Standardization (ISO).

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 18, an inside back cover 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.

English version

Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse thread

(ISO 898-2:1992)

Caractéristiques mécaniques des éléments de fixation — Partie 2: Ecrous avec charges d'épreuve spécifiées — Filetage à pas gros (ISO 898-2:1992)

Mechanische Eigenschaften von Verbindungselementen — Teil 2: Muttern mit festgelegten Prüfkraften — Regelfgewinde (ISO 898-2:1992)

This European Standard was approved by CEN on 1993-12-16. 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 Central Secretariat or to any CEN member.

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CEN

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

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Foreword

This European Standard has been taken over by Technical Committee CEN/TC 185, Threaded and non-threaded mechanical fasteners and accessories, from the work of ISO/TC 2 of the International Organization for Standardization.

The text was submitted to the Unique Acceptance Procedure (UAP) and approved as a European Standard.

This European Standard supersedes
EN 20898-2:1991.

NOTE The International Standard ISO 6157-2 *Surface discontinuities of nuts* (see clause 8.3) is not yet available; in the interim reference shall be made to EN 493 *Fasteners — Surface discontinuities — Nuts*.

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 1994, and conflicting national standards shall be withdrawn at the latest by June 1994.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

NOTE Normative references to international publications are listed in annex ZA (normative)

1 Scope

This International Standard specifies the mechanical properties of nuts with specified proof load values when tested at room temperature (see ISO 1). Properties will vary at higher and lower temperature.

It applies to nuts

- with nominal thread diameters up to and including 39 mm;
- of triangular ISO thread and with diameters and pitches according to ISO 68 and ISO 262 (coarse thread);
- with diameter/pitch combinations according to ISO 261 (coarse thread);
- with thread tolerances 6H according to ISO 965-1 and ISO 965-2;
- with specific mechanical requirements;
- with widths across flats as specified in ISO 272 or equivalent;
- with nominal heights greater than or equal to $0,5D^{1)}$;
- made of carbon steel or low alloy steel.

It does not apply to nuts requiring special properties such as

- locking abilities (see ISO 2320);
- weldability;
- corrosion resistance (see ISO 3506);
- ability to withstand temperatures above + 300 °C or below – 50 °C.

NOTE 1 Nuts made from free-cutting steel should not be used above + 250 °C.

NOTE 2 For special products such as nuts for high-strength structural bolting, and overtapped nuts for use with hot-dipped galvanized bolts, see the product standards for appropriate values

NOTE 3 For assemblies with threads having tolerances wider than 6H/6g, there is an increased risk of stripping; see also Table 1.

NOTE 4 In the case of thread tolerances other or larger than 6H, a decrease of the stripping strength should be considered (see Table 1).

Table 1 — Reduction in thread strength

Thread		Test load, %		
greater than	less than or equal to	Thread tolerances		
		6H	7H	6G
—	M2,5	100	—	95,5
M2,5	M7	100	95,5	97
M7	M16	100	96	97,5
M16	M39	100	98	98,5

¹⁾ D is the nominal diameter of the internal thread in accordance with ISO 724.

²⁾ To be published.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 898. 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 898 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1:1975, *Standard reference temperature for industrial length measurements*.

ISO 68:1973, *ISO general purpose screw threads — Basic profile*.

ISO 261:1973, *ISO general purpose metric screw threads — General plan*.

ISO 262:1973, *ISO general purpose metric screw threads — Selected sizes for screws, bolts and nuts*.

ISO 272:1982, *Fasteners — Hexagon products — Widths across flats*.

ISO 286-2:1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*.

ISO 724:1978, *ISO metric screw threads — Basic dimensions*.

ISO 965-1:1980, *ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data*.

ISO 965-2:1980, *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose bolt and nut threads — Medium quality*.

ISO 4964:1984, *Steel — Hardness conversions*.

ISO 6157-2:—²⁾, *Fasteners — Surface discontinuities — Part 2: Nuts with threads M5 to M39*.

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

ISO 6507-1:1982, *Metallic materials — Hardness test — Vickers test — Part 1: HV 5 to HV 100*.

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

3 Designation system

3.1 Nuts with nominal heights $\geq 0,8D$ (effective lengths of thread $\geq 0,6D$)

Nuts with nominal heights $\geq 0,8D$ (effective lengths of thread $\geq 0,6D$) are designated by a number to indicate the maximum appropriate property class of bolts with which they may be mated.

Failure of threaded fasteners due to over-tightening can occur by bolt shank fracture or by stripping of the threads of the nut and/or bolt. Shank fracture is sudden and therefore easily noticed. Stripping is gradual and therefore difficult to detect and this introduces the danger of partly failed fasteners being left in assemblies.

It would therefore be desirable to design threaded connections so that their mode of failure would always be by shank fracture but, unfortunately, because of the many variables which govern stripping strength (nut and bolt material strengths, thread clearances, across-flats dimensions, etc.), nuts would have to be objectionably thick to guarantee this mode in all cases.

A bolt or screw of thread M5 to M39 assembled with a nut of the appropriate property class, in accordance with Table 2, is intended to provide an assembly capable of being tightened to the bolt proof load without thread stripping occurring.

However, should tightening beyond bolt proof load take place, the nut design is intended to ensure at least 10 % of the over-tightened assemblies fail through bolt breakage in order to warn the user that the installation practice is not appropriate.

NOTE 5 For more detailed information on the strength of screw thread assemblies, see annex A.

Table 2 — Designation system for nuts with nominal heights $\geq 0,8D$

Property class of nut	Mating bolts		Nuts	
	Property class	Thread range	Style 1	Style 2
			Thread ranges	
4	3.6; 4.6; 4.8	> M16	> M16	—
5	3.6; 4.6; 4.8	$\leq$ M16	$\leq$ M39	—
	5.6; 5.8	$\leq$ M39		
6	6.8	$\leq$ M39	$\leq$ M39	—
8	8.8	$\leq$ M39	$\leq$ M39	> M16 $\leq$ M39
9	9.8	$\leq$ M16	—	$\leq$ M16
10	10.9	$\leq$ M39	$\leq$ M39	—
12	12.9	$\leq$ M39	$\leq$ M16	$\leq$ M39

NOTE In general, nuts of a higher property class can replace nuts of a lower property class. This is advisable for a bolt/nut assembly going into a stress higher than the yield stress or the stress under proof load.

3.2 Nuts with nominal heights $\geq 0,5D$ but $< 0,8D$ (effective heights of thread $\geq 0,4D$ but $< 0,6D$)

Nuts with nominal heights $\geq 0,5D$ but $< 0,8D$ (effective height of thread $\geq 0,4D$ but $< 0,6D$) are designated by a combination of two numbers: the second indicates the nominal stress under proof load on a hardened test mandrel, while the first indicates that the loadability of a bolt-nut assembly is reduced in comparison with the loadability on a hardened test mandrel and also in comparison with a bolt-nut assembly described in 3.1. The effective loading capacity is not only determined by the hardness of the nut and the effective height of thread but also by the tensile strength of the bolt with which the nut is assembled. Table 3 gives the designation system and the stresses under proof load of the nuts. Proof loads are shown in Table 6. A guide for minimum expected stripping strengths of the joints when these nuts are assembled with bolts of various property classes is shown in Table 7.

Table 3 — Designation system and stresses under proof load for nuts with nominal heights $\geq 0,5D$ but $< 0,8D$

Property class of nut	Nominal stress under proof load N/mm ²	Actual stress under proof load N/mm ²
04	400	380
05	500	500

4 Materials

Nuts shall be made of steel conforming to the chemical composition limits specified in Table 4.

Table 4 — Limits of chemical composition

Property class		Chemical composition limits (check analysis), %			
		C max.	Mn min.	P max.	S max.
4 ^a ; 5 ^a ; 6 ^a	—	0,50	—	0,060	0,150
8;9	04 ^a	0,58	0,25	0,060	0,150
10 ^b	05 ^b	0,58	0,30	0,048	0,058
12 ^b	—	0,58	0,45	0,048	0,058

^a Nuts of these property classes may be manufactured from free-cutting steel unless otherwise agreed between the purchaser and the manufacturer. In such cases, the following maximum sulfur, phosphorus and lead contents are permissible:
sulfur 0,34 %; phosphorus 0,11 %; lead 0,35 %.

^b Alloying elements may be added, if necessary, to develop the mechanical properties of the nuts.

Nuts of property classes 05, 8 (style 1 above M16), 10 and 12 shall be hardened and tempered.

5 Mechanical properties

When tested by the methods described in clause 8, the nuts shall have the mechanical properties set out in Table 5.