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Fasteners
Technical delivery conditions
Property classes for nuts
(Hardness classes)

DIN 267 Part 24

Mechanische Verbindungselemente; technische Lieferbedingungen; Festigkeitsklassen für Muttern (Härteklassen)

This Standard, together with DIN ISO 898 Part 2, March 1981 edition, and DIN 267 Part 21, June 1981 edition, supersedes DIN 267 Part 4, October 1971 edition, and DIN 267 Part 8, October 1971 edition withdrawn in 1981.

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

DIN 267 Part 4 was converted to the international property classes for nuts in 1967. The previous symbols 4D, 5D, 5S, 6G, 6S and 8G were replaced by code numbers 4, 5, 6, 8, 10, 12 and 14, where the code number indicated $^1/_{100}$ of the minimum tensile strength of the bolt with which the nut could be mated and loaded up to the minimum tensile strength of the bolt, e. g. bolt 10.9 – nut 10. Appropriate proof load values were allocated to the nuts.

After relevant studies, experiments and calculations, this system of property classes was modified at the international level and laid down in International Standard ISO 898 Part 2 (see DIN ISO 898 Part 2) in an improved version and with greater certainty regarding tightening and the loadability of bolt/nut assemblies. Comprehensive explanatory notes are included in the National foreword and Appendix to DIN ISO 898 Part 2. This also explains that the previously usual hexagon nuts with the nominal 0,8 d nut height (e. g. nuts complying with DIN 934) cannot be fully loaded with sufficient assurance up to the yield point of the appropriate bolt or beyond this, without the nut being stripped. Higher proof load values have been allocated to the revised property classes in DIN ISO 898 Part 2, in order to ensure that fracture generally occurs in the case of overloading, in accordance with the usual principles of design.

It was originally intended to delete the previous specifications for property classes for nuts with coarse threads from DIN 267 Part 4, to replace these by a reference to DIN ISO 898 Part 2, and only to specify in DIN 267 Part 4 the property classes for nuts with fine threads which have not been specified at the international level. It was necessary to abandon this proposal, since not only higher proof load values are assigned to the ISO property classes, but these property classes also require larger nut heights in some cases (see DIN 970, for example). Therefore, in consideration of existing standards which cannot be superseded in the short term (e. g. DIN 934) and of numerous other documents and drawings, DIN 267 Part 4 was retained for an as yet unlimited period specifying the previous proof load values which are lower in comparison with DIN ISO 898 Part 2. However, because DIN ISO 898 Part 2 specifies the international code numbers, it has become necessary to add two vertical bars to the code numbers in DIN 267 Part 4, in order to differentiate products complying with the two standards, e. g. |8| instead of 8, so that there may be no confusion in the future.

By way of supplement to DIN ISO 898 Part 2, DIN 267 Part 23 lists the property classes (ISO classes) for nuts with fine thread, calculated on the basis of this standard. Furthermore, the property classes for nuts without defined proof load values (hardness classes) have been taken from DIN 267 Part 4 and have been specified in DIN 267 Part 24. Thus, at present, there are the following standards dealing with property classes for nuts:

DIN ISO 898 Part 2	Mechanical properties of fasteners; nuts with specified proof load values
DIN 267 Part 4	Fasteners; technical delivery conditions; property classes for nuts (previous classes)
DIN 267 Part 23	Fasteners; technical delivery conditions; property classes for nuts with fine thread (ISO classes)
DIN 267 Part 24	Fasteners; technical delivery conditions; property classes for nuts (hardness classes)

This division provides a clear separation between the previous DIN property classes and the new ISO classes. It permits a correspondingly similar separation in product standards and prevents incorrect allocation (see also the Explanatory notes).

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1 Field of application

This standard specifies the mechanical properties of nuts which do not have to withstand specified proof loads. The property classes specified have been classified according to minimum hardness values from which however no conclusions can be drawn with regard to the loadability and the stripping strength of the nuts. The performance properties of nuts depend on their style.

This standard does not apply to

- nuts which have to withstand specified proof loads in accordance with DIN ISO 898 Part 2, DIN 267 Part 4 and Part 23;
- prevailing torque type nuts in accordance with DIN 267 Part 15;
- nuts which have to meet particular requirements, for example with regard to weldability, corrosion-resistance (see DIN 267 Part 11), ability to withstand temperatures above +300 °C or below −50 °C (see DIN 267 Part 13).

Note. Nuts made of free-cutting steel shall not be used at temperatures above + 250 °C.

2 Designation

The property classes for nuts as specified in this standard shall be identified using a combination of a number and a letter as given in table 1. The number indicates 1/10 of the minimum Vickers hardness, the letter H stands for "hardness".

Table 1. **Symbols**

Property class symbol	11H	14H	17H	22H
Vickers hardness HV 5 min.	110	140	170	220

3 Materials

3.1 Non-cutting working

The chemical composition specified in table 2 shall also apply to manufacture by chip removal, where the nuts are not made from free cutting steel.

Table 2. **Chemical composition**

Property class	Chemical composition, in % by mass (check analysis) [1]			
	C max.	Mn min.	P max.	S max.
11H	0,50	–	0,110	0,150
14H	0,50	–	0,110	0,150
17H	0,58	0,30	0,060	0,150
22H	0,58	0,30	0,048	0,058

[1] Chips for the check analysis shall be taken uniformly over the whole cross section.

Thomas steel is not permitted for property class 22H nuts. "– 2" shall be added to the property class symbol where Thomas steel shall not be used for manufacturing property classes 14H and 17H nuts.

Nuts assigned to property class 22H shall be hardened and tempered to attain the mechanical property values specified in clause 4. If necessary, alloy steels shall be used.

3.2 Machining from free-cutting steel

Table 3. **Chemical composition**

Property class	Chemical composition, in % by mass (check analysis) [1]			
	C max.	P max.	Pb max.	S max.
11H, 14H, 17H	0,50	0,12	0,35	0,34

[1] Chips for the check analysis shall be taken uniformly over the whole cross section.

4 Mechanical properties

The properties listed in table 4 shall apply for testing at room temperature.

Table 4. **Mechanical properties**

Mechanical property		Property class			
		11H	14H	17H	22H
Vickers hardness HV 5	min.	110	140	170	220
	max.	185	215	245	300
Brinell hardness HB 30	min.	105	133	162	209
	max.	176	204	233	285

Conversion of hardness values as specified in DIN 50 150.

5 Testing

5.1 Hardness test

The hardness shall be tested according to Vickers or Brinell.

The Vickers hardness test shall be carried out as specified in DIN 50 133 Part 1.

The Brinell hardness test shall be carried out as specified in DIN 50 351.

The hardness shall be measured on one bearing surface of the nut. The hardness shall be taken as the mean of three values obtained when measuring at three locations spaced 120° apart.

In cases of doubt, the Vickers hardness test shall be the referee method.

5.2 Surface integrity test

DIN 267 Part 20 shall apply for the surface integrity test.

6 Marking

6.1 Identification of property class

Only property class 22H nuts shall be marked with the symbol identifying the property class.

6.2 Marking of nuts with left-hand thread

For nuts with left-hand thread, marking as specified in DIN ISO 898 Part 2 is recommended where this is technically feasible with regards to the style and size of the nut.

Standards referred to

DIN	267 Part 4	Fasteners; technical delivery conditions; property classes for nuts (previous classes)
DIN	267 Part 11	Fasteners; technical delivery conditions, with additions to ISO 3506; corrosion-resistant stainless steel components
DIN	267 Part 13	Fasteners; technical delivery conditions; components for bolted connections made mainly from materials with high impact strength at high and low temperatures
DIN	267 Part 15	Fasteners; technical delivery conditions; prevailing torque type nuts
DIN	267 Part 20	Fasteners; technical delivery conditions; surface discontinuities on nuts
DIN	267 Part 23	Fasteners; technical delivery conditions; property classes for nuts with fine thread (ISO classes)
DIN 50 133 Part 1		Testing of metallic materials; Vickers hardness test, proof load range 49 to 980 N (5 to 100 kp)
DIN 50 150		Testing of steel and cast steel; conversion tables for Vickers hardness, Brinell hardness, Rockwell hardness and tensile strength
DIN 50 351		Testing of metallic materials; Brinell hardness test
DIN ISO 898 Part 2		Mechanical properties of fasteners; nuts with specified proof load values

Previous editions

DIN 266: 03.31; DIN 589: 07.31, 01.34; DIN Kr 550: 03.36 DIN 267 Part 1 and Part 2: 04.37; DIN 267: 06.40, 01.43, 01.54, 12.60; DIN 267 Part 4: 05.68, 10.71

Amendments

The following amendments have been made compared with DIN 267 Part 4, October 1971 edition, and DIN 267 Part 8, October 1971 edition withdrawn in 1981.

a) The property classes for nuts which do not have to withstand specified proof loads (hardness classes) have been deleted in DIN 267 Part 4 and have been adopted in DIN 267 Part 24.

b) The content has been revised editorially.

Explanatory notes

The original intention was to replace DIN 267 Part 4 by DIN ISO 898 Part 2 to such an extent that the specifications still in use will only apply to nuts with fine thread which are not yet covered by the ISO Standard. However, this proposal could not be put into practice because it was not possible to abandon the previous hexagon nuts with 0,8 *d* heights (e. g. nuts complying with DIN 934) generally and in the short term in favour of higher nuts with greater proof load values, and because the property classes as defined in DIN 267 Part 4 are referred to in numerous documents, e. g. drawings. A draft of DIN 267 Part 4 published in June 1981 was criticized accordingly; this led to a revision of policy. The question of property classes for nuts with fine threads was included in this version, in accordance with work being undertaken at the international level.

A clear distinction has been introduced between the previous and new (modified) property classes and the corresponding products on the basis of DIN ISO 898 Part 2, taking DIN 267 Part 4 (October 1971 edition) into consideration.

The following solution has been chosen with regard to the property classes assigned to nuts:

DIN ISO 898 Part 2 Mechanical properties of fasteners; nuts with specified proof load values

The March 1981 edition of DIN ISO 898 Part 2 remains valid without amendment. It specifies the new property classes for nuts with full and reduced loadability and with the higher proof load values agreed internationally.

These are property classes

4, 5, 6, 8, 10, 12
for nuts with full loadability, and
04, 05 (previously 06)
for nuts with reduced loadability.

The property classes for nuts with full loadability shall apply in the first place only to the nuts known as ISO nuts with coarse thread and to nuts where express reference is made to DIN ISO 898 Part 2.

DIN 267 Part 4 Fasteners; technical delivery conditions; property classes for nuts (previous classes)

The classes specified in the October 1971 edition of DIN 267 Part 4 remain fundamentally unamended; however, the field of application has been restricted taking DIN ISO 898 Part 2 into account (see foreword).

DIN 267 Part 23 Fasteners; technical delivery conditions; property classes for nuts with fine thread (ISO classes)

This standard specifies property classes for nuts with fine thread; and the principle applied in DIN ISO 898 Part 2 for nuts with coarse thread is used as a basis for the property classes (proof load values), i.e. nut blanks for nuts with fine thread have the hardness and heat treatment specified for nuts with coarse thread, assigned to the next higher property class.

DIN 267 Part 23 applies only to ISO nuts (see DIN 971 Part 1 and Part 2 (at present both at the stage of draft)) and to other nuts with fine thread where reference is made to DIN 267 Part 23. It is intended to review this standard and replace it if necessary when the relevant international specifications supplementing ISO 898 Part 2 become available.

DIN 267 Part 24 Fasteners; technical delivery conditions; property classes for nuts (hardness classes)

This standard lists property classes (hardness classes) for nuts for which no loading values can be specified because of their form and dimensions, but which may only be classified according to their hardness and are marked accordingly.

Symbol	11H	14H	17H	22H
Minimum Vickers hardness	110	140	170	220

Property classes (hardness classes) as defined in DIN 267 Part 24 have not previously been considered for nuts at the international level. At the national level, however, these property classes were considered desirable. Thus, the standard has no international basis.

International Patent Classification

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