

Screws, bolts, nuts

Marking and mechanical properties of hex head fasteners UNC/UNF

according to SAE J429

Identification grade mark	Specification	Material	Nominal size range [in.]	Mechanical properties		
				Proof load [psi / MPa]	Yield strength [psi / MPa]	Tensile strength [psi / MPa]
 No grade mark	SAE J429 Grade 1	Low or medium carbon steel	1/4 – 1 1/2	33 000 / 227,53	36 000 / 248,21	60 000 / 413,69
	SAE J429 Grade 2		1/4 – 3/4 > 3/4 – 1 1/2	55 000 / 379,21 33 000 / 227,53	57 000 / 393,00 36 000 / 248,21	74 000 / 510,21 60 000 / 413,69
	SAE J429 Grade 5	Medium carbon steel, quenched and tempered	1/4 – 1 > 1 – 1 1/2	85 000 / 586,05 74 000 / 510,21	92 000 / 634,32 81 000 / 558,48	120 000 / 827,37 105 000 / 723,95
	SAE J429 Grade 5.2	Low carbon martensitic steel, quenched and tempered	1/4 – 1	85 000 / 586,05	92 000 / 634,32	120 000 / 827,37
	SAE J429 Grade 8	Low carbon martensitic steel, quenched and tempered	1/4 – 1 1/2	120 000 / 827,37	130 000 / 896,32	150 000 / 1034,20

1 ksi = 1000 psi = 6,8948 MPa = 6,8948 N/mm²

ksi = kilopounds per square inch

psi = pounds per square inch

Marking and designation of fasteners with reduced loadability

according to ISO 898, part 1

The revised standard as of April 2009 has been for the application for bolts, screws and studs with specified property classes – coarse thread and fine pitch thread.

Fasteners according to a product standard with reduced loadability need to be marked with property class preceded with the digit «0». The objective of the revised head marking is an indicative instruction for the assembly process. The user can further look up for additional notes in the Industrislag catalogue. The revised head marking is a defined identification in accordance to the revised standard.

Judgment of the change for the user:

- Fasteners that are manufactured according to the old standard have no functional differences compared to the revised standard.
- Fasteners according to the mentioned specification are always subjected to reduced loadability due to the head geometry according to ISO 898-1 – this means that tightening torques has to be taken into account.

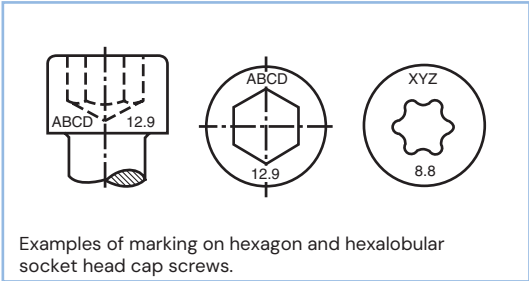
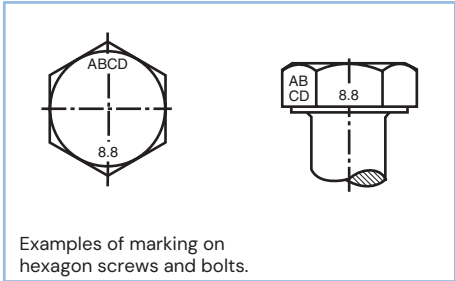
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Marking of fasteners
according to ISO 898, part

Marking symbols	Property class									
	4.6	4.8	5.6	5.8	6.8	8.8	9.8	10.9	12.9	12.9
Marking symbols for fasteners with full loadability ¹⁾	4.6	4.8	5.6	5.8	6.8	8.8	9.8	10.9	12.9	12.9
Marking symbols for fasteners with reduced loadability ¹⁾	04.6	04.8	05.6	05.8	06.8	08.8	09.8	010.9	012.9	012.9

¹⁾ The dot in the marking symbol may be omitted.

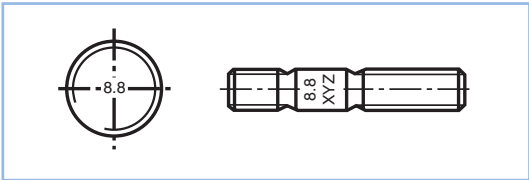
Identification with the manufacturer’s mark and the property class is mandatory for hexagon screws 4.6 to 12.9 and hexagon or hexalobular socket head cap screws 8.8 to 12.9 with thread diameter $d \geq 5$ mm, where the shape of the screw always allows it. (Marking of bolts and screws are preferably on the head).



Marking of studbolts
according to ISO 898, part 1

Marking is obligatory for property classes of or higher than 5.6 and is preferably to be made on the threaded part by an indentation. For adjustment bolts with locking, the marking must be on the side of the nut. Marking is required for bolts of nominal diameter of or greater than 5 mm.

The symbols shown in the table on the right are also authorised as a method of identification.



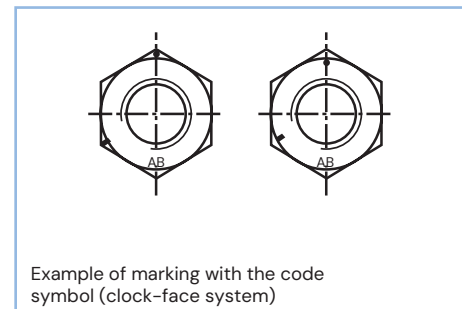
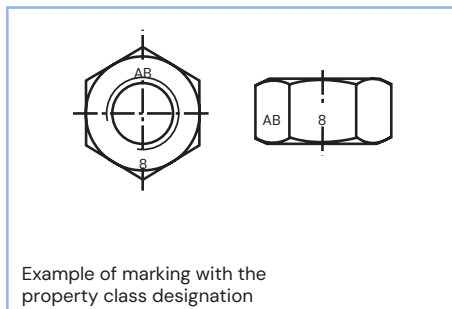
Property class	5.6	8.8	9.8	10.9	12.9
Marking symbol	—	○	+	□	△

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Marking of nuts according to ISO

according to ISO 898, part 2

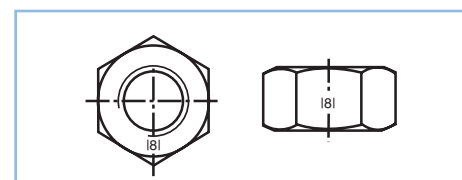
Identification with the manufacturer is mark and property class is mandatory for hexagon nuts with thread diameter $d \geq 5$ mm. The hexagon nuts must be marked with an indentation on the bearing surface or on the side or by embossing on the chamfer. Embossed markings must not protrude beyond the bearing surface of the nut.

**Marking of nuts according to DIN**

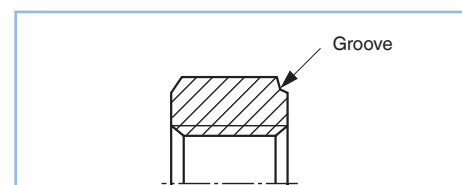
according to DIN 267, part 4

Marking symbols	Property class					
Characteristic	4	5	6	8	10	12
Identification mark	4	5	6	8	10	12

Hexagon nuts with nominal thread diameter $d \geq 5$ mm must be marked with the property class on the bearing surface or on the side. Embossed markings must not protrude beyond the bearing surface of the nut.



For hexagon nuts with nominal thread diameter $d \geq 5$ mm acc. to DIN 934 and DIN 935 made from free-cutting steel, the marking must also include a groove on one chamfer of the nut (up to property class 6).



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Pairing of screws and nuts $\geq 0,8 d$

according to ISO 898, part 2

Assignment of possible property classes of screws and nuts

Mating bolts		Nuts			
Property class	Diameter range	Property class	Diameter range Type 1	Type 2	Type 0,5 d
3.6 to 12.9 reduced loadability	$\leq M39$	04	–	–	$< M39$
		05	–	–	$< M39^{1)}$
3.6, 4.6, 4.8	$> M16$	4	$> M16$	–	–
3.6, 4.6, 4.8	$\leq M16$	5	$\leq M16$	–	–
5.6, 5.8	$\leq M39$		$> M16 \leq M39$		
6.8	$\leq M39$	6	$\leq M39$	–	–
08.8 reduced loadability	$\leq M39$	8	$\leq M16$	$> M16 \leq M39$	–
			$> M16 \leq M39^{1)}$		
8.8	$\leq M39$	8	$\leq M16$	$> M16 \leq M39$	–
			$> M16 \leq M39^{1)}$		
9.8	$\leq M16$	9	–	$\leq M16$	–
10.9	$\leq M39$	10	$\leq M39^{1)}$	–	–
12.9	$\leq M39$	12	$\leq M16^{1)}$	$\leq M39^{1)}$	–

¹⁾ Quenched and tempered material**Remark**

In general, nuts of a higher property class are preferable to nuts of a lower property class. This is advisable for a bolt / nut assembly stressed higher than the yield stress or the stress under proof load.