

# NUTS WITH SPECIFIED PROPERTY CLASSES, COARSE THREAD AND FINE PITCH THREAD

(REV. 1) ISO 898-2: 2012

Nuts compliant with ISO 898 have been used in applications ranging from -50 °C to +150 °C. Is the responsibility of users to consult an experienced fastener materials expert for temperatures outside the range of -50 °C to +150 °C and up to a maximum temperature of +300 °C to determine appropriate choices for a given application.

This part of ISO is applicable to nuts:

- made of carbon steel or alloy steel
- with coarse thread  $M5 \leq D \leq M39$  and fine pitch thread  $M8x1 \leq D \leq M39x3$ 
  - with triangular ISO metric thread according ISO 68-1
  - with diameter/pitch combinations according to ISO 261 and ISO 262
    - with minimum height  $0,45D$
  - with specified property classes, including proof load
- able to mate with bolts, screws and studs with property classes according to ISO 898-1
  - free-cutting steel nuts should not be used at temperatures above 250 °C

COMBINATION WITH PROPERTY CLASSES		RANGES OF NOMINAL DIAMETERS IN RELATION TO NUT STYLE AND PROPERTY CLASS		
NUT PROPERTY CLASS	MAXIMUM CLASS WITH ISO 898-1	REGULAR NUT STYLE 1	HIGH NUT STYLE 2	THIN NUT STYLE 0
04				$M5 \leq D \leq M39$ $M8x1 \leq D \leq M39x3$
05				
5	5.8	$M5 \leq D \leq M39$ $M8x1 \leq D \leq M39x3$		
6	6.8			
8	8.8		$M5 \leq D \leq M39$ $M8x1 \leq D \leq M39x3$	
9	9.8		$M5 \leq D \leq M39$	
10	10.9	$M5 \leq D \leq M39$ $M8x1 \leq D \leq M16x1,5$	$M5 \leq D \leq M39$ $M8x1 \leq D \leq M39x3$	
12	12.9 / 12.9	$M5 \leq D \leq M16$	$M5 \leq D \leq M39$ $M8x1 \leq D \leq M16x1,5$	

PROOF LOAD VALUES FOR NUTS WITH COARSE THREAD									
THREAD	PITCH	Proof Load <sup>1)</sup> N (newton)							
M5	0,8	5400	7100	8250	9500	12140	13000	14800	16300
M6	1	7640	10000	11700	13500	17200	18400	20900	23100
M7	1	11000	14500	16800	19400	24700	26400	30100	33200
M8	1,25	13900	18300	21600	24900	31800	34400	38100	42500
M10	1,5	22000	29000	34200	39400	50500	54500	60300	67300
M12	1,75	32000	42200	51400	59000	74200	80100	88500	100300
M14	2	43700	57500	70200	80500	101200	109300	120800	136900
M16	2	59700	78500	95800	109900	138200	149200	164900	186800
M18	2,5	73000	96000	121000	138200	176600	203500	230400	
M20	2,5	93100	122500	154400	176400	225400	259700	294000	
M22	2,5	115100	151500	190900	218200	278800	321200	363600	
M24	3	134100	176500	222400	254200	324800	374200	423600	
M27	3	174400	229500	289200	330500	422300	486500	550800	
M30	3,5	213200	280500	353400	403900	516100	594700	673200	
M33	3,5	263700	347000	437200	499700	638500	735600	832800	
M36	4	310500	408500	514700	588200	751600	866000	980400	
M39	4	370900	488000	614900	702700	897900	1035000	1171000	
PROPERTY CLASS	04	05	5	6	8	9	10	12	

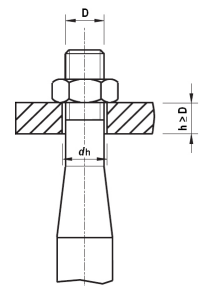


figure 1 - axial tensile test

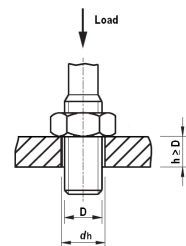


figure 2 - axial compressive test

<sup>1)</sup> For the application of thin nuts, it should be considered that the stripping load is lower than the proof load of a nut with full loadability.

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THREAD	PROPERTY CLASS		MATERIAL AND HEAT TREATMENT	CHEMICAL COMPOSITION LIMIT % (CAST ANALYSIS)			
				C max.	MN min.	P max.	S max.
COARSE THREAD	04 <sup>c</sup>		carbon steel <sup>d</sup>	0,58	0,25	0,060	0,15
	05 <sup>c</sup>		carbon steel QT <sup>e</sup>	0,58	0,30	0,048	0,058
	5 <sup>b</sup>		carbon steel <sup>d</sup>	0,58		0,060	0,15
	6		carbon steel <sup>d</sup>	0,58		0,060	0,15
	8	high nut style 2	carbon steel <sup>d</sup>	0,58	0,25	0,060	0,15
	8	regular nut style 1 D ≤ M 16	carbon steel <sup>d</sup>	0,58	0,25	0,060	0,15
	8 <sup>c</sup>	regular nut style 1 D > M 16	carbon steel QT <sup>e</sup>	0,58	0,30	0,048	0,058
	9		carbon steel <sup>d</sup>	0,58	0,25	0,060	0,15
	10 <sup>c</sup>		carbon steel QT <sup>e</sup>	0,58	0,30	0,048	0,058
	12 <sup>c</sup>		carbon steel QT <sup>e</sup>	0,58	0,45	0,048	0,058
FINE PITCH THREAD	04 <sup>b</sup>		carbon steel <sup>d</sup>	0,58	0,25	0,060	0,15
	05 <sup>c</sup>		carbon steel QT <sup>e</sup>	0,58	0,30	0,048	0,058
	5 <sup>b</sup>		carbon steel <sup>d</sup>	0,58		0,060	0,15
	6 <sup>b</sup>	D ≤ M 16	carbon steel <sup>d</sup>	0,58		0,060	0,15
	6 <sup>b</sup>	D > M 16	carbon steel QT <sup>e</sup>	0,58	0,30	0,048	0,058
	8	high nut style 2	carbon steel <sup>d</sup>	0,58	0,25	0,060	0,15
	8 <sup>c</sup>	regular nut style 1	carbon steel QT <sup>e</sup>	0,58	0,30	0,048	0,058
	10 <sup>c</sup>		carbon steel QT <sup>e</sup>	0,58	0,30	0,048	0,058
	12 <sup>c</sup>		carbon steel QT <sup>e</sup>	0,58	0,45	0,048	0,058

QT = Quenched and tempered nuts <sup>d</sup> this may be quenched and tempered at the manufacturer's discretion  
<sup>b</sup> may be manufactured from free-cutting steel with the following maximum contents: S% 0.34; P% 0.11; Pb% 0.35  
<sup>c</sup> alloying elements may be added, provided the mechanical properties required are fulfilled  
<sup>e</sup> in the as-hardened condition before tempering, there shall be sufficient hardenability to ensure a structure of approx. 90% martensite

HARDNESS PROPERTIES FOR NUTS WITH COARSE AND FINE PITCH THREAD												
THREAD	hardness HV		hardness HB		hardness HV		hardness HB		hardness HV		hardness HB	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
	PROPERTY CLASS 04				PROPERTY CLASS 05				PROPERTY CLASS 5			
<sup>a)</sup> M5 ≤ D ≤ M16	188	302	179	287	272	353	259	336	130	302	124	287
<sup>a)</sup> M16 < D ≤ M39									146	302	139	287
<sup>b)</sup> M8x1 ≤ D ≤ M16x1,5									175	302	166	287
<sup>b)</sup> M16x1,5 < D ≤ M39x3									190	302	181	287

<sup>a)</sup> Nuts with coarse thread. <sup>b)</sup> Nuts with fine pitch thread.

THREAD	hardness HV		hardness HB		hardness HV		hardness HB	
	min.	max.	min.	max.	min.	max.	min.	max.
	PROPERTY CLASS 6				PROPERTY CLASS 8			
<sup>a)</sup> M5 ≤ D ≤ M16	150	302	143	287	200	302	190	287
<sup>a)</sup> M16 < D ≤ M39	170	302	162	287	233 <sup>c</sup>	353 <sup>d</sup>	221 <sup>c</sup>	336 <sup>d</sup>
<sup>b)</sup> M8x1 ≤ D ≤ M16x1,5	188	302	179	287	250 <sup>e</sup>	353 <sup>f</sup>	238 <sup>e</sup>	336 <sup>f</sup>
<sup>b)</sup> M16x1,5 < D ≤ M39x3	233	302	221	287	295	353	280	336

<sup>a)</sup> Nuts with coarse thread. <sup>b)</sup> Nuts with fine pitch thread. <sup>c)</sup> Minimum value for high nuts style 2 : 180 HV ; 171 HB.  
<sup>d)</sup> Maximum value for high nuts style 2 : 302 HV ; 287 HB. <sup>e)</sup> Minimum value for high nuts style 2 : 195 HV ; 185 HB. <sup>f)</sup> Maximum value for high nuts style 2 : 302 HV ; 287 HB.

THREAD	hardness HV		hardness HB		hardness HV		hardness HB		hardness HV		hardness HB	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
	PROPERTY CLASS 9				PROPERTY CLASS 10				PROPERTY CLASS 12			
<sup>a)</sup> M5 ≤ D ≤ M16	188	302	179	287	272	353	259	336	295 <sup>h</sup>	353	280 <sup>h</sup>	336
<sup>a)</sup> M16 < D ≤ M39									272	353	259	336
<sup>b)</sup> M8x1 ≤ D ≤ M16x1,5	-	-	-	-	295 <sup>g</sup>	353	280 <sup>g</sup>	336	295	353	280	336
<sup>b)</sup> M16x1,5 < D ≤ M39x3	-	-	-	-	260	353	247	336	-	-	-	-

<sup>a)</sup> Nuts with coarse thread. <sup>b)</sup> Nuts with fine pitch thread. <sup>g)</sup> Minimum value for high nuts style 2 : 250 HV ; 238 HB.  
<sup>h)</sup> Minimum value for high nuts style 2 : 272 HV ; 259 HB.