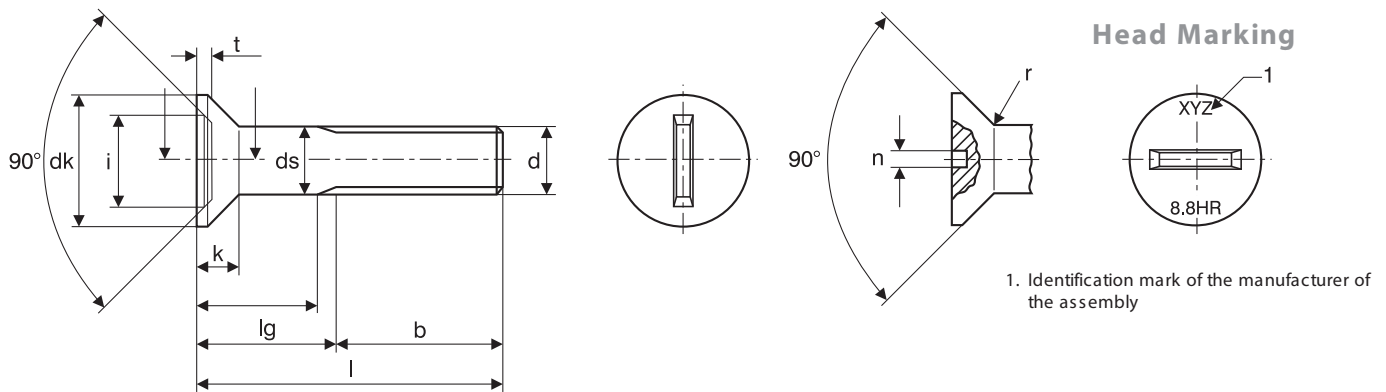


Pre-load Fasteners

EN 14399 - 7 System HR – Countersunk



EN14399 Dimensions of bolts

Nominal size and thread diameter d	Pitch of thread p	Thread Length b			Diameter of unthreaded shank d _s		Diameter of head d _k		Width of screwdriver slot i		Thickness of socket head k			Radius under head r		Thickness of screwdriver slot n		Depth of screwdriver slot t	
	coarse pitch	Bolt ≤125	Bolt 125-200	Bolt ≥200	min.	max.	min.	max.	min.	max.	min.	nom.	max.	min.	max.	min.	max.	min.	max.
M12	1.75	30	-	-	11.30	12.70	23.16	24.00	15.50	16.50	7.25	8.00	8.75	1.2	1.6	2.5	3.0	3.0	4.5
M16	2.00	38	44	-	15.30	16.70	31.16	32.00	21.5	22.50	9.25	10.00	10.75	1.2	1.6	2.5	3.0	3.0	4.5
M20	2.50	46	52	65	19.16	20.84	39.00	40.00	27.50	28.50	12.10	13.00	13.90	1.5	2.0	3.0	3.5	3.5	5.0
M22	2.50	50	56	69	21.16	22.84	43.00	44.00	29.50	30.50	13.10	14.00	14.90	1.5	2.0	3.0	3.5	3.5	5.0
M24	3.00	54	60	73	23.16	24.84	47.00	48.00	32.50	33.50	15.10	16.00	16.90	1.5	2.0	3.0	3.5	3.5	5.0
M27	3.00	60	66	79	26.16	27.84	53.00	54.00	36.50	37.50	16.60	17.50	18.40	2.0	2.5	3.0	3.5	3.5	5.0
M30	3.50	66	72	85	29.16	30.84	58.80	60.00	41.50	42.50	18.45	19.50	20.55	2.0	2.5	3.5	4.0	4.0	5.5
M36	4.00	78	84	97	35.00	37.00	70.8	72.00	49.50	50.50	21.95	23.00	24.05	2.0	2.5	3.5	4.0	4.0	5.5

Thread d			M12		M16		M20		M22		M24		M27		M30		M36	
l			ls min.	lg max.	ls min.	lg max.	ls min.	lg max.	ls min.	lg max.	ls min.	lg max.	ls min.	lg max.	ls min.	lg max.	ls min.	lg max.
nom.	min.	max.																
45	43.75	46.25	14.00	19.25														
50	48.75	51.25	14.00	19.25	18.00	24.00												
55	53.50	56.50	16.25	25.00	18.00	24.00												
60	58.50	61.50	21.25	30.00	18.00	24.00	23.00	30.50										
65	63.50	66.50	26.25	35.00	18.00	24.00	23.00	30.50	25.00	32.50								
70	68.50	71.50	31.25	40.00	22.00	32.00	23.00	30.50	25.00	32.50	28.00	37.00						
75	73.50	76.50	36.25	45.00	27.00	37.00	23.00	30.50	25.00	32.50	28.00	37.00						
80	78.50	81.50	41.25	50.00	32.00	42.00	23.00	30.50	25.00	32.50	28.00	37.00	31.00	40.00				
85	83.25	86.75	46.25	55.00	37.00	47.00	26.50	39.00	25.00	32.50	28.00	37.00	31.00	40.00				
90	88.25	91.75	51.25	60.00	42.00	52.00	31.50	44.00	27.50	40.00	28.00	37.00	31.00	40.00	34.50	45.00		
95	93.25	96.75	56.25	65.00	47.00	57.00	36.50	49.00	32.50	45.00	28.00	37.00	31.00	40.00	34.50	45.00		
100	98.25	101.75	61.25	70.00	52.00	62.00	41.50	54.00	37.50	50.00	31.00	46.00	31.00	40.00	34.50	45.00		
110	108.25	111.75			62.00	72.00	51.50	64.00	47.50	60.00	41.00	56.00	31.00	40.00	34.50	45.00	41.00	53.00
120	118.25	121.75			72.00	82.00	61.50	74.00	57.50	70.00	51.00	66.00	45.00	60.00	34.50	45.00	41.00	53.00
130	128.00	132.00			76.00	86.00	65.50	78.00	61.50	74.00	55.00	70.00	49.00	64.00	40.50	58.00	41.00	53.00
140	138.00	142.00			86.00	96.00	75.50	88.00	71.50	84.00	65.00	80.00	59.00	74.00	50.50	68.00	41.00	53.00
150	148.00	152.00			96.00	106.00	85.50	98.00	81.50	94.00	75.00	90.00	69.00	84.00	60.50	78.00	46.00	66.00
160	156.00	164.00									85.00	100.00	79.00	94.00	70.50	88.00	56.00	76.00
170	166.00	174.00									95.00	110.00	89.00	104.00	80.50	98.00	66.00	86.00
180	176.00	184.00									105.00	120.00	99.00	114.00	90.50	108.00	76.00	96.00
190	186.00	194.00									115.00	130.00	109.00	124.00	100.50	118.00	86.00	106.00
200	196.00	204.00									125.00	140.00	119.00	134.00	110.50	128.00	96.00	116.00

Pre-load Fasteners

EN 14399 - 7 System HR – Countersunk

Specification for bolts and reference standard

Characteristic		Standard
Material		Steel
General Requirements		EN 14399-1 ^a
Thread	Tolerance	6g ^b
	International Standard	ISO 261, ISO 965-2
Mechanical Properties	Property Class	8.8 & 10.9
	European Standard	EN ISO 898-1
Impact Strength	Value	Kv, min = 27 J at -20°C
	Test Piece ^b	ISO 148-1
	Test	EN 10045-1
Tolerances	Product Grade	C except: dimensions c and r Tolerance for length ≥ 160mm: ± 4.0mm
	International Standard	EN ISO 4759-1
Surface Finish ^d	Self Colour	As processed
	Hot Dip Galvanised	EN ISO 1461
	Others	To be agreed
Surface discontinuities		Limits for surface discontinuities as specified in EN26157-1.
Acceptability		For acceptance procedure, see EN ISO 3269.
^a For the time being EN 14399-1 refers only to EN 14399-3 and EN 14399-4 as far as dimensions and mechanical characteristics of the components and functional characteristics of the assemblies are concerned. Such references shall also apply to EN 14399-7. ^b The tolerance class specified applies without surface finish. Hot-dip galvanised bolts are intended for assembly with oversize tapped nuts. ^c The preparation of the test specimens with V-notch in the fastener shall be as specified in EN ISO 898-1. ^d Attention is drawn to the need to consider the risk of hydrogen embrittlement in the case of bolts of property class 10.9, when selecting an appropriate surface treatment process (e.g. cleaning and coating), see the relevant coating standards. ^e "As processed" means the normal finish resulting from manufacture with a light coating of oil. ^f Other coatings may be negotiated between the purchaser and the manufacturer provided they do not impair the mechanical properties or the functional characteristics. Coatings of cadmium or cadmium alloy are not permitted.		

EN14399 Mechanical properties of HR 8.8 bolts

Bolt thread diameter	Stress Area mm ²	Proof Load min. kN	Ultimate Load min. kN	Hardness Rockwell HRC	
				min.	max.
M12	84.30	50.70	70.00	23.00	34.00
M16	157.00	94.50	130.00	23.00	34.00
M20	245.00	147.00	203.00	23.00	34.00
M22	303.00	182.00	252.00	23.00	34.00
M24	353.00	212.00	293.00	23.00	34.00
M27	459.00	275.00	381.00	23.00	34.00
M30	561.00	337.00	466.00	23.00	34.00
M36	817.00	490.00	678.00	23.00	34.00

Important note

Preloaded bolted assemblies are very sensitive to differences in manufacture and lubrication. Therefore it is important that the assembly is supplied by one manufacturer who is always responsible for the function of the assembly.

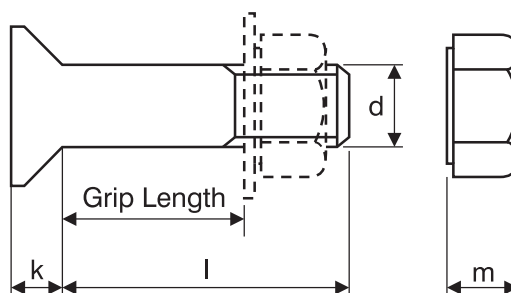
For the same reason, it is important that the coating of the assembly is under the control of one manufacturer.

Beside the mechanical properties of the components, the functionality of the assembly requires that the specific preload can be achieved if the assembly is tightened with a suitable procedure. For this purpose a test method for the suitability of the components for preloading was created, which will demonstrate whether the function of the assembly is fulfilled.

Calculation of correct bolt lengths*

The 'grip length' or the total thickness to be bolted, should be added to the length indicated in the table below. This measurement allows for the inclusion of one nut and one flat round hardened washer. An additional allowance should be made for the inclusion of a load indicating washer, nut faced washer or additional hardened washers by adding 3mm in each case.

Bolt thread diameter d	Addition To Grip Length
M12	22.00
M16	26.00
M20	30.00
M22	34.00
M24	36.00
M27	39.00
M30	42.00
M36	48.00



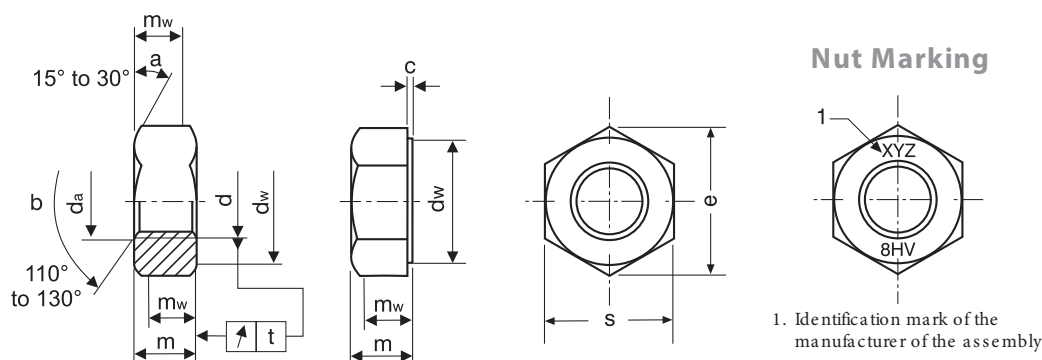
Pre-load Fasteners

EN 14399 - 7 System HR – Countersunk

EN14399 Dimensions of nuts

Nominal size and thread diameter d	p	da		dw	e	m		mw	c		s		t
	(coarse pitch series)	min.	max.	min.	min.	min.	max.	min.	min.	max.	min.	max.	min.
M12	1.75	12.00	13.00	20.10	23.91	10.37	10.80	2.00	0.4	0.8	21.16	22.00	0.38
M16	2.00	16.00	17.30	24.90	29.56	14.10	14.80	27.00	0.4	0.8	26.16	27.00	0.47
M20	2.50	20.00	21.60	29.50	35.03	16.90	18.00	32.00	0.4	0.8	31.00	32.00	0.58
M22	2.50	22.00	23.70	33.30	39.55	18.10	19.40	36.00	0.4	0.8	35.00	36.00	0.63
M24	3.00	24.00	25.90	38.00	45.20	20.20	21.50	41.00	0.4	0.8	40.00	41.00	0.72
M27	3.00	27.00	29.10	42.80	50.85	22.50	23.80	46.00	0.4	0.8	45.00	46.00	0.80
M30	3.50	30.00	32.40	46.60	55.37	24.30	25.60	50.00	0.4	0.8	49.00	50.00	0.87
M36	4.00	36.00	38.90	55.90	66.44	29.40	31.00	60.00	0.4	0.8	58.80	60.00	1.05

a For hot-dip galvanised nuts, the dimensions apply before galvanising.



Specification for nuts and reference standards

Characteristic		Standard
Material		Steel
General Requirements		EN 14399-1 ^a
Thread	Tolerance	6H or 6AZ
	International Standard	ISO 261, ISO 965-2 ISO 965-5
Mechanical Properties	Property Class	8 ^b or 10 ^b
	European Standard	EN 20898-2
Surface Finish	Self Colour	as processed ^c
	Hot Dip Galvanised	EN ISO 1461
	Others	to be agreed ^d
Surface Discontinuities		Limits for surface discontinuities as specified in EN 493.
Acceptability		For acceptance procedure, see EN ISO 3269.

a For the time being EN 14399-1 refers only to EN 14399-3 and EN 14399-4 as dimensions and mechanical characteristics of the components and functional characteristics of the assembly are concerned. Such references shall also apply to EN 14399-7.
b For proof load values, see (Proof load values of nuts) table. All other mechanical properties as specified in EN 20898-2.
c "As processed" means the normal finish resulting from manufacture with a light coating of oil.
d Other coatings may be negotiated between the purchaser and the manufacturer provided they do not impair the mechanical properties or the functional characteristics. Coatings of cadmium or cadmium alloy are not permitted.

EN 14399 Proof load values of nuts

Nut thread diameter d	Nominal stress area of standard test mandrel (mm ²) A _S	Property Class	
		8	10
		Tolerance class 6H* or 6AZ** Proof Load kN (A _S x S _p), N	
M12	84.30	84.30	97.80
M16	157.00	157.00	182.10
M20	245.00	245.00	284.20
M22	303.00	303.00	351.20
M24	353.00	353.00	409.50
M27	459.00	459.00	532.40
M30	561.00	561.00	650.80
M36	817.00	817.00	947.70

*6H is the tolerance class for self colour nuts.

**6AZ is the tolerance class of hot dip galvanised nuts.