



SLOVENSKI STANDARD

SIST EN 14399-7:2008

01-marec-2008

J]gc_c]fXbcg]bY'g]fi _]hi fbY'j]'U bY'nj YnY'nUdfYXbUdYhY!'+'XY.'G]ghYa `<F`!
Nj YnY'j]'U_U'n'j [fYnbc [`Uj c]'b'a U]W

High-strength structural bolting assemblies for preloading - Part 7: System HR -
Countersunk head bolt and nut assemblies

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Ta slovenski standard je istoveten z: ^{SIST EN 14399-7:2008} **EN 14399-7:2007**
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ICS:

21.060.10	Sorniki, vijaki, stebelni vijaki	Bolts, screws, studs
21.060.20	Matice	Nuts

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EUROPEAN STANDARD

EN 14399-7

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2007

ICS 21.060.01

English Version

High-strength structural bolting assemblies for preloading - Part 7: System HR - Countersunk head bolt and nut assemblies

Boulonnerie de construction métallique à haute résistance
apte à la précontrainte - Partie 7: Système HR - Boulons à
tête fraisée (vis et écrou)

Hochfeste planmäßig vorspannbare
Schraubenverbindungen für den Metallbau - Teil 7: System
HR - Garnituren aus Senkschrauben und Muttern

This European Standard was approved by CEN on 10 November 2007.

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 CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 14399-7:2007) has been prepared by Technical Committee CEN/TC 185 "Fasteners", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by June 2008, and conflicting national standards shall be withdrawn at the latest by June 2010.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

This document for structural bolting reflects the situation in Europe where two technical solutions exist to achieve the necessary ductility of bolt/nut/washer assemblies. These solutions utilize different systems (HR and HV) of bolt/nut/washer assemblies, see Table 1. Both systems are well proved and it is up to the experts responsible for structural bolting whether they use the one or the other system.

It is however important for the performance of the assembly to avoid mixing up the components of both systems. Therefore bolts and nuts for both systems are standardized in one single part of this European Standard each and the marking of the components of the same system is uniform.

Table 1 — Systems of bolt/nut/washer(s) assemblies

	Bolt/nut/washer(s) assembly System HR		Bolt/nut/washer(s) assembly System HV
General requirements	EN 14399-1		
Bolt/nut assemblies	EN 14399-3, EN 14399-7		EN 14399-4, EN 14399-8
Marking	HR		HV
Property classes	8.8/8 or 8.8/10	10.9/10	10.9/10
Washer(s)	EN 14399-5 or EN 14399-6		EN 14399-5 or EN 14399-6
Marking	H		H
Suitability test for preloading	EN 14399-2		EN 14399-2

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 the manufacturer.

Beside the mechanical properties of the components, the functionality of the assembly requires that the specified pre-load 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.

Attention is drawn to the importance of ensuring that the bolts are correctly used if satisfactory results are to be obtained. For recommendations concerning proper application, reference to prEN 1090-2 is made.

1 Scope

This document belongs to the suite of European Standards EN 14399 and is designed to be read in conjunction with EN 14399-1 for:

- general requirements;
- testing for conformity evaluation;
- evaluation of conformity;
- regulatory marking;

for assemblies of high-strength structural countersunk bolts and nuts of system HR suitable for preloaded joints with thread sizes M12 to M36 and bolt property classes 8.8 and 10.9 and EN 14399-2 for suitability testing.

This document gives requirements for:

- dimensions;
- associated washer(s) according to EN 14399-5 or to EN 14399-6;
- performance and suitability tests;

for assemblies with thread sizes M12 to M36 and bolt property classes 8.8 and 10.9.

Countersunk bolt and nut assemblies to this document have been designed to allow preloading of at least $0,7 f_{ub} \times A_s$ ¹⁾ according to EN 1993-1-8 (Eurocode 3) and to obtain ductility predominantly by elongation of the bolt. For this purpose the components have the following characteristics:

- nut height according to style 1 (see EN ISO 4032);
- thread length of the bolt according to ISO 888.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1993-1-8, *Eurocode 3: Design of steel structures — Part 1-8: Design of joints*

EN 10045-1, *Metallic materials - Charpy impact test - Part 1: Test method*

EN 14399-1:2005, *High-strength structural bolting assemblies for preloading - Part 1: General requirements*

EN 14399-2:2005, *High-strength structural bolting assemblies for preloading - Part 2: Suitability test for preloading*

EN 14399-5, *High-strength structural bolting assemblies for preloading - Part 5: Plain washers*

EN 14399-6, *High-strength structural bolting assemblies for preloading - Part 6: Plain chamfered washers*

1) f_{ub} is the nominal tensile strength (R_m) and A_s is the nominal stress area of the bolt.

EN 14399-7:2007 (E)

EN 20898-2, *Mechanical properties of fasteners - Part 2: Nuts with specified proof load values - Coarse thread (ISO 898-2:1992)*

EN 26157-1, *Fasteners - Surface discontinuities - Part 1: Bolts, screws and studs for general requirements (ISO 6157-1:1988)*

EN ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs (ISO 898-1:1999)*

EN ISO 3269, *Fasteners - Acceptance inspection (ISO 3269:2000)*

EN ISO 4032, *Hexagon nuts, style 1 - Product grades A and B (ISO 4032:1999)*

EN ISO 4759-1, *Tolerances for fasteners - Part 1: Bolts, screws, studs and nuts - Product grades A, B and C (ISO 4759-1:2000)*

EN ISO 6157-2, *Fasteners - Surface discontinuities - Part 2: Nuts (ISO 6157-2:1995)*

EN ISO 10684, *Fasteners - Hot dip galvanized coatings (ISO 10684:2004)*

ISO 148-1, *Metallic materials - Charpy pendulum impact test - Part 1: Test method*

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

ISO 888, *Bolts, screws and studs — Nominal lengths, and thread lengths for general purpose bolts*

ISO 965-2, *ISO general purpose metric screw threads - Tolerances - Part 2: Limits of sizes for general purpose external and internal screw threads - Medium quality*

ISO 965-5, *ISO general purpose metric screw threads - Tolerances - Part 5: Limits of sizes for internal screw threads to mate with hot-dip galvanized external screw threads with maximum size of tolerance position h before galvanizing*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14399-1:2005 and 14399-2:2005 apply.

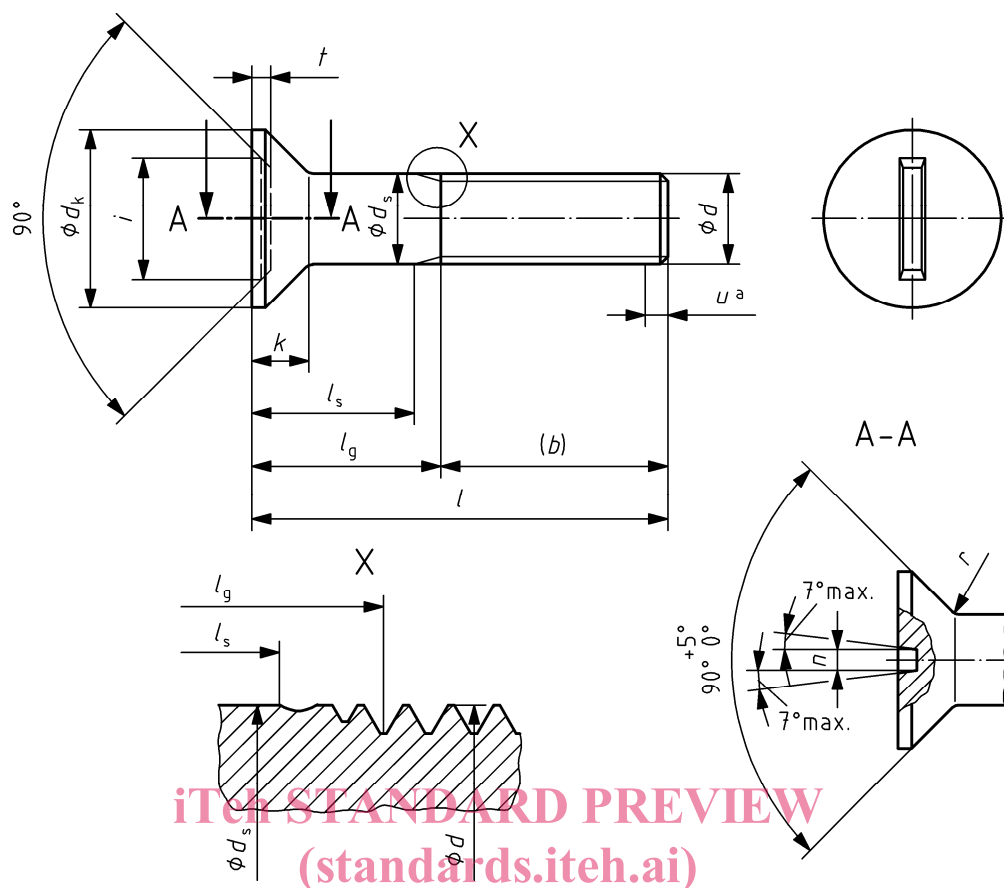
4 Bolts

4.1 General

The test method for suitability for preloading shall be as specified in EN 14399-2.

4.2 Dimensions of bolts

See Figure 1 and Table 2.



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The difference between l_g and l_s shall not be less than $1,5 P$.
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^a Incomplete thread $u \leq 2P$

Figure 1 — Dimensions of bolts

Table 2 — Dimensions of bolts ^a

Dimensions in millimetres

Thread <i>d</i>		M12	(M14) ^b	M16	(M18) ^b	M20						
<i>p^c</i>		1,75	2	2	2,5	2,5						
<i>b</i> (ref.)	<i>d</i>	30	34	38	42	46						
	<i>e</i>	—	40	44	48	52						
	<i>f</i>	—	—	—	—	65						
<i>d_s</i>	max.	12,70	14,70	16,70	18,70	20,84						
	min.	11,30	13,30	15,30	17,30	19,16						
<i>d_k</i>	max.	24,00	28,00	32,00	36	40						
	min.	23,16	27,16	31,16	35	39						
<i>i</i>	max.	16,5	19,5	22,5	25,5	28,5						
	min.	15,5	18,5	21,5	24,5	27,5						
<i>k</i>	nom.	8,00	9,00	10,00	12,0	13,0						
	max. ⁱ	8,75	9,75	10,75	12,9	13,9						
	min. ^j	7,25	8,25	9,25	11,1	12,1						
<i>r</i>	max.	1,6	1,6	1,6	2	2						
	min.	1,2	1,2	1,2	1,5	1,5						
<i>n</i>	max.	3,0	3,0	3,0	3,5	3,5						
	min.	2,5	2,5	2,5	3,0	3,0						
<i>t</i>	max.	4,5	4,5	4,5	5,0	5,0						
	min.	3,0	3,0	3,0	3,5	3,5						
<i>l</i>		<i>l_s</i> and <i>l_g</i> , ^{g, h}										
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nom.	min.	max.	<i>l_s</i> min.	<i>l_g</i> max.	<i>l_s</i> min.	<i>l_g</i> max.	<i>l_s</i> min.	<i>l_g</i> max.	<i>l_s</i> min.	<i>l_g</i> max.	<i>l_s</i> min.	<i>l_g</i> max.
45	43,75	46,25	14	19,25								
50	48,75	51,25	14	19,25			18	24				
55	53,5	56,5	16,25	25			18	24				
60	58,5	61,5	21,25	30	16	22	18	24			23	30,5
65	63,5	66,5	26,25	35	21	31	18	24			23	30,5
70	68,5	71,5	31,25	40	26	36	22	32			23	30,5
75	73,5	76,5	36,25	45	31	41	27	37	21	28,5	23	30,5
80	78,5	81,5	41,25	50	36	46	32	42	25,5	38	23	30,5
85	83,25	86,75	46,25	55	41	51	37	47	30,5	43	26,5	39
90	88,25	91,75	51,25	60	46	56	42	52	35,5	48	31,5	44
95	93,25	96,75	56,25	65	51	61	47	57	40,5	53	36,5	49
100	98,25	101,75	61,25	70	56	66	52	62	45,5	58	41,5	54
110	108,25	111,75			66	76	62	72	55,5	68	51,5	64
120	118,25	121,75			76	86	72	82	65,5	78	61,5	74
130	128	132			80	90	76	86	69,5	82	65,5	78
140	138	142			90	100	86	96	79,5	92	75,5	88
150	148	152			100	110	96	106	89,5	102	85,5	98
160	156	164			110	120			99,5	112		

Table 2 (continued)

Dimensions in millimetres

Thread d		M22	M24	M27	M30	M36						
p^c		2,5	3	3	3,5	4						
b (ref.)	d	50	54	60	66	78						
	e	56	60	66	72	84						
	f	69	73	79	85	97						
d_s	max.	22,84	24,84	27,84	30,84	37,00						
	min.	21,16	23,16	26,16	29,16	35,00						
d_k	max.	44	48	54	60,0	72,0						
	min.	43	47	53	58,8	70,8						
i	max.	30,5	33,5	37,5	42,5	50,5						
	min.	29,5	32,5	36,5	41,5	49,5						
k	nom.	14,0	16,0	17,5	19,50	23,00						
	max. ⁱ	14,9	16,9	18,4	20,55	24,05						
	min. ^j	13,1	15,1	16,6	18,45	21,95						
r	max.	2	2	2,5	2,5	2,5						
	min.	1,5	1,5	2	2	2						
n	max.	3,5	3,5	3,5	4,0	4,0						
	min.	3,0	3,0	3,0	3,5	3,5						
t	max.	5,0	5,0	5,0	5,5	5,5						
	min.	3,5	3,5	3,5	4,0	4,0						
l		l_s and l_g, h										
nom.	min.	max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.
65	63,5	66,5	25	32,5								
70	68,5	71,5	25	32,5	28	37						
75	73,5	76,5	25	32,5	28	37						
80	78,5	81,5	25	32,5	28	37	31	40				
85	83,25	86,75	25	32,5	28	37	31	40				
90	88,25	91,75	27,5	40	28	37	31	40	34,5	45		
95	93,25	96,75	32,5	45	28	37	31	40	34,5	45		
100	98,25	101,75	37,5	50	31	46	31	40	34,5	45		
110	108,25	111,75	47,5	60	41	56	31	40	34,5	45	41	53
120	118,25	121,75	57,5	70	51	66	45	60	34,5	45	41	53
130	128	132	61,5	74	55	70	49	64	40,5	58	41	53
140	138	142	71,5	84	65	80	59	74	50,5	68	41	53
150	148	152	81,5	94	75	90	69	84	60,5	78	46	66
160	156	164			85	100	79	94	70,5	88	56	76
170	166	174			95	110	89	104	80,5	98	66	86
180	176	184			105	120	99	114	90,5	108	76	96
190	186	194			115	130	109	124	100,5	118	86	106
200	196	204			125	140	119	134	110,5	128	96	116
NOTE		The popular lengths are defined in terms of lengths $l_{s \text{ min}}$ and $l_{g \text{ max}}$.										