



Pre-Load Bolt Assemblies BS EN 14399 - 10

HRC Assemblies



BAPP
Group of Companies

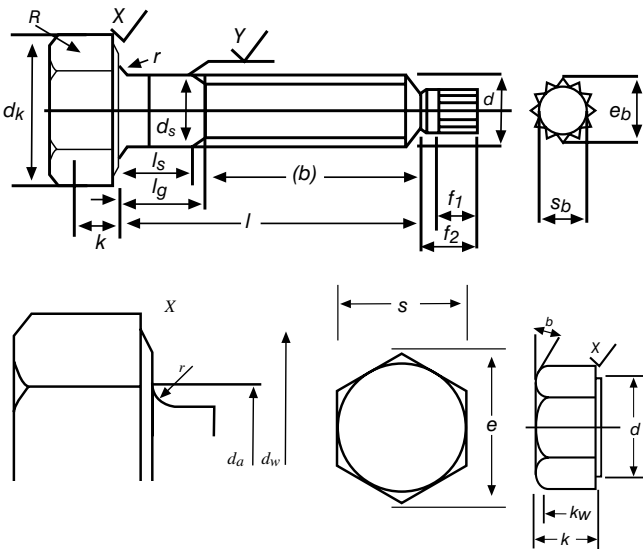
Pre-Load Bolt Assemblies

BS EN 14399 - 10

HRC Assemblies

BS EN 14399-10 HRC Hexagon Bolt Dimensions

Thread <i>d</i>	<i>pb</i>	<i>b(ref.)</i>			<i>c</i>		<i>d_a</i>	<i>d_s</i>			<i>d_w</i>		<i>e</i>			<i>k</i>			<i>k_w</i>	<i>r</i>	<i>s</i>	
		<i>c</i>	<i>d</i>	<i>e</i>	max.	min.	max.	max.	min.	max.	min.	min.	nom.	max.	min.	min.	min.	max.	min.			
M12	1.75	30			0.8	0.4	15.2	12.70	11.30	<i>f</i>	20.1	23.91	7.50	7.95	7.05	4.9	1.2	22	21.16			
M16	2.00	38	44		0.8	0.4	19.2	16.70	15.30		24.9	29.56	10.0	10.75	9.25	6.5	1.2	27	26.16			
M20	2.50	46	52	65	0.8	0.4	24.4	20.84	19.16		29.5	35.03	12.5	13.40	11.60	8.1	1.5	32	31.00			
M22	2.50	50	56	69	0.8	0.4	26.4	22.84	21.16		33.3	39.55	14.0	14.90	13.10	9.2	1.5	36	35.00			
M24	3.00	54	60	73	0.8	0.4	28.4	24.84	23.16		38.0	45.20	15.0	15.90	14.10	9.9	1.5	41	40.00			
M27	3.00	60	66	79	0.8	0.4	32.4	27.84	26.16		42.8	50.85	17.0	17.90	16.10	11.3	2.0	46	45.00			
M30	3.50	66	72	85	0.8	0.4	35.4	30.84	29.16		46.6	55.37	18.7	19.75	17.65	12.4	2.0	50	49.00			



BS EN 14399-10 HRC Spline End Dimensions

Thread <i>d</i>	Width Across Flats of Spline-end <i>s_b^a</i>			Width Across Corners of Spline-end <i>e_b^b</i>	Length of Spline-end <i>F₁</i>	Break off Length <i>F₂</i>
	nom.	max.	min.	min.	min.	max.
M12	7.7	8.0	7.4	8.36	11.0	16.0
M16	11.3	11.6	11.0	12.43	13.0	18.0
M20	14.1	14.4	13.8	15.60	15.0	20.0
M22	15.4	15.7	15.1	17.06	15.5	21.0
M24	16.8	17.1	16.5	18.65	16.0	21.5
M27	19.0	19.3	18.7	21.13	19.0	24.0
M30	21.1	21.4	20.8	23.50	21.0	26.0

a For hot dip galvanized bolts, the dimensions apply before galvanizing except for *s_b max.* which applies after galvanizing.
b *e_b*, min. = 1,13 *s_b*, min.

Product Characteristic		Standard
Material		Steel
General requirements		EN 14399-1
Thread	Tolerance	6g ^a
	International Standards	ISO 261, ISO 965-2
Mechanical Properties	Property Class	10.9
	European Standard	EN ISO 898-1
Impact strength	Value	<i>K_V</i> , min = 27 J at -20 °C
	Test Piece ^b	ISO 148-1
	Test	EN 10045-1
Tolerances	Product Grade	C except: dimensions <i>c</i> and <i>r</i> . Tolerance for lengths ≥ 150 mm ± 4.0mm
	International Standard	EN ISO 4759-1
Surface Finish ^c	Normal	as processed ^d
	Hot Dip Galvanized	EN ISO 10684
	Additional Protection Against Corrosion	After tightening, the non-coated area appearing at the end of the bolt resulting from the fracture of the spline-end may be protected against corrosion by applying an efficient protective treatment (e.g. by a complementary zinc-rich paint).
Surface discontinuities		Limits for surface discontinuities as specified in EN 26157-1.
Acceptability		For acceptance procedure, see EN ISO 3269.

a The tolerance class specified applies before hot dip galvanizing. Hot dip galvanized bolts are intended for assembly with oversize tapped nuts. b The location of Charpy V-notch test pieces in the bolt shank shall be as specified in EN ISO 898-1. c 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. d "As processed" means the normal finish resulting from manufacture with a light coating of oil. e 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 alloys are not permitted.**

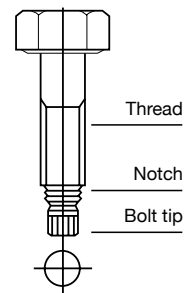
The bolt reacts to the fastening torque and the notched end of the bolt shears off. The required clamping force is thus given.

Features of High Strength HRC (Tension Control) Bolts

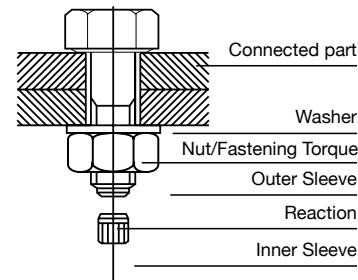
Developed for more simplified bolt fastening and more accurate performance. HRC (Tension Control) Bolts offer excellent characteristics as shown below.

1. Controlled clamping force can be ensured.
2. Completion of bolt fastening can be confirmed by the shear-off of the notched end of the bolt.
3. Removes the possibility of operator error.
4. Fastening can easily be done by electric wrench.
5. Noiseless installation and no need of wrench adjustment.
6. The bolt does not rotate when fastening.

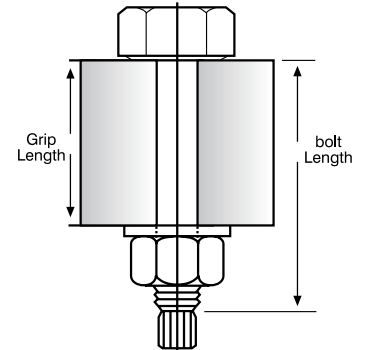
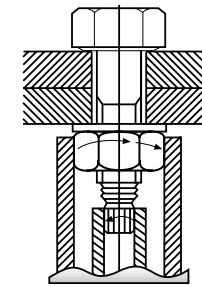
Before Clamping



Before Clamping



After Clamping



Pre-Load Bolt Assemblies BS EN 14399 - 10

HRC Assemblies

BS EN 14399-3 HR Nut Dimensions

Thread <i>d</i>	<i>pb</i>	<i>d_a</i>		<i>d_w</i>		<i>e</i>	<i>m</i>		<i>m_w</i>	<i>c</i>		<i>s</i>		<i>t</i>
		max.	min.	max.	min.		min.	max.		min.	min.	max.	min.	
M12	1.75	13.0	12	c	20.1	23.91	10.8	10.37	8.3	0.8	0.4	22	21.16	0.38
M16	2.00	17.3	16		24.9	29.56	14.8	14.10	11.3	0.8	0.4	27	26.16	0.47
M20	2.50	21.6	20		29.5	35.03	18.0	16.90	13.5	0.8	0.4	32	31.00	0.58
M22	2.50	23.7	22		33.3	39.55	19.4	18.10	14.5	0.8	0.4	36	35.00	0.63
M24	3.00	25.9	24		38.0	45.20	21.5	20.20	16.2	0.8	0.4	41	40.00	0.72
M27	3.00	29.1	27		42.8	50.85	23.8	22.50	18.1	0.8	0.4	46	45.00	0.80
M30	3.50	32.4	30		46.6	55.37	25.6	24.30	19.5	0.8	0.4	50	49.00	0.87

a For hot dip galvanized nuts, the dimensions apply before galvanizing. b P is the pitch of thread. c *d_w*, max. = *s* actual.

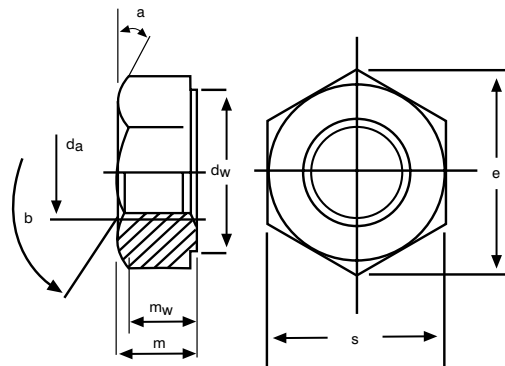
BS EN 14399-3 Nut Proof Loads. Class 10

Nut thread <i>d</i>	Nominal Stress Area of Standard Test Mandrel <i>A_s</i> mm ²	Property Class 10 Tolerance Class 6H or 6AZ	
		Proof Load (<i>A_s</i> x <i>S_p</i>) N	
		Nuts According to EN 14399-3 HR ^a	Nuts with Height <i>m</i> = <i>d</i> HRD ^b
	mm ²	Proof Load kN	Proof Load kN
M12	84.3	97 800	104 900
M16	157.0	182 100	195 500
M20	245.0	284 200	305 000
M22	303.0	351 200	377 200
M24	353.0	409 500	439 500
M27	459.0	532 400	571 500
M30	561.0	650 800	698 400

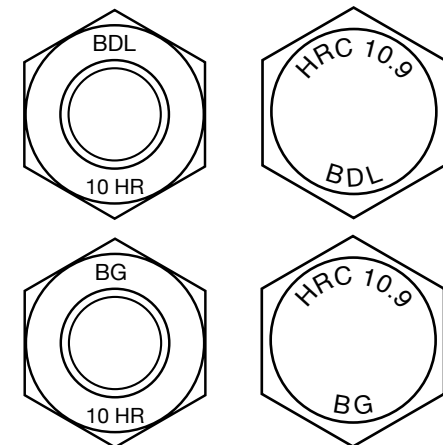
a The proof load values are based on the stress under proof load of 1 160 MPa.
b The proof load values are based on the stress under proof load of 1 245 MPa.

Product Characteristic	Standard	
Material	Steel	
General Requirements	EN 14399-1	
Thread	Tolerance	6H or 6AZ ^a
	International Standards	ISO 261, ISO 965-2, ISO 965-5
Mechanical Properties	Property Class	10 ^b
	European Standard	EN 20898-2
Tolerances	Product Grade	B except dimensions <i>m</i> and <i>c</i>
	International Standard	EN ISO 4759-1 ^c
Surface Finish ^e	Normal	as processed ^d
	Hot Dip Galvanized	EN ISO 10684
	Others	to be agreed ^e
Surface Discontinuities	Limits for surface discontinuities as specified in EN ISO 6157-2.	
Acceptability	For acceptance procedure, see EN ISO 3269.	

a Thread tolerance is 6 H for non-coated nuts and 6 AZ for hot dip galvanized nuts.
b For proof load values, see 5.3. All other mechanical properties as specified in EN 20898-2.
c Except tolerance on perpendicularity of bearing face, see tolerance *t* in Table 5.
d "As processed" means the normal finish resulting from manufacture with a light coating of oil.
e 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 alloys are not permitted.**



Sample Nut Marking Sample Bolt Marking

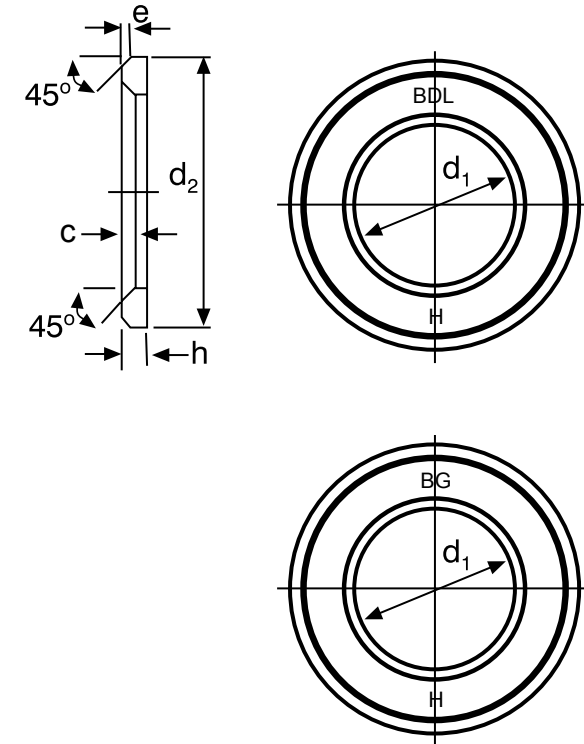


Pre-Load Bolt Assemblies BS EN 14399 - 10

HRC Assemblies

BS EN 14399 Chamfered Washer Dimensions

Nominal size of bolt or screw	BS EN 14399 Parts 5 & 6									
	Inside Diameter d1		Outside Diameter d2		Thickness h		External Chamfer e		Internal Chamfer c	
	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
M12	13.27	13.00	24.00	23.48	3.3	2.7	1.00	0.50	1.9	1.6
M16	17.27	17.00	30.00	29.48	4.3	3.7	1.50	0.75	1.9	1.6
M20	21.33	21.00	37.00	36.38	4.3	3.7	1.50	0.75	2.5	2.0
M22	23.33	23.00	39.00	38.38	4.3	3.7	1.50	0.75	2.5	2.0
M24	25.33	25.00	44.00	43.38	4.3	3.7	1.50	0.75	2.5	2.0
M27	28.52	28.00	50.00	49.00	5.6	4.4	2.00	1.00	3.0	2.5
M30	31.62	31.00	56.00	54.80	5.6	4.4	2.00	1.00	3.0	2.5
M36	37.62	37.00	66.00	64.80	6.6	5.4	2.50	1.25	3.0	2.5



Characteristic	Standard	
General Requirements	BS EN 14399-1	
Finish / Coatings	Self Colour / Black	BS EN 14399-5 & 6
	Hot Dip Galvanized	BS 7371-6 or BS EN ISO 10684
Mechanical Properties	BS EN 14399-5 & 6	
Dimensions & Tolerances	BS EN 14399-5 & 6	
Product Marking	BS EN 14399-5 & 6	

BS EN 14399 Mechanical properties of chamfered washer

Nominal Size	Vickers Hardness (HV)	
	min	max
M16 to M36 inclusive	300	370

Quality Assurance

Galvanised HRC Assemblies, (bolts, nuts and washers) are supplied in a fully assembled condition ready for use. No treatments such as T-Washing or Etching can be applied before installation as this will change the tightening characteristics and prevent the correct preload being achieved.

The components of the assembly, as supplied, have been tested as a batch and must not be mixed with components from any other batch of HRC assemblies.

Care must always be taken to avoid any contamination of the assemblies with anything that may change the lubrication of the nut, bolt thread or washer. SUCH CONTAMINATION WILL EFFECT THE ASSEMBLY PRELOAD THAT IS ACHIEVED DURING TIGHTENING.

Although HRC assemblies are designed to withstand the maximum preloads that can occur when contaminated with water, we would advise that tightening of HRC assemblies is avoided in the rain.