

## UNBRAKO TENSION CONTROL BOLT ( TC Bolt )

### PRODUCT RANGE

- TC BOLT WITH NUT AND WASHER
- EN 14399-10 / EN 14399-3 / EN 14399-6
- DIA M12 - M30 (ANY LENGTH)



### INTRODUCTION

TCB as they commonly known throughout the world, are rapidly replacing conventional high strength friction grip bolts and swaged collar rivets simply because they are quick and easy to install. High strength Unbrako TCB are used in a wide range of applications from bridge splice plates to beam-to-column connections, from stadia roof trusses to rail switches & crossings.

The combination of **Superior Tensile Strength** together with **Phenomenal Ductility** result in a universal bolt that can be employed in almost all steelwork connections.

It is a Heavy duty bolt used in **Steel Frame Construction**. The head is usually domed and is not designed to be driven. The end of the shank has a spline on it which is engaged by a special power wrench which prevents the bolt from turning while the nut is tightened. When the appropriate torque is reached the spline shears off.

**Efficient, Safe, Easy And Quick To Install - Unbrako TCB Are Corrosion Resistant And Eco-friendly Fasteners.**

## LIMITING VALUES OF BOLT FORCE AT THE FRACTURE OF THE SPLINE-END

Thread <i>d</i>	Nominal stress area of standard test mandrel <i>A<sub>s</sub></i> mm <sup>2</sup>	<i>F<sub>r</sub> min</i> 0,7 × <i>f<sub>ub</sub></i> × <i>A<sub>s</sub></i> <sup>a</sup>	<i>F<sub>r</sub> mean min</i> 0,77 × <i>f<sub>ub</sub></i> × <i>A<sub>s</sub></i> <sup>a</sup>
		N	N
M12	84,3	59 010	64 911
M16	157	109 900	120 890
M20	245	171 500	188 650
M22	303	212 100	233 310
M24	353	247 100	271 810
M27	459	321 300	353 430
M30	561	392 700	431 970

<sup>a</sup> *f<sub>ub</sub>* is the nominal tensile strength of the bolt (*R<sub>m, nom</sub>*).

## PROOF LOAD VALUES OF NUTS

Thread <i>d</i>	Nominal stress area of standard test mandrel <i>A<sub>s</sub></i> mm <sup>2</sup>	Property class 10 Tolerance class 6 H or 6 AZ	
		Proof load ( <i>A<sub>s</sub></i> × <i>S<sub>p</sub></i> ), N	
		Nuts according to EN 14399-3 (HR) <sup>a</sup>	Nuts with height <i>m</i> = 1 <i>d</i> (HRD) <sup>b</sup>
M12	84,3	97 800	104 900
M16	157	182 100	195 500
M20	245	284 200	305 000
M22	303	351 200	377 200
M24	353	409 500	439 500
M27	459	532 400	571 500
M30	561	650 800	698 400





a The proof load values are based on the stress under proof load of 1160 MPa.  
b The proof load values are based on the stress under proof load of 1245 MPa.

## MECHANICAL PROPERTIES OF UNBRAKO - TC WASHER

Mechanical Properties Grade	Hardness
EN-14399-6	300 HV TO 370 HV

## GUIDELINES OF UNBRAKO - TC BOLT ASSEMBLY

The marking of the products is in accordance with guidelines specified in EN-14399-10/EN-14399-3/EN14399-6. The grade (10.9 HRC /10 HR/H) and the Manufacturer's Identification (UNBRAKO) are marked on bolt, nut and washer.

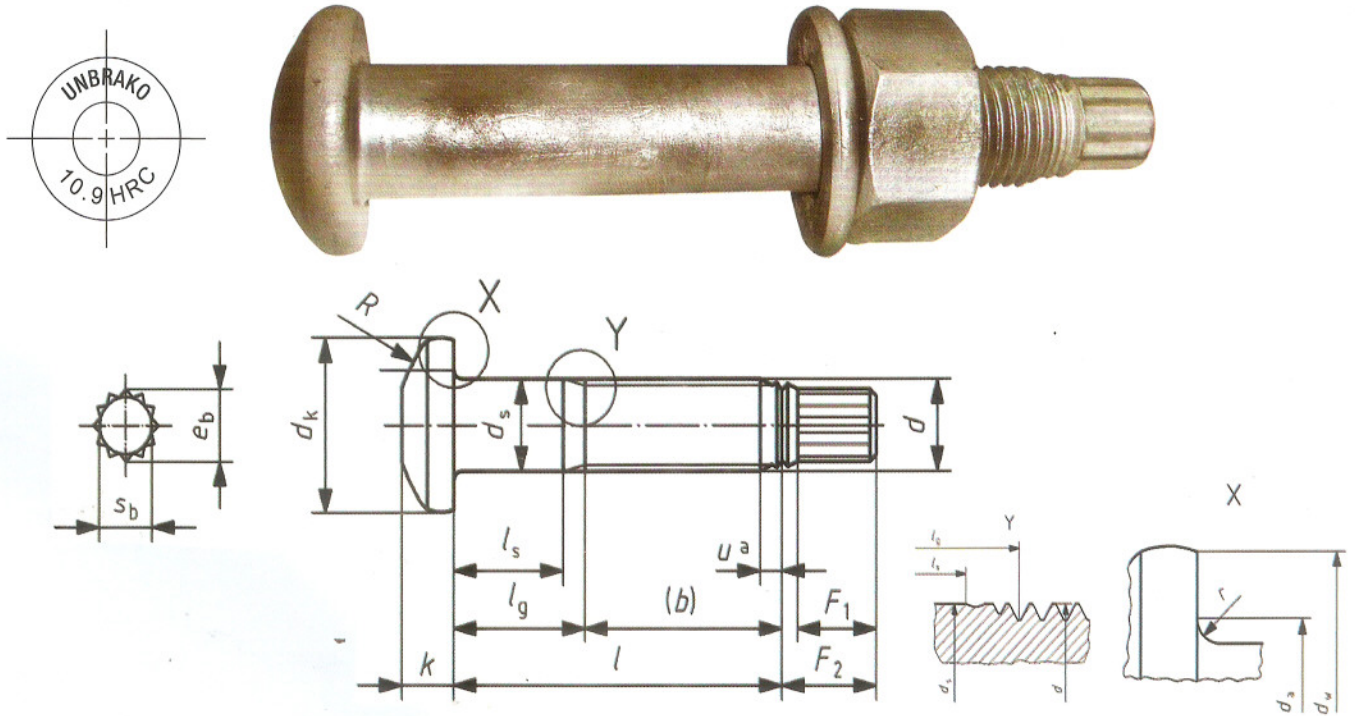
Bolt		Nut	Washer
EN-14399-10 CUP HEAD	EN-14399-10 HEXAGONAL HEAD		
			





# Unbrako Tension Control Bolt CE Approved

## DIMENSIONS OF UNBRAKO - TC BOLT



## DIMENSIONS OF CUP HEAD BOLTS

Dimensions in millimetres

Thread $d$		M12	M16	M20	M22	M24	M27	M30
$d_k$	min.	21	27	34	38,5	43	48	52
	$d_w$	min.	20	26	33	37	41	46
$k$	nom.	8	10	13	14	15	17	19
	max.	8,8	10,8	13,9	14,9	15,9	17,9	20,0
$R$	min.	7,2	9,2	12,1	13,1	14,1	16,1	18,0
	nom.	18	20	22	23	25	37	30

a For hot-dip galvanized bolts, the dimensions apply before galvanizing.

## DIMENSIONS OF spline-end

Dimensions in millimetres

Thread $d$		M12	M16	M20	M22	M24	M27	M30
Width across flats of spline-end, $s_b^a$	nom.	7,7	11,3	14,1	15,4	16,8	19,0	21,1
	max.	8,0	11,6	14,4	15,7	17,1	19,3	21,4
	min.	7,4	11,0	13,8	15,1	16,5	18,7	20,8
Width across corners of spline-end, $e_b^b$	min.	8,36	12,43	15,60	17,06	18,65	21,13	23,50
Length of spline-end, $F_1$	min.	11,0	13,0	15,0	15,5	16,0	19,0	21,0
Break off length, $F_2$	max.	16,0	18,0	20,0	21,0	21,5	24,0	26,0

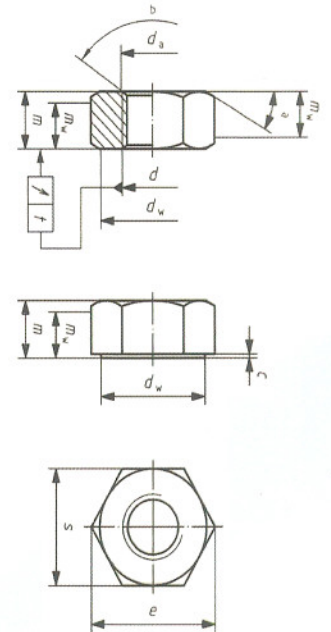
a For hot-dip galvanized bolts, the dimensions apply before galvanizing except for  $s_b^a$  max. which applies after galvanizing.



## UNBRAKO - TC NUT (EN 14399-3)

Thread $d$	M12	M16	M20	M22	M24	M27	M30	
$P^b$	1,75	2	2,5	2,5	3	3	3,5	
$d_a$	max.	13	17,3	21,6	23,7	25,9	29,1	32,4
	min.	12	16	20	22	24	27	30
$d_w$	max.							
	min.	20,1	24,9	29,5	33,3	38,0	42,8	46,6
$e$	min.	23,91	29,56	35,03	39,55	45,20	50,85	55,37
$m$	max.	10,8	14,8	18	19,4	21,5	23,8	25,6
	min.	10,37	14,1	16,9	18,1	20,2	22,5	24,3
$m_w$	min.	8,3	11,3	13,5	14,5	16,2	18,1	19,5
$c$	max.	0,8	0,8	0,8	0,8	0,8	0,8	0,8
	min.	0,4	0,4	0,4	0,4	0,4	0,4	0,4
$s$	max.	22	27	32	36	41	46	50
	min.	21,16	26,16	31	35	40	45	49
$t$		0,38	0,47	0,58	0,63	0,72	0,80	0,87

For hot dip galvanized nuts, the dimensions apply before galvanizing.  
 $P$  is the pitch of thread.  
 $d_{w, max.} = s_{actual}$ .



### Dimensions Of Nuts With Height $m = 1 d$ (HRD)a

Dimensions in millimetres

Thread $d$	M12	M16	M20	M22	M24	M27	M30	
$m$	max.	12,35	16,35	20,65	22,65	24,65	27,65	30,65
	min.	11,65	15,65	19,35	21,35	23,35	26,35	29,35
$m_w$	min.	9,32	12,52	15,48	17,08	18,68	21,08	23,48

a For hot dip galvanized nuts, the dimensions apply before galvanizing.

## UNBRAKO - TC WASHER (EN 14399-6)

Nominal size $d$ (nominal thread diameter of associated bolts)	12	(14) <sup>a</sup>	16	(18) <sup>a</sup>	20	22	24	27	30	36	
$d_1$	min.	13	15	17	19	21	23	25	28	31	37
	max.	13,27	15,27	17,27	19,33	21,33	23,33	25,33	28,52	31,62	37,62
$d_2$	min.	23,48	27,48	29,48	33,38	36,38	38,38	43,38	49	54,80	64,80
	max.	24	28	30	34	37	39	44	50	56	66
$h$	nom.	3	3	4	4	4	4	5	5	6	
	min.	2,7	2,7	3,7	3,7	3,7	3,7	3,7	4,4	4,4	5,4
	max.	3,3	3,3	4,3	4,3	4,3	4,3	4,3	5,6	5,6	6,6
$e$	nom. = min.	0,5	0,5	0,75	0,75	0,75	0,75	0,75	1	1	1,25
	max.	1,0	1,0	1,50	1,50	1,50	1,50	1,50	2	2	2,50
$c$	min.	1,6	1,6	1,6	2	2,0	2,0	2,0	2,5	2,5	2,5
	max.	1,9	1,9	1,9	2,5	2,5	2,5	2,5	3,0	3,0	3,0

NOTE For hot dip galvanized washers the above dimensions apply prior to galvanizing.

a Sizes in brackets are non-preferred sizes.

Dimensions in millimetres

