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## European Technical Assessment

**ETA 18/0441  
of 03/06/2018**

**Technical Assessment Body issuing the ETA:** Technical and Test Institute  
for Construction Prague

**Trade name of the construction product**

LT

**Product family to which the construction  
product belongs**

Product area code: 33  
Torque controlled expansion anchor  
for use in uncracked concrete

**Manufacturer**

LINK YAPI SAN. VE TİC. AŞ.  
GOSB 1000 CD. NO:1016  
ÇAYIROVA – GEBZE  
KOCAELİ  
TURKEY

**Manufacturing plant**

Manufacturing Plant No 2

**This European Technical Assessment  
contains**

10 pages including 8 Annexes which form  
an integral part of this assessment

**This European Technical Assessment is  
issued in accordance with regulation  
(EU) No 305/2011, on the basis of**

EAD 330232-00-0601  
Mechanical fasteners for use in concrete

**This version is a corrigendum to**

ETA 18/0441 of 03/06/2018

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## 1. Technical description of the product

The LT are through-fixing torque-controlled expansion anchors in sizes of M8, M10, M12, M16 and M20. Each type comprises a nut, bolt, washer and expansion sleeve. The anchors are made from zinc-plated and passivated steel.

The anchor is installed in a drilled hole; tightening the nut draws the cone into the sleeve. The expansion of this sleeve applies the anchorage.

The installed anchor is shown in Annex 1.

## 2. Specification of the intended use in accordance with the applicable EAD

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The provisions made in this European Technical Assessment are based on an assumed working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the products in relation to the expected economically reasonable working life of the works.

## 3. Performance of the product and references to the methods used for its assessment

### 3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance (static and quasi-static loading)	See Annex C 1 and C 2
Displacement	See Annex C 1 and C 2

### 3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1 according to EN 13501-1
Resistance to fire	No performance assessed

## 4. Assessment and verification of constancy of performance (AVCP) system applied with reference to its legal base

According to the Decision 97/463/EC of the European Commission<sup>1</sup>, the system 1 of assessment verification of constancy of performance (see Annex V to the Regulation (EU) No 305/2011) apply.

## 5. Technical details necessary for the implementation of the AVCP system, as provided in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Technical and Test Institute for Construction Prague.

Issued in Prague on 03.06.2018

By

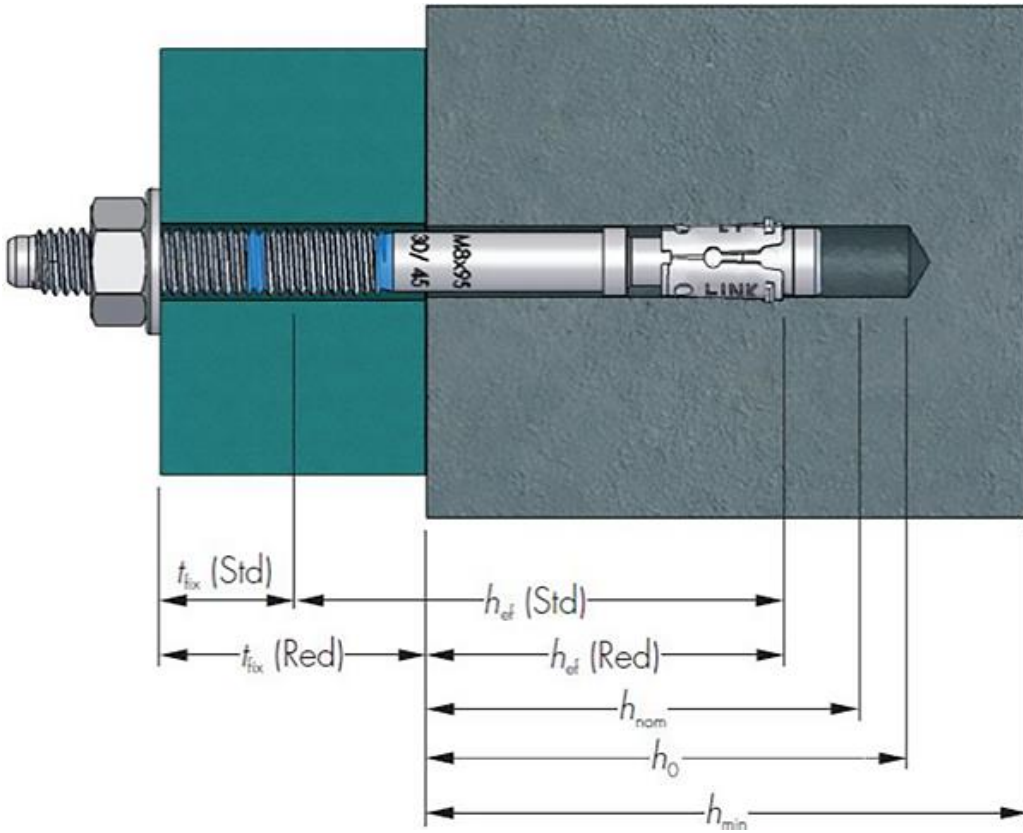
**Ing. Mária Schaan**

Head of the Technical Assessment Body

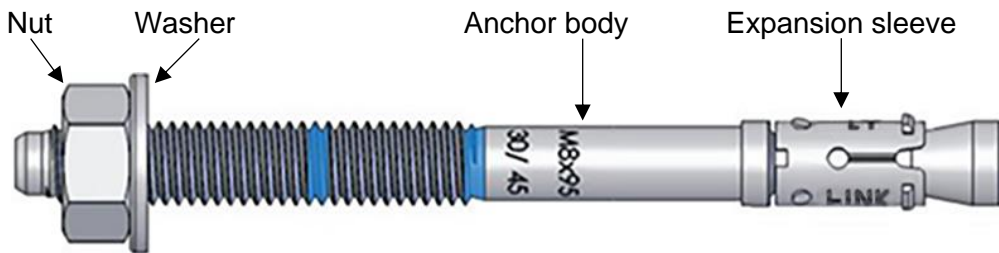
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<sup>1</sup> Official Journal of the European Communities L 198/31 25.7.1997

**LT - Installed anchor**



**LT - components**



**LT**

**Product description**

Installed conditions and components

**Annex A 1**

**Table A1 - Materials**

Component	Material	Coating
Anchor body	Steel grade C17C, EN 10263-2	Electroplated $\geq 5 \mu\text{m}$ and clear chromate film Cr3
Expansion sleeve	Steel grade DC03, EN 10139 M8-M12 C590 M16-M20 C490	
Hexagonal nut	according DIN 934	
Washer	according DIN 125A or DIN 9021	

**Table A2 – Material properties**

Component	M8 – M16	M20
Anchor body – ultimate tensile strength [N/mm <sup>2</sup> ]	400 - 480	480 - 530
	M8 – M12	M16 – M20
Expansion sleeve – hardness [HV]	185 - 215	155 - 185

**Table A3 – Marking**

<b>M8</b>																		
Bolt length [mm]	60	65	75	80	85	90	95	100	105	115	120	140	150	160				
Head marking	B	b	C	d	D	e	E	F	f	G	H	K	L	M				
Bolt marking	-/10	-/15	10/25	15/30	20/35	25/40	30/45	35/50	40/55	50/65	55/70	75/90	85/100	95/110				
<b>M10</b>																		
Bolt length [mm]	65	80	85	90	95	115	120	130	140	150	180							
Head marking	B	D	d	e	E	G	H	J	K	L	P							
Bolt marking	-/5	10/20	15/25	20/30	25/35	45/55	50/60	60/70	70/80	80/90	110/120							
<b>M12</b>																		
Bolt length [mm]	80	100	105	110	115	120	125	135	140	150	160	180	200	220	240	250	260	280
Head marking	D	F	f	G	g	h	H	J	K	L	M	P	R	S	T	U	V	X
Bolt marking	-/5	5/25	10/30	15/35	20/40	25/45	30/50	40/60	45/65	55/75	65/85	85/105	105/125	125/145	145/165	155/175	165/185	185/205
<b>M16</b>																		
Bolt length [mm]	100	105	125	130	140	150	160	180	200	220	250	280	300					
Head marking	F	f	H	J	K	L	M	P	R	S	U	X	Y					
Bolt marking	-/5	-/10	5/25	10/30	20/40	30/50	40/60	60/80	80/100	100/120	130/150	160/180	180/200					
<b>M20</b>																		
Bolt length [mm]	125	140	160	165	180	200	250	300										
Head marking	H	K	M	m	P	R	U	Y										
Bolt marking	-/5	-/20	20/40	25/45	40/60	60/80	110/130	160/180										

LT

**Product description**  
Materials  
Marking

Annex A 2

## Specifications of intended use

### Anchorage subject to:

- Static and quasi-static load.

### Base materials

- Uncracked concrete.
- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum and C50/60 at maximum according EN 206-1:2000-12.

### Use conditions (Environmental conditions)

- Structures subject to dry internal conditions.

### Design:

- The anchorages are designed in accordance with the FprEN 1992-4:2016 and EOTA Technical Report TR 055, December 2016 under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings.

### Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging any components of the anchor.
- Anchor installation in accordance with the manufacturer's specifications and drawings using the appropriate tools.
- Effective anchoring depth, edge distance and spacing not less than the specified values without minus tolerance.
- In case of aborted drill hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application.

LT

Intended use  
Specifications

Annex B 1

**Table B1 - Installation parameters**

Size	Drill hole diameter $d_0$ [mm]	Bolt length $l$ [mm]	Thread length $l_g$ [mm]	Hole diameter in fixture $d_f$ [mm]	Standard embedment			Reduced embedment			Installation torque $T_{inst}$ [N.m]
					Min. hole depth $h_0$ [mm]	Effective embedment depth $h_{ef}$ [mm]	Max. fixture thickness $t_{fix}$ [mm]	Min. hole depth $h_0$ [mm]	Effective embedment depth $h_{ef}$ [mm]	Max. fixture thickness $t_{fix}$ [mm]	
M8	8	60	25	9	-	-	-	40	32	10	15
		65	30	9	-	-	-	40	32	15	
		75	35	9	55	47	10	40	32	25	
		80	40	9	55	47	15	40	32	30	
		85	45	9	55	47	20	40	32	35	
		90	50	9	55	47	25	40	32	40	
		95	55	9	55	47	30	40	32	45	
		100	60	9	55	47	35	40	32	50	
		105	65	9	55	47	40	40	32	55	
		115	75	9	55	47	50	40	32	65	
		120	80	9	55	47	55	40	32	70	
140	100	9	55	47	75	40	32	90			
150	100	9	55	47	85	40	32	100			
160	100	9	55	47	95	40	32	110			
M10	10	65	21	11	-	-	-	49	39	5	30
		80	31	11	59	49	10	49	39	20	
		85	36	11	59	49	15	49	39	25	
		90	41	11	59	49	20	49	39	30	
		95	46	11	59	49	25	49	39	35	
		115	66	11	59	49	45	49	39	55	
		120	71	11	59	49	50	49	39	60	
		130	81	11	59	49	60	49	39	70	
		140	91	11	59	49	70	49	39	80	
		150	101	11	59	49	80	49	39	90	
180	100	11	59	49	110	49	39	120			
M12	12	80	30	13	-	-	-	60	48	5	50
		100	40	13	80	68	5	60	48	25	
		105	45	13	80	68	10	60	48	30	
		110	50	13	80	68	15	60	48	35	
		115	55	13	80	68	20	60	48	40	
		120	60	13	80	68	25	60	48	45	
		125	65	13	80	68	30	60	48	50	
		135	75	13	80	68	40	60	48	60	
		140	80	13	80	68	45	60	48	65	
		150	90	13	80	68	55	60	48	75	
		160	100	13	80	68	65	60	48	85	
		180	100	13	80	68	85	60	48	105	
		200	100	13	80	68	105	60	48	125	
		220	100	13	80	68	125	60	48	145	
240	100	13	80	68	145	60	48	165			
250	100	13	80	68	155	60	48	175			
260	100	13	80	68	165	60	48	185			
280	100	13	80	68	185	60	48	205			
M16	16	100	30	18	-	-	-	80	65	5	100
		105	35	18	-	-	-	80	65	10	
		125	45	18	100	85	5	80	65	25	
		130	50	18	100	85	10	80	65	30	
		140	60	18	100	85	20	80	65	40	
		150	70	18	100	85	30	80	65	50	
		160	80	18	100	85	40	80	65	60	
		180	100	18	100	85	60	80	65	80	
		200	100	18	100	85	80	80	65	100	
		220	100	18	100	85	100	80	65	120	
		250	100	18	100	85	130	80	65	150	
280	100	18	100	85	160	80	65	180			
300	100	18	100	85	180	80	65	200			
M20	20	125	50	22	-	-	-	100	80	5	200
		140	50	22	-	-	-	100	80	20	
		160	61	22	119	99	20	100	80	40	
		165	66	22	119	99	25	100	80	45	
		180	81	22	119	99	40	100	80	60	
		200	100	22	119	99	60	100	80	80	
		250	100	22	119	99	110	100	80	130	
300	100	22	119	99	160	100	80	180			

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Intended use  
Installation parameters

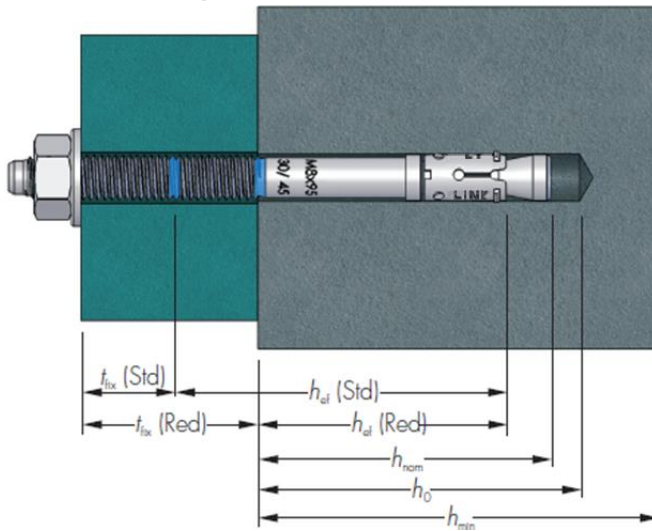
Annex B 2

**Table B2 - Installation parameters – Minimum spacing and edge distance**

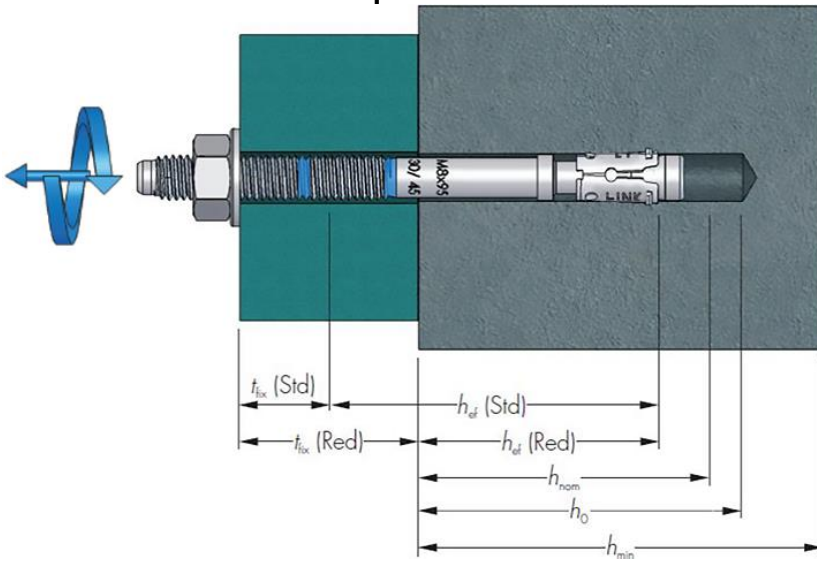
Size	M8		M10		M12		M16		M20	
	Red <sup>1)</sup>	Std	Red <sup>1)</sup>	Std	Red	Std	Red	Std	Red	Std
Minimum thickness of concrete member $h_{min}$	[mm]	100	100	100	100	136	130	170	158	198
Minimum spacing for edge distance $c \geq$	$s_{min}$ [mm]	45	50	55	55	100	75	100	90	125
	[mm]	50	55	65	65	100	90	100	105	125
Minimum edge distance for spacing $s \geq$	$c_{min}$ [mm]	40	40	65	50	100	65	100	80	125
	[mm]	100	100	55	90	100	100	100	150	200

<sup>1)</sup> Use restricted to anchoring statically indeterminate structural components

**Pre-torque installation**



**Post-torque installation**



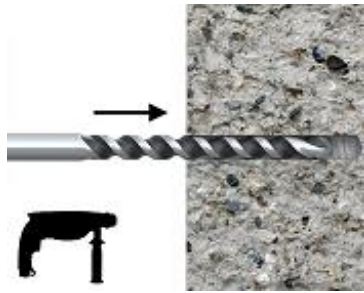
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Intended use  
Installation parameters

Annex B 3

**Installation instructions**

1.



Drill a hole of required diameter and depth

2.



Clear the hole of drilling dust and debris (using blowpump or equivalent method)

3.



Lightly tap the throughbolt through the fixture into hole with a hammer, until fixing depth is reached

4.



Tighten to the recommended torque

5.



Assembled condition of anchor

LT

**Intended use**  
Installation instructions

**Annex B 4**



**Table C1 – Characteristic resistance under tension load**

<b>Steel failure</b>				M8		M10		M12		M16		M20	
Size				Red <sup>1)</sup>	Std	Red <sup>1)</sup>	Std	Red	Std	Red	Std	Red	Std
Characteristic resistance	$N_{Rk,s}$	[kN]		15,8		25,2		37,3		66,1		101,0	
Partial safety factor	$\gamma_{Ms}$	[-]		1,4		1,4		1,4		1,4		1,4	

<b>Pull-out failure</b>													
Characteristic resistance in uncracked concrete C20/25	$N_{Rk,p}$	[kN]		9,0	12,0	9,0	12,0	16,0	25,0	30,0	40,0	35,0	40,0
Installation safety factor	$\gamma_{inst}$	[-]		1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Increasing factor													
Uncracked concrete	C30/37	$\psi_c$	[-]	1,25	1,10	1,36	1,37	1,20	1,16	1,12	1,17	1,18	1,30
	C40/50			1,50	1,21	1,72	1,74	1,40	1,33	1,23	1,34	1,36	1,59
	C50/60			1,76	1,32	2,08	2,10	1,60	1,49	1,34	1,50	1,54	1,89

<b>Concrete cone failure</b>													
Factor for concrete cone failure for uncracked concrete	$k_{ucr,N}$	[-]		11,0									
Installation safety factor	$\gamma_{inst}$	[-]		1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Effective anchorage depth	$h_{ef}$	[mm]		32	47	39	49	48	68	65	85	79	99
Spacing	$S_{cr,N}$	[mm]		96	141	117	147	144	204	195	255	237	297
Edge distance	$C_{cr,N}$	[mm]		48	71	59	74	72	102	98	128	119	149

<b>Splitting failure</b>													
Spacing	$S_{cr,sp}$	[mm]		160	240	200	260	250	370	360	430	410	530
Edge distance	$C_{cr,sp}$	[mm]		80	120	100	130	125	185	180	215	205	265
Installation safety factor	$\gamma_{inst}$	[-]		1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2

<sup>1)</sup> Use restricted to anchoring statically indeterminate structural components

**Table C2 – Displacement under tension load**

Size				M8		M10		M12		M16		M20	
				Red <sup>1)</sup>	Std	Red <sup>1)</sup>	Std	Red	Std	Red	Std	Red	Std
Tension load in uncracked concrete	N	[kN]		3,6	4,8	3,6	4,8	6,3	9,9	11,9	15,9	13,9	15,9
Displacement	$\delta_{N0}$	[mm]		0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20
	$\delta_{N\infty}$	[mm]		0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35

<sup>1)</sup> Use restricted to anchoring statically indeterminate structural components

<b>LT</b>	<b>Annex C 1</b>
<b>Performances</b>	
Characteristic resistance under tension load Displacement under tension load	

**Table C3 – Characteristic resistance under shear load**

Steel failure without lever arm			M8		M10		M12		M16		M20	
			Red <sup>1)</sup>	Std	Red <sup>1)</sup>	Std	Red	Std	Red	Std	Red	Std
Size												
Characteristic resistance	$V_{Rk,s}^0$ [kN]		10,1		16,0		23,3		43,0		67,4	
Ductility factor	$k_7$ [-]		0,8		0,8		0,8		0,8		0,8	
Partial safety factor	$\gamma_{Ms}$ [-]		1,25		1,25		1,25		1,25		1,25	

Steel failure with lever arm			M8		M10		M12		M16		M20	
Characteristic resistance	$M_{Rk,s}^0$ [Nm]		17		35		61		154		301	
Partial safety factor	$\gamma_{Ms}$ [-]		1,25		1,25		1,25		1,25		1,25	

Concrete pry-out failure			M8		M10		M12		M16		M20	
Characteristic resistance concrete C20/25	$V_{Rk,cp}$ [kN]		-	-	12,0	-	-	-	-	-	68,7	-
Factor	$k_8$ [-]		-	-	1,0	-	-	-	-	-	2,0	-
Installation safety factor	$\gamma_{inst}$ [-]		1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2

Concrete edge failure			M8		M10		M12		M16		M20	
Effective length of anchor	$l_f$ [mm]		32	47	39	49	48	68	65	85	79	99
Anchor diameter	$d_{nom}$ [mm]		8		10		12		16		20	
Installation safety factor	$\gamma_{inst}$ [-]		1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2

<sup>1)</sup> Use restricted to anchoring statically indeterminate structural components

**Table C4 – Displacement under shear load**

Size			M8		M10		M12		M16		M20	
			Red <sup>1)</sup>	Std	Red <sup>1)</sup>	Std	Red	Std	Red	Std	Red	Std
Tension load in uncracked concrete	$V$ [kN]		4,0	4,0	4,8	6,3	9,2	9,2	17,1	17,1	27,4	27,4
Displacement	$\delta_{v0}$ [mm]		1,8	1,8	1,8	1,8	2,4	2,4	3,0	3,0	3,0	3,0
	$\delta_{v\infty}$ [mm]		2,7	2,7	2,7	2,7	3,6	3,6	4,5	4,5	4,5	4,5

<sup>1)</sup> Use restricted to anchoring statically indeterminate structural components

<b>LT</b>	<b>Annex C 2</b>
<b>Performances</b>	
Characteristic resistance under shear load Displacement under shear load	