



**Technical and Test Institute
for Construction Prague**
Prosecká 811/76a
190 00 Prague
Czech Republic
eota@tzus.cz



Member of



www.eota.eu

European Technical Assessment

**ETA 20/0640
of 18/11/2020**

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

Trade name of the construction product

LE-ZN
LE-DZN

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

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

Manufacturer

Klimas Sp. z o.o.
Kuźnica Kiedrzyńska,
Ul. Wincentego Witosa 135/137,
42-233 Mykanów,
Poland

Manufacturing plant

Klimas Sp. z o.o.

**This European Technical Assessment
contains**

11 pages including 9 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 330232-01-0601
Mechanical fasteners for use in concrete

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1. Technical description of the product

The LE-ZN, LE-DZN are through-fixing torque-controlled expansion anchors in sizes of M6, M8, M10, M12, M16 and M20. Each type comprises a nut, bolt, washer and expansion sleeve. The anchors are made from steel with zinc coating.

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 A 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	See Annex C3

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 Commission¹, 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 18.11.2020

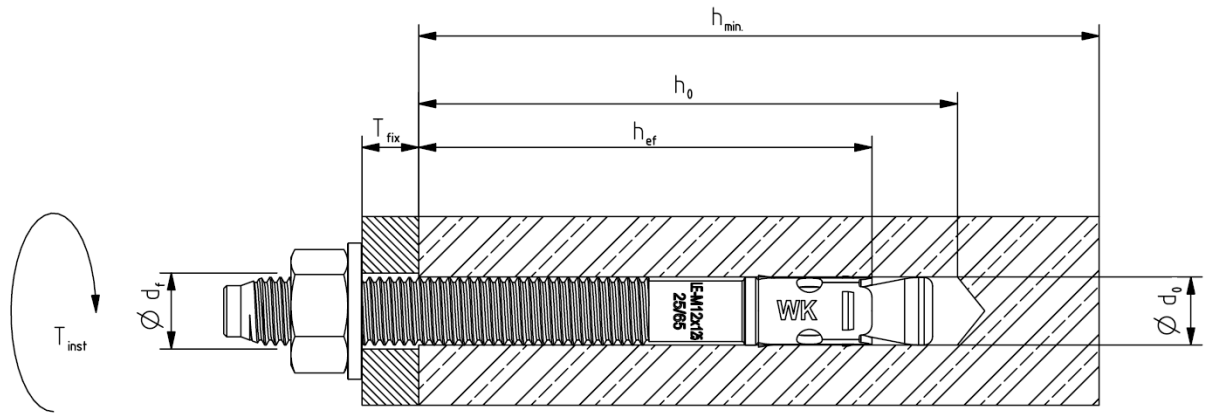
By

Ing. Mária Schaan

Head of the Technical Assessment Body

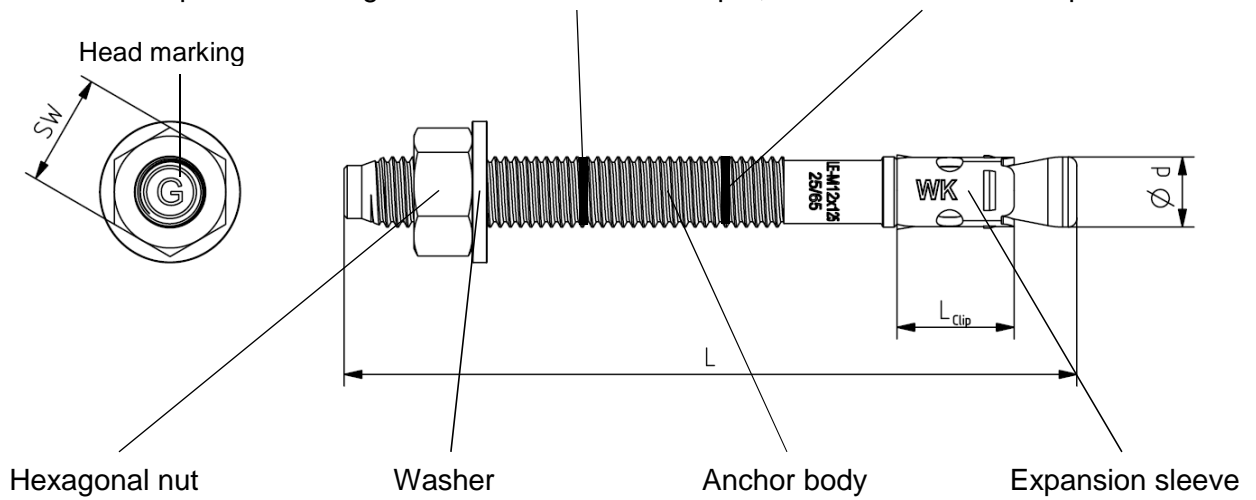
¹ Official Journal of the European Communities L 198/31 25.7.1997

Installed anchor



Components

Optional marking: Standard embedment depth, reduce embedment depth



LE-ZN, LE-DZN

Product description
Installed conditions and components

Annex A 1

Table A1 - Materials

Component	Material
Anchor body	Carbon steel
Expansion sleeve	Carbon steel
Hexagonal nut	Steel class 8 DIN 934 / EN ISO 898-2
Washer	Steel DIN 125 or EN ISO 7089 / DIN 9021A or EN ISO 7093
Protection	LE-ZN - Zinc coating ($\geq 5\mu\text{m}$); electroplated acc. to EN ISO 4042, all parts LE-DZN - flake zinc ($\geq 8\mu\text{m}$) acc. to ISO 2178:2016 for body, nut and washer

Table A2 – Marking

Parameters			M6	M8	M10	M12	M16	M20		
Bolt length:	L	[mm]	50÷160	60÷255	85÷255	85÷305	105÷345	160÷400		
Width torque wrench:	SW	[mm]	10	13	17	19	24	30		
Head Bolt Marking										
Bolt length [mm]	$L \geq$	20	65	77	90	103	115	128	141	153
Head marking		B	C	D	E	F	G	H	I	J
Bolt length [mm]	$L \geq$	166	178	191	204	217	230	242	255	281
Head marking		K	L	M	N	O	P	Q	R	S

LE-ZN, LE-DZN
Product description
 Materials
 Marking
Annex A 2

Specifications of intended use

Anchorage subject to:

- Static and quasi-static load
- Fire exposure

Base materials

- Uncracked concrete.
- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum and C50/60 at maximum according EN 206:2013+A1:2016

Use conditions (Environmental conditions)

- Structures subject to dry internal conditions.
- M6 is only for anchoring structural components which are statically indeterminate and subject to internal conditions.

Design:

- The anchorages are designed in accordance with the EN 1992-4 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.
- Anchorages under fire exposure have to be designed in accordance with EN 1992-4.

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.

LE-ZN, LE-DZN

Intended use
Specifications

Annex B 1

Table B1 - Installation parameters

Installation parameters			M6 ¹⁾	M8	M10	M12	M16	M20
drill diameter:	d _o	[mm]	6	8	10	12	16	20
Fixture clearance hole diameter:	d _f	[mm]	8	10	12	14	18	22
nominal torque:	T _{inst}	[Nm]	5	20	30	50	100	160
Width torque wrench:	SW	[mm]	10	13	17	19	24	30
Standard embedment								
drill depth:	h ₁	[mm]	43	52	74	88	106	145
embedment depth:	h _{nom}	[mm]	38	47	69	80	98	130
effective depth:	h _{ef}	[mm]	35	40	60	70	85	115
Reduced embedment								
drill depth:	h ₁	[mm]	-	-	54	68	86	125
embedment depth:	h _{nom}	[mm]	-	-	49	60	78	110
effective depth:	h _{ef}	[mm]	-	-	40	50	65	95

1) anchoring structural components which are statically indeterminate and subject to internal conditions.

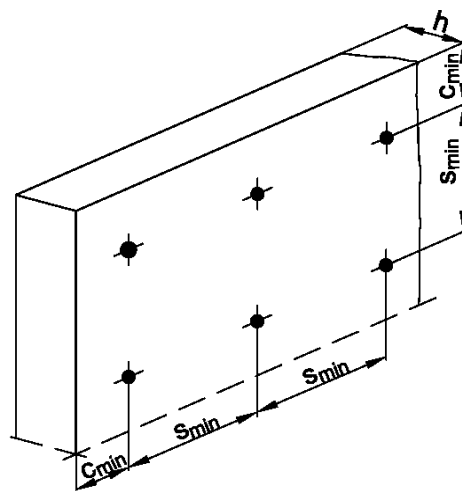
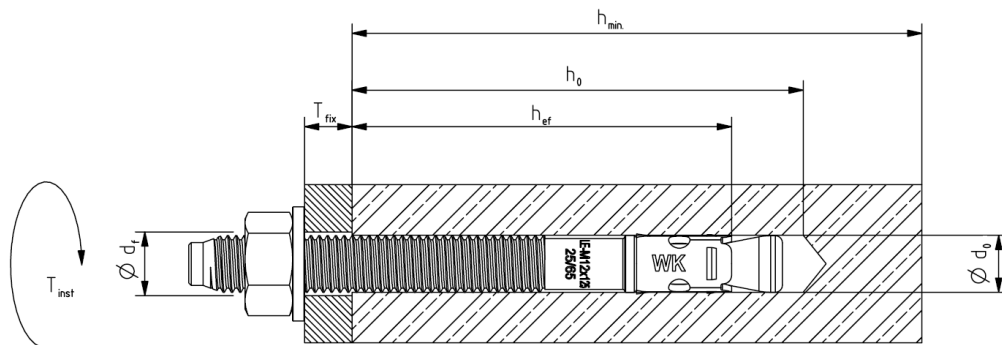
LE-ZN, LE-DZN

Intended use
Installation parameters

Annex B 2

Table B2 - Installation parameters – Minimum spacing and edge distance

Installation parameters			M6	M8	M10	M12	M16	M20
Standard embedment								
effective depth:	h_{ef}	[mm]	35	40	60	70	85	115
Minimum thickness of concrete member:	h_{min}	[mm]	100	100	120	160	170	230
Minimum allowable spacing:	s_{min}	[mm]	47	54	82	109	116	156
Minimum allowable edge distance:	c_{min}	[mm]	47	54	82	109	116	156
Reduced embedment								
effective depth:	h_{ef}	[mm]	-	-	40	50	65	95
Minimum thickness of concrete member:	h_{min}	[mm]	-	-	100	100	130	190
Minimum allowable spacing:	s_{min}	[mm]	-	-	54	68	88	128
Minimum allowable edge distance:	c_{min}	[mm]	-	-	54	68	88	128



LE-ZN, LE-DZN

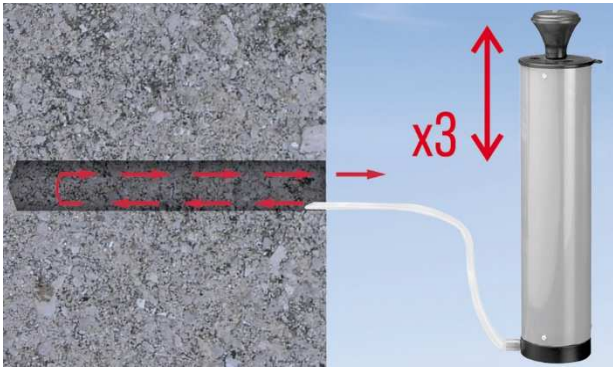
Intended use
Installation parameters

Annex B 3

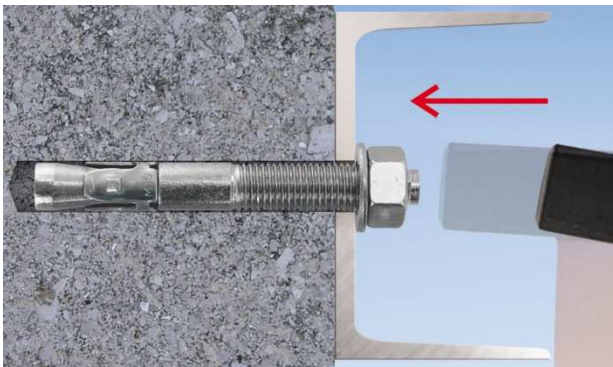
Installation instructions



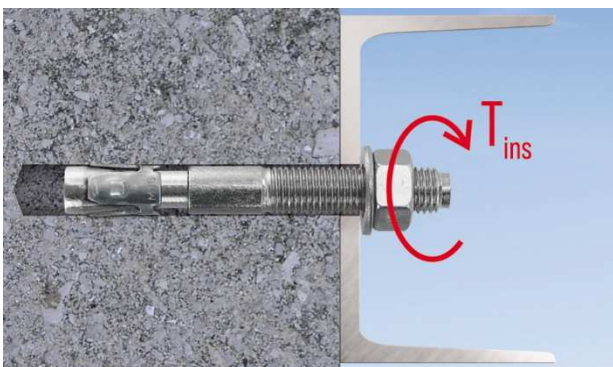
Drill a hole of required diameter and depth



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



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



Tighten to the recommended torque

LE-ZN, LE-DZN

Intended use
Installation instructions

Annex B 4

Table C1 – Characteristic resistance under tension load

Size			M6	M8	M10	M12	M16	M20
STEEL FAILURE								
Characteristic resistance – reduced part	$N_{Rk,s}$	[kN]	9,9	16,2	27,7	38,6	71,9	126,7
Partial safety factor class:	$\gamma_{M,s}$	[-]	1,81					
PULL OUT FAILURE								
Characteristic resistance in C20/25 uncracked concrete:	$N_{Rk,p}$	[kN]	1)	1)	1)	1)	1)	1)
Installation safety factor:	γ_{ins}	[-]	1,0	1,0	1,0	1,0	1,0	1,0
Increasing factors for $N^0_{Rk,c}$:	ψ_c	C30/37	1,00	1,06				
		C40/50	1,00	1,11				
		C50/60	1,00	1,16				
CONCRETE CONE FAILURE AND SPLITTING FAILURE								
Factor for uncracked concrete:	$k_{ucr,N}$	[-]	11,0					
Installation safety factor:	γ_{ins}	[-]	1,0					
Concrete cone failure:	$s_{cr,N}$	[mm]	3 x h_{ef}					
	$c_{cr,N}$	[mm]	1.5 x h_{ef}					
Standard embedment								
Effective anchorage depth:	h_{ef}	[mm]	35	40	60	70	85	115
Splitting failure:	$s_{cr,sp}$	[mm]	175	200	300	400	425	575
	$c_{cr,sp}$	[mm]	90	100	150	200	215	290
Reduced embedment								
Effective anchorage depth:	h_{ef}	[mm]	-	-	40	50	65	95
Splitting failure:	$s_{cr,sp}$	[mm]	-	-	200	250	325	475
	$c_{cr,sp}$	[mm]	-	-	100	125	165	240

1) The pull-out failure mode is not decisive

Table C2 – Displacement under tension load

Size			M6	M8	M10	M12	M16	M20
Tension service load in uncracked concrete:	N	[kN]	5,0	6,0	6,3	8,8	14,0	25,7
Displacement:	δ_{N0}	[mm]	1,5	1,5	1,5	1,6	1,7	1,8
	$\delta_{N\infty}$	[mm]	2,4					

LE-ZN, LE-DZN**Performances**

Characteristic resistance under tension load
Displacement under tension load

Annex C 1

Table C3 – Characteristic resistance under shear load

Size			M6	M8	M10	M12	M16	M20
STEEL FAILURE WITHOUT LEVER ARM								
Characteristic resistance	$V_{Rk,s}$	[kN]	6,8	12,4	19,7	28,7	53,4	83,3
Partial safety factor class:	$\gamma_{M,s}$	[-]	1,51					
STEEL FAILURE WITHOUT LEVER ARM								
Characteristic bending moment	$M_{Rk,s}$	[Nm]	15,6	38,0	75,4	131,6	316,0	621,8
Partial safety factor:	$\gamma_{M,s}$	[-]	1,51					
CONCRETE PRYOUT FAILURE								
Pryout factor:	k_8	[-]	1,0	1,0	1,0	1,0	2,0	2,0
Installation safety factor:	γ_{ins}	[-]	1,0					
CONCRETE EDGE FAILURE								
Effective length of anchor:	l_f	[mm]	35	40	40 / 60	50 / 70	65 / 85	95 / 115
Outside diameter of anchor:	d_{nom}	[mm]	6	8	10	12	16	20
Installation safety factor:	γ_{ins}	[-]	1,0					

Table C4 – Displacement under shear load

Size			M6	M8	M10	M12	M16	M20
Tension service load in uncracked concrete:	V	[kN]	6,1	6,0	9,6	12,7	23,6	34,6
Displacement:	δ_{v0}	[mm]	1,2	1,3	1,6	1,8	1,8	3,0
	$\delta_{v\infty}$	[mm]	1,8	2,0	2,4	2,7	2,7	4,5

LE-ZN, LE-DZN**Performances**

Characteristic resistance under shear load
 Displacement under shear load

Annex C 2

Table C5 – Characteristic values of resistance to tension load under fire exposure

Size			M6	M8	M10	M12	M16	M20
Min. Effective anchorage depth:	h_{ef}	[mm]	35	40	40	50	65	95
Characteristic fire resistance duration at 30 minutes								
Steel failure	$N_{Rk,s,fi}$	[kN]	0,2	0,4	0,9	1,7	3,1	4,9
Pull-Out Failure	$N_{Rk,p,fi}$	[kN]	2,5	3,0	3,3	4,5	7,0	12,5
Concrete Cone Failure	$N_{Rk,c,fi}$	[kN]	1,8	2,6	2,6	4,5	8,6	22,2
Characteristic fire resistance duration at 60 minutes								
Steel failure	$N_{Rk,s,fi}$	[kN]	0,2	0,3	0,8	1,3	2,4	3,7
Pull-Out Failure	$N_{Rk,p,fi}$	[kN]	2,5	3,0	3,3	4,5	7,0	12,5
Concrete Cone Failure	$N_{Rk,c,fi}$	[kN]	1,8	2,6	2,6	4,5	8,6	22,2
Characteristic fire resistance duration at 90 minutes								
Steel failure	$N_{Rk,s,fi}$	[kN]	0,1	0,3	0,6	1,1	2,0	3,2
Pull-Out Failure	$N_{Rk,p,fi}$	[kN]	2,5	3,0	3,3	4,5	7,0	12,5
Concrete Cone Failure	$N_{Rk,c,fi}$	[kN]	1,8	2,6	2,6	4,5	8,6	22,2
Characteristic fire resistance duration at 120 minutes								
Steel failure	$N_{Rk,s,fi}$	[kN]	0,1	0,2	0,5	0,8	1,6	2,5
Pull-Out Failure	$N_{Rk,p,fi}$	[kN]	2,0	2,4	2,6	3,6	5,6	10,0
Concrete Cone Failure	$N_{Rk,c,fi}$	[kN]	1,5	2,0	2,0	3,6	6,9	17,8
Spacing								
Spacing	$s_{cr,N}$	[mm]	4 x h_{ef}					
	s_{min}	[mm]	47	54	54	68	88	128
Edge distance	$c_{cr,N}$	[mm]	2 x h_{ef}					
	c_{min}	[mm]	2 x h_{ef} , however if the fire attack is from more than one side, the edge distance of the anchor has to be ≥ 300 mm and ≥ 2 x h_{ef}					

$\gamma_{M,fi}$ - partial safety factor for resistance under fire exposure (usually $\gamma_{M,fi}=1.0$)

Table C6 – Characteristic values of resistance to shear load under fire exposure

Size			M6	M8	M10	M12	M16	M20
Characteristic fire resistance duration at 30 minutes								
Steel Failure without lever arm	$V_{Rk,s,fi}$	[kN]	0,2	0,4	0,9	1,7	3,1	4,9
Steel Failure with lever arm	$M_{Rk,s,fi}$	[Nm]	0,1	0,4	1,7	3,9	9,3	18,3
Characteristic fire resistance duration at 60 minutes								
Steel Failure without lever arm	$V_{Rk,s,fi}$	[kN]	0,2	0,3	0,8	1,3	2,4	3,7
Steel Failure with lever arm	$M_{Rk,s,fi}$	[Nm]	0,1	0,3	1,4	2,9	7,0	13,7
Characteristic fire resistance duration at 90 minutes								
Steel Failure without lever arm	$V_{Rk,s,fi}$	[kN]	0,1	0,3	0,6	1,1	2,0	3,2
Steel Failure with lever arm	$M_{Rk,s,fi}$	[Nm]	0,1	0,3	1,1	2,5	6,0	11,9
Characteristic fire resistance duration at 120 minutes								
Steel Failure without lever arm	$V_{Rk,s,fi}$	[kN]	0,1	0,2	0,5	0,8	1,6	2,5
Steel Failure with lever arm	$M_{Rk,s,fi}$	[Nm]	0,1	0,2	0,9	1,9	4,6	9,1

LE-ZN, LE-DZN

Performances
Characteristic values of resistance under fire exposure

Annex C 3