

DECLARATION OF PERFORMANCE : No LE-ZNA4/21

1. Unique identification code of the product-type: **LE-ZNA4**
2. Intended use/es: **Torque controlled expansion anchor for use in cracked and uncracked concrete**
3. Manufacturer: **KLIMAS Sp. z o.o.
ul. Wincentego Witosa 135/137
Kućnica Kiedrzyńska 42-233 Mykanów**
4. Authorised representative: **not applicable**
5. System/s of AVCP: **system 1**
6. European Assessment Document: **a) EAD 330232-01-0601
b) ETA-20/0641 28/12/2023
c) Instytut Techniki Budowlanej - ITB
d) 1488**
7. Declared performance/s:

7a. Mechanical resistance and stability (BWR 1)

Table C1: Design method EN 1992-4 , Characteristic resistance for tension loads

Size			M8	M10	M12	M16
STEEL FAILURE						
Characteristic resistance	N _{Rk,s}	[kN]	16,2	27,7	38,6	71,9
Partial safety factor class:	γ _{M,s}	[-]	1,57			
PULL OUT FAILURE						
Characteristic resistance in uncracked concrete C20/25:	N _{Rk,p}	[kN]	1)	1)	1)	1)
Characteristic resistance in cracked concrete C20/25:	N _{Rk,p}	[kN]	1)	1)	1)	1)
Installation safety factor:	γ _{ins}	[-]	1,0			1,2
Increasing factors for N ⁰ _{Rk,c} :	Ψ _c	C30/37	1,04			
		C40/50	1,06			
		C50/60	1,08			
CONCRETE CONE FAILURE AND SPLITTING FAILURE						
Factor for uncracked concrete:	k _{ucr,N}	[-]	11,0			
Factor for cracked concrete:	k _{ucr,N}	[-]	7,7			
Installation safety factor:	γ _{ins}	[-]	1,0			1,2
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]	40	60	70	85
Splitting failure:	s _{cr,sp}	[mm]	2 x c _{cr,sp}			
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Splitting failure:	c _{cr,sp}	[mm]	72	96	105	127,5
Reduced embedment						
Effective anchorage depth:	h _{ef}	[mm]	-	40	50	65
Splitting failure:	s _{cr,sp}	[mm]	2 x c _{cr,sp}			
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Splitting failure:	c _{cr,sp}	[mm]	-	80	100	130

1) The pull-out failure mode is not decisive

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Table C2: Displacements under tension loading

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

Table C3: Design method EN-1992-4, Characteristic resistance under shear loads

Size			M8	M10	M12	M16
STEEL FAILURE WITHOUT LEVER ARM						
Characteristic resistance	V _{Rk,s}	[kN]	12,4	19,7	26,6	49,6
Partial safety factor class:	γ _{M,s}	[-]	1,31			
STEEL FAILURE WITH LEVER ARM						
Characteristic bending moment	M _{Rk,s}	[Nm]	25,5	50,8	89,1	226,4
Partial safety factor:	γ _{M,s}	[-]	1,31			
CONCRETE PRYOUT FAILURE						
Standard embedment						
Pryout factor:	k _g	[-]	1,0	2,0	2,0	2,0
Reduced embedment						
Pryout factor:	k _g	[-]	1,0	1,0	1,0	2,0
Installation safety factor:	γ _{ins}	[-]	1,0			
CONCRETE EDGE FAILURE						
Effective length of anchor:	l _f	[mm]	40	40 / 60	50 / 70	65 / 85
Outside diameter of anchor:	d _{nom}	[mm]	8	10	12	16
Installation safety factor:	γ _{ins}	[-]	1,0			

Table C4: Displacements under shear loading

Size			M8	M10	M12	M16
Tension service load in concrete:	V	[kN]	6,1	9,6	12,7	19,7
Displacement:	δ_{V0}	[mm]	1,9	2,1	2,2	2,2
	$\delta_{V\infty}$	[mm]	2,9	3,1	3,2	3,2

Table C5: Design method EN-1992-4, Characteristic resistances load – seismic performance category C1

Size			M8	M10	M12	M16
TENSION LOAD STEEL FAILURE						
Characteristic resistance	N _{Rk,s,C1}	[kN]	16,2	27,7	38,6	71,9
Partial safety factor	γ _{Ms,s,C1}	[-]	1,57			
TENSION LOAD PULLOUT FAILURE						
Characteristic resistance	N _{Rk,p,C1}	[kN]	8,5	8,5	12,0	18,0
Partial safety factor	γ _{Ms,p,C1}	[-]	1,0	1,0	1,0	1,2
SHEAR LOAD STEEL FAILURE WITHOUT LEVER ARM						
Characteristic resistance	V _{Rk,s,C1}	[kN]	8,2	13,6	20,7	39,7
Partial safety factor	γ _{Ms,C1}	[-]	1,31			

7b. Safety in case of fire (BWR 2)

Reaction to fire	Class A1 according to EN 13501-1
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Table C6: Design method EN-1992-4 Characteristic resistance for tension loads under fire exposure

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

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

Table C7: Design method EN-1992-4 Characteristic value of resistance to shear loads under fire exposure

Size			M8	M10	M12	M16
Characteristic fire resistance duration at 30 minutes						
Steel Failure without lever arm	$V_{Rk,s,fi(30)}$	[kN]	0,4	0,9	1,7	3,1
Steel Failure with lever arm	$M_{Rk,s,fi(30)}$	[Nm]	0,4	1,1	2,6	6,7
Characteristic fire resistance duration at 60 minutes						
Steel Failure without lever arm	$V_{Rk,s,fi(60)}$	[kN]	0,3	0,8	1,3	2,4
Steel Failure with lever arm	$M_{Rk,s,fi(60)}$	[Nm]	0,3	1,0	2,0	5,0
Characteristic fire resistance duration at 90 minutes						
Steel Failure without lever arm	$V_{Rk,s,fi(90)}$	[kN]	0,3	0,6	1,1	2,0
Steel Failure with lever arm	$M_{Rk,s,fi(90)}$	[Nm]	0,3	0,7	1,7	4,3
Characteristic fire resistance duration at 120 minutes						
Steel Failure without lever arm	$V_{Rk,s,fi(120)}$	[kN]	0,2	0,5	0,8	1,6
Steel Failure with lever arm	$M_{Rk,s,fi(120)}$	[Nm]	0,2	0,6	1,3	3,3
Concrete pryout failure R30-R120						
Characteristic resistance	$V_{Rk,cp,fi}$	[kN]	Concrete pryout failure according to EN 1992-4			
Spacing	s_{min}	[mm]	54	54	68	88
Edge distance	c_{min}	[mm]	54	54	68	88

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8. Appropriate Technical Documentation and/or Specific Technical Documentation: **not applicable**

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

Kuźnica Kiedrzyńska

05.01.2024 r.

(place and date of issue)

*This declaration replaces the declaration from
24.03.2023.*

Kierownik działu technicznego

Adam Szczepanowski

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(signature)