

# DECLARATION OF PERFORMANCE No LE-A4/21

1. Unique identification code of the product-type: **LE-A4**
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**

			M8	M10	M12	M16
STEEL FAILURE						
Characteristic resistance	N <sub>Rk,s</sub>	[kN]	16,7	28,5	39,7	74,0
Partial safety factor class:	γ <sub>M,s</sub>	[-]	1,62			
PULL OUT FAILURE						
Characteristic resistance in uncracked concrete C20/25:	N <sub>Rk,p</sub>	[kN]	1)	1)	1)	1)
Characteristic resistance in cracked concrete C20/25:	N <sub>Rk,p</sub>	[kN]	1)	1)	1)	1)
Installation safety factor:	γ <sub>ins</sub>	[-]	1,0			1,2
Increasing factors for N <sup>0</sup> <sub>Rk,c</sub> :	Ψ <sub>c</sub>	C30/37	1,04			
		C40/50	1,06			
		C50/60	1,08			
CONCRETE CONE FAILURE AND SPLITTING FAILURE						
Factor for uncracked concrete:	k <sub>ucr,N</sub>	[-]	11,0			
Factor for cracked concrete:	k <sub>ucr,N</sub>	[-]	7,7			
Installation safety factor:	γ <sub>ins</sub>	[-]	1,0			1,2
Concrete cone failure:	s <sub>cr,N</sub>	[mm]	3 x h <sub>ef</sub>			
	c <sub>cr,N</sub>	[mm]	1.5 x h <sub>ef</sub>			
Standard embedment						
Effective anchorage depth:	h <sub>ef</sub>	[mm]	40	60	70	85
Splitting failure:	s <sub>cr,sp</sub>	[mm]	2 x c <sub>cr,sp</sub>			
LE-A4						
Splitting failure:	c <sub>cr,sp</sub>	[mm]	72	90	105	127,5
Reduced embedment						
Effective anchorage depth:	h <sub>ef</sub>	[mm]	-	40	50	65
Splitting failure:	s <sub>cr,sp</sub>	[mm]	2 x c <sub>cr,sp</sub>			
LE-A4						
Splitting failure:	c <sub>cr,sp</sub>	[mm]	-	100	100	165

1) The pull-out failure mode is not decisive

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**Table C2: Displacements under tension loading**

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

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

			M8	M10	M12	M16
STEEL FAILURE WITHOUT LEVER ARM						
Characteristic resistance	V <sub>Rk,s</sub>	[kN]	12,8	20,3	25,9	48,6
Partial safety factor class:	γ <sub>M,s</sub>	[-]	1,35			
STEEL FAILURE WITH LEVER ARM						
Characteristic bending moment	M <sub>Rk,s</sub>	[Nm]	26,2	52,3	91,7	233,1
Partial safety factor:	γ <sub>M,s</sub>	[-]	1,35			
CONCRETE PRYOUT FAILURE						
Standard embedment						
Pryout factor:	k <sub>8</sub>	[-]	1,0	2,0	2,0	2,0
Reduced embedment						
Pryout factor:	k <sub>8</sub>	[-]	1,0	1,0	1,0	2,0
Installation safety factor:	γ <sub>ins</sub>	[-]	1,0			
CONCRETE EDGE FAILURE						
Effective length of anchor:	l <sub>f</sub>	[mm]	40	40 / 60	50 / 70	65 / 85
Outside diameter of anchor:	d <sub>nom</sub>	[mm]	8	10	12	16
Installation safety factor:	γ <sub>ins</sub>	[-]	1,0			

**Table C4: Displacements under shear loading**

			M8	M10	M12	M16
Tension service load in concrete:	V	[kN]	6,6	10,7	12,3	19,3
Displacement:	$\delta_{V0}$	[mm]	1,2	1,7	2,0	2,0
	$\delta_{V\infty}$	[mm]	1,8	2,6	2,9	2,9

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

			M8	M10	M12	M16
TENSION LOAD STEEL FAILURE						
Characteristic resistance	N <sub>Rk,s,C1</sub>	[kN]	16,7	28,5	39,7	74,0
Partial safety factor	γ <sub>Ms,s,C1</sub>	[-]	1,62			
TENSION LOAD PULLOUT FAILURE						
Characteristic resistance	N <sub>Rk,p,C1</sub>	[kN]	8,5	8,5	12,0	18,0
Installation safety factor	γ <sub>inst</sub>	[-]	1,0	1,0	1,0	1,2
SHEAR LOAD STEEL FAILURE WITHOUT LEVER ARM						
Characteristic resistance	V <sub>Rk,s,C1</sub>	[kN]	7,2	11,0	17,1	33,0
Partial safety factor	γ <sub>Ms,C1</sub>	[-]	1,35			

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

Reaction to fire	Class A1 according to EN 13501-1
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**Table C8: Design method EN-1992-4 Characteristic resistance for tension loads under fire exposure**

			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]	0,7	1,5	2,5	4,7
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]	0,6	1,2	2,1	3,9
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]	0,4	0,9	1,7	3,1
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]	0,4	0,8	1,3	2,5
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 $\geq 300$ 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 C9: Design method EN-1992-4 Characteristic value of resistance to shear loads under fire exposure**

			M8	M10	M12	M16
Characteristic fire resistance duration at 30 minutes						
Steel Failure without lever arm	$V_{Rk,s,fi(30)}$	[kN]	0,7	1,5	2,5	4,7
Steel Failure with lever arm	$M_{Rk,s,fi(30)}$	[Nm]	0,7	1,9	3,9	10,0
Characteristic fire resistance duration at 60 minutes						
Steel Failure without lever arm	$V_{Rk,s,fi(60)}$	[kN]	0,6	1,2	2,1	3,9
Steel Failure with lever arm	$M_{Rk,s,fi(60)}$	[Nm]	0,6	1,5	3,3	8,3
Characteristic fire resistance duration at 90 minutes						
Steel Failure without lever arm	$V_{Rk,s,fi(90)}$	[kN]	0,4	0,9	1,7	3,1
Steel Failure with lever arm	$M_{Rk,s,fi(90)}$	[Nm]	0,4	1,2	2,6	6,7
Characteristic fire resistance duration at 120 minutes						
Steel Failure without lever arm	$V_{Rk,s,fi(120)}$	[kN]	0,4	0,8	1,3	2,5
Steel Failure with lever arm	$M_{Rk,s,fi(120)}$	[Nm]	0,4	1,0	2,1	5,3
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

## DECLARATION OF PERFORMANCE No LE-A4/21

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)