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PRODUCT DATA SHEET – LE-ZNA4

Section 1. PRODUCT DESCRIPTION

MECHANICAL ANCHOR – LE-ZNA4












Mechanical anchor LE-ZNA4 consists of threaded rod bolt ended with expansion cone, expansion sleeve, hexagonal nut and washer. Threaded rod bolt, nut and washer are made of low carbon steel and covered with a layer of zinc, while the expansion sleeve is made of A4 stainless steel. Fixing is executed by tightening the nut with adequate torque which causes sliding of expansion sleeve over the expansion cone and creates a permanent anchorage. The anchor is ideal for fixing in non-aggressive environments and both indoor: metal substructure of the facade, machines and equipment, montage of light and medium weight steel structures, handrails and storage racks.

Recommended for substrates:

- **cracked and non-cracked, reinforced and non-reinforced concrete of C20/25 ÷ C50/60 strength class**

Advantages:

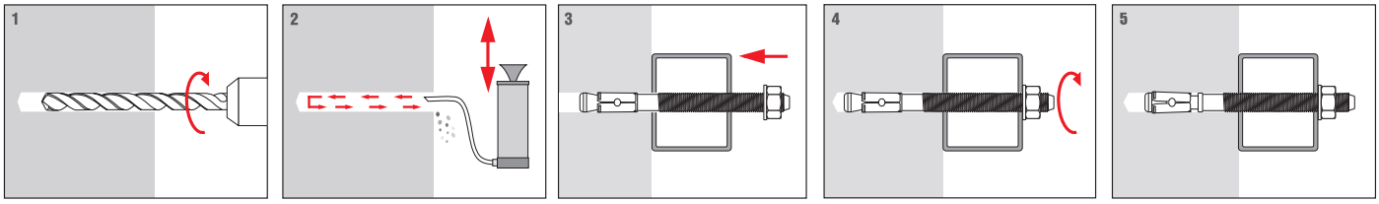
- **fast and simple installation by driving the anchor and tightening**
- **ready to carry full capacity immediately**
- **supplied assembled with the nut and washer**
- **seismic surveys**
- **fire resistance R30 – R120**

Mechanical anchor hold European Technical Assessment: ETA-20/0641

Section 2. METHOD OF INSTALLATION

1. Original mechanical anchors delivered by the manufacturer can be used only
2. Before installation check whether parameters of the substrate (where anchors are to be installed) conform to parameters of the substrate used in testing, based on which characteristic loading resistances of connections were determined (see table 1÷6)
3. Install anchors so that reinforcement of the substrate is not damaged
4. Before installation, indicate the drilling points where anchors are to be installed in accordance with installation guidelines
5. Then drill the holes in accordance with the parameters selected (diameter and depth of the hole), perpendicularly to the substrate (see table 1, 4)
6. Clean holes with SCF brush (min. 3x) and blow out clean with PCF pump (min. 3x)
7. Drive anchor into the hole by light hits of a hammer and then tighten the screw by applying an adequate torque (T_{inst}) using torque wrench (see table 1, 4)
8. Note that after the anchor is expanded, the washer under the nut should be pressed against the fixed member

Assembly diagram:



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Section 3. TECHNICAL DATA

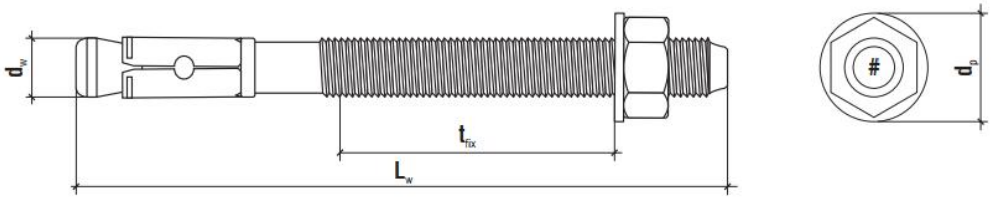

TABLE 1. INSTALLATION PARAMETERS – STANDARD EMBEDMENT DEPTH							
Anchor diameter		**d**	**[mm]**	**Ø8**	**Ø10**	**Ø12**	**Ø16**
Drill hole diameter		d_0	[mm]	8	10	12	16
Effective embedment depth		h_{ef}	[mm]	40	60	70	85
Depth of drill hole		$h_0 \geq$	[mm]	52	74	88	106
Diameter of clearance hole in the fixture		$d_f \leq$	[mm]	10	12	14	18
Torque moment		T_{inst}	[Nm]	20	30	50	100
Width torque wrench		SW	[mm]	13	17	19	24
Minimum thickness of concrete member		h_{min}	[mm]	100	120	160	170
Minimum allowable spacing		s_{min}	[mm]	54	82	109	116
Minimum allowable edge distance		c_{min}	[mm]	54	82	109	116
Spacing for ensuring the transmission of the characteristic resistance in tension of a single fastener without edge and spacing effects in case of concrete cone failure		$s_{cr,N}$	[mm]	120	180	210	255
Edge distance for ensuring the transmission of the characteristic resistance in tension of a single fastener without edge and spacing effects in case of concrete cone failure		$c_{cr,N}$	[mm]	60	90	105	127,5
Spacing for ensuring the transmission of the characteristic resistance in tension of a single fastener without edge and spacing effects in case of splitting failure		$s_{cr,sp}$	[mm]	200	300	400	425
Edge distance for ensuring the transmission of the characteristic resistance in tension of a single fastener without edge and spacing effects in case of splitting failure		$c_{cr,sp}$	[mm]	100	150	200	215

TABLE 2. TENSION LOAD – STANDARD EMBEDMENT DEPTH							
Characteristic resistance of an anchor in case of steel failure		$N_{Rk,s}$	[kN]	16,2	27,7	38,6	71,9
Design resistance of an anchor in case of steel failure (γ=1,57)		$N_{Rd,s}$	[kN]	10,3	17,6	24,6	45,8
Characteristic resistance in case of failure by pull-out		$N_{Rk,p}$	[kN]	*	*	*	*
Design resistance in case of failure by pull-out		$N_{Rd,p}$	[kN]	*	*	*	*
Characteristic resistance of an anchor in case of concrete cone failure	uncracked concrete	$N_{Rk,c}$	[kN]	12,4	22,9	28,8	38,6
	cracked concrete	$N_{Rk,c}$	[kN]	8,7	16,0	20,2	27,0
Design resistance of an anchor in case of concrete cone failure	uncracked concrete	$N_{Rd,c}$	[kN]	8,3	15,2	19,2	21,4
	cracked concrete	$N_{Rd,c}$	[kN]	5,8	10,7	13,4	15,0
Characteristic resistance of a single anchor in case of splitting failure	uncracked concrete	$N_{Rk,sp}$	[kN]	12,4	22,9	28,8	38,6
	cracked concrete	$N_{Rk,sp}$	[kN]	8,7	16,0	20,2	27,0
Design resistance of a single anchor in case of splitting failure	uncracked concrete	$N_{Rd,sp}$	[kN]	8,3	15,2	19,2	21,4
	cracked concrete	$N_{Rd,sp}$	[kN]	5,8	10,7	13,4	15,0

*pull-out failure is not authoritative

TABLE 3. SHEAR LOAD – STANDARD EMBEDMENT DEPTH						
Characteristic resistance of an anchor in case of steel failure	$V_{Rk,s}$	[kN]	12,4	19,7	26,6	49,6
Design resistance of an anchor in case of steel failure (γ=1,31)	$V_{Rd,s}$	[kN]	9,5	15,1	20,3	37,9
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	25,5	50,8	89,1	226,4
Design bending resistance (γ=1,31)	$M^0_{Rk,s}$	[Nm]	19,5	38,8	68,0	172,8
Characteristic resistance of an anchor in case of concrete pry-out failure	$V_{Rk,cp}$	[kN]	12,4	45,7	57,6	77,1
Design resistance of an anchor in case of concrete pry-out failure (γ=1,5)	$V_{Rd,cp}$	[kN]	8,3	30,5	38,4	51,4

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TABLE 4. INSTALLATION PARAMETERS – REDUCED EMBEDMENT DEPTH							
Anchor diameter		**d**	**[mm]**	**Ø8**	**Ø10**	**Ø12**	**Ø16**
Drill hole diameter		d_0	[mm]	-	10	12	16
Effective embedment depth		h_{ef}	[mm]	-	40	50	65
Depth of drill hole		$h_0 \geq$	[mm]	-	54	68	86
Diameter of clearance hole in the fixture		$d_f \leq$	[mm]	-	12	14	18
Torque moment		T_{inst}	[Nm]	-	30	50	100
Width torque wrench		SW	[mm]	-	17	19	24
Minimum thickness of concrete member		h_{min}	[mm]	-	100	100	130
Minimum allowable spacing		s_{min}	[mm]	-	54	68	88
Minimum allowable edge distance		c_{min}	[mm]	-	54	68	88
Spacing for ensuring the transmission of the characteristic resistance in tension of a single fastener without edge and spacing effects in case of concrete cone failure		$s_{cr,N}$	[mm]	-	120	150	195
Edge distance for ensuring the transmission of the characteristic resistance in tension of a single fastener without edge and spacing effects in case of concrete cone failure		$c_{cr,N}$	[mm]	-	60	75	97,5
Spacing for ensuring the transmission of the characteristic resistance in tension of a single fastener without edge and spacing effects in case of splitting failure		$s_{cr,sp}$	[mm]	-	200	250	325
Edge distance for ensuring the transmission of the characteristic resistance in tension of a single fastener without edge and spacing effects in case of splitting failure		$c_{cr,sp}$	[mm]	-	100	125	165

TABLE 5. TENSION LOAD - REDUCED EMBEDMENT DEPTH							
Characteristic resistance of an anchor in case of steel failure		$N_{Rk,s}$	[kN]	-	27,7	38,6	71,9
Design resistance of an anchor in case of steel failure (γ=1,57)		$N_{Rd,s}$	[kN]	-	17,6	24,6	45,8
Characteristic resistance in case of failure by pull-out		$N_{Rk,p}$	[kN]	-	*	*	*
Design resistance in case of failure by pull-out		$N_{Rd,p}$	[kN]	-	*	*	*
Characteristic resistance of an anchor in case of concrete cone failure	uncracked concrete	$N_{Rk,c}$	[kN]	-	12,4	17,4	25,8
	cracked concrete	$N_{Rk,c}$	[kN]	-	8,7	12,2	18,0
Design resistance of an anchor in case of concrete cone failure	uncracked concrete	$N_{Rd,c}$	[kN]	-	8,3	11,6	14,3
	cracked concrete	$N_{Rd,c}$	[kN]	-	5,8	8,1	10,0
Characteristic resistance of a single anchor in case of splitting failure	uncracked concrete	$N_{Rk,sp}$	[kN]	-	12,4	17,4	25,8
	cracked concrete	$N_{Rk,sp}$	[kN]	-	8,7	12,2	18,0
Design resistance of a single anchor in case of splitting failure	uncracked concrete	$N_{Rd,sp}$	[kN]	-	8,3	11,6	14,3
	cracked concrete	$N_{Rd,sp}$	[kN]	-	5,8	8,1	10,0

*pull-out failure is not authoritative

TABLE 6. SHEAR LOAD – REDUCED EMBEDMENT DEPTH						
Characteristic resistance of an anchor in case of steel failure	$V_{Rk,s}$	[kN]	-	19,7	26,6	49,6
Design resistance of an anchor in case of steel failure (γ=1,31)	$V_{Rd,s}$	[kN]	-	15,1	20,3	37,9
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	-	50,8	89,1	226,4
Design bending resistance (γ=1,31)	$M^0_{Rk,s}$	[Nm]	-	38,8	68,0	172,8
Characteristic resistance of an anchor in case of concrete pry-out failure	$V_{Rk,cp}$	[kN]	-	12,4	17,4	51,6
Design resistance of an anchor in case of concrete pry-out failure (γ=1,5)	$V_{Rd,cp}$	[kN]	-	8,3	11,6	34,4

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TABLE 7. CHARACTERISTIC RESISTANCES LOADS – SEISMIC PERFORMANCE CATEGORY C1						
Anchor diameter	**d**	**[mm]**	**Ø8**	**Ø10**	**Ø12**	**Ø16**
Tensile – steel failure						
Characteristic resistance	$N_{Rk,s,C1}$	[kN]	16,2	27,7	38,6	71,9
Partial safety factor	$\gamma_{Ms,C1}$	[-]	1,57			
Tension load pullout failure						
Characteristic resistance	$N_{Rk,p,C1}$	[kN]	8,5	8,5	12,0	18,0
Partial safety factor	$\gamma_{Ms,C1}$	[-]	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	$\gamma_{Ms,C1}$	[-]	1,31			

TABLE 8. CHARACTERISTIC VALUES OF RESISTANCE TO TENSION LOAD UNDER FIRE EXPOSURE						
Anchor diameter	**d**	**[mm]**	**Ø8**	**Ø10**	**Ø12**	**Ø16**
Min. effective anchorage depth	h_{ef}	[mm]	40	40	50	65
Characteristic fire resistance duration at 30 minutes						
Steel failure	$N_{Rk,s,fi}$	[kN]	0,4	0,9	1,7	3,1
Pull-Out Failure	$N_{Rk,p,fi}$	[kN]	2,2	2,2	3,1	4,5
Concrete Cone Failure	$N_{Rk,c,fi}$	[kN]	1,9	1,9	3,4	6,6
Characteristic fire resistance duration at 60 minutes						
Steel failure	$N_{Rk,s,fi}$	[kN]	0,3	0,8	1,3	2,4
Pull-Out Failure	$N_{Rk,p,fi}$	[kN]	2,2	2,2	3,1	4,5
Concrete Cone Failure	$N_{Rk,c,fi}$	[kN]	1,9	1,9	3,4	6,6
Characteristic fire resistance duration at 90 minutes						
Steel failure	$N_{Rk,s,fi}$	[kN]	0,3	0,6	1,1	2,0
Pull-Out Failure	$N_{Rk,p,fi}$	[kN]	2,2	2,2	3,1	4,5
Concrete Cone Failure	$N_{Rk,c,fi}$	[kN]	1,9	1,9	3,4	6,6
Characteristic fire resistance duration at 120 minutes						
Steel failure	$N_{Rk,s,fi}$	[kN]	0,2	0,5	0,8	1,6
Pull-Out Failure	$N_{Rk,p,fi}$	[kN]	1,7	1,7	2,4	3,6
Concrete Cone Failure	$N_{Rk,c,fi}$	[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 ≥ $2 \times h_{ef}$			

$\gamma_{M,fi}$ - partial safety factor for resistance under fire exposure (usually $\gamma_{M,fi}$ =1,0)

TABLE 9. CHARACTERISTIC VALUES OF RESISTANCE TO SHEAR LOAD UNDER FIRE EXPOSURE						
Anchor diameter	**d**	**[mm]**	**Ø8**	**Ø10**	**Ø12**	**Ø16**
Characteristic fire resistance duration at 30 minutes						
Steel failure without lever arm	$V_{Rk,s,fi}$	[kN]	0,4	0,9	1,7	3,1
Steel failure with lever arm	$M_{Rk,s,fi}$	[Nm]	0,4	1,1	2,6	6,7
Characteristic fire resistance duration at 60 minutes						
Steel failure without lever arm	$V_{Rk,s,fi}$	[kN]	0,3	0,8	1,3	2,4
Steel failure with lever arm	$M_{Rk,s,fi}$	[Nm]	0,3	1,0	2,0	5,0

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Characteristic fire resistance duration at 90 minutes						
Steel failure without lever arm	$V_{Rk,s,fi}$	[kN]	0,3	0,6	1,1	2,0
Steel failure with lever arm	$M_{Rk,s,fi}$	[Nm]	0,3	0,7	1,7	4,3
Characteristic fire resistance duration at 120 minutes						
Steel failure without lever arm	$V_{Rk,s,fi}$	[kN]	0,2	0,5	0,8	1,6
Steel failure with lever arm	$M_{Rk,s,fi}$	[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

TABLE 10. SELECTION TABLE

Product code	Anchor diameter and length	Max. thickness of fixed member	Thread	Nut head type	Pieces per pack
	d_w x L_w [mm]	t_{fix1} / t_{fix2} [mm]	[-]	[-]	[pcs.]
LE-ZNA4 M8					
LE-ZNA4-08060	8x60	5 / -	M8	SW-13	100
LE-ZNA4-08075	8x75	20 / -	M8	SW-13	100
LE-ZNA4-08095	8x95	40 / -	M8	SW-13	50
LE-ZNA4-08115	8x115	60 / -	M8	SW-13	50
LE-ZNA4-08135	8x135	80 / -	M8	SW-13	50
LE-ZNA4-08155	8x155	100 / -	M8	SW-13	50
LE-ZNA4 M10					
LE-ZNA4-10085	10x85	5 / 25	M10	SW-17	50
LE-ZNA4-10095	10x95	15 / 35	M10	SW-17	50
LE-ZNA4-10105	10x105	25 / 45	M10	SW-17	25
LE-ZNA4-10115	10x115	35 / 55	M10	SW-17	25
LE-ZNA4-10135	10x135	55 / 75	M10	SW-17	25
LE-ZNA4-10155	10x155	75 / 95	M10	SW-17	25
LE-ZNA4 M12					
LE-ZNA4-12085	12x85	- / 5	M12	SW-19	40
LE-ZNA4-12095	12x95	- / 15	M12	SW-19	50
LE-ZNA4-12105	12x105	5 / 25	M12	SW-19	50
LE-ZNA4-12115	12x115	15 / 35	M12	SW-19	40
LE-ZNA4-12125	12x125	25 / 45	M12	SW-19	25
LE-ZNA4-12145	12x145	45 / 65	M12	SW-19	25
LE-ZNA4-12165	12x165	65 / 85	M12	SW-19	25
LE-ZNA4 M16					
LE-ZNA4-16105	16x105	- / 5	M16	SW-24	25
LE-ZNA4-16115	16x115	- / 15	M16	SW-24	25
LE-ZNA4-16125	16x125	5 / 25	M16	SW-24	25
LE-ZNA4-16145	16x145	25 / 45	M16	SW-24	20
LE-ZNA4-16165	16x165	45 / 65	M16	SW-24	15

Section 4. REMARKS

1. All previous versions of this Product Data Sheet shall cease to be valid
2. Data given in this Product Data Sheet is in accordance with current knowledge and published in good faith. Wkręt-met Sp. z o.o. is not responsible for correctness and quality of the fixing if recommendations regarding method of use and installation are not followed.

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