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PRODUCT DATA SHEET – LE-ZN

Section 1. PRODUCT DESCRIPTION

MECHANICAL ANCHOR – LE-ZN

Mechanical anchor LE-ZN consists of threaded rod bolt ended with expansion cone, expansion sleeve, hexagonal nut and washer. It is made of carbon steel. Corrosion protection is ensured by galvanized zinc coating. 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 indoor: machines and equipment, montage of light and medium weight steel structures, handrails and storage racks.

Recommended for substrates:

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

Advantages:

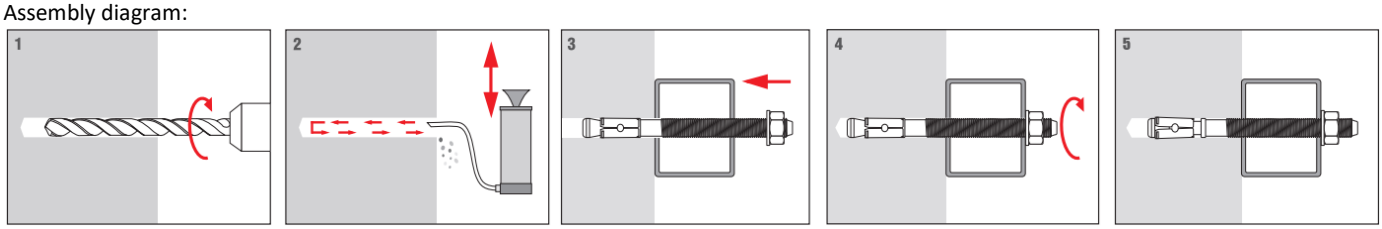
- **fast and simple installation by driving the anchor and tightening**
- **ready to carry full capacity immediately**
- **supplied assembled with the nut and washer**
- **fire resistance R30 – R120**

Mechanical anchor hold European Technical Assessment: ETA-20/0640

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:



Section 3. TECHNICAL DATA

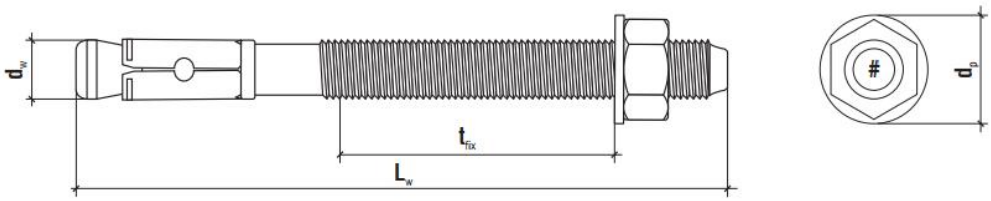


TABLE 1. INSTALLATION PARAMETERS – STANDARD EMBEDMENT DEPTH						
Anchor diameter	**d**	**[mm]**	**M8**	**M10**	**M12**	**M16**
Drill hole diameter	d_0	[mm]	8	10	12	16
Effective embedment depth	h_{ef}	[mm]	40	60	70	85
Depth of drill hole	$h_0 \geq$	[mm]	52	74	88	106
Diameter of clearance hole in the 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[1)]	s_{min}	[mm]	35	40	50	65
	for c ≥	[mm]	75	70	65	85
Minimum allowable edge distance[1)]	c_{min}	[mm]	40	45	55	65
	for s ≥	[mm]	130	105	85	125
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

[1)]ETA-20/0640 provides flexible edge & spacing values for each anchor layout configuration depending on base material thickness. Minimum spacing and edge distance values on the table are recommendations for specific anchor layout with minimum base material dimensions. We kindly ask you to check your designs on **KLIMAS DESIGN FIX SOFTWARE** to verify the edge & spacing values. **Example of the calculated minimum edge distance and spacing for the specific member thicknesses for standard embedment depth are also mentioned in TABLE 2.**

TABLE 2. – EXAMPLE OF THE CALCULATED MINIMUM EDGE DISTANCE AND SPACING FOR THE SPECIFIC MEMBER THICKNESSES – STANDARD EMBEDMENT DEPTH																
Installation parameters			**M8**			**M10**					**M12**			**M16**		
Splitting area	$A_{sp,req.}$	[mm²]	24799			28712					37844			54150		
Embedment depth	h_{ef}	[mm]	40			60					70			85		
Minimum thickness of concrete member	h_{min}	[mm]	100			120					160			170		
Actual concrete member thickness	$h_{act.}$[1]	[mm]	100		115	120		150			160			170		190
Minimum allowable spacing:	s_{min}	[mm]	35		35	40		40			50			65		65
	for c ≥	[mm]	75		65	70		55			65			85		75
Minimum allowable edge distance:	c_{min}	[mm]	40	50	50	45	50	45	50	55	55	65		65		75
	for s ≥	[mm]	130	100	70	105	90	95	65	40	85	50		125		65

[1] For other base material thicknesses h ≥ hact. , same edge distance and spacing values are allowed

TABLE 3. TENSION LOAD – STANDARD EMBEDMENT DEPTH						
Anchor diameter			**M8**	**M10**	**M12**	**M16**
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=1,81)	$N_{Rd,s}$	[kN]	8,9	15,3	21,3	39,7
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	$N_{Rk,c}$	[kN]	12,4	22,9	28,8	38,6
Design resistance of an anchor in case of concrete cone failure (γ=1,5)	$N_{Rd,c}$	[kN]	8,3	15,2	19,2	25,7
Characteristic resistance of a single anchor in case of splitting failure	$N_{Rk,sp}$	[kN]	12,4	22,9	28,8	38,6
Design resistance of a single anchor in case of splitting failure (γ=1,5)	$N_{Rd,sp}$	[kN]	8,3	15,2	19,2	25,7

*pull-out failure is not authoritative

TABLE 4. SHEAR LOAD – STANDARD EMBEDMENT DEPTH						
Characteristic resistance of an anchor in case of steel failure	$V_{Rk,s}$	[kN]	12,4	19,7	28,7	53,4
Design resistance of an anchor in case of steel failure (γ=1,51)	$V_{Rd,s}$	[kN]	8,2	13,1	19,0	35,4
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	38,0	75,4	131,6	316,0
Design bending resistance (γ=1,51)	$M^0_{Rk,s}$	[Nm]	25,2	49,9	87,2	209,2
Characteristic resistance of an anchor in case of concrete pry-out failure	$V_{Rk,cp}$	[kN]	12,4	22,9	28,8	77,1
Design resistance of an anchor in case of concrete pry-out failure (γ=1,5)	$V_{Rd,cp}$	[kN]	8,3	15,2	19,2	51,4

TABLE 5. INSTALLATION PARAMETERS – REDUCED EMBEDMENT DEPTH						
Anchor diameter	**d**	**[mm]**	**M8**	**M10**	**M12**	**M16**
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[1)]	s_{min}	[mm]	-	40	50	65
	for c ≥	[mm]	-	85	110	120
Minimum allowable edge distance[1)]	c_{min}	[mm]	-	45	55	65
	for s ≥	[mm]	-	155	215	225
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

[1)]ETA-20/0640 provides flexible edge & spacing values for each anchor layout configuration depending on base material thickness. Minimum spacing and edge distance values on the table are recommendations for specific anchor layout with minimum base material dimensions. We kindly ask you to check your designs on **KLIMAS DESIGN FIX SOFTWARE** to verify the edge & spacing values. **Example of the calculated minimum edge distance and spacing for the specific member thicknesses for reduced embedment depth are also mentioned in TABLE 6.**

TABLE 6. – EXAMPLE OF THE CALCULATED MINIMUM EDGE DISTANCE AND SPACING FOR THE SPECIFIC MEMBER THICKNESSES – REDUCED EMBEDMENT DEPTH														
Installation parameters			M8	M10					M12				M16	
Splitting area	$A_{sp,req.}$	[mm²]	-	28712					37844				54150	
Embedment depth	h_{ef}	[mm]	-	40					50				65	
Minimum thickness of concrete member	h_{min}	[mm]	-	100					100				130	
Actual concrete member thickness	$h_{act.}$[1]	[mm]	-	100	130				100	150			130	160
Minimum allowable spacing:	s_{min}	[mm]	-	40	40				50	50			65	65
	for c ≥	[mm]	-	85	65				110	70			120	95
Minimum allowable edge distance:	c_{min}	[mm]	-	45	45	50	55	60	95	55	60	70	100	80
	for s ≥	[mm]	-	155	135	100	70	45	95	125	95	50	120	100

[1] For other base material thicknesses h ≥ $h_{act.}$, same edge distance and spacing values are allowed

TABLE 7. TENSION LOAD - REDUCED EMBEDMENT DEPTH						
Anchor diameter			**M8**	**M10**	**M12**	**M16**
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=1,81)	$N_{Rd,s}$	[kN]	-	15,3	21,3	39,7
Characteristic resistance in case of failure by pull-out	$N_{Rk,p}$	[kN]	-	*	*	*
Design resistance in case of failure by pull-out (γ=1,5)	$N_{Rd,p}$	[kN]	-	*	*	*
Characteristic resistance of an anchor in case of concrete cone failure	$N_{Rk,c}$	[kN]	-	12,4	17,4	25,8
Design resistance of an anchor in case of concrete cone failure (γ=1,5)	$N_{Rd,c}$	[kN]	-	8,3	11,6	17,2
Characteristic resistance of a single anchor in case of splitting failure	$N_{Rk,sp}$	[kN]	-	12,4	17,4	25,8
Design resistance of a single anchor in case of splitting failure	$N_{Rd,sp}$	[kN]	-	8,3	11,6	17,2

*pull-out failure is not authoritative

TABLE 8. SHEAR LOAD – REDUCED EMBEDMENT DEPTH						
Characteristic resistance of an anchor in case of steel failure	$V_{Rk,s}$	[kN]	-	19,7	28,7	53,4
Design resistance of an anchor in case of steel failure (γ=1,51)	$V_{Rd,s}$	[kN]	-	13,1	19,0	35,4
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	-	75,4	131,6	316,0
Design bending resistance (γ=1,51)	$M^0_{Rk,s}$	[Nm]	-	49,9	87,2	209,2
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

TABLE 9. CHARACTERISTIC VALUES OF RESISTANCE TO TENSION LOAD UNDER FIRE EXPOSURE						
Anchor diameter	**d**	**[mm]**	**M8**	**M10**	**M12**	**M16**
Min. effective anchorage depth	h_{ef}	[mm]	40	40	50	65
Characteristic fire resistance duration at 30 minutes						
Steel failure	$N_{Rk,s,fi}$	[kN]	0,4	0,9	1,7	3,1
Pull-Out Failure	$N_{Rk,p,fi}$	[kN]	3,0	3,3	4,5	7,0
Concrete Cone Failure	$N_{Rk,c,fi}$	[kN]	2,6	2,6	4,5	8,6
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]	3,0	3,3	4,5	7,0
Concrete Cone Failure	$N_{Rk,c,fi}$	[kN]	2,6	2,6	4,5	8,6
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]	3,0	3,3	4,5	7,0
Concrete Cone Failure	$N_{Rk,c,fi}$	[kN]	2,6	2,6	4,5	8,6
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]	2,4	2,6	3,6	5,6

Concrete Cone Failure	$N_{Rk,c,fi}$	[kN]	2,0	2,0	3,6	6,9
Spacing						
Spacing	$s_{cr,N}$	[mm]	4 x h_{ef}			
	s_{min}	[mm]	54	54	68	88
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 10. CHARACTERISTIC VALUES OF RESISTANCE TO SHEAR LOAD UNDER FIRE EXPOSURE

Anchor diameter	**d**	**[mm]**	**M8**	**M10**	**M12**	**M16**
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	1,7	3,9	9,3
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	1,4	2,9	7,0
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	1,1	2,5	6,0
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	0,9	1,9	4,6

TABLE 11. 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-ZN M8					
LE-ZN-08060	8x60	5 / -	M8	SW-13	100
LE-ZN-08075	8x75	20 / -	M8	SW-13	100
LE-ZN-08095	8x95	40 / -	M8	SW-13	50
LE-ZN-08115	8x115	60 / -	M8	SW-13	50
LE-ZN-08135	8x135	80 / -	M8	SW-13	50
LE-ZN-08155	8x155	100 / -	M8	SW-13	50
LE-ZN M10					
LE-ZN-10085	10x85	5 / 25	M10	SW-17	50
LE-ZN-10095	10x95	15 / 35	M10	SW-17	50
LE-ZN-10105	10x105	25 / 45	M10	SW-17	25
LE-ZN-10115	10x115	35 / 55	M10	SW-17	25
LE-ZN-10135	10x135	55 / 75	M10	SW-17	25
LE-ZN-10155	10x155	75 / 95	M10	SW-17	25
LE-ZN M12					
LE-ZN-12085	12x85	-/ 5	M12	SW-19	40
LE-ZN-12095	12x95	- / 15	M12	SW-19	50
LE-ZN-12105	12x105	5 / 25	M12	SW-19	50
LE-ZN-12115	12x115	15 / 35	M12	SW-19	40
LE-ZN-12125	12x125	25 / 45	M12	SW-19	25
LE-ZN-12145	12x145	45 / 65	M12	SW-19	25
LE-ZN-12165	12x165	65 / 85	M12	SW-19	25
LE-ZN M16					
LE-ZN-16105	16x105	- / 5	M16	SW-24	25
LE-ZN-16115	16x115	- / 15	M16	SW-24	25
LE-ZN-16125	16x125	5 / 25	M16	SW-24	25
LE-ZN-16145	16x145	25 / 45	M16	SW-24	20
LE-ZN-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. KLIMAS 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.