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# PRODUCT DATA SHEET – LE-A4

## Section 1. PRODUCT DESCRIPTION

**MECHANICAL ANCHOR – LE-A4**









**Mechanical anchor LE-A4 consists of threaded rod bolt ended with expansion cone, expansion sleeve, hexagonal nut and washer. It 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 aggressive, urban and industrial environments, both indoor and outdoor: 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**

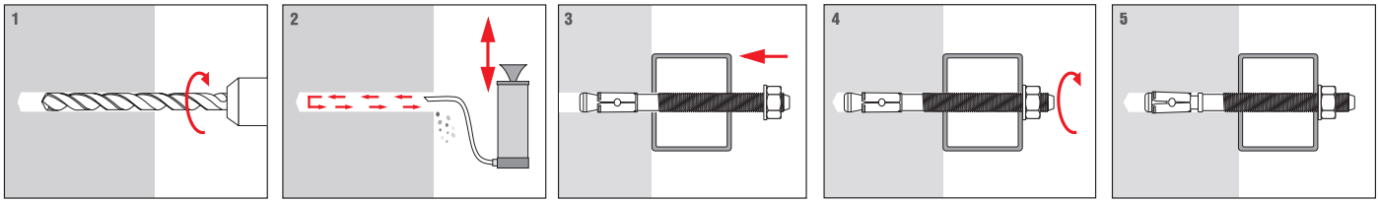



**Mechanical anchor hold European Technical Assessment: ETA-20/0641**

## 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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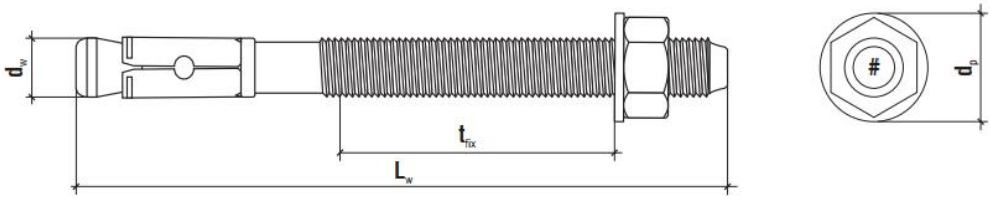
## Section 3. TECHNICAL DATA




| 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] | 16,7 | 28,5 | 39,7 | 74,0 |
| Design resistance of an anchor in case of steel failure (γ=1,62) | | $N_{Rd,s}$ | [kN] | 10,3 | 17,6 | 24,5 | 45,7 |
| 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 | 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] | 12,8 | 20,3 | 25,9 | 48,6 |
| Design resistance of an anchor in case of steel failure (γ=1,35) | $V_{Rd,s}$ | [kN] | 9,5 | 15,0 | 19,2 | 36,0 |
| Characteristic bending resistance | $M^0_{Rk,s}$ | [Nm] | 26,2 | 52,3 | 91,7 | 233,1 |
| Design bending resistance (γ=1,35) | $M^0_{Rk,s}$ | [Nm] | 19,4 | 38,8 | 67,9 | 172,6 |
| 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] | - | 28,5 | 39,7 | 74,0 |
| Design resistance of an anchor in case of steel failure (γ=1,62) | | $N_{Rd,s}$ | [kN] | - | 17,6 | 24,5 | 45,7 |
| 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 | 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] | - | 20,3 | 25,9 | 48,6 |
| Design resistance of an anchor in case of steel failure (γ=1,35) | $V_{Rd,s}$ | [kN] | - | 15,0 | 19,2 | 36,0 |
| Characteristic bending resistance | $M^0_{Rk,s}$ | [Nm] | - | 52,3 | 91,7 | 233,1 |
| Design bending resistance (γ=1,35) | $M^0_{Rk,s}$ | [Nm] | - | 38,8 | 67,9 | 172,6 |
| 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] | 16,7 | 28,5 | 39,7 | 74,0 |
| Partial safety factor | $\gamma_{Ms,C1}$ | [-] | 1,62 | | | |
| 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] | 7,2 | 11,0 | 17,1 | 33,0 |
| Partial safety factor | $\gamma_{Ms,C1}$ | [-] | 1,35 | | | |

| 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] | 0,7 | 1,5 | 2,5 | 4,7 |
| 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] | 0,6 | 1,2 | 2,1 | 3,9 |
| 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] | 0,4 | 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 120 minutes | | | | | | |
| Steel failure | $N_{Rk,s,fi}$ | [kN] | 0,4 | 0,8 | 1,3 | 2,5 |
| 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] | 0,7 | 1,5 | 2,5 | 4,7 |
| Steel failure with lever arm | $M_{Rk,s,fi}$ | [Nm] | 0,7 | 1,9 | 3,9 | 10,0 |
| Characteristic fire resistance duration at 60 minutes | | | | | | |
| Steel failure without lever arm | $V_{Rk,s,fi}$ | [kN] | 0,6 | 1,2 | 2,1 | 3,9 |
| Steel failure with lever arm | $M_{Rk,s,fi}$ | [Nm] | 0,6 | 1,5 | 3,3 | 8,3 |

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

**TABLE 10. SELECTION TABLE**

| Product code | Anchor diameter and length | Max. thickness of fixed member | Thread / thread length | Nut head type | Pieces per pack |
|---|---|---|---|---|---|
| | $d_w$ x $L_w$ [mm] | $t_{fix1}$ / $t_{fix2}$ [mm] | [-] / [mm] | [-] | [pcs.] |
| **LE-A4 M8** | | | | | |
| LE-A4-08060 | 8x60 | 5 / - | M8 / 15 | SW-13 | 100 |
| LE-A4-08075 | 8x75 | 20 / - | M8 / 30 | SW-13 | 100 |
| LE-A4-08095 | 8x95 | 40 / - | M8 / 50 | SW-13 | 50 |
| LE-A4-08115 | 8x115 | 60 / - | M8 / 70 | SW-13 | 50 |
| LE-A4-08135 | 8x135 | 80 / - | M8 / 90 | SW-13 | 50 |
| LE-A4-08155 | 8x155 | 100 / - | M8 / 110 | SW-13 | 50 |
| **LE-A4 M10** | | | | | |
| LE-A4-10085 | 10x85 | 5 / 25 | M10 / 40 | SW-17 | 50 |
| LE-A4-10095 | 10x95 | 15 / 35 | M10 / 50 | SW-17 | 50 |
| LE-A4-10105 | 10x105 | 25 / 45 | M10 / 60 | SW-17 | 25 |
| LE-A4-10115 | 10x115 | 35 / 55 | M10 / 70 | SW-17 | 25 |
| LE-A4-10135 | 10x135 | 55 / 75 | M10 / 90 | SW-17 | 25 |
| LE-A4-10155 | 10x155 | 75 / 95 | M10 / 110 | SW-17 | 25 |
| **LE-A4 M12** | | | | | |
| LE-A4-12085 | 12x85 | - / 5 | M12 / 35 | SW-19 | 40 |
| LE-A4-12095 | 12x95 | - / 15 | M12 / 45 | SW-19 | 50 |
| LE-A4-12105 | 12x105 | 5 / 25 | M12 / 55 | SW-19 | 50 |
| LE-A4-12115 | 12x115 | 15 / 35 | M12 / 65 | SW-19 | 40 |
| LE-A4-12125 | 12x125 | 25 / 45 | M12 / 75 | SW-19 | 25 |
| LE-A4-12145 | 12x145 | 45 / 65 | M12 / 90 | SW-19 | 25 |
| LE-A4-12165 | 12x165 | 65 / 85 | M12 / 90 | SW-19 | 25 |
| **LE-A4 M16** | | | | | |
| LE-A4-16105 | 16x105 | - / 5 | M16 / 40 | SW-24 | 25 |
| LE-A4-16115 | 16x115 | - / 15 | M16 / 50 | SW-24 | 25 |
| LE-A4-16125 | 16x125 | 5 / 25 | M16 / 60 | SW-24 | 25 |
| LE-A4-16145 | 16x145 | 25 / 45 | M16 / 80 | SW-24 | 20 |
| LE-A4-16165 | 16x165 | 45 / 65 | M16 / 80 | 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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