# R-RBL Rawlbolt® - Lose Bolt for use in cracked and non-cracked concrete

**World's most popular all-purpose expanding shield anchor - loose bolt version**







## Approvals and Reports

- ETA-11/0479

## Product information

### Features and benefits

- RAWLBOLT® - first ever mechanical anchor in the world, forerunner of all of the later mechanical anchors
- For use in cracked and non-cracked concrete (ETA option 1), hollow-core slabs, flooring blocks and ceramics
- Product recommended for applications requiring fire resistance
- Three-pieces expanding sleeve of maximum expansion provides optimal load and safety of use in any substrate
- Wide range of diameters (M6 to M20)

### Applications

- Roller shutter doors
- Fire doors
- Structural steelwork
- Security grills
- Heavy machinery
- Pipework/ductwork supports

### Base materials

**Approved for use in:**

- Cracked concrete C20/25-C50/60
- Non-cracked concrete C20/25-C50/60
- Unreinforced concrete
- Reinforced concrete

**Also suitable for use in:**

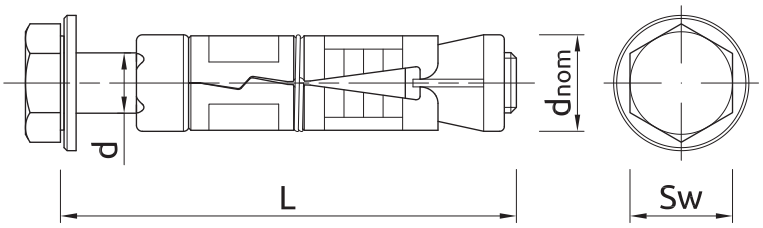
- Solid clay brick ≥ 20MPa
- Hollow Lightweight Concrete Block LAC 5 ≥ 5MPa
- Hollow Sand-lime Brick ≥ 15MPa
- Concrete hollow floor block (eg. Teriva)
- Hollow-core Slab C20/25
- Hollow-core Slab C30/37-C50/60

## Installation guide



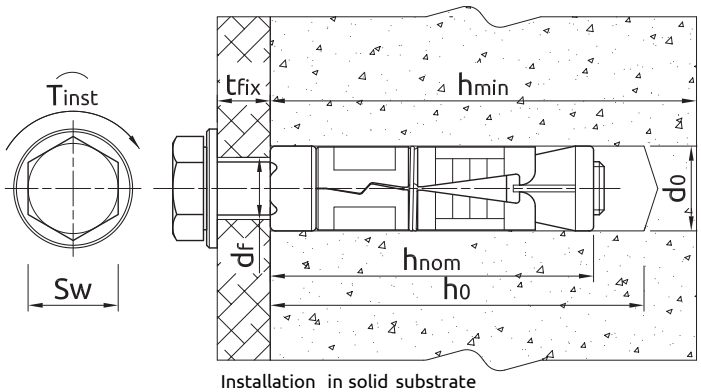

1. Drill a hole of required diameter and depth. Note: When fixing into brickwork, mortar joints should be avoided
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Remove pre-assembled bolt and washer. Insert shield into hole and tap home with hammer until flush with surface
4. Insert bolt with washer through fixture into the shield
5. Tighten to the recommended torque

## Product information




| Size | Product Code | Approval type | Anchor | | | Fixture | |
|---|---|---|---|---|---|---|---|
| | | | Diameter | External diameter | Length | Max. thickness | Hole diameter |
| | | | d | $d_{nom}$ | L | $t_{fix}$ | $d_f$ |
| | | - | [mm] | [mm] | [mm] | [mm] | [mm] |
| M6 | R-RBL-M06/10W | ETA-11/0479 | 6 | 12 | 55 | 10 | 6.5 |
| | R-RBL-M06/25W | ETA-11/0479 | 6 | 12 | 70 | 25 | 6.5 |
| | R-RBL-M06/40W | ETA-11/0479 | 6 | 12 | 85 | 40 | 6.5 |
| M8 | R-RBL-M08/10W | ETA-11/0479 | 8 | 14 | 65 | 10 | 9 |
| | R-RBL-M08/25W | ETA-11/0479 | 8 | 14 | 80 | 25 | 9 |
| | R-RBL-M08/40W | ETA-11/0479 | 8 | 14 | 95 | 40 | 9 |
| M10 | R-RBL-M10/10W | ETA-11/0479 | 10 | 16 | 75 | 10 | 11 |
| | R-RBL-M10/25W | ETA-11/0479 | 10 | 16 | 90 | 25 | 11 |
| | R-RBL-M10/50W | ETA-11/0479 | 10 | 16 | 115 | 50 | 11 |
| | R-RBL-M10/75W | ETA-11/0479 | 10 | 16 | 140 | 75 | 11 |
| M12 | R-RBL-M12/10W | ETA-11/0479 | 12 | 20 | 90 | 10 | 13 |
| | R-RBL-M12/25W | ETA-11/0479 | 12 | 20 | 105 | 25 | 13 |
| | R-RBL-M12/40W | ETA-11/0479 | 12 | 20 | 120 | 40 | 13 |
| | R-RBL-M12/60W | ETA-11/0479 | 12 | 20 | 140 | 60 | 13 |
| M16 | R-RBL-M16/15W | ETA-11/0479 | 16 | 25 | 135 | 15 | 17 |
| | R-RBL-M16/30W | ETA-11/0479 | 16 | 25 | 150 | 30 | 17 |
| | R-RBL-M16/60W | ETA-11/0479 | 16 | 25 | 180 | 60 | 17 |
| M20 | R-RBL-M20/60W | ETA-11/0479 | 20 | 32 | 195 | 60 | 22 |
| | R-RBL-M20/100W | ETA-11/0479 | 20 | 32 | 235 | 110 | 22 |
| M24 | R-RBL-M24/100W | - | 24 | 38 | 255 | 100 | 26 |
| | R-RBL-M24/150W | - | 24 | 38 | 300 | 150 | 26 |

## Installation data




Installation in solid substrate

## Installation data

| Size | | | M6 | M8 | M10 | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|---|---|---|---|
| Thread diameter | d | [mm] | 6 | 8 | 10 | 12 | 16 | 20 | 24 |
| Hole diameter in substrate | $d_0$ | [mm] | 12 | 14 | 16 | 20 | 25 | 32 | 38 |
| Installation torque | $T_{inst}$ | [Nm] | 6.5 | 15 | 27 | 50 | 120 | 230 | 400 |
| Wrench size | Sw | [mm] | 10 | 13 | 17 | 19 | 24 | 30 | 36 |
| Min. hole depth in substrate | $h_0$ | [mm] | 50 | 55 | 65 | 85 | 125 | 140 | 160 |
| Min. installation depth | $h_{nom}$ | [mm] | 45 | 50 | 60 | 80 | 120 | 135 | 155 |
| Min. substrate thickness | $h_{min}$ | [mm] | 100 | 100 | 100 | 100 | 142.5 | 172.5 | 240 |
| Min. spacing | $s_{min}$ | [mm] | 35 | 40 | 50 | 60 | 95 | 115 | 210 |
| Min. edge distance | $c_{min}$ | [mm] | 53 | 60 | 75 | 90 | 143 | 173 | 188 |

## Mechanical properties

| Size | | | M6 | M8 | M10 | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|---|---|---|---|
| Nominal ultimate tensile strength - tension | $f_{uk}$ | [N/mm²] | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| Nominal yield strength - tension | $f_{yk}$ | [N/mm²] | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Cross sectional area - tension | $A_s$ | [mm²] | 20.1 | 36.6 | 58 | 84.3 | 157 | 245 | 353 |
| Elastic section modulus | $W_{el}$ | [mm³] | 21.21 | 50.27 | 98.17 | 169.65 | 402.12 | 785.4 | 1357.17 |
| Characteristic bending resistance | $M^0_{Rk,s}$ | [Nm] | 12.72 | 30.16 | 58.9 | 101.79 | 241.27 | 471.24 | 814.3 |
| Design bending resistance | M | [Nm] | 10.18 | 24.13 | 47.12 | 81.43 | 193.02 | 376.99 | 651.44 |

## Basic performance data

Performance data for single anchor without influence of edge distance and spacing - ETAG 001

| Size | | M6 | M8 | M10 | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|---|---|---|
| **MEAN ULTIMATE LOAD** | | | | | | | | |
| **TENSION LOAD $N_{Ru,m}$** | | | | | | | | |
| NON-CRACKED CONCRETE | [kN] | 6.36 | 8.35 | 15.24 | 18.48 | 48.77 | 56.55 | 94.30 |
| CRACKED CONCRETE | [kN] | 4.06 | 5.31 | 7.12 | 12.01 | 18.24 | 34.16 | - |
| **SHEAR LOAD $V_{Ru,m}$** | | | | | | | | |
| NON-CRACKED CONCRETE | [kN] | 6.04 | 10.98 | 17.40 | 25.30 | 47.10 | 73.50 | 105.90 |
| CRACKED CONCRETE | [kN] | 6.04 | 10.98 | 17.40 | 25.30 | 47.10 | 73.50 | - |
| **CHARACTERISTIC LOAD** | | | | | | | | |
| **TENSION LOAD $N_{Rk}$** | | | | | | | | |
| NON-CRACKED CONCRETE | [kN] | 6.00 | 7.50 | 12.00 | 16.00 | 40.00 | 50.00 | 70.00 |
| CRACKED CONCRETE | [kN] | 4.00 | 5.00 | 6.00 | 12.00 | 16.00 | 30.00 | - |
| **SHEAR LOAD $V_{Rk}$** | | | | | | | | |
| NON-CRACKED CONCRETE | [kN] | 5.03 | 9.15 | 14.50 | 21.08 | 39.25 | 61.25 | 88.30 |
| CRACKED CONCRETE | [kN] | 5.03 | 9.11 | 12.73 | 21.08 | 39.25 | 61.25 | - |
| **DESIGN LOAD** | | | | | | | | |
| **TENSION LOAD $N_{Rd}$** | | | | | | | | |
| NON-CRACKED CONCRETE | [kN] | 3.33 | 4.17 | 6.67 | 8.89 | 22.22 | 27.78 | 38.90 |
| CRACKED CONCRETE | [kN] | 2.22 | 2.78 | 3.33 | 6.67 | 8.89 | 16.67 | - |
| **SHEAR LOAD $V_{Rd}$** | | | | | | | | |
| NON-CRACKED CONCRETE | [kN] | 4.02 | 7.32 | 11.60 | 16.86 | 31.40 | 49.00 | 70.60 |
| CRACKED CONCRETE | [kN] | 4.02 | 7.32 | 10.61 | 16.86 | 31.40 | 49.00 | - |
| **RECOMMENDED LOAD** | | | | | | | | |
| **TENSION LOAD $N_{rec}$** | | | | | | | | |
| NON-CRACKED CONCRETE | [kN] | 2.38 | 2.98 | 4.76 | 6.35 | 15.87 | 19.84 | 27.80 |
| CRACKED CONCRETE | [kN] | 1.59 | 1.99 | 2.38 | 4.76 | 6.35 | 11.91 | - |
| **SHEAR LOAD $V_{rec}$** | | | | | | | | |
| NON-CRACKED CONCRETE | [kN] | 2.87 | 5.23 | 8.29 | 12.05 | 22.43 | 35.00 | 50.40 |
| CRACKED CONCRETE | [kN] | 2.87 | 5.23 | 7.58 | 12.05 | 22.43 | 35.00 | - |

# Basic performance data

# Design performance data

| Size | | | M6 | M8 | M10 | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|---|---|---|---|
| Effective embedment depth | $h_{ef}$ | [mm] | 35.00 | 40.00 | 50.00 | 60.00 | 95.00 | 115.00 | 125.00 |
| **TENSION LOAD** | | | | | | | | | |
| **STEEL FAILURE** | | | | | | | | | |
| Characteristic resistance | $N_{Rk,s}$ | [kN] | 10.05 | 18.30 | 29.00 | 42.15 | 78.50 | 122.50 | 176.50 |
| Partial safety factor | $\gamma_{Ms}$ | - | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| **PULL-OUT FAILURE; NON-CRACKED CONCRETE C20/25** | | | | | | | | | |
| Characteristic resistance | $N_{Rk,p}$ | [kN] | 6.00 | 7.50 | 12.00 | 16.00 | 40.00 | 50.00 | 70.00 |
| **PULL-OUT FAILURE; CRACKED CONCRETE C20/25** | | | | | | | | | |
| Characteristic resistance | $N_{Rk,p}$ | [kN] | 4.00 | 5.00 | 6.00 | 12.00 | 16.00 | 30.00 | - |
| **PULL-OUT FAILURE** | | | | | | | | | |
| Installation safety factor | $\gamma_2$ | - | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 1.40 |
| Increasing factors for $N_{Rd,p}$ - C30/37 | $\Psi_c$ | - | 1.22 | 1.22 | 1.22 | 1.22 | 1.22 | 1.22 | 1.00 |
| Increasing factors for $N_{Rd,p}$ - C40/50 | $\Psi_c$ | - | 1.41 | 1.41 | 1.41 | 1.41 | 1.41 | 1.41 | 1.00 |
| Increasing factors for $N_{Rd,p}$ - C50/60 | $\Psi_c$ | - | 1.55 | 1.55 | 1.55 | 1.55 | 1.55 | 1.55 | 1.00 |
| **CONCRETE CONE FAILURE** | | | | | | | | | |
| Factor for cracked concrete | k | - | 7.20 | 7.20 | 7.20 | 7.20 | 7.20 | 7.20 | - |
| Factor for cracked concrete | $k_{cr,N}$ | - | 7.70 | 7.70 | 7.70 | 7.70 | 7.70 | 7.70 | - |
| Factor for non-cracked concrete | k | - | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 |
| Factor for non-cracked concrete | $k_{ucr,N}$ | - | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |
| Installation safety factor | $\gamma_2$ | - | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 1.40 |
| Spacing | $s_{cr,N}$ | [mm] | 105.00 | 120.00 | 150.00 | 180.00 | 285.00 | 345.00 | 375.00 |
| Edge distance | $c_{cr,N}$ | [mm] | 52.50 | 60.00 | 75.00 | 90.00 | 143.00 | 173.00 | 188.00 |
| **CONCRETE SPLITTING FAILURE** | | | | | | | | | |
| Spacing | $s_{cr,sp}$ | [mm] | 105.00 | 120.00 | 150.00 | 180.00 | 285.00 | 345.00 | 375.00 |
| Edge distance | $c_{cr,sp}$ | [mm] | 53.00 | 60.00 | 75.00 | 90.00 | 143.00 | 173.00 | 188.00 |
| Installation safety factor | $\gamma_2$ | - | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 1.40 |
| **SHEAR LOAD** | | | | | | | | | |
| **STEEL FAILURE** | | | | | | | | | |
| Characteristic resistance without lever arm | $V_{Rk,s}$ | [kN] | 5.03 | 9.15 | 14.50 | 21.08 | 39.25 | 61.25 | 88.30 |
| Ductility factor | $k_7$ | - | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| Characteristic resistance with lever arm | $M_{Rk,s}$ | [Nm] | 7.63 | 18.74 | 37.39 | 65.52 | 166.52 | 324.62 | 583.40 |
| Partial safety factor | $\gamma_{Ms}$ | - | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| **CONCRETE PRY-OUT FAILURE** | | | | | | | | | |
| Factor | k | - | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Installation safety factor | $\gamma_2$ | - | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| **CONCRETE EDGE FAILURE** | | | | | | | | | |
| Effective length of anchor | $\ell_f$ | [mm] | 35.00 | 40.00 | 50.00 | 60.00 | 95.00 | 115.00 | 125.00 |
| Anchor diameter | $d_{nom}$ | [mm] | 6.00 | 8.00 | 10.00 | 12.00 | 16.00 | 20.00 | 24.00 |
| Installation safety factor | $\gamma_2$ | - | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

# Design performance data

Resistance to tension and shear loads under fire exposure

| Size | | | M6 | M8 | M10 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|---|---|
| **TENSION LOAD** | | | | | | | | |
| Edge distance | $c_{cr}$ | [mm] | 70.00 | 80.00 | 100.00 | 120.00 | 190.00 | 230.00 |
| Spacing | $s_{cr}$ | [mm] | 140.00 | 160.00 | 200.00 | 240.00 | 380.00 | 460.00 |
| **R (for EI) = 30 min** | | | | | | | | |
| **TENSION LOAD** | | | | | | | | |
| **STEEL FAILURE** | | | | | | | | |
| Characteristic resistance | $N_{Rk,s}$ | [kN] | 0.20 | 0.40 | 0.90 | 1.70 | 3.10 | 4.90 |
| **PULL-OUT FAILURE** | | | | | | | | |
| Characteristic resistance | $N_{Rk,p}$ | [kN] | 1.00 | 1.30 | 1.50 | 3.00 | 4.00 | 7.50 |
| **SHEAR LOAD** | | | | | | | | |
| **STEEL FAILURE** | | | | | | | | |
| Characteristic resistance without lever arm | $V_{Rk,s}$ | [kN] | 0.20 | 0.40 | 0.90 | 1.70 | 3.10 | 4.90 |
| Characteristic resistance with lever arm | $M_{Rk,s}$ | [kN] | 0.20 | 0.40 | 1.10 | 2.60 | 6.70 | 13.00 |
| **R (for EI) = 60 min** | | | | | | | | |
| **TENSION LOAD** | | | | | | | | |
| **STEEL FAILURE** | | | | | | | | |
| Characteristic resistance | $N_{Rk,s}$ | [kN] | 0.20 | 0.30 | 0.80 | 1.30 | 2.40 | 3.70 |
| **PULL-OUT FAILURE** | | | | | | | | |
| Characteristic resistance | $N_{Rk,p}$ | [kN] | 1.00 | 1.30 | 1.50 | 3.00 | 4.00 | 7.50 |
| **SHEAR LOAD** | | | | | | | | |
| **STEEL FAILURE** | | | | | | | | |
| Characteristic resistance without lever arm | $V_{Rk,s}$ | [kN] | 0.20 | 0.30 | 0.80 | 1.30 | 2.40 | 3.70 |
| Characteristic resistance with lever arm | $M_{Rk,s}$ | [kN] | 0.10 | 0.30 | 1.00 | 2.00 | 5.00 | 9.70 |
| **R (for EI) = 90 min** | | | | | | | | |
| **TENSION LOAD** | | | | | | | | |
| **STEEL FAILURE** | | | | | | | | |
| Characteristic resistance | $N_{Rk,s}$ | [kN] | 0.10 | 0.30 | 0.60 | 1.10 | 2.00 | 3.20 |
| **PULL-OUT FAILURE** | | | | | | | | |
| Characteristic resistance | $N_{Rk,p}$ | [kN] | 1.00 | 1.30 | 1.50 | 3.00 | 4.00 | 7.50 |
| **SHEAR LOAD** | | | | | | | | |
| **STEEL FAILURE** | | | | | | | | |
| Characteristic resistance without lever arm | $V_{Rk,s}$ | [kN] | 0.10 | 0.30 | 0.60 | 1.10 | 2.00 | 3.20 |
| Characteristic resistance with lever arm | $M_{Rk,s}$ | [kN] | 0.10 | 0.30 | 0.70 | 1.70 | 4.30 | 8.40 |
| **R (for EI) = 120 min** | | | | | | | | |
| **TENSION LOAD** | | | | | | | | |
| **STEEL FAILURE** | | | | | | | | |
| Characteristic resistance | $N_{Rk,s}$ | [kN] | 0.10 | 0.20 | 0.50 | 0.80 | 1.60 | 2.50 |
| **PULL-OUT FAILURE** | | | | | | | | |
| Characteristic resistance | $N_{Rk,p}$ | [kN] | 0.80 | 1.00 | 1.20 | 2.40 | 3.20 | 6.00 |
| **SHEAR LOAD** | | | | | | | | |
| **STEEL FAILURE** | | | | | | | | |
| Characteristic resistance without lever arm | $V_{Rk,s}$ | [kN] | 0.10 | 0.20 | 0.50 | 0.80 | 1.60 | 2.50 |
| Characteristic resistance with lever arm | $M_{Rk,s}$ | [kN] | 0.10 | 0.20 | 0.60 | 1.30 | 3.30 | 6.50 |

## Product commercial data

| Size | Product Code | Anchor | | Quantity [pcs] | | | Weight [kg] | | | Bar Codes |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Diameter [mm] | Length [mm] | Box | Outer | Pallet | Box | Outer | Pallet | |
| M6 | R-RBL-M06/10W [1] | 6 | 55 | 50 | 400 | 16000 | 1.56 | 12.4 | 527.6 | 5906675283210 |
| | R-RBL-M06/25W [1] | 6 | 70 | 50 | 400 | 16000 | 1.65 | 13.2 | 556.4 | 5906675283234 |
| | R-RBL-M06/40W [1] | 6 | 85 | 50 | 50 | 8000 | 1.81 | 1.81 | 319.6 | 5906675283258 |
| M8 | R-RBL-M08/10W [1] | 8 | 65 | 50 | 400 | 16000 | 2.7 | 21.6 | 895.6 | 5906675283272 |
| | R-RBL-M08/25W [1] | 8 | 80 | 50 | 50 | 8000 | 3.0 | 3.0 | 502.0 | 5906675283296 |
| | R-RBL-M08/40W [1] | 8 | 95 | 50 | 50 | 8000 | 3.2 | 3.2 | 541.2 | 5906675283319 |
| M10 | R-RBL-M10/10W [1] | 10 | 75 | 50 | 50 | 8000 | 4.6 | 4.6 | 765.2 | 5906675283333 |
| | R-RBL-M10/25W [1] | 10 | 90 | 50 | 50 | 8000 | 5.0 | 5.0 | 832.4 | 5906675283357 |
| | R-RBL-M10/50W [1] | 10 | 115 | 50 | 50 | 6000 | 5.6 | 5.6 | 705.6 | 5906675283371 |
| | R-RBL-M10/75W [1] | 10 | 140 | 50 | 50 | 8000 | 6.4 | 6.4 | 1054.0 | 5906675283395 |
| M12 | R-RBL-M12/10W [1] | 12 | 90 | 25 | 25 | 4000 | 4.2 | 4.2 | 700.4 | 5906675283401 |
| | R-RBL-M12/25W [1] | 12 | 105 | 25 | 25 | 4000 | 4.5 | 4.5 | 749.6 | 5906675283418 |
| | R-RBL-M12/40W [1] | 12 | 120 | 25 | 25 | 3000 | 4.9 | 4.9 | 614.7 | 5906675283425 |
| | R-RBL-M12/60W [1] | 12 | 140 | 25 | 25 | 4000 | 5.2 | 5.2 | 862.0 | 5906675283432 |
| M16 | R-RBL-M16/15W [1] | 16 | 135 | 10 | 10 | 1600 | 4.2 | 4.2 | 693.5 | 5906675283449 |
| | R-RBL-M16/30W [1] | 16 | 150 | 10 | 10 | 1600 | 4.4 | 4.4 | 734.3 | 5906675283456 |
| | R-RBL-M16/60W [1] | 16 | 180 | 10 | 10 | 1200 | 4.8 | 4.8 | 608.3 | 5906675283463 |
| M20 | R-RBL-M20/60W [1] | 20 | 195 | 10 | 10 | 1200 | 9.0 | 9.0 | 1113.5 | 5906675283487 |
| | R-RBL-M20/100W [1] | 20 | 235 | 10 | 10 | 1200 | 9.8 | 9.8 | 1207.8 | 5906675283470 |
| M24 | R-RBL-M24/100W | 24 | 255 | 5 | 5 | 400 | 7.4 | 7.4 | 622.2 | 5906675283494 |
| | R-RBL-M24/150W | 24 | 300 | 10 | 10 | 400 | 16.3 | 16.3 | 681.5 | 5906675283500 |

1) ETA-11/0479