

## R-RBL Rawlbolt® - Loose 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
- UKTA-22/6106



### 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

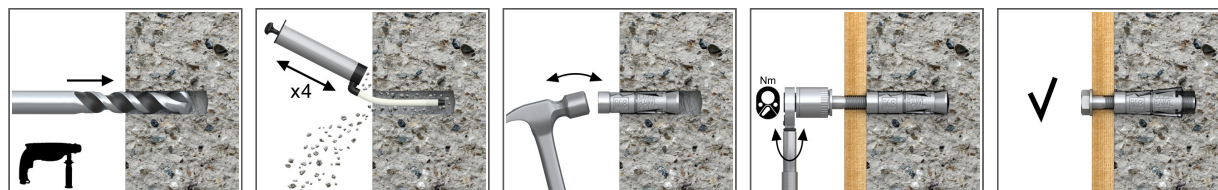
##### Approved for use in:

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

##### Also suitable for use in:

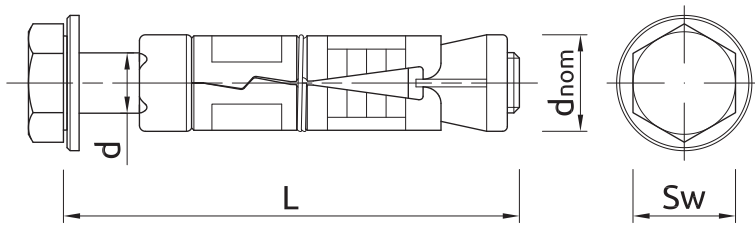
- Solid clay brick  $\geq 20\text{MPa}$
- Hollow Lightweight Concrete Block LAC  $5 \geq 5\text{MPa}$
- Hollow Sand-lime Brick  $\geq 15\text{MPa}$
- Concrete hollow floor block (eg. Teriva)
- Hollow-core Slab C20/25
- Hollow-core Slab C30/37-C50/60

### Installation guide



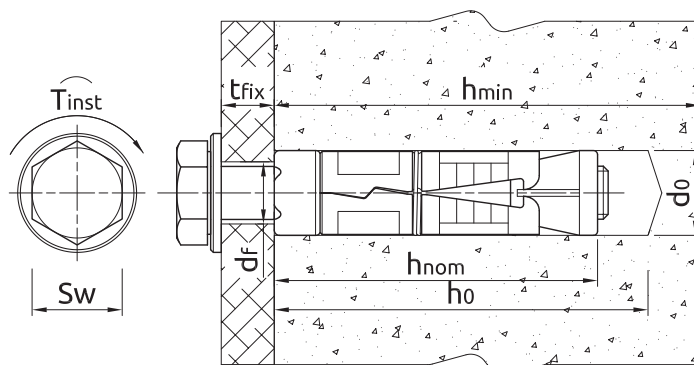
1. Drill a hole of required diameter and depth. Note: When fixing into brickwork, mortar joints should be avoided
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Remove pre-assembled bolt and washer. Insert shield into hole and tap home with hammer until flush with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

Installation data



Installation in solid substrate

## Installation data

Size			M6	M8	M10	M12	M16	M20
Thread diameter	d	[mm]	6	8	10	12	16	20
Hole diameter in substrate	d <sub>0</sub>	[mm]	12	14	16	20	25	32
Installation torque	T <sub>inst</sub>	[Nm]	6.5	15	27	50	120	230
Wrench size	Sw	[mm]	10	13	17	19	24	30
Min. hole depth in substrate	h <sub>0</sub>	[mm]	50	55	65	85	125	140
Min. installation depth	h <sub>nom</sub>	[mm]	45	50	60	80	120	135
Min. substrate thickness	h <sub>min</sub>	[mm]	100	100	100	100	142.5	172.5
Min. spacing	s <sub>min</sub>	[mm]	35	40	50	60	95	115
Min. edge distance	c <sub>min</sub>	[mm]	53	60	75	90	143	173

## Mechanical properties

Size			M6	M8	M10	M12	M16	M20
Nominal ultimate tensile strength - tension	F <sub>uk</sub>	[N/mm <sup>2</sup> ]	500	500	500	500	500	500
Nominal yield strength - tension	F <sub>yk</sub>	[N/mm <sup>2</sup> ]	400	400	400	400	400	400
Cross sectional area - tension	A <sub>s</sub>	[mm <sup>2</sup> ]	20.1	36.6	58	84.3	157	245
Elastic section modulus	W <sub>el</sub>	[mm <sup>3</sup> ]	21.21	50.27	98.17	169.65	402.12	785.4
Characteristic bending resistance	M <sup>0</sup> <sub>Rk,s</sub>	[Nm]	12.72	30.16	58.9	101.79	241.27	471.24
Design bending resistance	M	[Nm]	10.18	24.13	47.12	81.43	193.02	376.99

## Basic performance data

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

Size		M6	M8	M10	M12	M16	M20
<b>NON-CRACKED CONCRETE</b>							
Effective embedment depth h <sub>ef</sub>	[mm]	35.00	40.00	50.00	60.00	95.00	115.00
<b>CRACKED CONCRETE</b>							
Effective embedment depth h <sub>ef</sub>	[mm]	35.00	40.00	50.00	60.00	95.00	115.00
<b>MEAN ULTIMATE LOAD</b>							
<b>TENSION LOAD N<sub>Ru,m</sub></b>							
NON-CRACKED CONCRETE	[kN]	7.80	8.35	15.24	18.48	48.77	56.55
CRACKED CONCRETE	[kN]	5.20	6.50	7.80	15.60	20.80	34.16
<b>SHEAR LOAD V<sub>Ru,m</sub></b>							
NON-CRACKED CONCRETE	[kN]	5.53	10.07	15.95	23.19	43.18	67.38
CRACKED CONCRETE	[kN]	5.53	10.07	15.95	23.19	43.18	67.38
<b>CHARACTERISTIC LOAD</b>							
<b>TENSION LOAD N<sub>Rk</sub></b>							
NON-CRACKED CONCRETE	[kN]	6.00	7.50	12.00	16.00	40.00	50.00
CRACKED CONCRETE	[kN]	4.00	5.00	6.00	12.00	16.00	30.00
<b>SHEAR LOAD V<sub>Rk</sub></b>							
NON-CRACKED CONCRETE	[kN]	5.03	9.15	14.50	21.08	39.25	61.25
CRACKED CONCRETE	[kN]	5.03	8.71	12.17	21.08	39.25	61.25
<b>DESIGN LOAD</b>							
<b>TENSION LOAD N<sub>Rd</sub></b>							
NON-CRACKED CONCRETE	[kN]	3.33	4.17	6.67	8.89	22.22	27.78
CRACKED CONCRETE	[kN]	2.22	2.78	3.33	6.67	8.89	16.67
<b>SHEAR LOAD V<sub>Rd</sub></b>							
NON-CRACKED CONCRETE	[kN]	4.02	7.32	11.60	16.86	31.40	49.00
CRACKED CONCRETE	[kN]	4.02	5.81	8.12	16.86	31.40	49.00

## Design performance data

(-) failure is not decisive

Size			M6	M8	M10	M12	M16	M20
Effective embedment depth	$h_{ef}$	[mm]	35.00	40.00	50.00	60.00	95.00	115.0
<b>TENSION LOAD</b>								
<b>STEEL FAILURE</b>								
Characteristic resistance	$N_{Rk,s}$	[kN]	10.05	18.30	29.00	42.15	78.50	122.5
Partial safety factor	$\gamma_{Ms}$	-	1.50	1.50	1.50	1.50	1.50	1.50
<b>PULL-OUT FAILURE; NON-CRACKED CONCRETE C20/25</b>								
Characteristic resistance	$N_{Rk,p}$	[kN]	6.00	7.50	12.00	16.00	40.00	50.00
<b>PULL-OUT FAILURE; CRACKED CONCRETE C20/25</b>								
Characteristic resistance	$N_{Rk,p}$	[kN]	4.00	5.00	6.00	12.00	16.00	30.00
<b>PULL-OUT FAILURE</b>								
Installation safety factor	$\gamma_{inst}$	-	1.20	1.20	1.20	1.20	1.20	1.20
Increasing factors for $N_{Rd,p}$ - C30/37	$\psi_c$	-	1.22	1.22	1.22	1.22	1.22	1.22
Increasing factors for $N_{Rd,p}$ - C40/50	$\psi_c$	-	1.41	1.41	1.41	1.41	1.41	1.41
Increasing factors for $N_{Rd,p}$ - C50/60	$\psi_c$	-	1.55	1.55	1.55	1.55	1.55	1.55
<b>CONCRETE CONE FAILURE</b>								
Factor for cracked concrete	$k_{cr,N}$	-	7.70	7.70	7.70	7.70	7.70	7.70
Factor for non-cracked concrete	$k_{ucr,N}$	-	11.00	11.00	11.00	11.00	11.00	11.00
Installation safety factor	$\gamma_{inst}$	-	1.20	1.20	1.20	1.20	1.20	1.20
Spacing	$s_{cr,N}$	[mm]	105.0	120.0	150.0	180.0	285.0	345.0
Edge distance	$c_{cr,N}$	[mm]	52.50	60.00	75.00	90.00	143.0	173.0
<b>CONCRETE SPLITTING FAILURE</b>								
Spacing	$s_{cr,sp}$	[mm]	105.0	120.0	150.0	180.0	285.0	345.0
Edge distance	$c_{cr,sp}$	[mm]	53.00	60.00	75.00	90.00	143.0	173.0
Installation safety factor	$\gamma_{inst}$	-	1.20	1.20	1.20	1.20	1.20	1.20
<b>SHEAR LOAD</b>								
<b>STEEL FAILURE</b>								
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	5.03	9.15	14.50	21.08	39.25	61.25
Ductility factor	$k_\gamma$	-	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	166.5	324.6
Partial safety factor	$\gamma_{Ms}$	-	1.25	1.25	1.25	1.25	1.25	1.25
<b>CONCRETE PRY-OUT FAILURE</b>								
Factor	$k$	-	1.00	1.00	1.00	2.00	2.00	2.00
Installation safety factor	$\gamma_{inst}$	-	1.00	1.00	1.00	1.00	1.00	1.00
<b>CONCRETE EDGE FAILURE</b>								
Effective length of anchor	$\ell_f$	[mm]	35.00	40.00	50.00	60.00	95.00	115.0
Anchor diameter	$d_{nom}$	[mm]	6.00	8.00	10.00	12.00	16.00	20.00
Installation safety factor	$\gamma_{inst}$	-	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
<b>R (for EI) = 30 min</b>								
Effective embedment depth	$h_{ef}$	[mm]	35.00	40.00	50.00	60.00	95.00	115.00
<b>TENSION LOAD</b>								
<b>STEEL FAILURE</b>								
Characteristic resistance	$N_{Rk,s}$	[kN]	0.20	0.40	0.90	1.70	3.10	4.90
<b>PULL-OUT FAILURE</b>								
Characteristic resistance	$N_{Rk,p}$	[kN]	1.00	1.30	1.50	3.00	4.00	7.50
<b>SHEAR LOAD</b>								
<b>STEEL FAILURE</b>								
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	$M_{Rk,s}$	[Nm]	0.20	0.40	1.10	2.60	6.70	13.00
<b>R (for EI) = 60 min</b>								
Effective embedment depth	$h_{ef}$	[mm]	35.00	40.00	50.00	60.00	95.00	115.00
<b>TENSION LOAD</b>								
<b>STEEL FAILURE</b>								
Characteristic resistance	$N_{Rk,s}$	[kN]	0.20	0.30	0.80	1.30	2.40	3.70
<b>PULL-OUT FAILURE</b>								
Characteristic resistance	$N_{Rk,p}$	[kN]	1.00	1.30	1.50	3.00	4.00	7.50
<b>SHEAR LOAD</b>								
<b>STEEL FAILURE</b>								
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	$M_{Rk,s}$	[Nm]	0.10	0.30	1.00	2.00	5.00	9.70
<b>R (for EI) = 90 min</b>								
Effective embedment depth	$h_{ef}$	[mm]	35.00	40.00	50.00	60.00	95.00	115.00
<b>TENSION LOAD</b>								
<b>STEEL FAILURE</b>								
Characteristic resistance	$N_{Rk,s}$	[kN]	0.10	0.30	0.60	1.10	2.00	3.20
<b>PULL-OUT FAILURE</b>								
Characteristic resistance	$N_{Rk,p}$	[kN]	1.00	1.30	1.50	3.00	4.00	7.50
<b>SHEAR LOAD</b>								
<b>STEEL FAILURE</b>								
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	$M_{Rk,s}$	[Nm]	0.10	0.30	0.70	1.70	4.30	8.40
<b>R (for EI) = 120 min</b>								
Effective embedment depth	$h_{ef}$	[mm]	35.00	40.00	50.00	60.00	95.00	115.00
<b>TENSION LOAD</b>								
<b>STEEL FAILURE</b>								
Characteristic resistance	$N_{Rk,s}$	[kN]	0.10	0.20	0.50	0.80	1.60	2.50
<b>PULL-OUT FAILURE</b>								
Characteristic resistance	$N_{Rk,p}$	[kN]	0.80	1.00	1.20	2.40	3.20	6.00
<b>SHEAR LOAD</b>								
<b>STEEL FAILURE</b>								
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	$M_{Rk,s}$	[Nm]	0.10	0.20	0.60	1.30	3.30	6.50

## Product commercial data

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

1) ETA-11/0479