Designated according to The Construction Products (Amendment etc.) (EU Exit) Regulations 2020

UK Technical Assessment	UKTA-0836-22/6106 of 03/08/2022
Technical Assessment Body issuing the UK Technical Assessment:	British Board of Agrément
Trade name of the construction product:	R-RB RAWLBOLT
Product family to which the construction product belongs:	Area Code 33 Torque controlled expansion fastener of sizes M6, M8, M10, M12, M16 and M20 for use in uncracked and cracked concrete
Manufacturer:	RAWLPLUG S.A. ul. Kwidzyńska 6 PL 51-416 Wrocław Poland
Manufacturing plant(s):	Manufacturing Plant No. 2 Manufacturing Plant No. 3
This UK Technical Assessment contains:	16 pages including 3 annexes which form an integral part of this assessment
This UK Technical Assessment is issued in accordance with The Construction Products (Amendment etc.) (EU Exit) Regulations 2020 on the basis of:	UKAD 330232-00-0601 *Mechanical fasteners for use in concrete*

1 Technical description of the product

The R-RB RAWLBOLT are fasteners available in types R-RBL and R-RBP in the sizes M6, M8, M10, M12, M16 and M20. The fasteners are manufactured of galvanized steel which are placed into a drill hole and fastened by torque-controlled expansion.

An illustration and product specifications are given in Annex A.

2 Specification of the intended use(s) in accordance with the applicable UK Assessment Document (hereinafter UKAD)

The performances given in Annex C are only valid if the fastener is used in compliance with the specifications and conditions given in Annex B.

The provisions made in this UK Technical Assessment are based on an assumed working life of the fastener of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer or Technical Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential Characteristic	Performance
Characteristic resistance for tension loads, displacements	Annex C1
Characteristic resistance for shear loads, displacements	Annex C2

3.2 Safety in case of fire (BWR 2)

Characteristic	Performance
Reaction to fire	Fasteners satisfy requirements for Class A1
Resistance to fire	See Annex C3 and C4

3.3 Health, hygiene and the environment (BWR 3)

Regarding dangerous substances, there may be additional legislative requirements falling outside of the scope of this document. These requirements must be complied with as appropriate.

3.4 Safety and accessibility in use (BWR 4)

Not relevant.

3.5 Protection against noise (BWR 5)

Not relevant.

3.6 Energy economy and heat retention (BWR 6)

Not relevant.

3.7 Sustainable use of natural resources (BWR 7)

No performance assessed.

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied

4.1 System of assessment and verification of constancy of performance

According to UKAD No. 330232-00-0601 and Annex V of the Construction Products Regulation (Regulation (EU) 305/2011 as brought into UK law and amended, the system of assessment and verification of constancy of performance (AVCP) 1 applies.

Product	Intended use	Level or class	System
Metal fasteners for use in concrete	For fixing and/or supporting to concrete structural elements (which contributes to the stability of the works) or heavy units	-	1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable UKAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the British Board of Agrément and made available to the UK Approved Bodies involved in the conformity attestation process.

5.1 UKCA marking for the product/ system must contain the following information:

- Identification number of the Approved Body
- Name/address of the manufacturer of the product/ system
- Marking with intention of clarification of intended use
- Date of marking
- Number of certificate of constancy of performance
- UKTA number.

On behalf of the British Board of Agrément 	
Date of Issue: 3 August 2022	**Hardy Giesler** Chief Executive Officer

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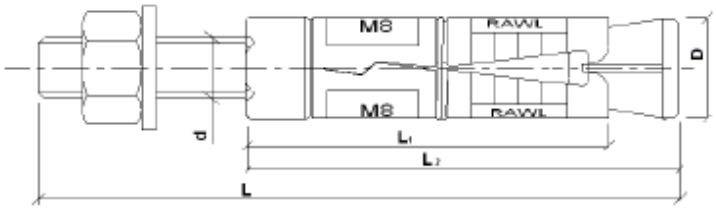
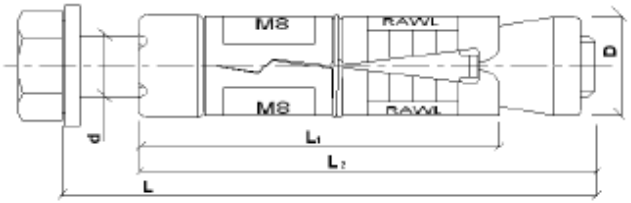
ANNEX A : RAWLBOLT R-RBP and R-RBL– product specifications

This annex applies to the product described in the main body of the UK Technical Assessment.

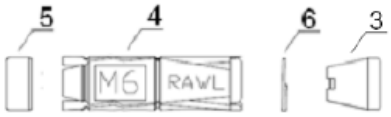
Figure A1 Characteristic of the product

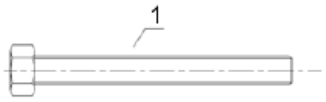


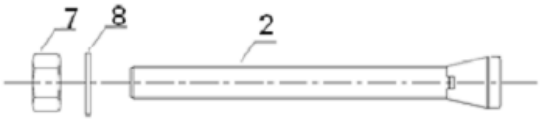
R-RBP



R-RBL







1 – screw with hexagonal head,
2 – threaded bolt with conical nut,
3 – conical nut,
4 – expansion sleeve,
5, 6 – sleeve fittings,
7 – hexagonal nut,
8 – washer

R-RB RAWLBOLT	Annex A 1
Product description Anchor	

ANNEX A : RAWLBOLT R-RBP and R-RBL– product specifications (continued)

Table A1: R-RBL anchor dimensions

Type of anchor			d [mm]	D [mm]	L [mm]	L1 [mm]	L2 [mm]
Size	Marking	t_{fix} (1) [mm]					
M6	R-RBL-M06/10	10	6	12	55	35	50
	R-RBL-M06/25	25			70		
	R-RBL-M06/40	40			85		
M8	R-RBL-M08/10	10	8	14	65	40	55
	R-RBL-M08/25	25			80		
	R-RBL-M08/40	40			95		
M10	R-RBL-M10/10	10	10	16	75	50	65
	R-RBL-M10/25	25			90		
	R-RBL-M10/50	50			115		
	R-RBL-M10/75	75			140		
M12	R-RBL-M12/10	10	12	20	90	60	85
	R-RBL-M12/25	25			105		
	R-RBL-M12/40	40			120		
	R-RBL-M12/60	60			140		
M16	R-RBL-M16/15	15	16	25	135	95	125
	R-RBL-M16/30	30			150		
	R-RBL-M16/60	60			180		
M20	R-RBL-M20/60	60	20	32	195	115	140
	R-RBL-M20/100	100			235		

(1) – thickness of the fixed element.

R-RB RAWLBOLT	Annex A 2
Product description Dimensions	

Table A2: R-RBP fastener dimensions

Type of fastener			d [mm]	D [mm]	L [mm]	L1 [mm]	L2 [mm
Size	Marking	t_{fix}(1) [mm]					
M6	R-RBP-M06/10	10	6	12	65	35	50
	R-RBP-M06/25	25			80		
	R-RBP-M06/60	60			115		
M8	R-RBP-M08/10	10	8	14	75	40	55
	R-RBP-M08/25	25			90		
	R-RBP-M08/60	60			125		
M10	R-RBP-M10/15	15	10	16	90	50	65
	R-RBP-M10/30	30			105		
	R-RBP-M10/60	60			135		
M12	R-RBP-M12/15	15	12	20	110	60	85
	R-RBP-M12/30	30			125		
	R-RBP-M12/75	75			170		
M16	R-RBP-M16/15	15	16	25	150	95	125
	R-RBP-M16/35	35			170		
	R-RBP-M16/75	75			210		
M20	R-RBP-M20/15	15	20	32	170	115	140
	R-RBP-M20/30	30			185		
	R-RBL-M20/100	100			255		

(1) – thickness of the fixed element

R-RB RAWLBOLT	Annex A 2
Product description Dimensions	

ANNEX A : RAWLBOLT R-RBP and R-RBL– product specifications (continued)

Table A2: Materials

Part	Designation	Material	Protection
1	Screw with hexagonal	Carbon steel class 5.8 EN ISO 898-1	Zinc plated ≥ 5 µm EN ISO 4042
2	Threaded bolt	Carbon steel class 5.8 EN ISO 898-1	Zinc plated ≥ 5 µm EN ISO 4042
3	Conical nut	Carbon steel BS 3111-1	Zinc plated ≥ 5 µm EN ISO 4042
4	Expansion sleeve	Carbon steel BS 1449, Part 1	Zinc plated ≥ 5 µm EN ISO 4042
5, 6	Sleeve fittings	Carbon steel BS 1449, Part 1	Zinc plated ≥ 5 µm EN ISO 4042
7	Hexagonal nut	Carbon steel class 5 EN ISO 898-1	Zinc plated ≥ 5 µm EN ISO 4042
8	Washer	Carbon steel class 5 EN ISO 898-1	Zinc plated ≥ 5 µm EN ISO 4042

R-RB RAWLBOLT	Annex A 3
Product description Materials	

ANNEX B : Specification of intended use

B1 Intended use - specifications

Anchorages subject to:

- Static and quasi-static loads.
- Anchorages with requirements related to resistance to fire.

Base material:

- Reinforced or unreinforced normal weight concrete of strength classes C20/25 at minimum and C50/60 at maximum according to EN 206.
- Uncracked and cracked concrete.

Use conditions (environmental conditions):

- Structures subject to dry internal conditions.

Design:

- The anchorages under static loads, quasi-static loads and fire exposure are designed in accordance with methods given in EOTA Technical Report TR 055.
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- The position of the anchor is indicated on the design drawings.
- Verifiable calculation notes and drawings are taking account of the loads to be transmitted.

Installation of anchors:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging any component of the anchor.
- Anchor installation in accordance with the manufacturer's specification and drawings and using the appropriate tools.
- Checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply.
- Check of concrete being well compacted, e.g. without significant voids.
- Effective anchorage depth, edge distances and spacings not less than the specified values without minus tolerances.
- Positioning of the drill holes without damaging the reinforcement.
- Hole drilling by hammer drill.
- Cleaning of the hole of drilling dust.
- Application of the torque moment using a calibrated torque wrench.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance it the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load if is not in the direction of load application.

R-RB RAWLBOLT	Annex B 1
Intended use Specification	

ANNEX B : Specification of intended use (continued)

Figure B1 Installation parameters

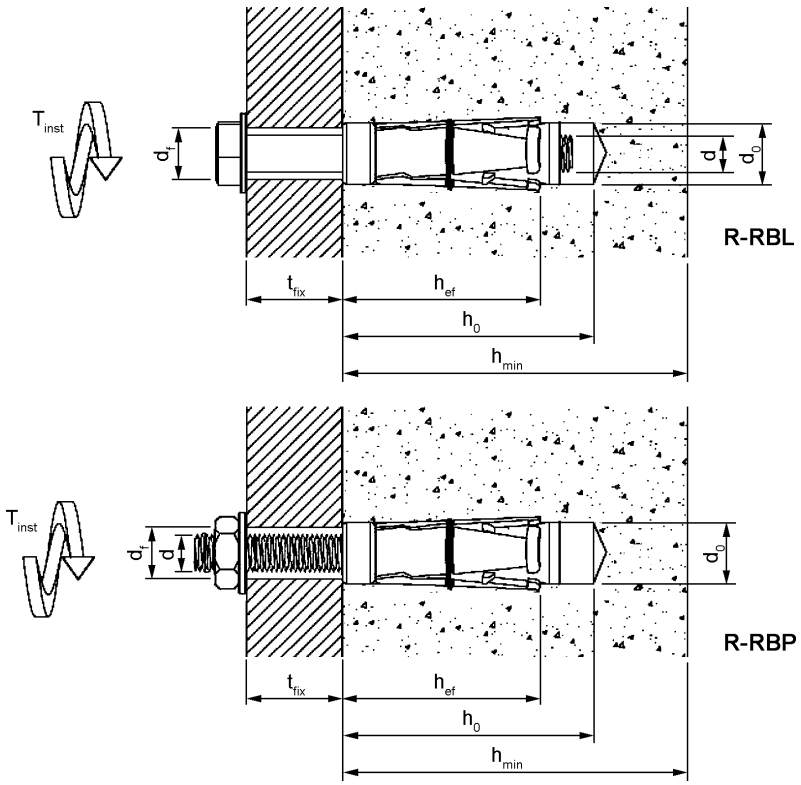


Table B1: Installation parameters

Anchor size		M6	M8	M10	M12	M16	M20
Effective anchorage depth	h_{ef} [mm]	35	40	50	60	95	115
Nominal drill hole diameter	d_o = [mm]	12	14	16	20	25	32
Depth of drill hole	h_0 ≥ [mm]	50	55	65	85	125	140
Diameter of clearance hole in the fixture	d_f ≤ [mm]	6.5	9.0	11.0	13.0	17.0	22.0
Installation torque	T_{inst} = [Nm]	6.5	15	27	50	120	230
Minimum thickness of member	h_{min} [mm]	100	100	100	100	142.5	172.5
Minimum spacing	s_{min} [mm]	35	40	50	60	95	115
Minimum edge distance	c_{min} [mm]	52.5	60	75	90	142.5	172.5

R-RB RAWLBOLT	Annex B 2
Intended use Installation parameters	

ANNEX B : Specification of intended use (continued)

Figure B2 Installation instruction

Installation instruction for R-RBL anchor

Installation instruction for R-RBP anchor

R-RB RAWLBOLT	Annex B 3
Intended use Installation instructions	

ANNEX C : Characteristic values for loads and displacements

Table C1: Characteristic values for tension loads (static and quasi-static loading)

Anchor size			M6	M8	M10	M12	M16	M20
Steel failure								
Characteristic resistance		$N_{Rk,s}$ [kN]	10.05	18.30	29.00	42.15	78.50	122.50
Partial safety factor		γ_{Ms} 1)	1.5					
Pull-out failure								
Characteristic resistance in non-cracked concrete C20/25		$N_{Rk,p}$ [kN]	6	7.5	12	16	40	50
Characteristic resistance in cracked concrete C20/25		$N_{Rk,p}$ [kN]	4	5	6	12	16	30
Installation safety factor		γ_2 2) = γ_{inst} 3) 4)	1.2					
Increasing factor	concrete C30/37	ψ_c	1.22					
	concrete C40/50		1.41					
	concrete C50/60		1.55					
Concrete cone failure and splitting failure								
Effective anchorage depth		h_{ef} [mm]	35	40	50	60	95	115
Factor for non-cracked concrete		k_1 2) = k_{ucr} 3)	10.1	10.1	10.1	10.1	10.1	10.1
		k_1 2) = $k_{ucr,N}$ 4)	11.0	11.0	11.0	11.0	11.0	11.0
Factor for cracked concrete		k_1 2) = k_{cr} 3)	7.2	7.2	7.2	7.2	7.2	7.2
		k_1 2) = $k_{cr,N}$ 4)	7.7	7.7	7.7	7.7	7.7	7.7
Installation safety factor		γ_2 2) = γ_{inst} 3) 4)	1.2					
Increasing factor	concrete C30/37	ψ_c	1.22					
	concrete C40/50		1.41					
	concrete C50/60		1.55					
Characteristic resistance for splitting		$N^0_{Rk,sp}$ 4) [kN]	6	7.5	12	16	40	50
Characteristic spacing	concrete cone failure	$s_{cr,N}$ [mm]	105	120	150	180	285	345
	splitting failure	$s_{cr,sp}$ [mm]	105	120	150	180	285	345
Characteristic edge distance	concrete cone failure	$c_{cr,N}$ [mm]	52.5	60	75	90	143	173
	splitting failure	$c_{cr,sp}$ [mm]	53	60	75	90	143	173

1) in absence of other national regulations

2) parameter for design according to UKAD 330232-00-0601 and EN 1992-4

3) parameter for design according to CEN/TS 1992-4-4:2009

4) parameter for design according to prEN 1992-4:2016

Table C2: Displacements under tension loads

Anchor size		M6	M8	M10	M12	M16	M20
Tension load	N [kN]	2.52	3.31	6.04	8.73	22.05	32.00
Displacement	δ_{N0} [mm]	0.37	0.35	0.38	0.40	0.81	0.77
	$\delta_{N\infty}$ [mm]	1.00	1.00	1.00	1.00	1.00	1.00

R-RB RAWLBOLT

Performances
Characteristic values for tension loads, displacements

Annex C 1

ANNEX C : Characteristic values for loads and displacements (continued)

Table C3: Characteristic values for shear loads (static and quasi-static loading)

Anchor size		M6	M8	M10	M12	M16	M20
Steel failure without lever arm							
Characteristic resistance	$V_{Rk,s}$[2)3)] = $V^0_{Rk,s}$[4)] [kN]	5.03	9.15	14.50	21.08	39.25	61.25
Ductility factor	k[2)]= k_2[3)] = k_7[4)]	0.8	0.8	0.8	0.8	0.8	0.8
Partial safety factor	γ_{Ms}[1)]	1.25					
Steel failure with lever arm							
Characteristic bending resistance	$M^0_{Rk,s}$ [Nm]	7.63	18.74	37.39	65.52	166.52	324.62
Partial safety factor	γ_{Ms}[(1)]	1.25					
Concrete pry-out failure							
Factor	k[2)]= k_3[3)] = k_8[4)]	1.0			2.0		
Partial safety factor	γ_{Ms}[1)]	1.25					
Concrete edge failure							
Effective length of anchor under shear loading	l_f [mm]	35	40	50	60	95	115
Outside diameter of anchor	d_{nom} [mm]	6	8	10	12	16	20
Partial safety factor	γ_{Mc}[1)]	1.5					

[1)] in absence of other national regulations
[2)] parameter for design according to UKAD 330232-00-0601 and EN 1992-4
[3)] parameter for design according to CEN/TS 1992-4-4:2009
[4)] parameter for design according to prEN 1992-4:2016

Table C4: Displacements under shear loads

Anchor size		M6	M8	M10	M12	M16	M20
Shear load	V [kN]	3.04	5.51	7.89	11.10	17.84	28.59
Displacement	δ_{V0} [mm]	0.59	2.22	1.15	0.91	0.80	0.80
	$\delta_{V\infty}$ [mm]	0.89	3.33	1.73	1.37	1.20	1.20

R-RB RAWLBOLT

Performances
Characteristic values for shear loads, displacements

Annex C 2

ANNEX C : Characteristic values for loads and displacements (continued)

Table C5: Characteristic values of resistance to tension loads under fire exposure

Fire resistance class R30		**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Characteristic resistance (steel failure)	$N_{Rk,s,fi,30}$ [kN]	0.2	0.4	0.9	1.7	3.1	4.9
Characteristic resistance in concrete C20/25 to C50/60 (pull-out failure)	$N_{Rk,p,fi,30}$ [kN]	1.0	1.3	1.5	3.0	4.0	7.5
Characteristic resistance in concrete C20/25 to C50/60 (concrete cone failure)	$N^0_{Rk\ c,fi,30}$ [kN]	1.3	1.8	3.2	5.0	15.7	25.4
Fire resistance class R60		**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Characteristic resistance (steel failure)	$N_{Rk,s,fi,60}$ [kN]	0.2	0.3	0.8	1.3	2.4	3.7
Characteristic resistance in concrete C20/25 to C50/60 (pull-out failure)	$N_{Rk,p,fi,60}$ [kN]	1.0	1.3	1.5	3.0	4.0	7.5
Characteristic resistance in concrete C20/25 to C50/60 (concrete cone failure)	$N^0_{Rk\ c,fi,60}$ [kN]	1.3	1.8	3.2	5.0	15.7	25.4
Fire resistance class R90		**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Characteristic resistance (steel failure)	$N_{Rk,s,fi,90}$ [kN]	0.1	0.3	0.6	1.1	2.0	3.2
Characteristic resistance in concrete C20/25 to C50/60 (pull-out failure)	$N_{Rk,p,fi,90}$ [kN]	1.0	1.3	1.5	3.0	4.0	7.5
Characteristic resistance in concrete C20/25 to C50/60 (concrete cone failure)	$N^0_{Rk,c,fi,90}$ [kN]	1.3	1.8	3.2	5.0	15.7	25.4
Fire resistance class R120		**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Characteristic resistance (steel failure)	$N_{Rk,s,fi,120}$ [kN]	0.1	0.2	0.5	0.8	1.6	2.5
Characteristic resistance in concrete C20/25 to C50/60 (pull-out failure)	$N_{Rk,p,fi,120}$ [kN]	0.8	1.0	1.2	2.4	3.2	6.0
Characteristic resistance in concrete C20/25 to C50/60 (concrete cone failure)	$N^0_{Rk,c,fi,120}$ [kN]	1.0	1.4	2.5	4.0	12.6	20.3

		M6	**M8**	**M10**	**M12**	**M16**	**M20**
Spacing	$s_{cr,N}$ [mm]	4 x h_{ef}					
Edge distance	$c_{cr,N}$ [mm]	2 x h_{ef}					

R-RB RAWLBOLT	Annex C 3
Performances Characteristic resistance under tension loading with fire exposure	

ANNEX C : Characteristic values for loads and displacements (continued)

Table C6: Characteristic values of resistance to shear loads under fire exposure

Fire resistance class R30		M6	M8	M10	M12	M16	M20
Characteristic resistance	$V_{Rk,s,fi,30}$ [kN]	0.2	0.4	0.9	1.7	3.1	4.9
Characteristic bending resistance	$M^0_{Rk,s,fi,30}$ [Nm]	0.2	0.4	1.1	2.6	6.7	13.0
Characteristic resistance (concrete pry-out failure)	$V_{Rk,cp,fi,30}$ [kN]	1.3	1.8	3.2	5.0	15.7	25.4
Characteristic resistance (concrete edge failure)	$V^0_{Rk,cp,fi,30}$ [kN]	0.2	0.4	0.9	1.7	3.1	4.9
Fire resistance class R60		**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Characteristic resistance	$V_{Rk,s,fi,60}$ [kN]	0.2	0.3	0.8	1.3	2.4	3.7
Characteristic bending resistance	$M^0_{Rk,s,fi,60}$ [Nm]	0.1	0.3	1.0	2.0	5.0	9.7
Characteristic resistance (concrete pry-out failure)	$V_{Rk,cp,fi,60}$ [kN]	1.3	1.8	3.2	5.0	15.7	25.4
Characteristic resistance (concrete edge failure)	$V^0_{Rk,cp,fi,60}$ [kN]	0.2	0.3	0.8	1.3	2.4	3.7
Fire resistance class R80		**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Characteristic resistance	$V_{Rk,s,fi,90}$ [kN]	0.1	0.3	0.6	1.1	2.0	3.2
Characteristic bending resistance	$M^0_{Rk,s,fi,90}$ [Nm]	0.1	0.3	0.7	1.7	4.3	8.4
Characteristic resistance (concrete pry-out failure)	$V_{Rk,cp,fi,90}$ [kN]	1.3	1.8	3.2	10.0	31.4	50.8
Characteristic resistance (concrete edge failure)	$V^0_{Rk,cp,fi,90}$ [kN]	0.03	0.08	0.15	0.28	0.5	0.8
Fire resistance class R120		**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Characteristic resistance	$V_{Rk,s,fi,120}$ [kN]	0.1	0.2	0.5	0.8	1.6	2.5
Characteristic bending resistance	$M^0_{Rk,s,fi,120}$ [Nm]	0.1	0.2	0.6	1.3	3.3	6.5
Characteristic resistance (concrete pry-out failure)	$V_{Rk,cp,fi,120}$ [kN]	1.0	1.4	2.5	8.0	25.2	40.6
Characteristic resistance (concrete edge failure)	$V^0_{Rk,cp,fi,120}$ [kN]	0.02	0.06	0.12	0.22	0.4	0.64

In absence of other national regulations the partial safety factor for resistance under fire exposure
$\gamma_{M,fi}$ = 1.0 is recommended

R-RB RAWLBOLT	Annex C 4
Performances Characteristic resistance under shear loading with fire exposure	

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