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Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organization for Technical Assessment)

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European Technical Assessment

ETA-11/0479 of 29/05/2017

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	R-RB RAWLBOLT
Product family to which the construction product belongs	Torque controlled expansion anchor of sizes M6, M8, M10, M12, M16 and M20 for use in non-cracked and cracked concrete
Manufacturer	RAWLPLUG S.A. ul. Kwidzyńska 6 PL 51-416 Wrocław Poland
Manufacturing plants	1. Plant 2 2. Plant 3
This European Technical Assessment contains	15 pages including 3 Annexes which form an integral part of this Assessment
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	European Assessment Document (EAD) 330232-00-0601 "Mechanical fasteners for use in concrete"
This version replaces	ETA-11/0479 issued on 26/06/2013

Specific Part

1 Technical description of the product

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

An illustration and the description of the product are given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document (EAD)

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

The provisions made in this European Technical Assessment are based on an assumed working life of the anchor 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 Performance of the product

3.1.1 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

3.1.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchors satisfy requirements for Class A1
Resistance to fire	Annex C3 and C4

3.2 Methods used for the assessment

The assessment of fitness of anchors for the declared intended use in relation to the requirements for mechanical resistance and stability and safety in case of fire in the sense of the Basic Requirements 1 and 2 has been made in accordance with the EAD 330232-00-0601 "*Mechanical fasteners for use in concrete*".

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to Decision 96/582/EC of the European Commission the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Metal anchors 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

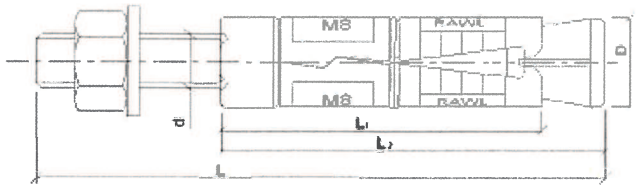
5 Technical details necessary for the implementation of the AVCP system, as provided in the applicable European Assessment Document (EAD)

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited in Instytut Techniki Budowlanej.

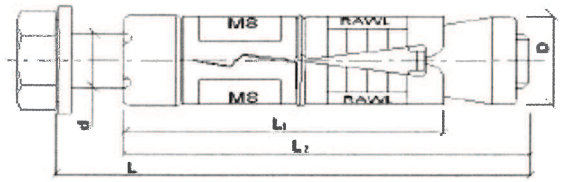
For the type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 29/05/2017 by Instytut Techniki Budowlanej

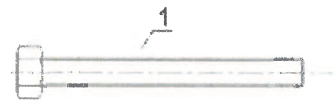
Marcin M. Kruk, PhD
Director of ITB

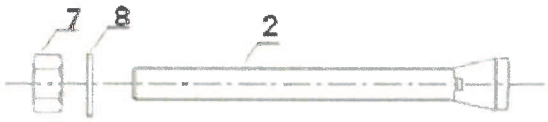


R-RBP



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 A1** of European Technical Assessment ETA-11/0479
Product description Anchor	

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 A2** of European Technical Assessment ETA-11/0479
Product description Dimensions	

Table A2: R-RBP anchor dimensions

Type of anchor			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 A2** of European Technical Assessment ETA-11/0479
Product description Dimensions	

Table A3: 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

Specification of intended use

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.
- Non-cracked 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 B1**
Intended use Specifications	of European Technical Assessment ETA-11/0479

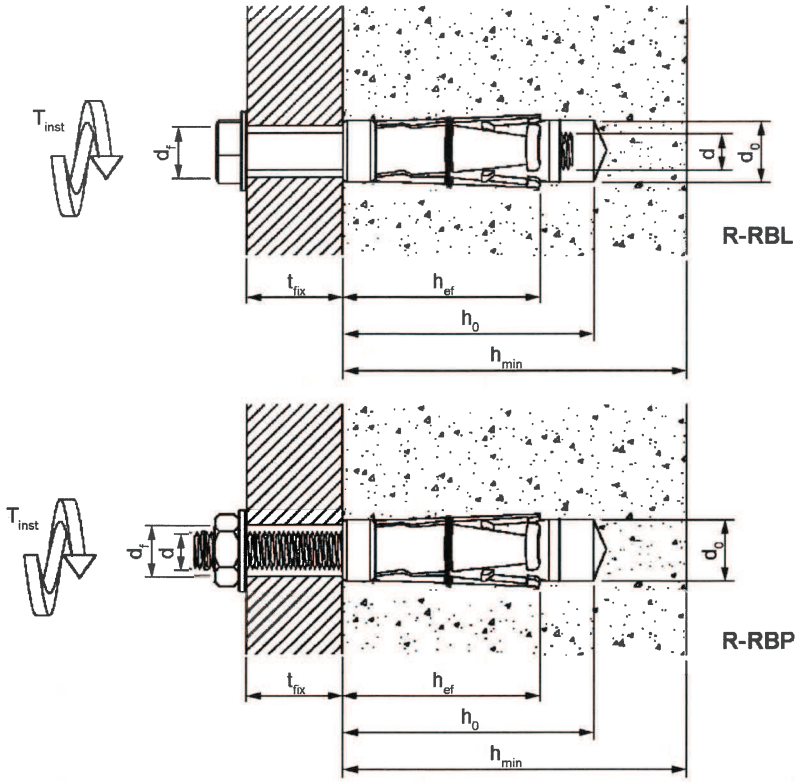
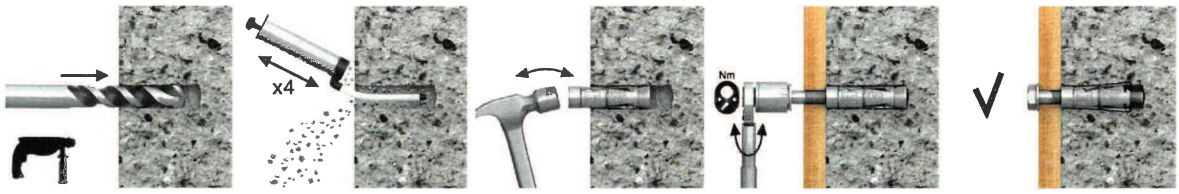


Table B1: Installation parameters

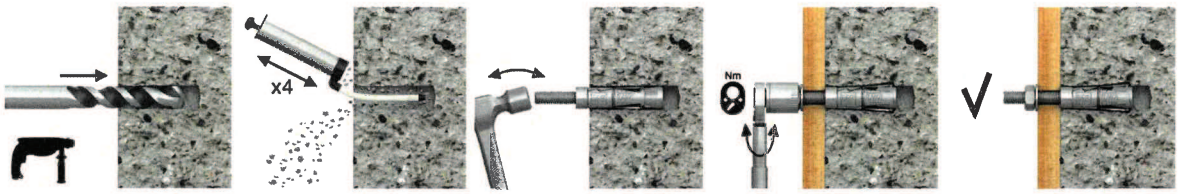
Anchor size		M6	M8	M10	M12	M16	M20
Effective anchorage depth	h_{ef} [mm]	35	40	50	60	95	115
Nominal drill hole diameter	d_o = [mm]	12	14	16	20	25	32
Depth of drill hole	$h_0 \geq$ [mm]	50	55	65	85	125	140
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	6,5	9,0	11,0	13,0	17,0	22,0
Installation 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 B2** of European Technical Assessment ETA-11/0479
Intended use Installation parameters	

Installation instruction for R-RBL anchor



Installation instruction for R-RBP anchor



R-RB RAWLBOLT	**Annex B3** of European Technical Assessment ETA-11/0479
Intended use Installation instruction	

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 ETAG-001 Annex C

[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

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 ETAG-001 Annex C
[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

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]	$4 \times h_{ef}$					
Edge distance	$c_{cr,N}$ [mm]	$2 \times h_{ef}$					

R-RB RAWLBOLT

Performances
Characteristic resistance under tension loading with fire exposure

Annex C3
of European Technical Assessment ETA-11/0479

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 C4** of European Technical Assessment ETA-11/0479
Performances Characteristic resistance under shear loading with fire exposure	