RV200 with Rebar as an Anchor (CFS+)

High performance vinylester resin approved for use with reinforcement bars - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-13/0805

Product information

Features and benefits

- Approved for use with rebar as an anchor for use in non-cracked concrete
- Suitable for use in low temperatures (down to -20°C for winter option) enables use throughout the year
- Suitable for use in dry or wet substrates and water filled holes
- Anchor does not generate tensions in the substrate which enables RV200 to be specified where closer edge and spacing distances are required
- Winter version can be used in warmer temperatures for faster curing
- Unique soft foil pack for less waste
- Effortless extrusion due to patented self-opening system with manual or battery dispenser guns
- Very high load capacity

Applications

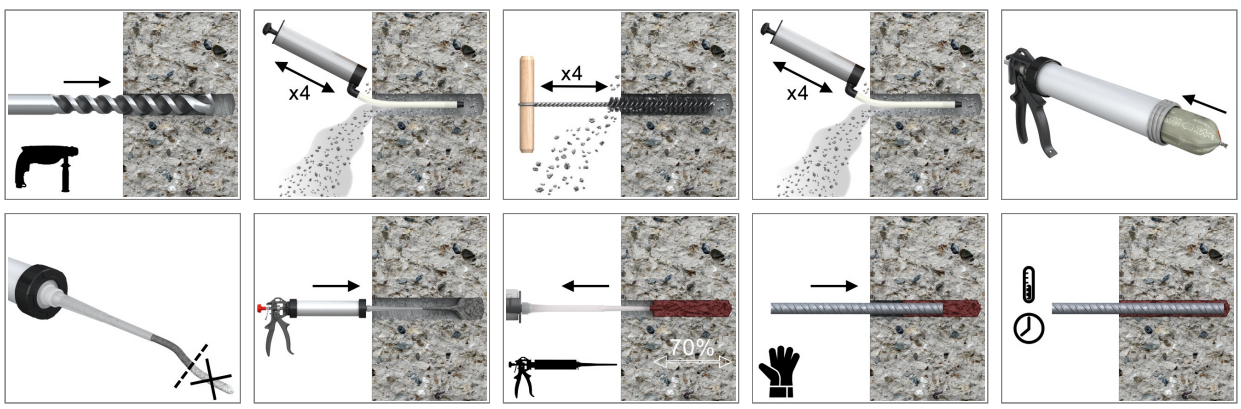
- Curtain walling
- Canopies
- Cable trays
- Formwork support systems
- Heavy machinery

Base materials

Approved for use in:

- Non-cracked concrete C20/25-C50/60

Installation guide



Product information

1. Drill hole to the required diameter and depth for rebar size being used.
2. Clean the hole thoroughly with brush and hand pump at least four times before installation.
3. Insert foil into gun and attach nozzle.
4. Dispense to waste until even colour is obtained.
5. Insert the mixer nozzle to the bottom of the drill hole and inject resin, slowly withdrawing the nozzle as the hole is filled to 70% of its depth.
6. Immediately insert the rebar, slowly and with slight twisting motion. Remove any excess resin around the hole before it sets and leave it undisturbed until the curing time elapses.

Product Code	Resin	Description / Resin Type	Volume [ml]
R-CFS+RV200-4	RV200	Styrene Free Vinylester Resin	300
R-CFS+RV200-600-8			600

Installation data

REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Rebar diameter	d_s	[mm]	8	10	12	14	16	20	25	32
Hole diameter in substrate	d_0	[mm]	12	14	18	18	22	26	32	40
Min. hole depth in substrate	h_0	[mm]	h_{nom}+5	h_{nom}+5	h_{nom}+5	h_{nom}+5	h_{nom}+5	h_{nom}+5	h_{nom}+5	h_{nom}+5
Min. substrate thickness	h_{min}	[mm]	h_{nom}+30 ≥100	h_{nom}+30 ≥100	h_{nom} + $2d_0$	h_{nom} + $2d_0$	h_{nom} + $2d_0$	h_{nom} + $2d_0$	h_{nom} + $2d_0$	h_{nom} + $2d_0$
Min. spacing	s_{min}	[mm]	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40
Min. edge distance	c_{min}	[mm]	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40	0.5 * h_{nom} ≥ 40
MINIMUM EMBEDMENT DEPTH										
Min. installation depth	$h_{nom,min}$	[mm]	60	70	80	80	100	120	140	165
MAXIMUM EMBEDMENT DEPTH										
Min. installation depth	$h_{nom, max}$	[mm]	100	120	145	145	190	240	290	360

Minimum working and curing time

RV200

Resin temperature	Concrete temperature	Curing time*	Working time
[°C]	[°C]	[min]	[min]
5	-20	-	-
5	-15	-	-
5	-10	-	-
5	-5	240	60
5	0	180	40
5	5	120	20
10	10	80	12
15	15	60	8
20	20	45	5
25	30	20	2
25	40	10	0.5

**For wet concrete the curing time must be doubled*

Installation data

RV200-W

Resin temperature	Concrete temperature	Curing time*	Working time
[°C]	[°C]	[min]	[min]
5	-20	1440	100
5	-15	960	60
5	-10	480	30
5	-5	240	16
5	0	120	12
5	5	60	8
10	10	45	5
15	15	30	3
20	20	10	2
25	25	-	-
25	30	-	-
25	40	-	-
25	45	-	-
25	50	-	-

**For wet concrete the curing time must be doubled*

Mechanical properties

REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
f_uk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	540	540	540	540	540	540	540	540
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50	79	113	154	201	314	491	804
Elastic section modulus	W_{el}	[mm³]	50	98	170	269	402	785	1534	3217
f_uk = 575 (e.g. B 500 SP acc. to EC2)										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50	79	113	154	201	314	491	804
Elastic section modulus	W_{el}	[mm³]	50	98	170	269	402	785	1534	3217
f_uk = 620 (e.g. G-60 acc. to ASTM 615)										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	620	620	620	620	620	620	620	620
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	50	79	113	154	201	314	491	804
Elastic section modulus	W_{el}	[mm³]	50	98	170	269	402	785	1534	3217

Basic performance data

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Substrate		Non-cracked concrete							
MEAN ULTIMATE LOAD									
TENSION LOAD $N_{Ru,m}$									
f_uk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)									
Minimum embedment depth	[kN]	26.8	37.3	48.3	48.3	67.5	88.7	111.8	143.1
Maximum embedment depth	[kN]	28.5	44.5	64.1	87.3	114.0	178.1	246.7	348.2
f_uk = 575 (e.g. B 500 SP acc. to EC2)									
Minimum embedment depth	[kN]	26.8	37.3	48.3	48.3	67.5	88.7	111.8	143.1
Maximum embedment depth	[kN]	30.4	47.4	68.3	92.9	121.4	189.7	246.7	348.2
f_uk = 620 (e.g. G-60 acc. to ASTM 615)									
Minimum embedment depth	[kN]	26.8	37.3	48.3	48.3	67.5	88.7	111.8	143.1
Maximum embedment depth	[kN]	32.7	51.1	73.6	100.2	130.9	190.6	246.7	348.2
SHEAR LOAD $V_{Ru,m}$									
f_uk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)									
Minimum embedment depth	[kN]	17.1	26.7	38.5	52.4	68.4	106.9	167.0	273.6
Maximum embedment depth	[kN]	17.1	26.7	38.5	52.4	68.4	106.9	167.0	273.6
f_uk = 575 (e.g. B 500 SP acc. to EC2)									
Minimum embedment depth	[kN]	18.2	28.5	41.0	55.8	72.8	113.8	177.8	276.1
Maximum embedment depth	[kN]	18.2	28.5	41.0	55.8	72.8	113.8	177.8	291.3
f_uk = 620 (e.g. G-60 acc. to ASTM 615)									
Minimum embedment depth	[kN]	19.6	30.7	44.2	60.1	78.5	122.7	191.7	286.1
Maximum embedment depth	[kN]	19.6	30.7	44.2	60.1	78.5	122.7	191.7	314.1
CHARACTERISTIC LOAD									
TENSION LOAD N_{Rk}									
f_uk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)									
Minimum embedment depth	[kN]	16.6	22.0	30.2	31.7	45.3	56.6	77.0	104.3
Maximum embedment depth	[kN]	27.1	37.7	54.7	57.4	86.0	113.1	159.4	235.2
f_uk = 575 (e.g. B 500 SP acc. to EC2)									
Minimum embedment depth	[kN]	16.6	22.0	30.2	31.7	45.2	56.6	77.0	104.3
Maximum embedment depth	[kN]	27.7	37.7	54.7	57.4	86.0	113.1	159.4	235.2
f_uk = 620 (e.g. G-60 acc. to ASTM 615)									
Minimum embedment depth	[kN]	16.6	22.0	30.2	31.7	45.2	56.6	77.0	104.3
Maximum embedment depth	[kN]	27.7	37.7	54.7	57.4	86.0	113.1	159.4	235.2
SHEAR LOAD V_{Rk}									
f_uk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)									
Minimum embedment depth	[kN]	13.6	21.2	30.5	41.6	54.3	84.8	132.5	208.5
Maximum embedment depth	[kN]	13.6	21.2	30.5	41.6	54.3	84.8	132.5	217.2
f_uk = 575 (e.g. B 500 SP acc. to EC2)									
Minimum embedment depth	[kN]	14.5	22.6	32.5	44.3	57.8	90.3	141.1	208.5
Maximum embedment depth	[kN]	14.5	22.6	32.5	44.3	57.8	90.3	141.1	231.2
f_uk = 620 (e.g. G-60 acc. to ASTM 615)									
Minimum embedment depth	[kN]	15.6	24.4	35.1	47.7	62.3	97.4	152.2	208.5
Maximum embedment depth	[kN]	15.6	24.4	35.1	47.7	62.3	97.4	152.2	249.3

Basic performance data

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
DESIGN LOAD									
TENSION LOAD N_{Rd}									
f_uk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)									
Minimum embedment depth	[kN]	9.22	12.2	16.8	17.6	25.1	31.4	42.8	57.9
Maximum embedment depth	[kN]	15.4	20.9	30.4	31.9	47.8	62.8	88.6	130.7
f_uk = 575 (e.g. B 500 SP acc. to EC2)									
Minimum embedment depth	[kN]	9.22	12.2	16.8	17.6	25.1	31.4	42.8	57.9
Maximum embedment depth	[kN]	15.4	20.9	30.4	31.9	47.8	62.8	88.6	130.7
f_uk = 620 (e.g. G-60 acc. to ASTM 615)									
Minimum embedment depth	[kN]	9.22	12.2	16.8	17.6	25.1	31.4	42.8	57.9
Maximum embedment depth	[kN]	15.4	20.9	30.4	31.9	47.8	62.8	88.6	130.7
SHEAR LOAD V_{Rd}									
f_uk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)									
Minimum embedment depth	[kN]	9.05	14.1	20.4	27.7	36.2	56.6	88.4	139.0
Maximum embedment depth	[kN]	9.05	14.1	20.4	27.7	36.2	56.6	88.4	144.8
f_uk = 575 (e.g. B 500 SP acc. to EC2)									
Minimum embedment depth	[kN]	9.63	15.1	21.7	29.5	38.5	60.2	94.1	139.0
Maximum embedment depth	[kN]	9.63	15.1	21.7	29.5	38.5	60.2	94.1	154.2
f_uk = 620 (e.g. G-60 acc. to ASTM 615)									
Minimum embedment depth	[kN]	10.4	16.2	23.4	31.8	41.6	64.9	101.5	139.0
Maximum embedment depth	[kN]	10.4	16.2	23.4	31.8	41.6	64.9	101.5	166.2
RECOMMENDED LOAD									
TENSION LOAD N_{rec}									
f_uk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)									
Minimum embedment depth	[kN]	6.58	8.73	12.0	12.6	18.0	22.4	30.5	41.4
Maximum embedment depth	[kN]	11.0	15.0	21.7	22.8	34.1	44.9	63.3	93.4
f_uk = 575 (e.g. B 500 SP acc. to EC2)									
Minimum embedment depth	[kN]	6.58	8.73	12.0	12.6	18.0	22.4	30.5	41.4
Maximum embedment depth	[kN]	11.0	15.0	21.7	22.8	34.1	44.9	63.3	93.4
f_uk = 620 (e.g. G-60 acc. to ASTM 615)									
Minimum embedment depth	[kN]	6.58	8.73	12.0	12.6	18.0	22.4	30.5	41.4
Maximum embedment depth	[kN]	11.0	15.0	21.7	22.8	34.1	44.9	63.3	93.6
SHEAR LOAD V_{rec}									
f_uk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)									
Minimum embedment depth	[kN]	6.46	10.1	14.5	19.8	25.9	40.4	63.1	99.3
Maximum embedment depth	[kN]	6.46	10.1	14.5	19.8	25.9	40.4	63.1	103.4
f_uk = 575 (e.g. B 500 SP acc. to EC2)									
Minimum embedment depth	[kN]	6.88	10.8	15.5	21.1	27.5	43.0	67.2	99.3
Maximum embedment depth	[kN]	6.88	10.8	15.5	21.1	27.5	43.0	67.2	110.1
f_uk = 620 (e.g. G-60 acc. to ASTM 615)									
Minimum embedment depth	[kN]	7.42	11.6	16.7	22.7	29.7	46.4	72.5	99.3
Maximum embedment depth	[kN]	7.42	11.6	16.7	22.7	29.7	46.4	72.5	118.7

Design performance data

REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
TENSION LOAD										
STEEL FAILURE; F_UK = 540 (E.G. 500 B ACC. TO BS 4449; B 500 B ACC. TO SS 560)										
Characteristic resistance	$N_{Rk,s}$	[kN]	27.14	42.41	61.07	83.13	108.57	169.65	265.07	434.29
Partial safety factor	γ_{Ms}	-	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
STEEL FAILURE; F_UK = 575 (E.G. B 500 SP ACC. TO EC2)										
Characteristic resistance	$N_{Rk,s}$	[kN]	28.90	45.16	65.03	88.51	115.61	180.64	282.25	462.44
Partial safety factor	γ_{Ms}	-	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
STEEL FAILURE; F_UK = 620 (E.G. G-60 ACC. TO ASTM 615)										
Characteristic resistance	$N_{Rk,s}$	[kN]	31.16	48.69	70.12	95.44	124.66	194.78	304.34	498.63
Partial safety factor	γ_{Ms}	-	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
COMBINED PULL-OUT AND CONCRETE CONE FAILURE; NON-CRACKED CONCRETE, C20/25 (40°C/24°C)										
Characteristic bond resistance	T_{Rk}	[N/mm²]	11.00	10.00	10.00	9.00	9.00	7.50	7.00	6.50
Sustained load factor	Ψ^0_{sus}	-	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
COMBINED PULL-OUT AND CONCRETE CONE FAILURE; NON-CRACKED CONCRETE, C20/25 (80°C/50°C)										
Characteristic bond resistance	T_{Rk}	[N/mm²]	9.00	8.00	8.00	7.00	7.00	6.00	6.00	5.00
Sustained load factor	Ψ^0_{sus}	-	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
COMBINED PULL-OUT AND CONCRETE CONE FAILURE										
Installation safety factor	γ_{inst}	-	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Increasing factors for $N_{Rd,p}$ - C30/37	Ψ_c	-	1.04	1.04	1.04	1.04	1.04	1.00	1.00	1.00
Increasing factors for $N_{Rd,p}$ - C40/50	Ψ_c	-	1.07	1.07	1.07	1.07	1.07	1.00	1.00	1.00
Increasing factors for $N_{Rd,p}$ - C50/60	Ψ_c	-	1.09	1.09	1.09	1.09	1.09	1.00	1.00	1.00
CONCRETE CONE FAILURE										
Installation safety factor	γ_{inst}	-	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Factor for non-cracked concrete	$k_{ucr,N}$	-	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
Edge distance	$c_{cr,N}$	[mm]	$1.5*h_{ef}$	$1.5*h_{ef}$	$1.5*h_{ef}$	$1.5*h_{ef}$	$1.5*h_{ef}$	$1.5*h_{ef}$	$1.5*h_{ef}$	$1.5*h_{ef}$
Spacing	$s_{cr,N}$	[mm]	$3.0*h_{ef}$	$3.0*h_{ef}$	$3.0*h_{ef}$	$3.0*h_{ef}$	$3.0*h_{ef}$	$3.0*h_{ef}$	$3.0*h_{ef}$	$3.0*h_{ef}$
CONCRETE SPLITTING FAILURE										
Installation safety factor	γ_{inst}	-	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20

Design performance data

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
SHEAR LOAD										
STEEL FAILURE; F_UK = 540 (E.G. 500 B ACC. TO BS 4449; B 500 B ACC. TO SS 560)										
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	13.57	21.21	30.54	41.56	54.29	84.82	132.54	217.15
Ductility factor	k_7	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Characteristic resistance with lever arm	$M_{Rk,s}$	[Nm]	32.57	63.62	109.93	174.57	260.58	508.94	994.02	2084.61
Partial safety factor	γ_{Ms}	-	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
STEEL FAILURE; F_UK = 575 (E.G. B 500 SP ACC. TO EC2)										
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	14.45	22.59	32.52	44.26	57.81	90.32	141.13	231.22
Ductility factor	k_7	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Characteristic resistance with lever arm	$M_{Rk,s}$	[Nm]	34.68	67.74	117.06	185.88	277.47	541.92	1058.45	2219.72
Partial safety factor	γ_{Ms}	-	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
STEEL FAILURE; F_UK = 620 (E.G. G-60 ACC. TO ASTM 615)										
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	15.58	24.35	35.06	47.72	62.33	97.39	152.17	249.32
Ductility factor	k_7	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Characteristic resistance with lever arm	$M_{Rk,s}$	[Nm]	37.40	73.04	126.22	200.43	299.18	584.34	1141.28	2393.44
Partial safety factor	γ_{Ms}	-	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
CONCRETE PRY-OUT FAILURE										
Factor	k	-	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Installation safety factor	γ_{inst}	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CONCRETE EDGE FAILURE										
Anchor diameter	d_{nom}	[mm]	8.00	10.00	12.00	14.00	16.00	20.00	25.00	32.00
Effective length of anchor	ℓ_f	[mm]	min(300; h_{ef};12d_{nom})	min(300; h_{ef};12d_{nom})	min(300; h_{ef};12d_{nom})	min(300; h_{ef};12d_{nom})	min(300; h_{ef};12d_{nom})	min(300; h_{ef};12d_{nom})	min(300; h_{ef};12d_{nom})	min(300; h_{ef};12d_{nom})
Installation safety factor	γ_{inst}	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Combined pull-out and concrete cone failure (EN 1992-4:2018, p.7.2.1.6., 7.14 - $N^0_{Rk,p}=\psi^0_{sus}*\tau_{Rk}*\pi*d*h_{ef}$).
$h_{ef} = h_{nom}$

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Codes
		Box	Outer	Pallet	Box	Outer	Pallet	
R-CFS+RV200-4 [1)]	300	1	8	96	2.4	19.3	261.3	5906675205830
R-CFS+RV200-600-8 [1)]	600	1	1	36	10.0	10.0	390.0	5906675119045

1) ETA-13/0805