Bonded Anchors

The following section provides detailed information and technical data on the range of Rawlplug® Bonded Anchors.

The range includes:
Bonded Anchors in Cartridges | CFS+ Cartridge Free System Glass Capsules | Accessories

BONDED ANCHORS IN CARTRIDGES

- R-KEX II
  - with Threaded Rods
  - with Sockets
  - with Rebar as an Anchor
  - with Post-Installed Rebar
- R-KER II
  - with Threaded Rods
  - with Sockets
  - with Rebar as an Anchor
  - with Post-Installed Rebar
- R-KER
  - with Threaded Rods
  - with Sockets
  - with Rebar as an Anchor
  - with Post-Installed Rebar
- R-KEM II
  - with Threaded Rods for Concrete
  - with Threaded Rods for Masonry
- R-KF2
  - with Threaded Rods

R-KEX II with Threaded Rods

Premium pure epoxy resin approved for use in cracked and non-cracked concrete

Installation movie

Approvals and Reports

- ETA-13/0455

Product overview

Features and benefits

- Approved for use with threaded rods for use in cracked and non-cracked concrete (EAD 330499-00-0601)
- Suitable for use in dry and wet substrates including under water
- Very high chemical resistance – suitable for applications exposed to influence of various agents (industrial or marine environment)
- Minimal shrinkage provides the option to use in diamond drilled holes and over-sized holes.
- Extended bonding time ensures easy installation of metal components (up to 35 min in +20°C)
- For use in temperatures above 0°C
- Seismic category C1
- Diamond and hammer drilling
- Special mixer nozzle - allows for precise mixing of the product

Applications

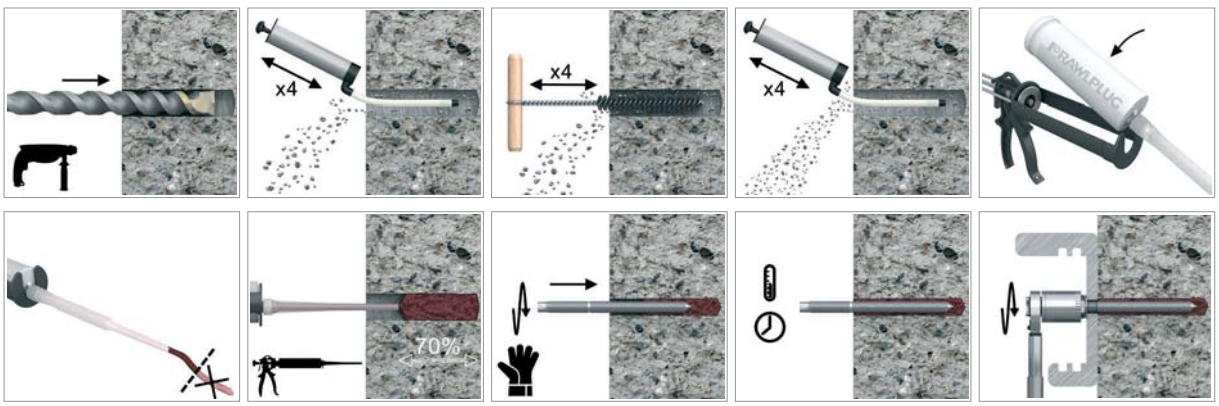
- Safety barriers
- Formworks support systems
- Structural steelwork
- Street lamps
- Curtain walling
- Racking systems
- Balustrading
- Barriers
- Cladding restraints
- Masonry support
- Machinery
- Platforms

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud size being used.
2. Clean the drill hole thoroughly with brush and hand pump at least four times before installation.
3. Attach nozzle and insert cartridge into gun.
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 stud, 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.
7. Attach fixture and tighten the nut to the required torque.

Product information

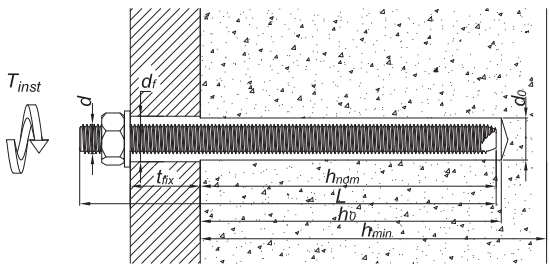
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KEX-II-385	R-KEX II	Epoxy Resin	385
R-KEX-II-600	R-KEX II	Epoxy Resin	600

R-STUDS

Size	Product Code			Anchor		Fixture		
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness	
				d	L	d_f	t_{fix} for $h_{ef,min}$	t_{fix} for $h_{ef,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	40	-
	R-STUDS-08160	-	R-STUDS-08160-A4*	8	160	9	90	-
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	48	-
	R-STUDS-10170	-	R-STUDS-10170-A4*	10	170	12	88	-
	R-STUDS-10190	-	R-STUDS-10190-A4*	10	190	12	108	-
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	65	-
	R-STUDS-12190	-	R-STUDS-12190-A4*	12	190	14	95	-
	R-STUDS-12220	-	R-STUDS-12220-A4*	12	220	14	125	-
	R-STUDS-12260	-	R-STUDS-12260-A4*	12	260	14	165	-
	R-STUDS-12300	-	R-STUDS-12300-A4*	12	300	14	205	45
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	71	-
	R-STUDS-16220	R-STUDS-16220-88	R-STUDS-16220-A4*	16	220	18	101	-
	R-STUDS-16260	-	R-STUDS-16260-A4*	16	260	18	141	-
	R-STUDS-16300	-	R-STUDS-16300-A4*	16	300	18	181	-
	R-STUDS-16380	-	R-STUDS-16380-A4*	16	380	18	261	41
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	117	-
	R-STUDS-20300	R-STUDS-20300-88	R-STUDS-20300-A4*	20	300	22	157	-
	R-STUDS-20350	-	R-STUDS-20350-A4*	20	350	22	207	-
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4*	24	300	26	132	-
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	181	-

* Make to order

Installation data



Installation data (cont.)

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Hole diameter in fixture	d_f	[Nm]	9	12	14	18	22	26	32
Min. hole depth in substrate	h_0	[mm]	h_{nom} + 5						
Min. substrate thickness	h_{min}	[mm]	h_{nom} + 30 mm; ≥ 100 mm			$h_{nom} + 2d_0$			
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	200
Min. spacing	s_{min}	[mm]	40	40	40	50	60	70	85
Min. edge distance	c_{min}	[mm]	40	40	40	50	60	70	83
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	160	200	240	320	400	480	600

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	5	150	2880
10	10	120	1080
20	20	35	480
25	30	12	300

* For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
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]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95	185	321	642
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152	297	513	1028
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107	208	360	721

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete							Cracked concrete						
CHARACTERISTIC LOAD															
TENSION LOAD $N_{Ru,m}$															
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8															
Minimum embedment depth	[kN]	18	29	36	51	66	84	107	12	18	21	35	47	60	76
Maximum embedment depth	[kN]	18	29	42	78	122	176	280	18	29	42	78	122	176	280
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8															
Minimum embedment depth	[kN]	24	30	36	51	66	84	107	12	18	21	35	47	60	76
Maximum embedment depth	[kN]	29	46	67	126	196	282	449	29	46	63	113	176	217	283
R-STUDS METRIC THREADED RODS - A4-70															
Minimum embedment depth	[kN]	24	30	36	51	66	84	107	12	18	21	35	47	60	76
Maximum embedment depth	[kN]	26	41	59	110	171	247	393	26	41	59	110	171	217	283
SHEAR LOAD $V_{Ru,m}$															
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8															
Minimum embedment depth	[kN]	9	14	21	39	61	88	140	9	14	21	39	61	88	140
Maximum embedment depth	[kN]	9	14	21	39	61	88	140	9	14	21	39	61	88	140
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8															
Minimum embedment depth	[kN]	15	23	34	63	98	141	214	15	23	34	63	95	119	153
Maximum embedment depth	[kN]	15	23	34	63	98	141	224	15	23	34	63	98	141	224
R-STUDS METRIC THREADED RODS - A4-70															
Minimum embedment depth	[kN]	13	20	29	55	86	124	196	13	20	29	55	86	119	153
Maximum embedment depth	[kN]	13	20	29	55	86	124	196	13	20	29	55	86	124	196
DESIGN LOAD															
TENSION LOAD N_{Rk}															
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8															
Minimum embedment depth	[kN]	12	19	24	34	44	56	71	8	12	14	24	32	40	51
Maximum embedment depth	[kN]	12	19	28	52	81	117	187	12	19	28	52	81	117	187
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8															
Minimum embedment depth	[kN]	16	20	24	34	44	56	71	8	12	14	24	32	40	51
Maximum embedment depth	[kN]	19	31	45	84	131	188	299	19	31	42	75	117	145	189
R-STUDS METRIC THREADED RODS - A4-70															
Minimum embedment depth	[kN]	14	20	24	34	44	56	71	8	12	14	24	32	40	51
Maximum embedment depth	[kN]	14	22	32	59	91	132	210	14	22	32	59	91	132	189
SHEAR LOAD $V_{Ru,m}$															
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8															
Minimum embedment depth	[kN]	7	11	17	31	49	70	112	7	11	17	31	49	70	102
Maximum embedment depth	[kN]	7	11	17	31	49	70	112	7	11	17	31	49	70	112
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8															
Minimum embedment depth	[kN]	12	18	27	50	78	112	143	12	18	27	47	63	80	102
Maximum embedment depth	[kN]	19	31	45	84	131	188	299	19	31	42	75	117	145	189
R-STUDS METRIC THREADED RODS - A4-70															
Minimum embedment depth	[kN]	8	13	19	35	55	80	126	8	13	19	35	55	80	102
Maximum embedment depth	[kN]	8	13	19	35	55	80	126	8	13	19	35	55	80	126

Basic performance data (cont.)

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete							Cracked concrete						
RECOMMENDED LOAD															
TENSION LOAD N_{Rk}															
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8															
Minimum embedment depth	[kN]	9	14	17	24	32	40	51	6	8	10	17	23	28	36
Maximum embedment depth	[kN]	9	14	20	37	58	84	133	9	14	20	37	58	84	133
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8															
Minimum embedment depth	[kN]	11	14	17	24	32	40	51	6	8	10	17	23	28	36
Maximum embedment depth	[kN]	14	22	32	60	93	134	214	14	22	30	54	84	103	135
R-STUDS METRIC THREADED RODS - A4-70															
Minimum embedment depth	[kN]	10	14	17	24	32	40	51	6	8	10	17	23	28	36
Maximum embedment depth	[kN]	10	16	23	42	65	94	150	10	16	23	42	65	94	135
SHEAR LOAD $V_{Ru,m}$															
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8															
Minimum embedment depth	[kN]	5	8	12	22	35	50	80	5	8	12	22	35	50	73
Maximum embedment depth	[kN]	5	8	12	22	35	50	80	5	8	12	22	35	50	80
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8															
Minimum embedment depth	[kN]	9	13	19	36	56	80	102	9	13	19	34	45	57	73
Maximum embedment depth	[kN]	9	13	19	36	56	81	128	9	13	19	36	56	81	128
R-STUDS METRIC THREADED RODS - A4-70															
Minimum embedment depth	[kN]	6	9	13	25	39	57	90	6	9	13	25	39	57	73
Maximum embedment depth	[kN]	6	9	13	25	39	57	90	6	9	13	25	39	57	90

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KEX-II-385	385	10	10	560	6.7	6.7	390.0	5906675028538	20
R-KEX-II-600	600	7	7	441	7.0	7.0	472.7	5906675293721	20

R-KEX II with Sockets

Premium pure epoxy resin approved for use with internally threaded sockets

Approvals and Reports

- ETA-13/0455

Product overview

Features and benefits

- Allows removal of bolt to leave a re-usable socket in place
- Approved for use with Sockets in non-cracked concrete EAD 330499-00-0601
- Suitable for use in dry and wet substrates including under water
- Very high chemical resistance – suitable for applications exposed to influence of various agents (industrial or marine environment)
- Minimal shrinkage provides the option to use
- Extended bonding time ensures easy installation of metal components (up to 30 min in +20°C)
- For use in temperatures above 0°C
- Special mixer nozzle - allows for precise mixing of the product

Applications

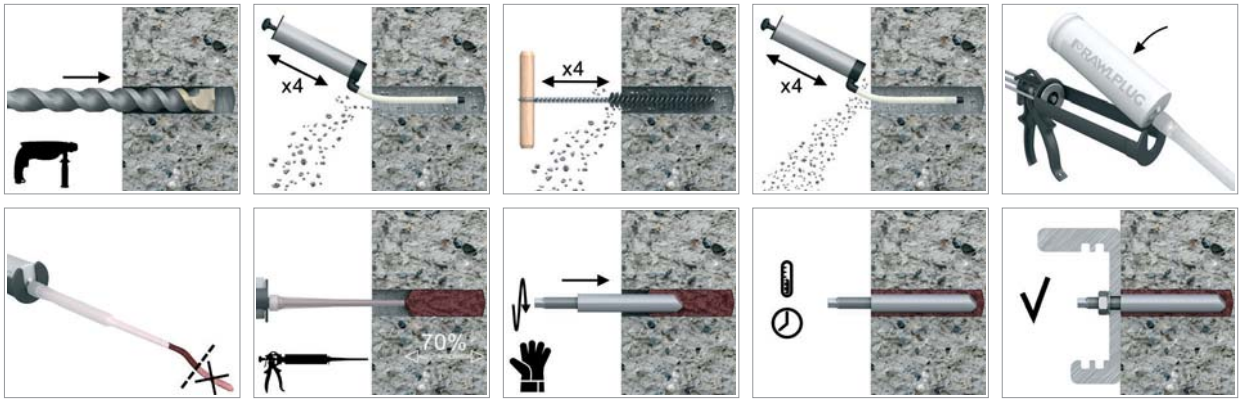
- Safety barriers
- Temporary works/formworks support systems
- Balustrading
- Barriers
- Cladding restraints
- Masonry support
- Machinery
- Platforms
- Steelwork

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for socket size being used.
2. Clean the drill hole thoroughly with brush and hand pump at least four times before installation.
3. Attach nozzle and insert cartridge into gun.
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 socket, slowly and with slight twisting motion. Remove any access resin around the hole before it sets and leave it undisturbed until the curing time elapses.
7. Attach fixture and tighten the bolt to the required torque.

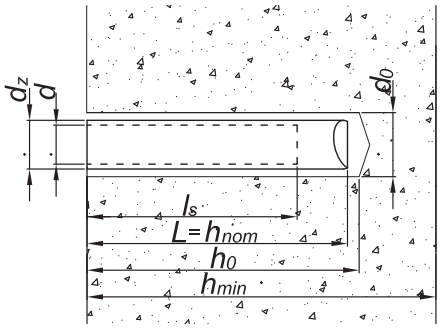
Product information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KEX-II-385	R-KEX II	Epoxy Resin	385
R-KEX-II-600	R-KEX II	Epoxy Resin	600

SOCKETS

Size	Product Code		Anchor			Fixture
	Steel class 5.8	Steel grade A4	Socket diameter	Length	Internal thread length	Hole diameter
			d	L	l_g	d_f
			[mm]	[mm]	[mm]	[mm]
M6	R-ITS-Z-06075	R-ITS-A4-06075	10	75	24	7
M8	R-ITS-Z-08075	R-ITS-A4-08075	12	75	25	9
	R-ITS-Z-08090	R-ITS-A4-08090	12	90	25	9
M10	R-ITS-Z-10075	R-ITS-A4-10075	16	75	30	12
	R-ITS-Z-10100	R-ITS-A4-10100	16	100	30	12
M12	R-ITS-Z-12100	R-ITS-A4-12100	16	100	35	14
M16	R-ITS-Z-16125	R-ITS-A4-16125	24	125	50	18

Installation data



SOCKETS

Size			M6	M8		M10		M12	M16
Installation depth	h_{nom}	[mm]	75	75	90	75	100	100	125
Thread diameter	d	[mm]	6	8	8	10	10	12	16
Hole diameter in substrate	d_0	[mm]	12	14	14	20	20	20	28
Hole diameter in fixture	d_f	[mm]	7	9	9	12	12	14	18
Thread engagement length	h_s	[mm]	6-24	8-25	8-25	10-30	10-30	12-35	16-50
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
Min. substrate thickness	h_{min}	[mm]	h_{nom} + 30 ≥ 100	h_{nom} + 30 ≥ 100	h_{nom} + 30 ≥ 100	h_{nom} + $2d_0$	h_{nom} + $2d_0$	h_{nom} + $2d_0$	h_{nom} + $2d_0$
Installation torque	T_{inst}	[Nm]	3	5	5	10	10	20	40
Min. spacing	s_{min}	[mm]	40	40	50	40	50	50	70
Min. edge distance	c_{min}	[mm]	40	40	50	40	50	50	70

Installation data (cont.)

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	5	150	2880
10	10	120	1080
20	20	35	480
25	30	12	300

* For wet concrete the curing time must be doubled

Mechanical properties

SOCKETS

Size			M6	M8	M10	M12	M16
R-ITS-Z INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.2	50.3	98.2	169.7	402.1
R-ITS-A4 INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.2	50.3	98.2	169.7	402.1
R-STUDS METRIC THREADED RODS - steel class 5.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	8	19	37	65	166
Design bending resistance	M	[Nm]	6	15	30	52	133
Allowable bending resistance	M_{rec}	[Nm]	5	11	21	37	95
R-STUDS METRIC THREADED RODS - steel class 8.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	12	30	60	105	266
Design bending resistance	M	[Nm]	10	24	48	84	213
Allowable bending resistance	M_{rec}	[Nm]	7	17	34	60	152
R-STUDS METRIC THREADED RODS - A4							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	11	26	52	92	233
Design bending resistance	M	[Nm]	7	17	34	59	149
Allowable bending resistance	M_{rec}	[Nm]	5	12	24	42	107

Basic performance data

SOCKETS

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

Size		M6	M8		M10		M12	M16
Substrate		Non-cracked concrete						
Embedment depth h_{ef}	[mm]	75		90	75	100		125
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	10.0	18.0	18.0	29.0	29.0	42.0	70.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	16.0	29.0	29.0	32.8	46.0	50.5	70.6
R-STUDS METRIC THREADED RODS - A4	[kN]	14.0	26.0	26.0	32.8	41.0	50.5	70.6
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.0	9.0	9.0	14.0	14.0	21.0	39.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.0	15.0	15.0	23.0	23.0	34.0	63.0
R-STUDS METRIC THREADED RODS - A4	[kN]	7.0	13.0	13.0	20.0	20.0	29.0	55.0

Basic performance data (cont.)

SOCKETS

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

Size		M6	M8		M10		M12	M16
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	6.67	12.0	12.0	18.2	19.3	28.0	39.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	10.5	18.2	19.3	18.2	28.1	28.1	39.2
R-STUDS METRIC THREADED RODS - A4	[kN]	7.49	13.9	13.9	18.2	21.9	28.1	39.2
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.0	7.2	7.2	11.2	11.2	16.8	31.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	6.4	12.0	12.0	18.4	18.4	27.2	50.4
R-STUDS METRIC THREADED RODS - A4	[kN]	4.49	8.33	8.33	12.8	12.8	18.6	35.3
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.76	8.57	8.57	13.0	13.8	20.0	28.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	7.50	13.0	13.8	13.0	20.1	20.0	28.0
R-STUDS METRIC THREADED RODS - A4	[kN]	5.35	9.93	9.93	13.0	15.6	20.0	28.0
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	2.86	5.14	5.14	8.0	8.0	12.0	22.3
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	4.57	8.57	8.57	13.1	13.1	19.4	36.0
R-STUDS METRIC THREADED RODS - A4	[kN]	3.21	5.95	5.95	9.16	9.16	13.3	25.2

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KEX-II-385	385	10	10	380	6.7	6.7	285.0	5906675028538	20
R-KEX-II-600	600	7	7	441	7.0	7.0	472.7	5906675293721	20

R-KEX II with Rebar as an Anchor

Premium pure epoxy resin approved for use with reinforcement bars

Installation movie

Approvals and Reports

- ETA-13/0455

Product overview

Features and benefits

- Approved for use with rebar as an anchor in cracked and non-cracked concrete (EAD 330499-00-0601)
- Suitable for use in dry and wet substrates including under water
- Very high chemical resistance – suitable for applications exposed to influence of various agents (industrial or marine environment)
- Minimal shrinkage provides the option to use in diamond drilled holes and over-sized holes
- Extended bonding time ensures easy installation of metal components (up to 35 min in 20°C)
- For use above 0° C
- Seismic category C1
- Diamond and hammer drilling
- Special mixer nozzle - allows for precise mixing of the product

Applications

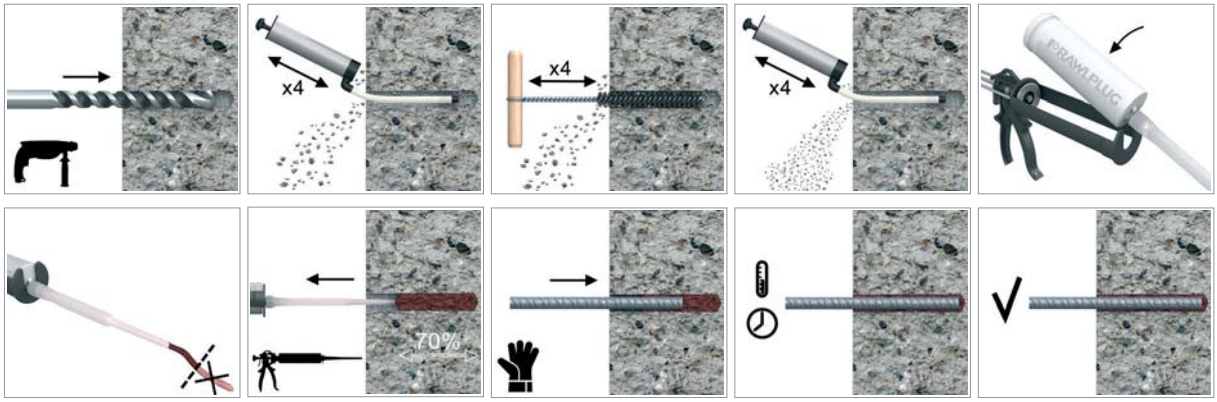
- Safety barriers
- Temporary works/formworks support systems
- Curtain walling
- Formwork supports
- Masonry support
- Platforms
- Steelwork
- Rebar dowelling
- Starter bars
- Rebar missed-outs

Base materials

Approved for use in:

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

Installation guide



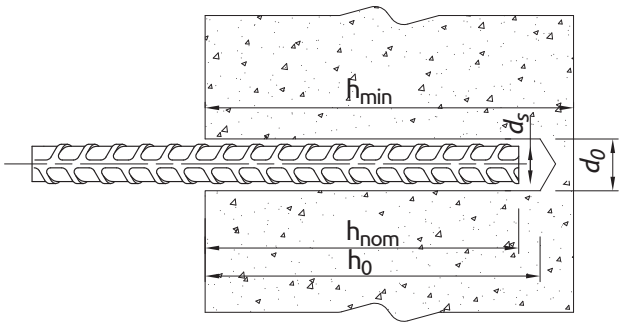
Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar size being used.
2. Clean the drill hole thoroughly with brush and hand pump at least four times before installation.
3. Attach nozzle and insert cartridge into gun.
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 information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KEX-II-385	R-KEX II	Epoxy Resin	385
R-KEX-II-600	R-KEX II	Epoxy Resin	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} + 30 ≥ 100	h_{nom} + 30 ≥ 100	h_{nom} + $2d_0$ ≥ 100	h_{nom} + $2d_0$ ≥ 100	h_{nom} + $2d_0$ ≥ 100	h_{nom} + $2d_0$ ≥ 100
Min. spacing	s_{min}	[mm]	40	40	40	40	50	60	70	85
Min. edge distance	c_{min}	[mm]	40	40	40	40	50	60	70	85
MINIMUM EMBEDMENT DEPTH										
Installation depth	$h_{nom, min}$	[mm]	60	70	80	80	100	120	140	165
MAXIMUM EMBEDMENT DEPTH										
Installation depth	$h_{nom, max}$	[mm]	160	200	240	280	320	400	500	640

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	5	150	2880
10	10	120	1080
20	20	35	480
25	30	12	300

*For wet concrete the curing time must be doubled

Mechanical properties

REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
fuk = 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]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
fuk = 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]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
fuk = 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]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217

Basic performance data

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Substrate		Non-cracked concrete								Cracked concrete							
CHARACTERISTIC LOAD																	
TENSION LOAD N_{Rd}																	
fuk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)																	
Minimum embedment depth	[kN]	16.6	26.4	36.1	35.2	50.5	66.4	83.7	107.0	8.29	11.0	16.6	19.4	25.1	37.7	59.6	66.4
Maximum embedment depth	[kN]	27.1	42.4	61.1	83.1	108.6	169.7	265.1	434.3	22.1	31.4	49.8	58.1	80.4	125.7	216.0	257.4
fuk = 575 (e.g. B 500 SP acc. to EC2)																	
Minimum embedment depth	[kN]	16.6	26.4	36.1	35.2	50.5	66.4	83.7	107.0	8.29	11.0	16.6	19.4	25.1	37.7	59.6	66.4
Maximum embedment depth	[kN]	28.9	45.2	65.0	88.5	115.6	180.6	282.3	462.4	22.1	31.4	49.8	58.1	80.4	125.7	216.0	257.4
fuk = 620 (e.g. G-60 acc. to ASTM 615)																	
Minimum embedment depth	[kN]	16.6	26.4	36.1	35.2	50.5	66.4	83.7	107.0	8.29	11.0	16.6	19.4	25.1	37.7	59.6	66.4
Maximum embedment depth	[kN]	31.2	48.7	70.1	95.4	124.7	194.8	304.3	482.6	22.1	31.4	49.8	58.1	80.4	125.7	216.0	257.4
SHEAR LOAD V_{Rd}																	
fuk = 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	214.1	13.6	21.2	30.5	33.5	50.3	75.4	119.3	90.1
Maximum embedment depth	[kN]	13.6	21.2	30.5	41.6	54.3	84.8	132.5	217.2	13.6	21.2	30.5	41.6	54.3	84.8	132.5	217.2
fuk = 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	214.1	14.5	22.0	32.5	38.7	50.3	75.4	119.3	132.7
Maximum embedment depth	[kN]	14.5	22.6	32.5	44.3	57.8	90.3	141.1	231.2	14.5	22.6	32.5	44.3	57.8	90.3	141.1	231.2
fuk = 620 (e.g. G-60 acc. to ASTM 615)																	
Minimum embedment depth	[kN]	15.6	24.4	35.1	46.9	62.3	97.4	152.2	214.1	15.6	22.0	33.2	38.7	50.3	75.4	119.3	132.7
Maximum embedment depth	[kN]	15.6	24.4	35.1	46.9	62.3	97.4	152.2	249.3	15.6	24.4	35.1	47.7	62.3	97.4	152.2	249.3

Basic performance data

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
DESIGN LOAD																	
TENSION LOAD N_{Rd}																	
fuk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)																	
Minimum embedment depth	[kN]	9.22	14.7	20.1	19.6	28.1	36.9	46.5	59.5	4.61	4.61	9.22	10.8	14.0	20.9	33.1	36.9
Maximum embedment depth	[kN]	19.4	30.3	43.6	58.6	77.6	121.2	189.3	303.8	12.3	17.5	27.7	32.3	44.7	69.8	120.0	143.0
fuk = 575 (e.g. B 500 SP acc. to EC2)																	
Minimum embedment depth	[kN]	9.22	14.7	20.1	19.6	28.1	36.9	46.5	59.5	4.61	4.61	9.22	10.8	14.0	20.9	33.1	36.9
Maximum embedment depth	[kN]	20.6	32.3	46.5	58.6	82.6	129.0	201.6	303.8	12.3	17.5	27.7	32.3	44.7	69.8	120.0	143.0
fuk = 620 (e.g. G-60 acc. to ASTM 615)																	
Minimum embedment depth	[kN]	9.22	14.7	20.1	19.6	28.1	36.9	46.5	59.5	4.61	4.61	9.22	10.8	14.0	20.9	33.1	36.9
Maximum embedment depth	[kN]	22.3	34.8	50.1	58.6	89.0	139.1	207.3	303.8	12.3	17.5	27.7	32.3	44.7	69.8	120.0	143.0
SHEAR LOAD V_{Rd}																	
fuk = 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	142.7	9.05	14.1	20.4	22.3	33.5	50.3	79.5	60.1
Maximum embedment depth	[kN]	9.05	14.1	20.4	27.7	36.2	56.6	88.4	144.8	9.05	14.1	20.4	27.7	36.2	56.6	88.4	144.8
fuk = 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	142.7	9.63	14.7	21.7	25.8	33.5	50.3	79.5	88.5
Maximum embedment depth	[kN]	9.63	15.1	21.7	29.5	38.5	60.2	94.1	154.2	9.63	15.1	21.7	29.5	38.5	60.2	94.1	154.2
fuk = 620 (e.g. G-60 acc. to ASTM 615)																	
Minimum embedment depth	[kN]	10.4	16.2	23.4	31.3	41.6	64.9	101.5	142.7	10.4	14.7	22.1	25.8	33.5	50.3	79.5	88.5
Maximum embedment depth	[kN]	10.4	16.2	23.4	31.3	41.6	64.9	101.5	166.2	10.4	16.2	23.4	31.3	41.6	64.9	101.5	166.2
RECOMMENDED LOAD																	
TENSION LOAD N_{rec}																	
fuk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)																	
Minimum embedment depth	[kN]	6.58	10.5	14.3	14.0	20.0	26.3	33.2	42.5	3.29	4.36	6.58	7.68	9.97	15.0	23.7	26.3
Maximum embedment depth	[kN]	13.9	21.6	31.2	41.9	55.4	86.6	135.2	217.0	8.78	12.5	19.8	23.0	31.9	49.9	85.7	102.0
fuk = 575 (e.g. B 500 SP acc. to EC2)																	
Minimum embedment depth	[kN]	6.58	10.5	14.3	14.0	20.0	26.3	33.2	42.5	3.29	4.36	6.58	7.68	9.97	15.0	23.7	26.3
Maximum embedment depth	[kN]	14.8	23.0	33.2	41.9	59.0	92.2	144.0	217.0	8.78	12.5	19.8	23.0	31.9	49.9	85.7	102.0
fuk = 620 (e.g. G-60 acc. to ASTM 615)																	
Minimum embedment depth	[kN]	6.58	10.5	14.3	14.0	20.0	26.3	33.2	42.5	3.29	4.36	6.58	7.68	9.97	15.0	23.7	26.3
Maximum embedment depth	[kN]	15.9	24.8	35.8	41.9	63.6	99.4	148.0	217.0	8.78	12.5	19.8	23.0	31.9	49.9	85.7	102.0
SHEAR LOAD V_{rec}																	
fuk = 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	101.9	6.46	10.1	14.5	15.9	23.9	35.9	56.8	42.9
Maximum embedment depth	[kN]	6.46	10.1	14.5	19.8	25.9	40.4	63.1	103.4	6.46	10.1	14.5	19.8	25.9	40.4	63.1	103.4
fuk = 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	101.9	6.88	10.5	15.5	18.4	23.9	35.9	56.8	63.2
Maximum embedment depth	[kN]	6.88	10.8	15.5	21.1	27.5	43.0	67.2	101.1	6.88	10.8	15.5	21.1	27.5	43.0	67.2	110.1
fuk = 620 (e.g. G-60 acc. to ASTM 615)																	
Minimum embedment depth	[kN]	7.42	11.6	16.7	22.4	29.7	46.4	72.5	101.9	7.42	10.5	15.8	18.4	23.9	35.9	56.8	63.2
Maximum embedment depth	[kN]	7.42	11.6	16.7	22.7	29.7	46.4	72.5	118.7	7.42	11.6	16.7	22.7	29.7	46.4	72.5	118.7

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KEX-II-385	385	10	10	380	6.7	6.7	285.0	5906675028538	20
R-KEX-II-600	600	7	7	441	7.0	7.0	472.7	5906675293721	20

R-KEX II with Post-Installed Rebar

Premium pure epoxy resin approved for use with post-installed rebar connections

Installation movie

Approvals and Reports

- ETA-13/0585

Product overview

Features and benefits

- Approved for use with post-installed rebars in concrete (EAD 330087-00-0601)
- Suitable for use in dry and wet substrates including under water
- High depth of anchoring – 2,5 m for rebar applications
- Very high chemical resistance – suitable for applications exposed to influence of various agents (industrial or marine environment)
- Minimal shrinkage provides the option to use in diamond drilled holes
- Extended bonding time ensures easy installation of metal components (up to 30 min in +20°C)
- For use in positive temperatures
- Diamond and hammer drilling
- Special mixer nozzle - allows for precise mixing of the product

Applications

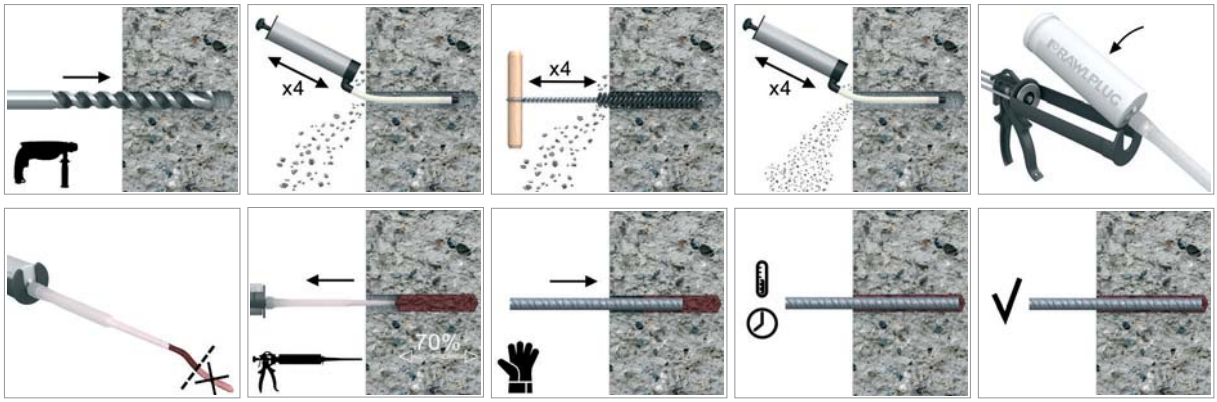
- Post-installed rebar connections
- Rebar
- Rebar dowelling
- Rebar missed-outs
- Strengthening reinforced concrete structures
- Starter bars
- Expansion of the stairs
- Renovation and modernization of bridges
- Installation of pavement cover

Base materials

Approved for use in:

- Concrete C12/15-C50/60

Installation guide



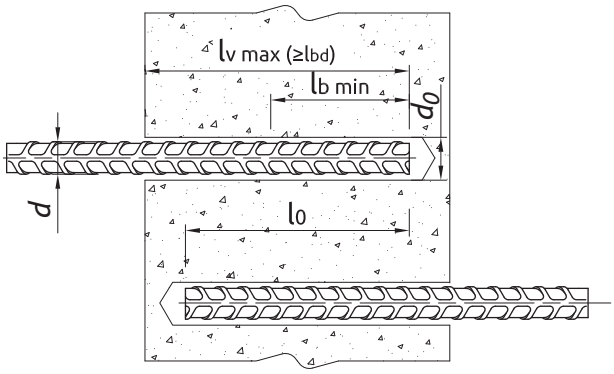
Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar size being used.
2. Clean the drill hole thoroughly with brush and hand pump at least four times before installation.
3. Attach nozzle and insert cartridge into gun.
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 information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-KEX-II-385	R-KEX II	Epoxy Resin	385
R-KEX-II-600	R-KEX II	Epoxy Resin	600

Installation data



POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø13	Ø14	Ø16	Ø18	Ø20	Ø22	Ø25	Ø28	Ø30	Ø32	Ø34	Ø36	Ø40
Rebar diameter	d_s	[mm]	8	10	12	13	14	16	18	20	22	25	28	30	32	34	36	40
Hole diameter in substrate	d_0	[mm]	12	14	16	16	18	20	22	25	26	30	35	35	40	45	45	50
Brush diameter	-	[mm]	14	16	18	18	20	22	24	27	27	32	37	37	42	47	47	52
Min. anchorage length	$l_{v,min.}$	[mm]	115	145	170	185	200	230	260	285	315	355	400	420	455	485	510	570
Min. lap length (overlap splice)	$l_{0,min.}$	[mm]	200	215	260	270	300	345	430	430	470	535	600	640	690	725	770	855
Max. anchorage length	$l_{v,max.}$	[mm]	400	500	600	700	700	800	900	1000	1100	1200	1400	1500	2500	2000	2000	2000

Minimum working and curing time

Resin temperature [°C]	Concrete temperature [°C]	Working time [min]	Curing time* [min]
5	5	150	2880
10	10	120	1080
20	20	35	480
25	30	12	300

*For wet concrete the curing time must be doubled

Mechanical properties

POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø13	Ø14	Ø16	Ø18	Ø20	Ø22	Ø25	Ø28	Ø30	Ø32	Ø34	Ø36	Ø40
fyk = 410 (e.g. 34GS acc. to EC2)																		
Nominal yield strength - tension	f_{yk}	[N/mm²]	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Cross sectional area - tension	A_s	[mm²]	50	78	113	132	153	201	254	314	380	490	615	706	804	907	1018	1257
fyk = 420 (e.g. G-60 acc. to ASTM 615)																		
Nominal yield strength - tension	f_{yk}	[N/mm²]	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
Cross sectional area - tension	A_s	[mm²]	50	78	113	132	153	201	254	314	380	490	615	706	804	907	1018	1257
fyk = 460 (e.g. 460 B acc. to BS 4449)																		
Nominal yield strength - tension	f_{yk}	[N/mm²]	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
Cross sectional area - tension	A_s	[mm²]	50	78	113	132	153	201	254	314	380	490	615	706	804	907	1018	1257
fyk = 500 (e.g. B 500 SP acc. to EC2; 500 B acc. to BS 4449; B 500 B acc. to SS 560)																		
Nominal yield strength - tension	f_{yk}	[N/mm²]	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Cross sectional area - tension	A_s	[mm²]	50	78	113	132	153	201	254	314	380	490	615	706	804	907	1018	1257
fyk = 600 (e.g. B 600 B acc. to SS 560)																		
Nominal yield strength - tension	f_{yk}	[N/mm²]	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Cross sectional area - tension	A_s	[mm²]	50	78	113	132	153	201	254	314	380	490	615	706	804	907	1018	1257

Basic performance data

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 410 [N/mm²]

d_s [mm] \ l_{bd} [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	5,8	6,9	8,1	9,2	10,4	11,6	14,5	17,3	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	-	8,7	10,1	11,6	13,0	14,5	18,1	21,7	25,3	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	-	-	28,0
12	-	-	12,1	13,9	15,6	17,3	21,7	26,0	30,3	34,7	39,0	40,3	40,3	40,3	-	-	-	-	-	-	-	-	-	-	40,3
13	-	-	-	15,0	16,9	18,8	23,5	28,2	32,9	37,6	42,3	47,0	47,3	47,3	47,3	47,3	-	-	-	-	-	-	-	-	47,3
14	-	-	-	-	18,2	20,2	25,3	30,3	35,4	40,5	45,5	50,6	54,9	54,9	54,9	54,9	-	-	-	-	-	-	-	-	54,9
16	-	-	-	-	-	23,1	28,9	34,7	40,5	46,2	52,0	57,8	63,6	69,4	71,7	71,7	71,7	71,7	-	-	-	-	-	-	71,7
18	-	-	-	-	-	-	32,5	39,0	45,5	52,0	58,5	65,0	71,5	78,0	84,5	90,7	90,7	90,7	90,7	-	-	-	-	-	90,7
20	-	-	-	-	-	-	36,1	43,4	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	112,0	112,0	112,0	-	-	-	-	112,0
22	-	-	-	-	-	-	-	47,7	55,6	63,6	71,5	79,5	87,4	95,4	103,3	111,3	119,2	127,2	135,5	135,5	-	-	-	-	135,5
25	-	-	-	-	-	-	-	54,2	63,2	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	162,6	175,0	-	-	-	-	175,0
28	-	-	-	-	-	-	-	-	70,8	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	182,1	202,3	219,5	-	-	-	219,5
30	-	-	-	-	-	-	-	-	75,9	86,7	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	195,1	216,8	252,0	252,0	-	-	252,0
32	-	-	-	-	-	-	-	-	-	92,5	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	208,1	231,2	286,7	286,7	286,7	286,7	286,7
34	-	-	-	-	-	-	-	-	-	98,3	110,6	122,8	135,1	147,4	159,7	172,0	184,3	196,5	221,1	245,7	307,1	323,7	323,7	-	323,7
36	-	-	-	-	-	-	-	-	-	-	117,1	130,1	143,1	156,1	169,1	182,1	195,1	208,1	234,1	260,1	325,2	362,9	362,9	-	362,9
40	-	-	-	-	-	-	-	-	-	-	113,1	125,7	138,2	150,8	163,4	175,9	188,5	201,1	226,2	251,3	314,2	377,0	448,0	-	448,0

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 410 [N/mm²]

d_s [mm] \ l_{bd} [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	10,8	13,0	15,1	17,3	17,9	17,9	17,9	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	13,5	16,2	18,9	21,6	24,3	27,0	28,0	28,0	28,0	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	-	-	28,0
12	-	19,5	22,7	25,9	29,2	32,4	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	-	-	-	-	-	-	-	-	-	-	40,3
13	-	-	24,6	28,1	31,6	35,1	43,9	47,3	47,3	47,3	47,3	47,3	47,3	47,3	47,3	47,3	-	-	-	-	-	-	-	-	47,3
14	-	-	26,5	30,3	34,0	37,8	47,3	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	-	-	-	-	-	-	-	-	54,9
16	-	-	-	32,2	36,2	40,2	50,3	60,3	70,4	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	-	-	-	-	-	-	71,7
18	-	-	-	-	40,7	45,2	56,5	67,9	79,2	90,7	90,7	90,7	90,7	90,7	90,7	90,7	90,7	90,7	90,7	-	-	-	-	-	90,7
20	-	-	-	-	-	46,5	58,1	69,7	81,4	93,0	104,6	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	-	-	-	-	112,0
22	-	-	-	-	-	-	63,9	76,7	89,5	102,3	115,0	127,9	135,5	135,5	135,5	135,5	135,5	135,5	135,5	135,5	-	-	-	-	135,5
25	-	-	-	-	-	-	66,8	80,1	93,5	106,8	120,2	133,5	146,9	173,6	175,0	175,0	175,0	175,0	175,0	175,0	-	-	-	-	175,0
28	-	-	-	-	-	-	-	89,7	104,7	119,6	134,6	149,5	164,5	179,4	194,4	209,4	219,5	219,5	219,5	219,5	219,5	-	-	-	219,5
30	-	-	-	-	-	-	-	84,8	99,0	113,1	127,2	141,4	155,5	169,6	183,8	197,9	212,1	226,2	252,0	252,0	252,0	252,0	-	-	252,0
32	-	-	-	-	-	-	-	-	95,0	108,6	122,1	135,7	149,3	162,9	176,4	190,0	203,6	217,1	244,3	271,4	286,7	286,7	286,7	286,7	286,7
34	-	-	-	-	-	-	-	-	100,9	115,4	129,8	144,2	158,6	173,0	187,5	201,9	216,3	230,7	259,6	288,4	323,7	323,7	323,7	-	323,7
36	-	-	-	-	-	-	-	-	-	-	117,1	130,1	143,1	156,1	169,1	182,1	195,1	208,1	234,1	260,1	352,2	362,9	362,9	-	362,9
40	-	-	-	-	-	-	-	-	-	-		125,7	138,2	150,8	163,4	175,9	188,5	201,1	226,2	251,3	314,2	377,0	448,0	-	448,0

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 410 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	17,9	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	14,5	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	-	-	28,0
12	-	19,1	20,8	22,5	24,3	26,0	28,2	30,3	32,5	34,7	39,0	40,3	40,3	40,3	-	-	-	-	-	-	-	-	-	-	40,3
13	-	-	22,5	24,4	26,3	28,2	30,5	32,9	35,2	37,6	42,3	47,0	47,3	47,3	47,3	47,3	-	-	-	-	-	-	-	-	47,3
14	-	-	-	26,3	28,3	30,3	32,9	35,4	37,9	40,5	45,5	50,6	54,9	54,9	54,9	54,9	-	-	-	-	-	-	-	-	54,9
16	-	-	-	-	32,4	34,7	37,6	40,5	43,4	46,2	52,0	57,8	63,6	69,4	71,7	71,7	71,7	71,7	-	-	-	-	-	-	71,7
18	-	-	-	-	-	-	42,3	45,5	48,8	52,0	58,5	65,0	71,5	78,0	84,5	90,7	90,7	90,7	90,7	-	-	-	-	-	90,7
20	-	-	-	-	-	-	-	50,6	54,2	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	112,0	112,0	112,0	-	-	-	-	112,0
22	-	-	-	-	-	-	-	-	-	63,6	71,5	79,5	87,4	95,4	103,3	111,3	119,2	127,2	135,5	135,5	-	-	-	-	135,5
25	-	-	-	-	-	-	-	-	-	-	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	162,6	175,0	-	-	-	-	175,0
28	-	-	-	-	-	-	-	-	-	-	-	101,2	111,3	121,4	131,5	141,6	151,7	161,9	182,1	202,3	219,5	-	-	-	219,5
30	-	-	-	-	-	-	-	-	-	-	-	-	119,2	130,1	140,9	151,7	162,6	173,4	195,1	216,8	252,0	252,0	-	-	252,0
32	-	-	-	-	-	-	-	-	-	-	-	-	-	138,7	150,3	161,9	173,4	185,0	208,1	231,2	286,7	286,7	286,7	286,7	286,7
34	-	-	-	-	-	-	-	-	-	-	-	-	-	147,4	159,7	172,0	184,3	196,5	221,1	245,7	307,1	323,7	323,7	-	323,7
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	169,1	182,1	195,1	208,1	234,1	260,1	325,2	362,9	362,9	-	362,9
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	188,5	201,1	226,2	251,3	314,2	377,0	448,0	-	448,0

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 410 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	27,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	-	-	28,0
12	32,4	35,7	38,9	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	-	-	-	-	-	-	-	-	-	-	40,3
13	35,1	38,6	42,1	45,7	47,3	47,3	47,3	47,3	47,3	47,3	47,3	47,3	47,3	47,3	47,3	47,3	-	-	-	-	-	-	-	-	47,3
14	-	41,6	45,4	49,2	53,0	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	-	-	-	-	-	-	-	-	54,9
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	-	-	-	-	-	-	71,7
18	-	-	-	-	63,3	67,9	73,5	79,2	84,8	90,5	90,7	90,7	90,7	90,7	90,7	90,7	90,7	90,7	90,7	-	-	-	-	-	90,7
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	104,6	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	-	-	-	-	112,0
22	-	-	-	-	-	-	-	89,5	95,9	102,3	115,1	127,9	135,5	135,5	135,5	135,5	135,5	135,5	135,5	135,5	-	-	-	-	135,5
25	-	-	-	-	-	-	-	-	100,1	106,8	120,2	133,5	146,9	160,2	173,6	175,0	175,0	175,0	175,0	175,0	-	-	-	-	175,0
28	-	-	-	-	-	-	-	-	-	-	134,6	149,5	164,5	179,4	194,4	209,4	219,5	219,5	219,5	219,5	219,5	-	-	-	219,5
30	-	-	-	-	-	-	-	-	-	-	127,2	141,4	155,5	169,6	183,8	197,9	212,1	226,2	252,0	252,0	252,0	252,0	-	-	252,0
32	-	-	-	-	-	-	-	-	-	-	-	135,7	149,3	162,9	176,4	190,0	203,6	217,1	244,3	271,4	286,7	286,7	286,7	286,7	286,7
34	-	-	-	-	-	-	-	-	-	-	-	-	158,6	173,0	187,5	201,9	216,3	230,7	259,6	288,4	323,7	323,7	323,7	-	323,7
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	169,1	182,1	195,1	208,1	234,1	260,1	325,2	362,9	362,9	-	362,9
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	188,5	201,1	226,2	251,3	314,2	377,0	448,0	-	448,0

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	5,8	6,9	8,1	9,2	10,4	11,6	14,5	17,3	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	-	8,7	10,1	11,6	13,0	14,5	18,1	21,7	25,3	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	-	-	28,7
12	-	-	-	13,9	15,6	17,3	21,7	26,0	30,3	34,7	39,0	41,3	41,3	41,3	-	-	-	-	-	-	-	-	-	-	41,3
13	-	-	-	15,0	16,9	18,8	23,5	28,2	32,9	37,6	42,3	47,0	48,5	48,5	48,5	48,5	-	-	-	-	-	-	-	-	48,5
14	-	-	-	-	18,2	20,2	25,3	30,3	35,4	40,5	45,5	50,6	55,6	56,2	56,2	56,2	-	-	-	-	-	-	-	-	56,2
16	-	-	-	-	-	23,1	28,9	34,7	40,5	46,2	52,0	57,8	63,6	69,4	73,4	73,4	73,4	73,4	-	-	-	-	-	-	73,4
18	-	-	-	-	-	-	32,5	39,0	45,5	52,0	58,5	65,0	71,5	78,0	84,5	91,0	92,9	92,9	92,9	-	-	-	-	-	92,9
20	-	-	-	-	-	-	36,1	43,4	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	114,8	114,8	114,8	-	-	-	-	114,8
22	-	-	-	-	-	-	-	47,7	55,6	63,6	71,5	79,5	87,4	95,4	103,3	111,3	119,2	127,2	138,8	138,8	-	-	-	-	138,8
25	-	-	-	-	-	-	-	54,2	63,2	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	162,6	179,3	-	-	-	-	179,3
28	-	-	-	-	-	-	-	-	70,8	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	182,1	202,3	224,9	-	-	-	224,9
30	-	-	-	-	-	-	-	-	75,9	86,7	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	195,1	216,8	252,0	252,0	-	-	252,01
32	-	-	-	-	-	-	-	-	-	92,5	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	208,1	231,2	286,7	286,7	286,7	286,7	286,71
34	-	-	-	-	-	-	-	-	-	98,3	110,6	122,8	135,1	147,4	159,7	172,0	184,3	196,5	221,1	245,7	307,1	323,7	323,7	-	323,69
36	-	-	-	-	-	-	-	-	-	-	117,1	130,1	143,1	156,1	169,1	182,1	195,1	208,1	234,1	260,1	325,2	362,9	362,9	-	362,89
40	-	-	-	-	-	-	-	-	-	-	-	125,7	138,2	150,8	163,4	175,9	188,5	201,1	226,2	251,3	314,2	377,0	448,0	-	448,01

Basic performance data (cont.)

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																								
d_s [mm] \ l_{bd} [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
30	-	-	-	-	-	-	-	-	-	86,7	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	195,1	216,8	258,2	258,2	-	-	258,2
32	-	-	-	-	-	-	-	-	-	92,5	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	208,1	231,2	289,0	293,7	293,7	293,7	293,7
34	-	-	-	-	-	-	-	-	-	-	110,6	122,8	135,1	147,4	159,7	172,0	184,3	196,5	221,1	245,7	307,1	331,6	331,6	-	331,6
36	-	-	-	-	-	-	-	-	-	-	117,1	130,1	143,1	156,1	169,1	182,1	195,1	208,1	234,1	260,1	325,2	371,7	371,7	-	371,7
40	-	-	-	-	-	-	-	-	-	-	-	-	138,2	150,8	163,4	175,9	188,5	201,1	226,2	251,3	314,2	377,0	458,9	-	458,9

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																								
d_s [mm] \ l_{bd} [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	10,8	13,0	15,1	17,3	18,4	18,4	18,4	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	13,5	16,2	18,9	21,6	24,3	27,0	28,7	28,7	28,7	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	-	-	28,7
12	-	19,5	22,7	25,9	29,2	32,4	40,5	41,3	41,3	41,3	41,3	41,3	41,3	41,3	-	-	-	-	-	-	-	-	-	-	41,3
13	-	-	24,6	28,1	31,6	35,1	43,9	48,5	48,5	48,5	48,5	48,5	48,5	48,5	48,5	48,5	-	-	-	-	-	-	-	-	48,5
14	-	-	26,5	30,3	34,0	37,8	47,3	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	-	-	-	-	-	-	-	-	56,2
16	-	-	-	32,2	36,2	40,2	50,3	60,3	70,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	-	-	-	-	-	-	73,4
18	-	-	-	-	40,7	45,2	56,5	67,9	79,2	90,5	92,9	92,9	92,9	92,9	92,9	92,9	92,9	92,9	92,9	-	-	-	-	-	92,9
20	-	-	-	-	-	46,5	58,1	69,7	81,4	93,0	104,6	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	-	-	-	-	114,8
22	-	-	-	-	-	-	63,9	76,7	89,5	102,3	115,1	127,9	138,8	138,8	138,8	138,8	138,8	138,8	138,8	138,8	-	-	-	-	138,8
25	-	-	-	-	-	-	66,8	80,1	93,5	106,8	120,2	133,5	146,9	160,2	173,6	179,3	179,3	179,3	179,3	179,3	-	-	-	-	179,3
28	-	-	-	-	-	-	-	89,7	104,7	119,6	134,6	149,5	164,5	179,4	194,4	209,4	224,3	224,9	224,9	224,9	224,9	-	-	-	224,9
30	-	-	-	-	-	-	-	84,8	99,0	113,1	127,2	141,4	155,5	169,6	183,8	197,9	212,1	226,2	254,5	258,2	258,2	258,2	-	-	258,2
32	-	-	-	-	-	-	-	-	95,0	108,6	122,1	135,7	149,3	162,9	176,4	190,0	203,6	217,1	244,3	271,4	293,7	293,7	293,7	293,7	293,7
34	-	-	-	-	-	-	-	-	100,9	115,4	129,8	144,2	158,6	173,0	187,5	201,9	216,3	230,7	259,6	288,4	331,6	331,6	331,6	-	331,6
36	-	-	-	-	-	-	-	-	-	-	117,1	130,1	143,1	156,1	169,1	182,1	195,1	208,1	234,1	260,1	325,2	371,7	371,7	-	371,7
40	-	-	-	-	-	-	-	-	-	-	-	-	138,2	150,8	163,4	175,9	188,5	201,1	226,2	251,3	314,2	377,0	458,9	-	458,9

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																								
d_s [mm] \ l_{bd} [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	18,4	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	14,5	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	-	-	28,7
12	-	19,1	20,8	22,5	24,3	26,0	28,2	30,3	32,5	34,7	39,0	41,3	41,3	41,3	-	-	-	-	-	-	-	-	-	-	41,3
13	-	-	22,5	24,4	26,3	28,2	30,5	32,9	35,2	37,6	42,3	47,0	48,5	48,5	48,5	48,5	-	-	-	-	-	-	-	-	48,5
14	-	-	-	26,3	28,3	30,3	32,9	35,4	37,9	40,5	45,5	50,6	55,6	56,2	56,2	56,2	-	-	-	-	-	-	-	-	56,2
16	-	-	-	-	-	34,7	37,6	40,5	43,4	46,2	52,0	57,8	63,6	69,4	73,4	73,4	73,4	73,4	-	-	-	-	-	-	73,4
18	-	-	-	-	-	-	42,3	45,5	48,8	52,0	58,5	65,0	71,5	78,0	84,5	91,0	92,9	92,9	92,9	-	-	-	-	-	92,9
20	-	-	-	-	-	-	-	-	54,2	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	114,8	114,8	114,8	-	-	-	-	114,8
22	-	-	-	-	-	-	-	-	-	63,6	71,5	79,5	87,4	95,4	103,3	111,3	119,2	127,2	138,8	138,8	-	-	-	-	138,8
25	-	-	-	-	-	-	-	-	-	-	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	162,6	179,3	-	-	-	-	179,3
28	-	-	-	-	-	-	-	-	-	-	-	-	111,3	121,4	131,5	141,6	151,7	161,9	182,1	202,3	224,9	-	-	-	224,9
30	-	-	-	-	-	-	-	-	-	-	-	-	119,2	130,1	140,9	151,7	162,6	173,4	195,1	216,8	258,2	258,2	-	-	258,2
32	-	-	-	-	-	-	-	-	-	-	-	-	-	138,7	150,3	161,9	173,4	185,0	208,1	231,2	289,0	293,7	293,7	293,7	293,7
34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	159,7	172,0	184,3	196,5	221,1	245,7	307,1	331,6	331,6	-	331,6
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	169,1	182,1	195,1	208,1	234,1	260,1	325,2	371,7	371,7	-	371,7
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	201,1	226,2	251,3	314,2	377,0	458,9	-	458,9

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	27,0	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	-	-	28,7
12	32,4	35,7	38,9	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	-	-	-	-	-	-	-	-	-	-	41,3
13	35,1	38,6	42,1	45,7	48,5	48,5	48,5	48,5	48,5	48,5	48,5	48,5	48,5	48,5	48,5	48,5	-	-	-	-	-	-	-	-	48,5
14	-	41,6	45,4	49,2	53,0	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	-	-	-	-	-	-	-	-	56,2
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	-	-	-	-	-	-	73,4
18	-	-	-	-	63,3	67,9	73,5	79,2	84,8	90,5	92,9	92,9	92,9	92,9	92,9	92,9	92,9	92,9	92,9	-	-	-	-	-	92,9
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	104,6	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	-	-	-	-	114,8
22	-	-	-	-	-	-	-	89,5	95,9	102,3	115,1	127,9	138,8	138,8	138,8	138,8	138,8	138,8	138,8	138,8	-	-	-	-	138,8
25	-	-	-	-	-	-	-	-	100,1	106,8	120,2	133,5	146,9	160,2	173,6	179,3	179,3	179,3	179,3	179,3	-	-	-	-	179,3
28	-	-	-	-	-	-	-	-	-	-	134,6	149,5	164,5	179,4	194,4	209,4	224,3	224,9	224,9	224,9	224,9	-	-	-	224,9
30	-	-	-	-	-	-	-	-	-	-	127,2	141,4	155,5	169,6	183,8	197,9	212,1	226,2	254,5	258,2	258,2	258,2	-	-	258,2
32	-	-	-	-	-	-	-	-	-	-	-	135,7	149,3	162,9	176,4	190,0	203,6	217,1	244,3	271,4	293,7	293,7	293,7	293,7	293,7
34	-	-	-	-	-	-	-	-	-	-	-	-	158,6	173,0	187,5	201,9	216,3	230,7	259,6	288,4	331,6	331,6	331,6	-	331,6
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	169,1	182,1	195,1	208,1	234,1	260,1	325,2	371,7	371,7	-	371,7
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	201,1	226,2	251,3	314,2	377,0	458,9	-	458,9

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	-	6,9	8,1	9,2	10,4	11,6	14,5	17,3	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	-	-	10,1	11,6	13,0	14,5	18,1	21,7	25,3	28,9	31,4	31,4	-	-	-	-	-	-	-	-	-	-	-	-	31,4
12	-	-	-	13,9	15,6	17,3	21,7	26,0	30,3	34,7	39,0	43,4	45,2	45,2	-	-	-	-	-	-	-	-	-	-	45,2
13	-	-	-	-	16,9	18,8	23,5	28,2	32,9	37,6	42,3	47,0	51,7	53,1	53,1	53,1	-	-	-	-	-	-	-	-	53,1
14	-	-	-	-	-	20,2	25,3	30,3	35,4	40,5	45,5	50,6	55,6	60,7	61,6	61,6	-	-	-	-	-	-	-	-	61,6
16	-	-	-	-	-	-	28,9	34,7	40,5	46,2	52,0	57,8	63,6	69,4	75,1	80,4	80,4	80,4	-	-	-	-	-	-	80,4
18	-	-	-	-	-	-	32,5	39,0	45,5	52,0	58,5	65,0	71,5	78,0	84,5	91,0	97,5	101,8	101,8	-	-	-	-	-	101,8
20	-	-	-	-	-	-	-	43,4	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	125,7	125,7	-	-	-	-	125,7
22	-	-	-	-	-	-	-	47,7	55,6	63,6	71,5	79,5	87,4	95,4	103,3	111,3	119,2	127,2	143,1	152,1	-	-	-	-	152,1
25	-	-	-	-	-	-	-	-	63,2	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	162,6	180,6	-	-	-	-	196,4
28	-	-	-	-	-	-	-	-	-	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	182,1	202,3	246,3	-	-	-	246,3
30	-	-	-	-	-	-	-	-	-	86,7	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	195,1	216,8	271,0	282,7	-	-	282,7
32	-	-	-	-	-	-	-	-	-	-	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	208,1	231,2	289,0	321,7	321,7	321,7	321,7
34	-	-	-	-	-	-	-	-	-	-	110,6	122,8	135,1	147,4	159,7	172,0	184,3	196,5	221,1	245,7	307,1	363,2	363,2	-	363,2
36	-	-	-	-	-	-	-	-	-	-	-	130,1	143,1	156,1	169,1	182,1	195,1	208,1	234,1	260,1	325,2	390,2	407,2	-	407,2
40	-	-	-	-	-	-	-	-	-	-	-	-	-	150,8	163,4	175,9	188,5	201,1	226,2	251,3	314,2	377,0	502,6	-	502,6

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	10,8	13,0	15,1	17,3	19,5	20,1	20,1	20,1	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	13,5	16,2	18,9	21,6	24,3	27,0	31,4	31,4	31,4	31,4	31,4	31,4	-	-	-	-	-	-	-	-	-	-	-	-	31,4
12	-	19,5	22,7	25,9	29,2	32,4	40,5	45,2	45,2	45,2	45,2	45,2	45,2	45,2	-	-	-	-	-	-	-	-	-	-	45,2
13	-	-	24,6	28,1	31,6	35,1	43,9	52,7	53,1	53,1	53,1	53,1	53,1	53,1	53,1	53,1	-	-	-	-	-	-	-	-	53,1
14	-	-	26,5	30,3	34,0	37,8	47,3	56,7	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	-	-	-	-	-	-	-	-	61,6
16	-	-	-	32,2	36,2	40,2	50,3	60,3	70,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	-	-	-	-	-	-	80,4
18	-	-	-	-	40,7	45,2	56,5	67,9	79,2	90,5	101,8	101,8	101,8	101,8	101,8	101,8	101,8	101,8	101,8	-	-	-	-	-	101,8
20	-	-	-	-	-	46,5	58,1	69,7	81,4	93,0	104,6	116,2	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	-	-	-	-	125,7
22	-	-	-	-	-	-	63,9	76,7	89,5	102,3	115,1	127,9	140,6	152,1	152,1	152,1	152,1	152,1	152,1	152,1	-	-	-	-	152,1
25	-	-	-	-	-	-	66,8	80,1	93,5	106,8	120,2	133,5	146,9	160,2	173,6	186,9	196,4	196,4	196,4	196,4	-	-	-	-	196,4
28	-	-	-	-	-	-	-	89,7	104,7	119,6	134,6	149,5	164,5	179,4	194,4	209,4	224,3	239,3	246,3	246,3	246,3	-	-	-	246,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140,9	151,7	162,6	173,4	195,1	216,8	271,0	307,3	-	-	307,33
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161,9	173,4	185,0	208,1	231,2	289,0	346,8	349,7	349,7	349,65
34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	184,3	196,5	221,1	245,7	307,1	368,5	394,7	-	394,75
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	208,1	234,1	260,1	325,2	390,2	442,6	-	442,55
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	226,2	251,3	314,2	377,0	502,7	-	546,35

Basic performance data (cont.)

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	-	-	-	-	-	-	-	84,8	99,0	113,1	127,2	141,4	155,5	169,6	183,8	197,9	212,1	226,2	254,5	282,7	282,7	282,7	-	-	282,7
10	-	-	-	-	-	-	-	-	-	108,6	122,1	135,7	149,3	162,9	176,4	190,0	203,6	217,1	244,3	271,4	321,7	321,7	321,7	321,7	321,7
12	-	-	-	-	-	-	-	-	-	115,4	129,8	144,2	158,6	173,0	187,5	201,9	216,3	230,7	259,6	288,4	360,5	363,2	363,2	-	363,2
13	-	-	-	-	-	-	-	-	-	-	-	130,1	143,1	156,1	169,1	182,1	195,1	208,1	234,1	260,1	325,2	390,2	407,2	-	407,2
14	-	-	-	-	-	-	-	-	-	-	-	-	-	150,8	163,4	175,9	188,5	201,1	226,2	251,3	314,2	377,0	502,6	-	502,6

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	18,8	20,1	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	14,5	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,9	31,4	31,4	-	-	-	-	-	-	-	-	-	-	-	-	31,4
12	-	-	20,8	22,5	24,3	26,0	28,2	30,3	32,5	34,7	39,0	43,4	45,2	45,2	-	-	-	-	-	-	-	-	-	-	45,2
13	-	-	-	24,4	26,3	28,2	30,5	32,9	35,2	37,6	42,3	47,0	51,7	53,1	53,1	53,1	-	-	-	-	-	-	-	-	53,1
14	-	-	-	-	28,3	30,3	32,9	35,4	37,9	40,5	45,5	50,6	55,6	60,7	61,6	61,6	-	-	-	-	-	-	-	-	61,6
16	-	-	-	-	-	-	37,6	40,5	43,4	46,2	52,0	57,8	63,6	69,4	75,1	80,4	80,4	80,4	-	-	-	-	-	-	80,4
18	-	-	-	-	-	-	-	-	48,8	52,0	58,5	65,0	71,5	78,0	84,5	91,0	97,5	101,8	101,8	-	-	-	-	-	101,8
20	-	-	-	-	-	-	-	-	-	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	125,7	125,7	-	-	-	-	125,7
22	-	-	-	-	-	-	-	-	-	-	71,5	79,5	87,4	95,4	103,3	111,3	119,2	127,2	143,1	152,1	-	-	-	-	152,1
25	-	-	-	-	-	-	-	-	-	-	-	90,3	99,4	108,4	117,4	126,4	135,5	144,5	162,6	180,6	-	-	-	-	196,4
28	-	-	-	-	-	-	-	-	-	-	-	-	111,3	121,4	131,5	141,6	151,7	161,9	182,1	202,3	246,3	-	-	-	246,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	130,1	140,9	151,7	162,6	173,4	195,1	216,8	271,0	282,7	-	-	282,7
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	150,3	161,9	173,4	185,0	208,1	231,2	289,0	321,7	321,7	321,7	321,7
34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	172,0	184,3	196,5	221,1	245,7	307,1	363,2	363,2	-	363,2
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	195,1	208,1	234,1	260,1	325,2	390,2	407,2	-	407,2
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	226,2	251,3	314,2	377,0	502,6	-	502,6

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	20,1	20,1	20,1	20,1	20,1	20,1	20,1	20,1	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	27,0	29,7	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	-	-	-	-	-	-	-	-	-	-	-	-	31,4
12	32,4	35,7	38,9	42,1	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	-	-	-	-	-	-	-	-	-	-	45,2
13	35,1	38,6	42,1	45,7	49,2	52,7	53,1	53,1	53,1	53,1	53,1	53,1	53,1	53,1	53,1	53,1	-	-	-	-	-	-	-	-	53,1
14	-	41,6	45,4	49,2	53,0	56,7	61,5	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	-	-	-	-	-	-	-	-	61,6
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	75,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	-	-	-	-	-	-	80,4
18	-	-	-	-	63,3	67,9	73,5	79,2	84,8	90,5	101,8	101,8	101,8	101,8	101,8	101,8	101,8	101,8	101,8	-	-	-	-	-	101,8
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	104,6	116,2	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	-	-	-	-	125,7
22	-	-	-	-	-	-	-	89,5	95,9	102,3	115,1	127,9	140,6	152,1	152,1	152,1	152,1	152,1	152,1	152,1	-	-	-	-	152,1
25	-	-	-	-	-	-	-	-	100,1	106,8	120,2	133,5	146,9	160,2	173,6	186,9	196,4	196,4	196,4	196,4	-	-	-	-	196,4
28	-	-	-	-	-	-	-	-	-	-	134,6	149,5	164,5	179,4	194,4	209,4	224,3	239,3	246,3	246,3	246,3	-	-	-	246,3
30	-	-	-	-	-	-	-	-	-	-	127,2	141,4	155,5	169,6	183,8	197,9	212,1	226,2	254,5	282,7	282,7	282,7	-	-	282,7
32	-	-	-	-	-	-	-	-	-	-	-	-	149,3	162,9	176,4	190,0	203,6	217,1	244,3	271,4	321,7	321,7	321,7	321,7	321,7
34	-	-	-	-	-	-	-	-	-	-	-	-	-	173,0	187,5	201,9	216,3	230,7	259,6	288,4	360,5	363,2	363,2	-	363,2
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	195,1	208,1	234,1	260,1	325,2	390,2	407,2	-	407,2
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	226,2	251,3	314,2	377,0	502,6	-	502,6

Basic performance data (cont.)

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	-	6,9	8,1	9,2	10,4	11,6	14,5	17,3	20,2	21,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	-	-	-	11,6	13,0	14,5	18,1	21,7	25,3	28,9	32,5	34,1	-	-	-	-	-	-	-	-	-	-	-	-	34,1
12	-	-	-	-	15,6	17,3	21,7	26,0	30,3	34,7	39,0	43,4	47,7	49,2	-	-	-	-	-	-	-	-	-	-	49,2
13	-	-	-	-	-	18,8	23,5	28,2	32,9	37,6	42,3	47,0	51,7	56,4	57,7	57,7	-	-	-	-	-	-	-	-	57,7
14	-	-	-	-	-	20,2	25,3	30,3	35,4	40,5	45,5	50,6	55,6	60,7	65,8	66,9	-	-	-	-	-	-	-	-	66,9
16	-	-	-	-	-	-	28,9	34,7	40,5	46,2	52,0	57,8	63,6	69,4	75,1	80,9	86,7	87,4	-	-	-	-	-	-	87,4
18	-	-	-	-	-	-	-	39,0	45,5	52,0	58,5	65,0	71,5	78,0	84,5	91,0	97,5	104,0	110,6	-	-	-	-	-	110,6
20	-	-	-	-	-	-	-	43,4	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	130,1	136,6	-	-	-	-	136,6
22	-	-	-	-	-	-	-	-	55,6	63,6	71,5	79,5	87,4	95,4	103,3	111,3	119,2	127,2	143,1	159,0	-	-	-	-	165,3
25	-	-	-	-	-	-	-	-	-	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	162,6	180,6	-	-	-	-	213,4
28	-	-	-	-	-	-	-	-	-	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	182,1	202,3	252,9	-	-	-	267,7
30	-	-	-	-	-	-	-	-	-	-	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	195,1	216,8	271,0	307,3	-	-	307,3
32	-	-	-	-	-	-	-	-	-	-	-	115,6	127,2	138,7	150,3	161,9	173,4	185,0	208,1	231,2	289,0	346,8	349,7	349,7	349,7
34	-	-	-	-	-	-	-	-	-	-	-	122,8	135,1	147,4	159,7	172,0	184,3	196,5	221,1	245,7	307,1	368,5	394,7	-	394,7
36	-	-	-	-	-	-	-	-	-	-	-	-	143,1	156,1	169,1	182,1	195,1	208,1	234,1	260,1	325,2	390,2	442,6	-	442,6
40	-	-	-	-	-	-	-	-	-	-	-	-	-	150,8	163,4	175,9	188,5	201,1	226,2	251,3	314,2	377,0	502,7	-	546,3

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	10,8	13,0	15,1	17,3	19,5	21,6	21,9	21,9	21,9	21,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	13,5	16,2	18,9	21,6	24,3	27,0	33,8	34,1	34,1	34,1	34,1	34,1	-	-	-	-	-	-	-	-	-	-	-	-	34,1
12	-	19,5	22,7	25,9	29,2	32,4	40,5	48,6	49,2	49,2	49,2	49,2	49,2	49,2	-	-	-	-	-	-	-	-	-	-	49,2
13	-	-	24,6	28,1	31,6	35,1	43,9	52,7	57,7	57,7	57,7	57,7	57,7	57,7	57,7	57,7	-	-	-	-	-	-	-	-	57,7
14	-	-	26,5	30,3	34,0	37,8	47,3	56,7	66,2	66,9	66,9	66,9	66,9	66,9	66,9	66,9	-	-	-	-	-	-	-	-	66,9
16	-	-	-	32,2	36,2	40,2	50,3	60,3	70,4	80,4	87,4	87,4	87,4	87,4	87,4	87,4	87,4	87,4	-	-	-	-	-	-	87,4
18	-	-	-	-	40,7	45,2	56,5	67,9	79,2	90,5	101,8	110,6	110,6	110,6	110,6	110,6	110,6	110,6	110,6	-	-	-	-	-	110,6
20	-	-	-	-	-	46,5	58,1	69,7	81,4	93,0	104,6	116,2	127,9	136,6	136,6	136,6	136,6	136,6	136,6	136,6	-	-	-	-	136,6
22	-	-	-	-	-	-	63,9	76,7	89,5	102,3	115,1	127,9	140,6	153,4	165,3	165,3	165,3	165,3	165,3	165,3	-	-	-	-	165,3
25	-	-	-	-	-	-	66,8	80,1	93,5	106,8	120,2	133,5	146,9	160,2	173,6	186,9	200,3	213,4	213,4	213,4	-	-	-	-	213,4
28	-	-	-	-	-	-	-	89,7	104,7	119,6	134,6	149,5	164,5	179,4	194,4	209,4	224,3	239,3	267,7	267,7	267,7	-	-	-	267,7
30	-	-	-	-	-	-	-	-	99,0	113,1	127,2	141,4	155,5	169,6	183,8	197,9	212,1	226,2	254,5	282,7	307,3	307,3	-	-	307,3
32	-	-	-	-	-	-	-	-	-	108,6	122,1	135,7	149,3	162,9	176,4	190,0	203,6	217,1	244,3	271,4	339,3	349,7	349,7	349,7	349,7
34	-	-	-	-	-	-	-	-	-	-	129,8	144,2	158,6	173,0	187,5	201,9	216,3	230,7	259,6	288,4	360,5	394,7	394,7	-	394,7
36	-	-	-	-	-	-	-	-	-	-	-	-	143,1	156,1	169,1	182,1	195,1	208,1	234,1	260,1	325,2	390,2	442,6	-	442,6
40	-	-	-	-	-	-	-	-	-	-	-	-	-	150,8	163,4	175,9	188,5	201,1	226,2	251,3	314,2	377,0	502,7	-	546,3

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	18,8	20,2	21,7	21,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	-	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,9	32,5	34,1	-	-	-	-	-	-	-	-	-	-	-	-	34,1
12	-	-	-	22,5	24,3	26,0	28,2	30,3	32,5	34,7	39,0	43,4	47,7	49,2	-	-	-	-	-	-	-	-	-	-	49,2
13	-	-	-	-	26,3	28,2	30,5	32,9	35,2	37,6	42,3	47,0	51,7	56,4	57,7	57,7	-	-	-	-	-	-	-	-	57,7
14	-	-	-	-	-	30,3	32,9	35,4	37,9	40,5	45,5	50,6	55,6	60,7	65,8	66,9	-	-	-	-	-	-	-	-	66,9
16	-	-	-	-	-	-	-	40,5	43,4	46,2	52,0	57,8	63,6	69,4	75,1	80,9	86,7	87,4	-	-	-	-	-	-	87,4
18	-	-	-	-	-	-	-	-	-	52,0	58,5	65,0	71,5	78,0	84,5	91,0	97,5	104,0	110,6	-	-	-	-	-	110,6
20	-	-	-	-	-	-	-	-	-	-	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	130,1	136,6	-	-	-	-	136,6
22	-	-	-	-	-	-	-	-	-	-	-	79,5	87,4	95,4	103,3	111,3	119,2	127,2	143,1	159,0	-	-	-	-	165,3
25	-	-	-	-	-	-	-	-	-	-	-	-	99,4	108,4	117,4	126,4	135,5	144,5	162,6	180,6	-	-	-	-	213,4
28	-	-	-	-	-	-	-	-	-	-	-	-	-	121,4	131,5	141,6	151,7	161,9	182,1	202,3	252,9	-	-	-	267,7
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140,9	151,7	162,6	173,4	195,1	216,8	271,0	307,3	-	-	307,3
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161,9	173,4	185,0	208,1	231,2	289,0	346,8	349,7	349,7	349,7
34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	184,3	196,5	221,1	245,7	307,1	368,5	394,7	-	394,7
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	208,1	234,1	260,1	325,2	390,2	442,6	-	442,6
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	226,2	251,3	314,2	377,0	502,7	-	546,3

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	21,6	21,9	21,9	21,9	21,9	21,9	21,9	21,9	21,9	21,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	27,0	29,7	32,4	34,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	-	-	-	-	-	-	-	-	-	-	-	-	34,1
12	32,4	35,7	38,9	42,1	45,4	48,6	49,2	49,2	49,2	49,2	49,2	49,2	49,2	49,2	-	-	-	-	-	-	-	-	-	-	49,2
13	35,1	38,6	42,1	45,7	49,2	52,7	57,1	57,7	57,7	57,7	57,7	57,7	57,7	57,7	57,7	57,7	-	-	-	-	-	-	-	-	57,7
14	-	41,6	45,4	49,2	53,0	56,7	61,5	66,2	66,9	66,9	66,9	66,9	66,9	66,9	66,9	66,9	-	-	-	-	-	-	-	-	66,9
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	75,4	80,4	87,4	87,4	87,4	87,4	87,4	87,4	87,4	87,4	-	-	-	-	-	-	87,4
18	-	-	-	-	63,3	67,9	73,5	79,2	84,8	90,5	101,8	110,6	110,6	110,6	110,6	110,6	110,6	110,6	110,6	-	-	-	-	-	110,6
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	104,6	116,2	127,9	136,6	136,6	136,6	136,6	136,6	136,6	136,6	-	-	-	-	136,6
22	-	-	-	-	-	-	-	89,5	95,9	102,3	115,1	127,9	140,6	153,4	165,3	165,3	165,3	165,3	165,3	165,3	-	-	-	-	165,3
25	-	-	-	-	-	-	-	-	100,1	106,8	120,2	133,5	146,9	160,2	173,6	186,9	200,3	213,4	213,4	213,4	-	-	-	-	213,4
28	-	-	-	-	-	-	-	-	-	-	134,6	149,5	164,5	179,4	194,4	209,4	224,3	239,3	267,7	267,7	267,7	-	-	-	267,7
30	-	-	-	-	-	-	-	-	-	-	-	141,4	155,5	169,6	183,8	197,9	212,1	226,2	254,5	282,7	307,3	307,3	-	-	307,3
32	-	-	-	-	-	-	-	-	-	-	-	-	-	162,9	176,4	190,0	203,6	217,1	244,3	271,4	339,3	349,7	349,7	349,7	349,7
34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	187,5	201,9	216,3	230,7	259,6	288,4	360,5	394,7	394,7	-	394,7
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	208,1	234,1	260,1	325,2	390,2	442,6	-	442,6
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	226,2	251,3	314,2	377,0	502,7	-	546,3

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	-	-	8,1	9,2	10,4	11,6	14,5	17,3	20,2	23,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	-	-	-	-	13,0	14,5	18,1	21,7	25,3	28,9	32,5	36,1	-	-	-	-	-	-	-	-	-	-	-	-	41,0
12	-	-	-	-	-	-	21,7	26,0	30,3	34,7	39,0	43,4	47,7	52,0	-	-	-	-	-	-	-	-	-	-	59,0
13	-	-	-	-	-	-	23,5	28,2	32,9	37,6	42,3	47,0	51,7	56,4	61,1	65,8	-	-	-	-	-	-	-	-	69,3
14	-	-	-	-	-	-	25,3	30,3	35,4	40,5	45,5	50,6	55,6	60,7	65,8	70,8	-	-	-	-	-	-	-	-	80,3
16	-	-	-	-	-	-	-	34,7	40,5	46,2	52,0	57,8	63,6	69,4	75,1	80,9	86,7	92,5	-	-	-	-	-	-	104,9
18	-	-	-	-	-	-	-	-	45,5	52,0	58,5	65,0	71,5	78,0	84,5	91,0	97,5	104,0	117,1	-	-	-	-	-	132,8
20	-	-	-	-	-	-	-	-	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	130,1	144,5	-	-	-	-	163,9
22	-	-	-	-	-	-	-	-	-	63,6	71,5	79,5	87,4	95,4	103,3	111,3	119,2	127,2	143,1	159,0	-	-	-	-	198,3
25	-	-	-	-	-	-	-	-	-	-	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	162,6	180,6	-	-	-	-	256,1
28	-	-	-	-	-	-	-	-	-	-	-	101,2	111,3	121,4	131,5	141,6	151,7	161,9	182,1	202,3	252,9	-	-	-	321,3
30	-	-	-	-	-	-	-	-	-	-	-	-	119,2	130,1	140,9	151,7	162,6	173,4	195,1	216,8	271,0	325,2	-	-	368,8
32	-	-	-	-	-	-	-	-	-	-	-	-	127,2	138,7	150,3	161,9	173,4	185,0	208,1	231,2	289,0	346,8	419,6	419,6	419,6
34	-	-	-	-	-	-	-	-	-	-	-	-	-	147,4	159,7	172,0	184,3	196,5	221,1	245,7	307,1	368,5	473,7	-	473,7
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	169,1	182,1	195,1	208,1	234,1	260,1	325,2	390,2	520,2	-	531,1
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	188,5	201,1	226,2	251,3	314,2	377,0	502,7	-	655,6

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
d_s [mm] \ l_{bd} [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	10,8	13,0	15,1	17,3	19,5	21,6	26,2	26,2	26,2	26,2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	13,5	16,2	18,9	21,6	24,3	27,0	33,8	40,5	41,0	41,0	41,0	41,0	-	-	-	-	-	-	-	-	-	-	-	-	41,0
12	-	19,5	22,7	25,9	29,2	32,4	40,5	48,6	56,7	59,0	59,0	59,0	59,0	59,0	-	-	-	-	-	-	-	-	-	-	59,0
13	-	-	24,6	28,1	31,6	35,1	43,9	52,7	61,5	69,3	69,3	69,3	69,3	69,3	69,3	69,3	-	-	-	-	-	-	-	-	69,3
14	-	-	26,5	30,3	34,0	37,8	47,3	56,7	66,2	75,6	80,3	80,3	80,3	80,3	80,3	80,3	-	-	-	-	-	-	-	-	80,3
16	-	-	-	32,2	36,2	40,2	50,3	60,3	70,4	80,4	90,5	100,5	104,9	104,9	104,9	104,9	104,9	104,9	-	-	-	-	-	-	104,9
18	-	-	-	-	40,7	45,2	56,5	67,9	79,2	90,5	101,8	113,1	124,4	132,8	132,8	132,8	132,8	132,8	132,8	-	-	-	-	-	132,8
20	-	-	-	-	-	-	58,1	69,7	81,4	93,0	104,6	116,2	127,9	139,5	151,1	162,7	163,9	163,9	163,9	163,9	-	-	-	-	163,9
22	-	-	-	-	-	-	63,9	76,7	89,5	102,3	115,1	127,9	140,6	153,4	166,2	179,0	191,8	198,3	198,3	198,3	-	-	-	-	198,3
25	-	-	-	-	-	-	-	80,1	93,5	106,8	120,2	133,5	146,9	160,2	173,6	186,9	200,3	213,6	240,3	256,1	-	-	-	-	256,1
28	-	-	-	-	-	-	-	-	104,7	119,6	134,6	149,5	164,5	179,4	194,4	209,4	224,3	239,3	269,2	299,1	321,3	-	-	-	321,3
30	-	-	-	-	-	-	-	-	-	113,1	127,2	141,4	155,5	169,6	183,8	197,9	212,1	226,2	254,5	282,7	353,4	368,8	-	-	368,8
32	-	-	-	-	-	-	-	-	-	-	-	135,7	149,3	162,9	176,4	190,0	203,6	217,1	244,3	271,4	339,3	407,2	419,6	419,6	419,6
34	-	-	-	-	-	-	-	-	-	-	-	144,2	158,6	173,0	187,5	201,9	216,3	230,7	259,6	288,4	360,5	432,6	473,7	-	473,7
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	169,1	182,1	195,1	208,1	234,1	260,1	325,2	390,2	520,2	-	531,1
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	188,5	201,1	226,2	251,3	314,2	377,0	502,7	-	655,6

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																								
d_s [mm] \ l_{bd} [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	-	12,7	13,9	15,0	16,2	17,3	18,8	20,2	21,7	23,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	-	-	-	18,8	20,2	21,7	23,5	25,3	27,1	28,9	32,5	36,1	-	-	-	-	-	-	-	-	-	-	-	-	41,0
12	-	-	-	-	-	-	28,2	30,3	32,5	34,7	39,0	43,4	47,7	52,0	-	-	-	-	-	-	-	-	-	-	59,0
13	-	-	-	-	-	-	-	32,9	35,2	37,6	42,3	47,0	51,7	56,4	61,1	65,8	-	-	-	-	-	-	-	-	69,3
14	-	-	-	-	-	-	-	-	37,9	40,5	45,5	50,6	55,6	60,7	65,8	70,8	-	-	-	-	-	-	-	-	80,3
16	-	-	-	-	-	-	-	-	-	-	52,0	57,8	63,6	69,4	75,1	80,9	86,7	92,5	-	-	-	-	-	-	104,9
18	-	-	-	-	-	-	-	-	-	-	-	65,0	71,5	78,0	84,5	91,0	97,5	104,0	117,1	-	-	-	-	-	132,8
20	-	-	-	-	-	-	-	-	-	-	-	-	79,5	86,7	93,9	101,2	108,4	115,6	130,1	144,5	-	-	-	-	163,9
22	-	-	-	-	-	-	-	-	-	-	-	-	-	95,4	103,3	111,3	119,2	127,2	143,1	159,0	-	-	-	-	198,3
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	117,4	126,4	135,5	144,5	162,6	180,6	-	-	-	-	256,1
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	151,7	161,9	182,1	202,3	252,9	-	-	-	321,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	173,4	195,1	216,8	271,0	325,2	-	-	368,8
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	208,1	231,2	289,0	346,8	419,6	419,6	419,6
34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	221,1	245,7	307,1	368,5	473,7	-	473,7
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	260,1	325,2	390,2	520,2	-	531,1
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	314,2	377,0	502,7	-	655,6

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																								
d_s [mm] \ l_{bd} [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	900	1000	1250	1500	2000	2500	Steel failure
8	21,6	23,8	25,9	26,2	26,2	26,2	26,2	26,2	26,2	26,2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	27,0	29,7	32,4	35,1	37,8	40,5	41,0	41,0	41,0	41,0	41,0	41,0	-	-	-	-	-	-	-	-	-	-	-	-	41,0
12	32,4	35,7	38,9	42,1	45,4	48,6	52,7	56,7	59,0	59,0	59,0	59,0	59,0	59,0	-	-	-	-	-	-	-	-	-	-	59,0
13	35,1	38,6	42,1	45,7	49,2	52,7	57,1	61,5	65,9	69,3	69,3	69,3	69,3	69,3	69,3	69,3	-	-	-	-	-	-	-	-	69,3
14	-	41,6	45,4	49,2	53,0	56,7	61,5	66,2	70,9	75,6	80,3	80,3	80,3	80,3	80,3	80,3	-	-	-	-	-	-	-	-	80,3
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	75,4	80,4	90,5	100,5	104,9	104,9	104,9	104,9	104,9	104,9	-	-	-	-	-	-	104,9
18	-	-	-	-	63,3	67,9	73,5	79,2	84,8	90,5	101,8	113,1	124,4	132,8	132,8	132,8	132,8	132,8	132,8	-	-	-	-	-	132,8
20	-	-	-	-	-	-	75,6	81,4	87,2	93,0	104,6	116,2	127,9	139,5	151,1	162,7	163,9	163,9	163,9	163,9	-	-	-	-	163,9
22	-	-	-	-	-	-	-	89,5	95,9	102,3	115,1	127,9	140,6	153,4	166,2	179,0	191,8	198,3	198,3	198,3	-	-	-	-	198,3
25	-	-	-	-	-	-	-	-	-	-	120,2	133,5	146,9	160,2	173,6	186,9	200,3	213,6	240,3	256,1	-	-	-	-	256,1
28	-	-	-	-	-	-	-	-	-	-	-	149,5	164,5	179,4	194,4	209,4	224,3	239,3	269,2	299,1	321,3	-	-	-	321,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	169,6	183,8	197,9	212,1	226,2	254,5	282,7	353,4	368,8	-	-	368,8
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	190,0	203,6	217,1	244,3	271,4	339,3	407,2	419,6	419,6	419,6
34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	216,3	230,7	259,6	288,4	360,5	432,6	473,7	-	473,7
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	260,1	325,2	390,2	520,2	-	531,1
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	314,2	377,0	502,7	-	655,6

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-KEX-II-385	385	10	10	380	6.7	6.7	285.0	5906675028538
R-KEX-II-600	600	7	7	441	7.0	7.0	472.7	5906675293721

R-KER II

Hybrid bonded anchor

IGHTS

EXTENSIVE CERTIFICATATION

The R-KER II has been designed for professionals, and in order to satisfy their needs, it was tested to confirm its top class parameters. The following certificates have been consequently obtained: ETA, C1 validating the use of the R-KER II anchor in seismic territories, and certificates verifying its fire resistance, electric conductivity and content of VOC (volatile organic compounds). This is what makes the R-KER II perfect for application in severe operating conditions.

COMPLETE SYSTEM ENSURING SAFE FIXING

The innovative formula of the resin has made it possible to achieve some of the highest load capacity in the group of hybrid resins. R-KERII ensures the highest safety level of anchor fasteners thanks to improvement and acceleration of the hole preparation process. Using Dustless Drill with automatic suction drilling and cleaning the holes you do at the same time. Thanks to this, you achieve optimal preparation of the anchoring hole and save time needed to prepare the hole.

EXTRAORDINARY STRENGTH

The special resin formulation allows achieve one of the best load capacity in relation to similar resins on the market.

EASE OF USE

The R-KER II anchors can be applied in a hole without cleaning, by means of the Dustless Drill Bit – which it provides

- Drilling and cleaning holes at one time
- Optimal preparation of the anchoring hole
- Saves time needed to prepare the hole
- Eliminating the risk associated with exposureto dust, reducing harmful dust.

What becomes a requirement on construction sites in an increasing number of countries (eg OSHA recommendation in the USA or HSE in Great Britain).

R-KER II

HYBRID BONDED ANCHOR

Efficiency and comfort of use, high technical parameters confirmed by recognised certificates and a wide range of applications with different rod types guarantee durable and secure anchoring. It is the needs of our clients that inspired us to develop the R-KER II.

ETA 17/0874 ETA 17/0594

Durability and strength

Extensive certification: **ETA, C1, VOC, R240, Electric Resistivity**

Wide range of connectors with many sizes and anti-corrosive variants **ZP, HGD, ZF, UHS ZF, A2, A4, HCR**

Three resin versions: standard summer winter

Comfortable work and better efficiency Using in fixing Dustless Drill - you can save up to 40% of the time on resin applications

40%

Easy installation thanks to a dedicated nozzle with scale on the mixer, providing accurate injection of resin

Dustless Drill - accelerated installation time due to simplified procedure - just drill the hole and apply system thanks to the automatic extraction of the output

High resistance in a variety of corrosive environments **(C1-C5)**

Convenient working conditions – 3 options of hole preparation: automatic cleaning using hollow drillbit, traditional method with brush, cleaning with compressed air

Thanks to the special formulation, resin fills all voids in the hole, while improved adhesion and even distribution of forces additionally ensure durable and reliable fixing.

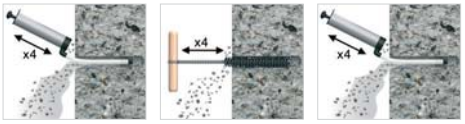
INSTALLATION GUIDE

Fix it comfortably

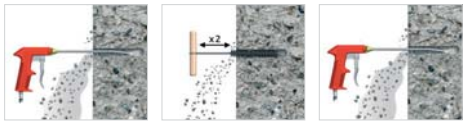
Apply a new and innovative drilling method using our special dustless drill bit. Rawlplug's hollow Dustlessdrill bit makes every installation easier, cleaner and more durable.

Drilling with automatic cleaning with the hollow Dustlessdrill bit

Traditional method – using blowpump and brush (4x, 4x, 4x)



Cleaning with compressed air (2x, 2x, 2x)



R-KER II anchor

1. Drill a hole to the right diameter and depth.
2. Insert a cartridge into the gun and attach a mixing nozzle.
3. When using a new cartridge, discard some part of resin until you obtain uniform colour of mixture.
4. Fill the hole with resin up to 70% of its volume starting from its far end.
5. Once you have dosed the resin, immediately insert a rod into the hole in a twisting motion. Remove any excess of resin that has escaped the hole and leave it undisturbed until it cures.
6. Attach the fixture and tighten the nut to the required torque.

R-KER-II Hybrid resin with Threaded Rods

High strength and versatile application in cracked and non-cracked concrete with threaded rods

Installation movie

Approvals and Reports

- ETA-17/0594

Product overview

Features and benefits

- Approved for use with threaded rods for use in cracked and non-cracked concrete
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- For faster curing can be used winter version of the resin
- Special nozzle with longer mixer for more comfortable and precize application
- Suitable for multiple use. Partly used product can be reused after fitting new nozzle
- Very high load capacity
- Seismic category C1
- Three methods for preparing core holes, including automatic Dustless Drill

Applications

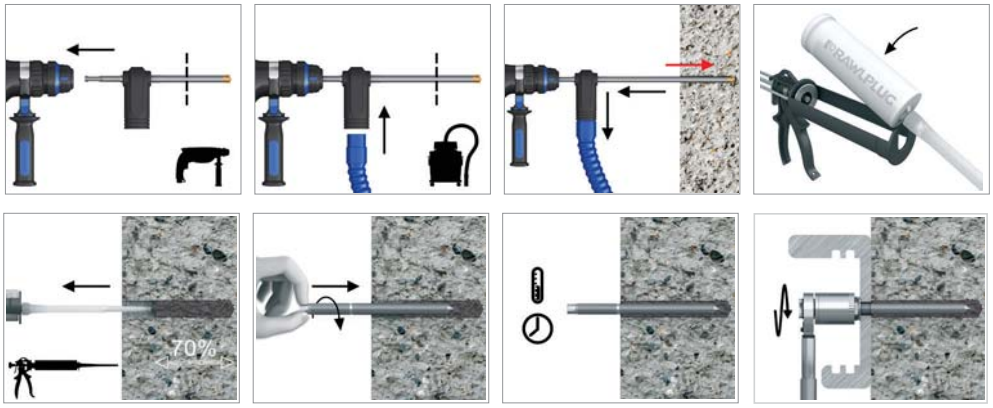
- Curtain walling
- Balustrading
- Handrails
- Canopies
- Cable conduits and trays
- Fencing & gates manufacturing and installation
- Pipework/ductwork supports
- Platforms
- Pipelines systems
- Passenger lifts

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth using a hollow Dustless Drill bit with vacuum cleaner.
2. Insert cartridge into gun and attach nozzle.
3. Dispense to waste until even colour is obtained (min. 10 cm).
4. 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.
5. Immediately insert the stud, 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.
6. Attach fixture and tighten the nut to the required torque.

Product information

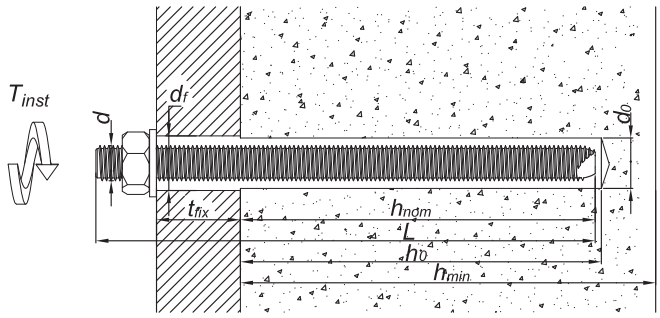
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KER-II-300	R-KER-II	R-KER II Hybrid Resin	300
R-KER-II-345			345
R-KER-II-400			400
R-KER-II-300-S	R-KER-II-S	R-KER II Hybrid Resin for High Temperature (Summer) / Slow Cure Styrene Free Hybrid Resin	300
R-KER-II-400-S			400
R-KER-II-300-W	R-KER-II-W	R-KER II Hybrid Resin for Low Temperature (Winter) / Rapid Cure Styrene Free Hybrid Resin	300
R-KER-II-345-W			345
R-KER-II-400-W			400

R-STUDS

Size	Product Code			Anchor		Fixture		
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness t_{fix} for:	
				d	L	d_f	$h_{nom, min}$	$h_{nom, max}$
				[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	40	-
	R-STUDS-08160	-	R-STUDS-08160-A4*	8	160	9	90	-
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	58	-
	R-STUDS-10170	-	R-STUDS-10170-A4*	10	170	12	98	-
	R-STUDS-10190	-	R-STUDS-10190-A4*	10	190	12	118	-
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	85	-
	R-STUDS-12190	-	R-STUDS-12190-A4*	12	190	14	115	-
	R-STUDS-12220	-	R-STUDS-12220-A4*	12	220	14	145	-
	R-STUDS-12260	-	R-STUDS-12260-A4*	12	260	14	185	-
	R-STUDS-12300	-	R-STUDS-12300-A4*	12	300	14	225	45
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	111	-
	R-STUDS-16220	R-STUDS-16220-88	R-STUDS-16220-A4*	16	220	18	141	-
	R-STUDS-16260	-	R-STUDS-16260-A4*	16	260	18	181	-
	R-STUDS-16300	-	R-STUDS-16300-A4*	16	300	18	221	-
	R-STUDS-16380	-	R-STUDS-16380-A4*	16	380	18	301	41
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	157	-
	R-STUDS-20300	R-STUDS-20300-88	R-STUDS-20300-A4*	20	300	22	197	-
	R-STUDS-20350	-	R-STUDS-20350-A4*	20	350	22	247	-
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4*	24	300	26	176	-
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	226	-

* Make to order

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Hole diameter in fixture	d_f	[mm]	9	12	14	18	22	26	32
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
Min. substrate thickness	h_{min}	[mm]	h_{nom} + 30 ≥ 100	h_{nom} + 30 ≥ 100	h_{nom} + 30 ≥ 100	h_{nom} + $2d_0$	h_{nom} + $2d_0$	h_{nom} + $2d_0$	h_{nom} + $2d_0$
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	160	200
Min. spacing	s_{min}	[mm]	40	40	40	40	40	50	60
Min. edge distance	s_{min}	[mm]	40	40	40	40	40	50	60
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	60	60	60	80	96	120
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	160	200	240	320	400	480	600

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min.]		
°C	°C	R-KER-II	R-KER-II S	R-KER-II W	R-KER-II	R-KER-II S	R-KER-II W
5	0	30	-	14	3 h	-	2h
5	5	15	40	9	90	12h	60
10	10	8	20	5.5	60	8h	45
15	15	5	15	3	60	6h	30
20	20	2.5	10	2	45	4h	15
25	25	2	9.5	1.5	45	3h	10
25	30	2	7	1.5	45	2h	10
25	35	1.5	6.5	1	30	2h	5
25	40	1.5	6.5	1	30	1.5h	5

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
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]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95	185	321	642
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152	297	513	1028
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107	208	360	721

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete							Cracked concrete						
CHARACTERISTIC LOAD															
TENSION LOAD N_{Rk}															
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8															
Minimum embedment depth	[kN]	18.0	23.5	23.5	23.5	36.1	47.5	66.4	15.1	16.7	16.7	16.7	25.8	33.9	47.3
Maximum embedment depth	[kN]	18.0	29.0	42.0	78.0	122.0	176.0	280.0	18.0	29.0	42.0	78.0	122.0	176.0	280.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8															
Minimum embedment depth	[kN]	23.5	23.5	23.5	23.5	36.1	47.5	66.4	15.1	16.7	16.7	16.7	25.8	33.9	47.3
Maximum embedment depth	[kN]	29.0	46.0	67.0	126.0	196.0	282.0	448.0	29.0	46.0	67.0	126.0	188.5	253.3	282.7
R-STUDS METRIC THREADED RODS - A4															
Minimum embedment depth	[kN]	23.5	23.5	23.5	23.5	36.1	47.5	66.4	15.1	16.7	16.7	16.7	25.8	33.9	47.3
Maximum embedment depth	[kN]	26.0	41.0	59.0	110.0	171.0	247.0	392.0	26.0	41.0	59.0	110.0	171.0	247.0	282.7
SHEAR LOAD V_{Rk}															
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8															
Minimum embedment depth	[kN]	9.0	14.0	21.0	39.0	61.0	88.0	132.8	9.0	14.0	21.0	33.5	51.5	67.7	94.7
Maximum embedment depth	[kN]	9.0	14.0	21.0	39.0	61.0	88.0	140.0	9.0	14.0	21.0	39.0	61.0	88.0	140.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8															
Minimum embedment depth	[kN]	15.0	23.0	34.0	46.9	72.3	95.0	132.8	15.0	23.0	33.5	33.5	51.5	67.7	94.7
Maximum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0	15.0	23.0	34.0	63.0	98.0	141.0	224.0
R-STUDS METRIC THREADED RODS - A4															
Minimum embedment depth	[kN]	13.0	20.5	29.0	46.9	72.3	95.0	132.8	13.0	20.0	29.0	33.5	51.5	67.7	94.7
Maximum embedment depth	[kN]	13.0	20.5	29.0	55.0	86.0	124.0	196.0	13.0	20.0	29.0	55.0	86.0	124.0	196.0

Basic performance data (cont.)

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete							Cracked concrete						
DESIGN LOAD															
TENSION LOAD N_{Rd}															
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8															
Minimum embedment depth	[kN]	12.0	15.7	15.7	15.7	24.1	31.7	44.3	10.1	11.2	11.2	11.2	17.2	22.6	31.6
Maximum embedment depth	[kN]	12.0	19.3	28.0	52.0	81.3	117.3	186.7	12.0	19.3	28.0	52.0	81.3	117.3	186.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8															
Minimum embedment depth	[kN]	15.7	15.7	15.7	15.7	24.1	31.7	44.3	10.1	11.2	11.2	11.2	17.2	22.6	31.6
Maximum embedment depth	[kN]	19.3	30.7	44.7	84.0	130.7	188.0	298.7	19.3	30.7	44.7	84.0	125.7	168.9	188.5
R-STUDS METRIC THREADED RODS - A4															
Minimum embedment depth	[kN]	13.9	15.7	15.7	15.7	24.1	31.7	44.3	10.1	11.2	11.2	11.2	17.2	22.6	31.6
Maximum embedment depth	[kN]	13.9	21.9	31.6	58.8	91.4	132.1	209.6	13.9	21.9	31.6	58.8	91.4	132.1	188.5
SHEAR LOAD V_{Rd}															
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8															
Minimum embedment depth	[kN]	7.2	11.2	16.8	31.2	48.2	63.3	88.5	7.2	11.2	16.8	22.3	34.4	45.2	63.1
Maximum embedment depth	[kN]	7.2	11.2	16.8	31.2	48.8	70.4	112.0	7.2	11.2	16.8	31.2	48.8	70.4	112.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8															
Minimum embedment depth	[kN]	12.0	18.4	27.2	31.3	48.2	63.3	88.5	12.0	18.4	22.3	22.3	34.4	45.2	63.1
Maximum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2	12.0	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4															
Minimum embedment depth	[kN]	8.3	13.1	18.6	31.3	48.2	63.3	88.5	8.3	12.8	18.6	22.3	34.4	45.2	63.1
Maximum embedment depth	[kN]	8.3	13.1	18.6	35.3	55.1	79.5	125.6	8.3	12.8	18.6	35.3	55.1	79.5	125.6
RECOMMENDED LOAD															
TENSION LOAD N_{rec}															
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8															
Minimum embedment depth	[kN]	8.57	11.2	11.2	11.2	17.2	22.6	31.6	7.18	7.97	7.97	7.97	12.3	16.1	22.5
Maximum embedment depth	[kN]	8.57	13.8	20.0	37.1	58.1	83.8	133.3	8.57	13.8	20.0	37.1	58.1	83.8	133.3
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8															
Minimum embedment depth	[kN]	11.2	11.2	11.2	11.2	17.2	22.6	31.6	7.18	7.97	7.97	7.97	12.3	16.1	22.5
Maximum embedment depth	[kN]	13.8	21.9	31.9	60.0	93.3	134.3	213.3	13.8	21.9	31.9	60.0	89.8	120.6	134.6
R-STUDS METRIC THREADED RODS - A4															
Minimum embedment depth	[kN]	9.93	11.2	11.2	11.2	17.2	22.6	31.6	7.18	7.97	7.97	7.97	12.3	16.1	22.5
Maximum embedment depth	[kN]	9.93	15.7	22.5	42.0	65.3	94.4	149.7	9.93	15.7	22.5	42.0	65.3	94.4	134.6
SHEAR LOAD V_{rec}															
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8															
Minimum embedment depth	[kN]	5.14	8.0	12.0	22.3	34.4	45.2	63.2	5.14	8.0	12.0	15.9	24.5	32.3	45.1
Maximum embedment depth	[kN]	5.14	8.0	12.0	22.3	34.9	50.3	80.0	5.14	8.0	12.0	22.3	34.9	50.3	80.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8															
Minimum embedment depth	[kN]	8.57	13.1	19.4	22.4	31.4	45.2	63.2	8.57	13.1	15.9	15.9	24.5	32.3	45.1
Maximum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0	8.57	13.1	19.4	36.0	56.0	80.6	128.0
R-STUDS METRIC THREADED RODS - A4															
Minimum embedment depth	[kN]	5.95	9.39	13.3	22.4	34.4	45.2	53.2	5.95	9.16	13.3	15.9	24.5	32.3	45.1
Maximum embedment depth	[kN]	5.95	9.39	13.3	25.2	39.4	56.8	89.7	5.95	9.16	13.3	25.2	39.4	56.8	89.7

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-KER II-300	300	10	10	840	5.2	5.2	466.8	5906675293738
R-KER II-345	345	10	10	840	7.6	7.6	668.4	5906675395203
R-KER-II-400	400	10	10	560	8.2	8.2	489.2	5906675392103
R-KER-II-300-S	300	10	10	840	5.2	5.2	466.8	5906675432045
R-KER-II-400-S	400	10	10	560	8.2	8.2	489.2	5906675432076
R-KER II-300-W	300	10	10	840	5.2	5.2	466.8	5906675432038
R-KER II-345-W	345	10	10	840	7.6	7.6	668.4	5906675432052
R-KER-II-400-W	400	10	10	560	8.2	8.2	489.2	5906675432069

R-KER II Hybrid resin with Sockets

High strength and versatile application in cracked and non-cracked concrete with internally threaded sockets (ITS)

Approvals and Reports

- ETA-17/0594

Product overview

Features and benefits

- Approved for use in cracked and non-cracked concrete
- Allows removal of bolt to leave a re-usable socket in place
- Winter version can be used in warmer temperatures for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- Very high load capacity
- Anchor does not generate tensions in the substrate which enables R-KER II to be specified where closer edge and spacing distances are required

Applications

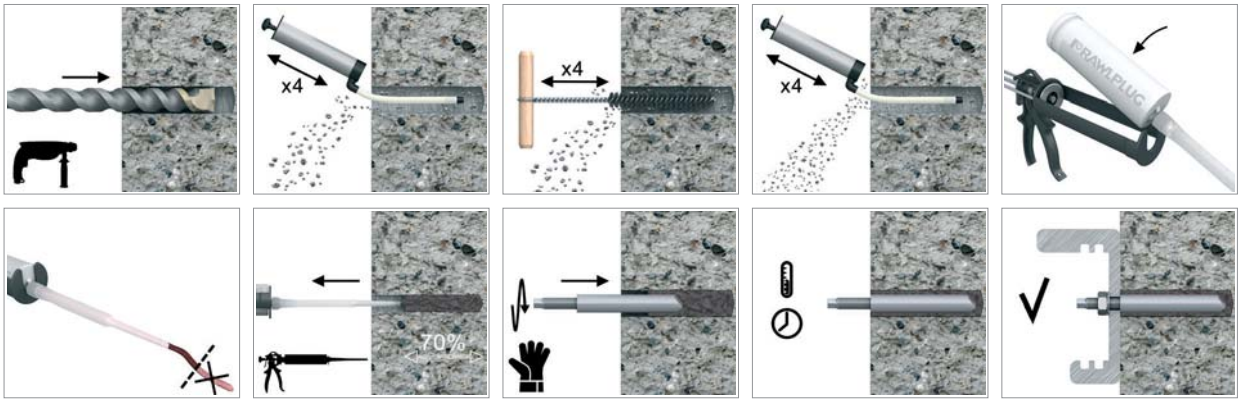
- Temporary works/formworks support systems
- Balustrading
- Barriers
- Cladding restraints
- Masonry support
- Machinery
- Platforms
- Steelwork

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for socket size being used.
2. Clean the drill hole thoroughly with brush and hand pump at least four times before installation.
3. Insert cartridge into gun and attach nozzle.
4. Dispense to waste until even colour is obtained (min. 10 cm)
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 socket, 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.
7. Attach fixture and tighten the bolt to the required torque.

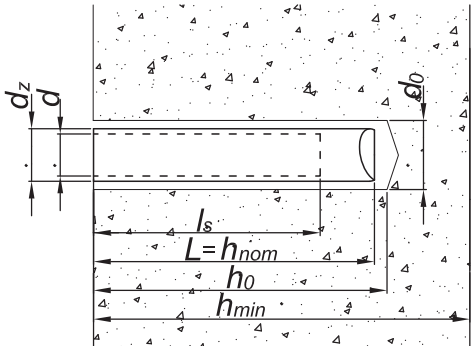
Product information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KER-II-300	R-KER-II	R-KER II Hybrid Resin	300
R-KER-II-345			345
R-KER-II-400			400
R-KER-II-300-S	R-KER-II-S	R-KER II Hybrid Resin for High Temperature (Summer) / Slow Cure Styrene Free Hybrid Resin	300
R-KER-II-400-S			400
R-KER-II-300-W	R-KER-II-W	R-KER II Hybrid Resin for Low Temperature (Winter) / Rapid Cure Styrene Free Hybrid Resin	300
R-KER-II-345-W			345
R-KER-II-400-W			400

SOCKETS

Size	Product Code		Anchor			Fixture	
	Steel class 5.8	Steel grade A4	Socket diameter	Length	Internal thread length	Hole diameter	Max. thickness t_{fix} for:
			d	L	l_g	d_f	$h_{nom,std}$
			[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-ITS-Z-06075	R-ITS-A4-06075	10	75	24	7	-
M8	R-ITS-Z-08075	R-ITS-A4-08075	12	75	25	9	-
	R-ITS-Z-08090	R-ITS-A4-08090	12	90	25	9	-
M10	R-ITS-Z-10075	R-ITS-A4-10075	16	75	30	12	-
	R-ITS-Z-10100	R-ITS-A4-10100	16	100	30	12	-
M12	R-ITS-Z-12100	R-ITS-A4-12100	16	100	35	14	-
M16	R-ITS-Z-16125	R-ITS-A4-16125	24	125	50	18	-

Installation data



Installation data (cont.)

SOCKETS

Size			M6	M8		M10		M12	M16
Installation depth	h_{nom}	[mm]	75	75	90	75	100	100	125
Thread diameter	d	[mm]	6	8	8	10	10	12	16
Hole diameter in substrate	d_0	[mm]	12	14	14	20	20	20	28
Hole diameter in fixture	d_f	[mm]	7	9	9	12	12	14	18
Thread engagement length	h_s	[mm]	24	25	25	30	30	35	50
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
Min. substrate thickness	h_{min}	[mm]	h_{nom} + 30 ≥ 100	h_{nom} + 30 ≥ 100	h_{nom} + 30 ≥ 100	h_{nom} + 2d_0	h_{nom} + 2d_0	h_{nom} + 2d_0	h_{nom} + 2d_0
Installation torque	T_{inst}	[Nm]	3	5	5	10	10	20	40
Min. spacing	s_{min}	[mm]	40	40	50	40	50	50	70
Min. edge distance	c_{min}	[mm]	40	40	50	40	50	50	70

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min]		
°C	°C	R-KER-II	R-KER-II S	R-KER-II W	R-KER-II	R-KER-II S	R-KER-II W
5	0	30	-	14	3h	-	2h
5	5	15	40	9	90	12h	60
10	10	8	20	5.5	60	8h	45
15	15	5	15	3	60	6h	30
20	20	2.5	10	2	45	4h	15
25	25	2	9.5	1.5	45	3h	10
25	30	2	7	1.5	45	2h	10
25	35	1.5	6.5	1	30	2h	5
25	40	1.5	6.5	1	30	1.5h	5

*For wet concrete the curing time must be doubled

Mechanical properties

Size			M6	M8	M10	M12	M16
R-ITS-Z Internally Threaded Sockets							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.21	50.3	98.2	169.7	402.1
R-ITS-A4 Internally Threaded Sockets							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.21	50.3	98.2	169.7	402.1
Metric Threaded Rods - Steel Class 5.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	8	19	37	65	166
Design bending resistance	M	[Nm]	6	15	30	52	133
Allowable bending resistance	M_{rec}	[Nm]	5	11	21	37	95
Metric Threaded Rods - Steel Class 8.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	12	30	60	105	266
Design bending resistance	M	[Nm]	10	24	48	84	213
Allowable bending resistance	M_{rec}	[Nm]	7	17	34	60	152
Metric Threaded Rods - A4							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	11	26	52	92	233
Design bending resistance	M	[Nm]	7	17	34	59	149
Allowable bending resistance	M_{rec}	[Nm]	5	12	24	42	107

Basic performance data

SOCKETS

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

Size		M6	M8		M10		M12	M16	M6	M8		M10		M12	M16
Substrate		Non-cracked concrete							Cracked concrete						
Effective embedment depth h_{ef}	[mm]	75.0		90.0	75.0	100.0		125.0	75.0		90.0	75.0	100.0		125.0
CHARACTERISTIC LOAD															
TENSION LOAD N_{Rk}															
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	10.00	18.0	18.0	29.0	29.0	42.0	70.6	10.00	18.0	18.0	23.4	29.0	36.0	37.7
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	16.0	29.0	29.0	32.8	46.0	50.5	70.6	16.0	23.4	29.0	23.4	36.0	36.0	37.7
METRIC THREADED RODS - A4	[kN]	14.0	25.0	25.0	32.8	40.0	50.5	70.6	14.0	23.4	25.0	23.4	36.0	36.0	37.7
SHEAR LOAD V_{Rk}															
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.00	9.00	9.00	14.5	14.5	21.0	39.0	5.00	9.00	9.00	14.5	14.5	21.0	39.0
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.00	14.5	14.5	23.0	23.0	33.5	62.5	8.00	14.5	14.5	23.0	23.0	33.5	62.5
METRIC THREADED RODS - A4	[kN]	7.00	12.5	12.5	20.0	20.0	29.5	54.5	7.00	12.5	12.5	20.0	20.0	29.5	54.5
DESIGN LOAD															
TENSION LOAD N_{Rd}															
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	6.67	12.0	12.0	19.3	19.3	28.0	47.1	6.67	12.0	12.0	15.6	19.3	24.0	25.1
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	10.7	19.3	19.3	21.9	30.7	33.7	47.1	10.7	15.6	19.3	15.6	24.0	24.0	25.1
METRIC THREADED RODS - A4	[kN]	7.49	13.4	13.4	21.4	21.4	32.6	47.1	7.49	13.4	13.4	15.6	21.4	24.0	25.1
SHEAR LOAD V_{Rd}															
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.00	7.20	7.20	11.6	11.6	16.8	31.2	4.00	7.20	7.20	11.6	11.6	16.8	31.2
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	6.40	11.6	11.6	18.4	18.4	26.8	50.0	6.40	11.6	11.6	18.4	18.4	26.8	50.0
METRIC THREADED RODS - A4	[kN]	4.49	8.01	8.01	12.8	12.8	18.9	34.9	4.49	8.01	8.01	12.8	12.8	18.9	34.9
RECOMMENDED LOAD															
TENSION LOAD N_{rec}															
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.76	8.57	8.57	13.8	13.8	20.0	33.6	4.76	8.57	8.57	11.1	13.8	17.1	18.0
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	7.62	13.8	13.8	15.6	21.9	24.1	33.6	7.62	11.1	13.8	11.1	17.1	17.1	20.0
METRIC THREADED RODS - A4	[kN]	5.35	9.55	9.55	15.3	15.3	22.5	33.6	5.35	9.55	9.55	11.1	15.3	17.1	18.0
SHEAR LOAD V_{rec}															
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	2.86	5.14	5.14	8.29	8.29	12.0	22.3	2.86	5.14	5.14	8.29	8.29	12.0	22.3
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	4.57	8.29	8.29	13.1	13.1	19.1	35.7	4.57	8.29	8.29	13.1	13.1	19.1	35.7
METRIC THREADED RODS - A4	[kN]	3.21	5.72	5.72	9.16	9.16	13.5	25.0	3.21	5.72	5.72	9.16	9.16	13.5	25.0

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Codes
		Box	Outer	Pallet	Box	Outer	Pallet	
R-KER-II-300	300	10	10	840	5.2	5.2	466.8	5906675293738
R-KER-II-345	345	10	10	840	7.6	7.6	668.4	5906675395203
R-KER-II-400	400	10	10	560	8.2	8.2	489.2	5906675392103
R-KER-II-300-S	300	10	10	840	5.2	5.2	466.8	5906675432045
R-KER-II-400-S	400	10	10	560	8.2	8.2	489.2	5906675432076
R-KER-II-300-W	300	10	10	840	5.2	5.2	466.8	5906675432038
R-KER-II-345-W	345	10	10	840	7.6	7.6	668.4	5906675432052
R-KER-II-400-W	400	10	10	560	8.2	8.2	489.2	5906675432069

R-KER-II Hybrid with Rebars as an Anchor

High performance hybrid resin approved for use with reinforcement bars as anchors

Installation movie

Approvals and Reports

- ETA-17/0594

Product overview

Features and benefits

- Approved for use with rebar as an anchor for use in cracked and non-cracked concrete
- Winter version can be used for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- Very high load capacity
- Anchor does not generate tensions in the substrate which enables its installation in minimum distance and close to the edge of the substrate
- Suitable for multiple use. Partly used product can be reused after fitting new nozzle
- Seismic category C1
- Three methods for preparing core holes, including automatic Dustless Drill

Applications

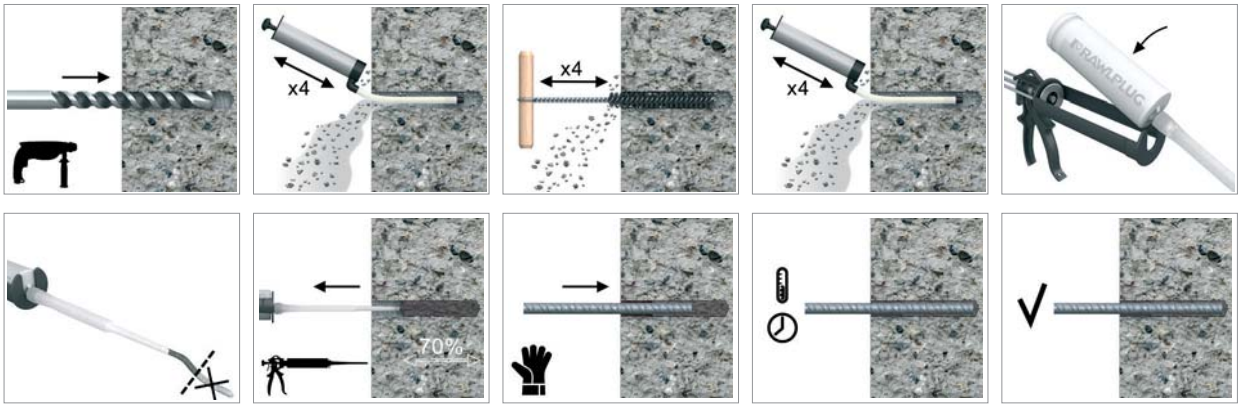
- Curtain walling
- Balustrading
- Barriers
- Cable trays
- Cladding restraints
- Structural steelwork
- Rebar dowelling
- Starter bars
- Rebar missed-outs

Base materials

Approved for use in:

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

Installation guide



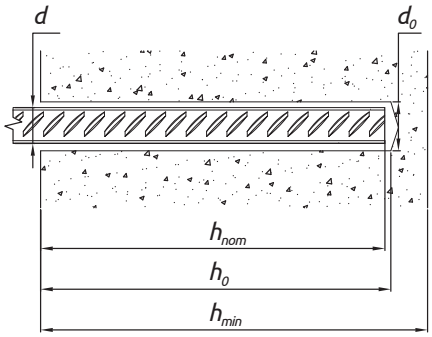
Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar size being used.
2. Clean the drill hole thoroughly with brush and hand pump at least four times before installation.
3. Insert cartridge into gun and attach nozzle.
4. Dispense to waste until even colour is obtained (min. 10 cm)
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. Attach fixture and tighten the nut to the required torque.

Product information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-KER-II-300	R-KER-II	R-KER II Hybrid Resin	300
R-KER-II-345			345
R-KER-II-400			400
R-KER-II-300-S	R-KER-II-S	R-KER II Hybrid Resin for High Temperature (Summer) / Slow Cure Styrene Free Hybrid Resin	300
R-KER-II-400-S			400
R-KER-II-300-W	R-KER-II-W	R-KER II Hybrid Resin for Low Temperature (Winter) / Rapid Cure Styrene Free Hybrid Resin	300
R-KER-II-345-W			345
R-KER-II-400-W			400

Installation data



REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Rebar diameter	d	[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} + 30 ≥ 100	h_{nom} + 30 ≥ 100	h_{nom} + $2d_0$	h_{nom} + $2d_0$	h_{nom} + $2d_0$	h_{nom} + $2d_0$
Min. spacing	s_{min}	[mm]	40	40	40	40	40	40	50	70
Min. edge distance	c_{min}	[mm]	40	40	40	40	40	40	50	70
MINIMUM EMBEDMENT DEPTH										
Installation depth	$h_{nom, min}$	[mm]	60	60	60	60	64	80	100	128
MAXIMUM EMBEDMENT DEPTH										
Installation depth	$h_{nom, max}$	[mm]	160	200	240	240	320	400	500	640

Installation data (cont.)

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min.]		
°C	°C	R-KER-II	R-KER-II S	R-KER-II W	R-KER-II	R-KER-II S	R-KER-II W
5	0	30	-	14	3 h	-	2h
5	5	15	40	9	90	12h	60
10	10	8	20	5.5	60	8h	45
15	15	5	15	3	60	6h	30
20	20	2.5	10	2	45	4h	15
25	25	2	9.5	1.5	45	3h	10
25	30	2	7	1.5	45	2h	10
25	35	1.5	6.5	1	30	2h	5
25	40	1.5	6.5	1	30	1,5h	5

*For wet concrete the curing time must be doubled

Mechanical properties

REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
fuk = 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]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
fuk = 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]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
fuk = 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]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217

Basic performance data

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Substrate		Non-cracked concrete								Cracked concrete							
CHARACTERISTIC LOAD																	
TENSION LOAD N_{Rk}																	
fuk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)																	
Minimum embedment depth	[kN]	19.6	23.5	23.5	23.5	25.9	36.1	50.5	73.1	12.1	16.7	16.7	16.7	18.4	25.8	36.0	45.0
Maximum embedment depth	[kN]	27.1	42.4	61.1	83.1	108.6	169.7	265.1	434.3	27.1	42.4	61.1	83.1	108.6	169.7	235.6	225.2
fuk = 575 (e.g. B 500 SP acc. to EC2)																	
Minimum embedment depth	[kN]	19.6	23.5	23.5	23.5	25.9	36.1	50.5	73.1	12.1	16.7	16.7	16.7	18.4	25.8	36.0	45.0
Maximum embedment depth	[kN]	28.9	45.2	65.0	88.5	115.6	180.6	282.3	462.4	28.9	45.2	65.0	88.5	115.6	180.6	235.6	225.2
fuk = 620 (e.g. G-60 acc. to ASTM 615)																	
Minimum embedment depth	[kN]	19.6	23.5	23.5	23.5	25.9	36.1	50.5	73.1	12.1	16.7	16.7	16.7	18.4	25.8	36.0	45.0
Maximum embedment depth	[kN]	31.2	48.7	70.1	95.4	124.7	194.8	304.3	482.6	31.2	48.7	70.1	95.4	124.7	188.5	235.6	225.2
SHEAR LOAD V_{Rk}																	
fuk = 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	51.7	72.3	101.0	146.3	13.6	21.2	30.5	33.5	36.9	51.5	72.0	90.1
Maximum embedment depth	[kN]	13.6	21.2	30.5	41.6	54.3	84.8	132.5	217.2	13.6	21.2	30.5	41.6	54.3	84.8	132.5	217.2
fuk = 575 (e.g. B 500 SP acc. to EC2)																	
Minimum embedment depth	[kN]	14.5	22.6	32.5	44.3	51.7	72.3	101.0	146.3	14.5	22.6	32.5	33.5	36.9	51.5	72.0	90.1
Maximum embedment depth	[kN]	14.5	22.6	32.5	44.3	57.8	90.3	141.1	231.2	14.5	22.6	32.5	44.3	57.8	90.3	141.1	231.2
fuk = 620 (e.g. G-60 acc. to ASTM 615)																	
Minimum embedment depth	[kN]	15.6	24.4	35.1	46.9	51.7	72.3	101.0	146.3	15.6	24.4	33.5	33.5	36.9	51.5	72.0	90.1
Maximum embedment depth	[kN]	15.6	24.4	35.1	47.7	62.3	97.4	152.2	249.3	15.6	24.4	35.1	47.7	62.3	97.4	152.2	249.3
DESIGN LOAD																	
TENSION LOAD N_{Rd}																	
fuk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)																	
Minimum embedment depth	[kN]	13.1	15.7	15.7	15.7	17.2	24.1	33.7	48.8	8.04	11.2	11.2	11.2	12.3	17.2	24.0	30.3
Maximum embedment depth	[kN]	19.4	30.3	43.6	59.4	77.6	121.2	189.3	310.2	19.4	30.3	43.6	59.4	77.6	121.2	157.1	150.1
fuk = 575 (e.g. B 500 SP acc. to EC2)																	
Minimum embedment depth	[kN]	13.1	15.7	15.7	15.7	17.2	24.1	33.7	48.8	8.04	11.2	11.2	11.2	12.3	17.2	24.0	30.3
Maximum embedment depth	[kN]	20.6	32.3	46.5	63.2	82.6	129.0	201.6	321.7	20.6	32.3	46.5	63.2	82.6	125.7	157.1	150.1
fuk = 620 (e.g. G-60 acc. to ASTM 615)																	
Minimum embedment depth	[kN]	13.1	15.7	15.7	15.7	17.2	24.1	33.7	48.8	8.04	11.2	11.2	11.2	12.3	17.2	24.0	30.3
Maximum embedment depth	[kN]	22.3	34.8	50.1	68.2	89.0	139.1	217.4	321.7	21.5	34.8	50.1	68.2	89.0	125.7	157.1	150.1
SHEAR LOAD V_{Rd}																	
fuk = 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	34.5	48.2	67.3	97.5	9.05	14.1	20.4	22.3	24.6	34.4	48.0	60.1
Maximum embedment depth	[kN]	9.05	14.1	20.4	27.7	36.2	56.6	88.4	144.8	9.05	14.1	20.4	27.7	36.2	56.6	88.4	144.8
fuk = 575 (e.g. B 500 SP acc. to EC2)																	
Minimum embedment depth	[kN]	9.63	15.1	21.7	29.5	34.5	48.2	67.3	97.5	9.63	15.1	21.7	22.3	24.6	34.4	48.0	60.1
Maximum embedment depth	[kN]	9.63	15.1	21.7	29.5	38.5	60.2	94.1	154.2	9.63	15.1	21.7	29.5	38.5	60.2	94.1	154.2
fuk = 620 (e.g. G-60 acc. to ASTM 615)																	
Minimum embedment depth	[kN]	10.4	16.2	23.4	31.3	34.5	48.2	67.3	97.5	10.4	16.2	22.3	22.3	24.6	34.4	48.0	60.1
Maximum embedment depth	[kN]	10.4	16.2	23.4	31.8	41.6	64.9	101.5	166.2	10.4	16.2	23.4	31.8	41.6	64.9	101.5	166.2

Basic performance data (cont.)

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
RECOMMENDED LOAD																	
TENSION LOAD N_{rec}																	
fuk = 540 (e.g. 500 B acc. to BS 4449; B 500 B acc. to SS 560)																	
Minimum embedment depth	[kN]	9.34	11.2	11.2	11.2	12.3	17.2	24.1	34.8	5.74	7.97	7.97	7.97	8.78	12.3	17.1	21.5
Maximum embedment depth	[kN]	13.9	21.6	31.2	42.4	55.4	86.6	135.2	221.6	13.9	21.6	31.2	42.4	55.4	86.6	112.2	107.2
fuk = 575 (e.g. B 500 SP acc. to EC2)																	
Minimum embedment depth	[kN]	9.34	11.2	11.2	11.2	12.3	17.2	24.1	34.8	5.74	7.97	7.97	7.97	8.78	12.3	17.1	21.5
Maximum embedment depth	[kN]	14.8	23.0	33.2	45.2	59.0	92.2	144.0	229.8	14.8	23.0	33.2	45.2	59.0	89.8	111.2	107.2
fuk = 620 (e.g. G-60 acc. to ASTM 615)																	
Minimum embedment depth	[kN]	9.34	11.2	11.2	11.2	12.3	17.2	24.1	34.8	5.74	7.97	7.97	7.97	8.78	12.3	17.1	21.5
Maximum embedment depth	[kN]	15.9	24.8	35.8	48.7	63.6	99.4	155.3	229.8	15.3	24.8	35.8	48.7	63.6	89.8	112.2	107.2
SHEAR LOAD V_{rec}																	
fuk = 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	24.6	34.4	48.1	69.7	6.46	10.1	14.5	15.9	17.6	24.5	34.3	42.9
Maximum embedment depth	[kN]	6.46	10.1	14.5	19.8	25.9	40.4	63.1	103.4	6.46	10.1	14.5	19.8	25.9	40.4	63.1	103.4
fuk = 575 (e.g. B 500 SP acc. to EC2)																	
Minimum embedment depth	[kN]	6.88	10.8	15.5	21.1	24.6	34.4	48.1	69.7	6.88	10.8	15.5	15.9	17.6	24.5	34.3	42.9
Maximum embedment depth	[kN]	6.88	10.8	15.5	21.1	27.5	43.0	67.2	110.1	6.88	10.8	15.5	21.1	27.5	43.0	67.2	110.1
fuk = 620 (e.g. G-60 acc. to ASTM 615)																	
Minimum embedment depth	[kN]	7.42	11.6	16.7	22.4	24.6	34.4	48.1	69.7	7.42	11.6	15.9	15.9	17.6	24.5	34.3	42.9
Maximum embedment depth	[kN]	7.42	11.6	16.7	22.7	29.7	46.4	72.5	118.7	7.42	11.6	16.7	22.7	29.7	46.4	72.5	118.7

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-KER II-300	300	10	10	840	5.2	5.2	466.8	5906675293738
R-KER II-345	345	10	10	840	7.6	7.6	668.4	5906675395203
R-KER-II-400	400	10	10	560	8.2	8.2	489.2	5906675392103
R-KER-II-300-S	300	10	10	840	5.2	5.2	466.8	5906675432045
R-KER-II-400-S	400	10	10	560	8.2	8.2	489.2	5906675432076
R-KER II-300-W	300	10	10	840	5.2	5.2	466.8	5906675432038
R-KER II-345-W	345	10	10	840	7.6	7.6	668.4	5906675432052
R-KER-II-400-W	400	10	10	560	8.2	8.2	489.2	5906675432069

R-KER-II Hybrid with Post-Installed Rebars

High performance hybrid resin approved for use with post-installed rebar connections

Installation movie

Approvals and Reports

- ETA-17/0874

ETA CE

Product overview

Features and benefits

- Approved for use with post-installed rebars
- Suitable for use in dry and wet substrates
- Very high load capacity
- Anchor does not generate tensions in the substrate which enables R-KER II to be specified whereclose edge and spacing distances are required
- Suitable for multiple use. Partly used product can be reused after fitting new nozzle
- Three methods for preparing core holes, including automatic Dustless Drill
- High depth of anchoring up to 1,5 m for rebar applications

Applications

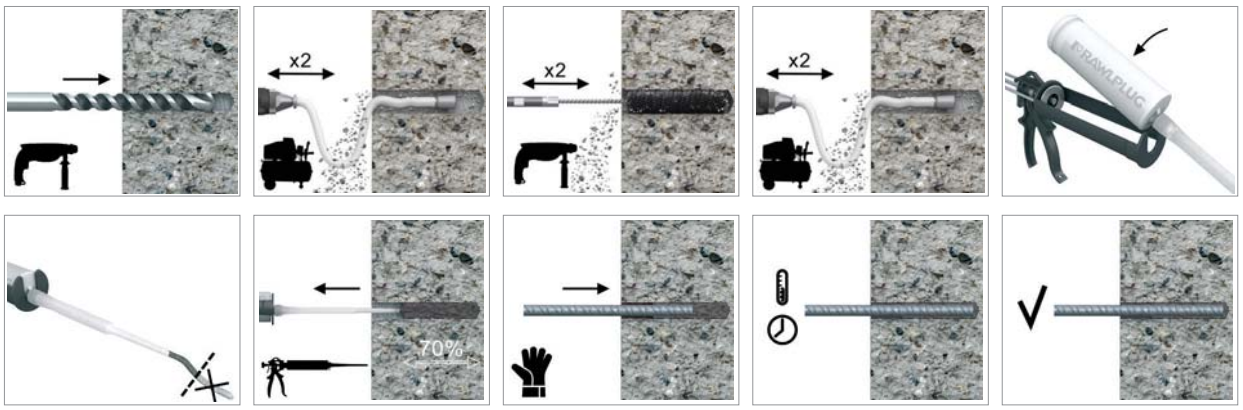
- Post-installed rebar connections
- Rebar
- Temporary works/formworks support systems
- Safety barriers
- Barriers
- Platforms
- Rebar dowelling
- Starter bars
- Rebar missed-outs

Base materials

Approved for use in:

- Concrete C12/15-C50/60

Installation guide



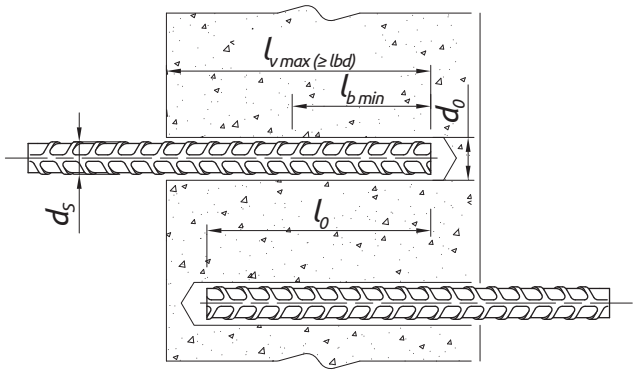
Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar size being used.
2. Clean the drill hole thoroughly with brush and pump (copressed air) at least two times before installation
3. Insert cartridge into gun and attach nozzle.
4. Dispense to waste until even colour is obtained (min. 10 cm)
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. Attach fixture and tighten the nut to the required torque.

Product information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-KER-II-300-S	R-KER-II-S	R-KER II Hybrid Resin for High Temperature (Summer) / Slow Cure Styrene Free Hybrid Resin	300
R-KER-II-400-S			400

Installation data



POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32	Ø40
Rebar diameter	d_s	[mm]	8	10	12	14	16	20	25	28	32	40
Hole diameter in substrate	d_0	[mm]	12	14	16	18	20	25	30	35	40	50
Brush diameter	-	[mm]	14	16	18	20	22	27	32	37	42	50
Min. anchorage length	$l_{b,\,min.}$	[mm]	115	145	170	200	230	285	355	400	455	570
Min. lap length (overlap splice)	$l_{0,\,min.}$	[mm]	200	215	255	300	340	430	540	600	690	860
Max. anchorage length	$l_{v,\,max.}$	[mm]	400	500	600	700	800	1000	1200	1400	1500	1000

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]	Curing time* [min.]
°C	°C	R-KER-II S	R-KER-II S
5	5	40	12h
10	10	20	8h
15	15	15	6h
20	20	10	4h
25	25	9.5	3h
25	30	7	2h
25	35	6.5	2h
25	40	6.5	1.5h
25	45	6	1h
25	50	6	0.5h

*For wet concrete the curing time must be doubled

Mechanical properties

POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32	Ø40
fyk = 410 (e.g. 34GS acc. to EC2)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	410	410	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2	1256.6
fyk = 420 (e.g. G-60 acc. to ASTM 615)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2	1256.6
fyk = 460 (e.g. 460 B acc. to BS 4449)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	460	460	460	460	460	460	460	460	460	460
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2	1256.6
fyk = 500 (e.g. B 500 SP acc. to EC2; 500 B acc. to BS 4449; B 500 B acc. to SS 560)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2	1256.6
fyk = 600 (e.g. B 600 B acc. to SS 560)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	600	600	600	600	600	600	600	600	600	600
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2	1256.6

Basic performance data

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk} = 410 [N/mm²]

l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	5,8	6,9	8,1	9,2	10,4	11,6	14,5	17,3	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	-	8,7	10,1	11,6	13,0	14,5	18,1	21,7	25,3	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	-	-	28,0
12	-	-	12,1	13,9	15,6	17,3	21,7	26,0	30,3	34,7	39,0	40,3	40,3	40,3	-	-	-	-	-	-	-	-	-	-	40,3
14	-	-	-	-	18,2	20,2	25,3	30,3	35,4	40,5	45,5	50,6	54,9	54,9	54,9	54,9	-	-	-	-	-	-	-	-	54,9
16	-	-	-	-	-	23,1	28,9	34,7	40,5	46,2	52,0	57,8	63,6	69,4	71,7	71,7	71,7	71,7	-	-	-	-	-	-	71,7
20	-	-	-	-	-	-	36,1	43,4	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	112,0	112,0	112,0	112,0	112,0	-	-	112,0
25	-	-	-	-	-	-	-	54,2	63,2	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	175,0	-	-	175,0
28	-	-	-	-	-	-	-	-	70,8	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	219,5	-	219,5
32	-	-	-	-	-	-	-	-	-	92,5	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	286,7	286,7	286,7
40	-	-	-	-	-	-	-	-	-	-	-	125,7	138,2	150,8	163,4	175,9	188,5	201,1	213,6	226,2	238,8	251,3	-	-	448,0

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk} = 410 [N/mm²]

l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	10,8	13,0	15,1	17,3	17,9	17,9	17,9	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	13,5	16,2	18,9	21,6	24,3	27,0	28,0	28,0	28,0	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	-	-	28,0
12	-	18,1	21,1	24,1	27,1	30,2	37,7	40,3	40,3	40,3	40,3	40,3	40,3	40,3	-	-	-	-	-	-	-	-	-	-	40,3
14	-	-	24,6	28,1	31,7	35,2	44,0	52,8	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	-	-	-	-	-	-	-	-	54,9
16	-	-	-	29,8	33,5	37,2	46,5	55,8	65,1	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	-	-	-	-	-	-	71,7
20	-	-	-	-	-	46,5	58,1	69,7	81,4	93,0	104,6	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	-	-	112,0
25	-	-	-	-	-	-	66,8	80,1	93,5	106,8	120,2	133,5	146,9	160,2	173,6	175,0	175,0	175,0	175,0	175,0	175,0	175,0	-	-	175,0
28	-	-	-	-	-	-	-	89,7	104,7	119,6	134,6	149,5	164,5	179,4	194,4	209,4	219,5	219,5	219,5	219,5	219,5	219,5	219,5	-	219,5
32	-	-	-	-	-	-	-	-	105,6	120,6	135,7	150,8	165,9	181,0	196,0	211,1	226,2	241,3	256,4	271,4	286,5	286,7	286,7	286,7	286,7
40	-	-	-	-	-	-	-	-	-	-	130,1	144,5	159,0	173,4	187,9	202,3	216,8	231,2	245,7	260,1	274,6	289,0	-	-	448,0

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 410 [N/mm²]																									
l_0 [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	17,9	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	14,5	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	-	-	28,0
12	-	19,1	20,8	22,5	24,3	26,0	28,2	30,3	32,5	34,7	39,0	40,3	40,3	40,3	-	-	-	-	-	-	-	-	-	-	40,3
14	-	-	-	26,3	28,3	30,3	32,9	35,4	37,9	40,5	45,5	50,6	54,9	54,9	54,9	54,9	-	-	-	-	-	-	-	-	54,9
16	-	-	-	-	32,4	34,7	37,6	40,5	43,4	46,2	52,0	57,8	63,6	69,4	71,7	71,7	71,7	71,7	-	-	-	-	-	-	71,7
20	-	-	-	-	-	-	-	50,6	54,2	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	112,0	112,0	112,0	112,0	112,0	-	-	112,0
25	-	-	-	-	-	-	-	-	-	-	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	175,0	-	-	175,0
28	-	-	-	-	-	-	-	-	-	-	-	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	219,5	-	219,5
32	-	-	-	-	-	-	-	-	-	-	-	-	-	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	286,7	286,7	286,7
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	188,5	201,1	213,6	226,2	238,8	251,3	-	-	448,0

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 410 [N/mm²]																									
l_0 [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	27,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	-	-	28,0
12	30,2	33,2	36,2	39,2	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	-	-	-	-	-	-	-	-	-	-	40,3
14	-	38,7	42,2	45,7	49,3	52,8	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	-	-	-	-	-	-	-	-	54,9
16	-	-	44,6	48,4	52,1	55,8	60,4	65,1	69,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	-	-	-	-	-	-	71,7
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	104,6	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	-	-	112,0
25	-	-	-	-	-	-	-	-	100,1	106,8	120,2	133,5	146,9	160,2	173,6	175,0	175,0	175,0	175,0	175,0	175,0	175,0	-	-	175,0
28	-	-	-	-	-	-	-	-	-	-	134,6	149,5	164,5	179,4	194,4	209,4	219,5	219,5	219,5	219,5	219,5	219,5	219,5	-	219,5
32	-	-	-	-	-	-	-	-	-	-	-	150,8	165,9	181,0	196,0	211,1	226,2	241,3	256,4	271,4	286,5	286,7	286,7	286,7	286,7
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	187,9	202,3	216,8	231,2	245,7	260,1	274,6	289,0	-	-	448,0

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	5,8	6,9	8,1	9,2	10,4	11,6	14,5	17,3	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	-	8,7	10,1	11,6	13,0	14,5	18,1	21,7	25,3	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	-	-	28,7
12	-	-	-	13,9	15,6	17,3	21,7	26,0	30,3	34,7	39,0	41,3	41,3	41,3	-	-	-	-	-	-	-	-	-	-	41,3
14	-	-	-	-	18,2	20,2	25,3	30,3	35,4	40,5	45,5	50,6	55,6	56,2	56,2	56,2	-	-	-	-	-	-	-	-	56,2
16	-	-	-	-	-	23,1	28,9	34,7	40,5	46,2	52,0	57,8	63,6	69,4	73,4	73,4	73,4	73,4	-	-	-	-	-	-	73,4
20	-	-	-	-	-	-	36,1	43,4	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	114,8	114,8	114,8	114,8	114,8	-	-	114,8
25	-	-	-	-	-	-	-	54,2	63,2	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	179,3	-	-	179,3
28	-	-	-	-	-	-	-	-	70,8	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	224,9	-	224,9
32	-	-	-	-	-	-	-	-	-	92,5	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	289,0	293,7	293,7
40	-	-	-	-	-	-	-	-	-	-	-	-	138,2	150,8	163,4	175,9	188,5	201,1	213,6	226,2	238,8	251,3	-	-	458,9

Basic performance data (cont.)

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	10,8	13,0	15,1	17,3	18,4	18,4	18,4	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	13,5	16,2	18,9	21,6	24,3	27,0	28,7	28,7	28,7	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	-	-	28,7
12	-	18,1	21,1	24,1	27,1	30,2	37,7	41,3	41,3	41,3	41,3	41,3	41,3	41,3	-	-	-	-	-	-	-	-	-	-	41,3
14	-	-	24,6	28,1	31,7	35,2	44,0	52,8	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	-	-	-	-	-	-	-	-	56,2
16	-	-	-	29,8	33,5	37,2	46,5	55,8	65,1	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	-	-	-	-	-	-	73,4
20	-	-	-	-	-	46,5	58,1	69,7	81,4	93,0	104,6	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	-	-	114,8
25	-	-	-	-	-	-	66,8	80,1	93,5	106,8	120,2	133,5	146,9	160,2	173,6	179,3	179,3	179,3	179,3	179,3	179,3	179,3	-	-	179,3
28	-	-	-	-	-	-	-	89,7	104,7	119,6	134,6	149,5	164,5	179,4	194,4	209,4	224,3	224,9	224,9	224,9	224,9	224,9	224,9	-	224,9
32	-	-	-	-	-	-	-	-	105,6	120,6	135,7	150,8	165,9	181,0	196,0	211,1	226,2	241,3	256,4	271,4	286,5	293,7	293,7	293,7	293,7
40	-	-	-	-	-	-	-	-	-	-	130,1	144,5	159,0	173,4	187,9	202,3	216,8	231,2	245,7	260,1	274,6	289,0	-	-	458,9

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
l_0 [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	18,4	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	14,5	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	-	-	28,7
12	-	19,1	20,8	22,5	24,3	26,0	28,2	30,3	32,5	34,7	39,0	41,3	41,3	41,3	-	-	-	-	-	-	-	-	-	-	41,3
14	-	-	-	26,3	28,3	30,3	32,9	35,4	37,9	40,5	45,5	50,6	55,6	56,2	56,2	56,2	-	-	-	-	-	-	-	-	56,2
16	-	-	-	-	-	34,7	37,6	40,5	43,4	46,2	52,0	57,8	63,6	69,4	73,4	73,4	73,4	73,4	-	-	-	-	-	-	73,4
20	-	-	-	-	-	-	-	-	54,2	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	114,8	114,8	114,8	114,8	114,8	-	-	114,8
25	-	-	-	-	-	-	-	-	-	-	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	179,3	-	-	179,3
28	-	-	-	-	-	-	-	-	-	-	-	-	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	224,9	-	224,9
32	-	-	-	-	-	-	-	-	-	-	-	-	-	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	289,0	293,7	293,7
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	201,1	213,6	226,2	238,8	251,3	-	-	458,9

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
l_0 [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	27,0	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	-	-	28,7
12	30,2	33,2	36,2	39,2	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	-	-	-	-	-	-	-	-	-	-	41,3
14	-	38,7	42,2	45,7	49,3	52,8	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	-	-	-	-	-	-	-	-	56,2
16	-	-	44,6	48,4	52,1	55,8	60,4	65,1	69,7	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	-	-	-	-	-	-	73,4
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	104,6	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	-	-	114,8
25	-	-	-	-	-	-	-	-	100,1	106,8	120,2	133,5	146,9	160,2	173,6	179,3	179,3	179,3	179,3	179,3	179,3	179,3	-	-	179,3
28	-	-	-	-	-	-	-	-	-	-	134,6	149,5	164,5	179,4	194,4	209,4	224,3	224,9	224,9	224,9	224,9	224,9	224,9	-	224,9
32	-	-	-	-	-	-	-	-	-	-	-	150,8	165,9	181,0	196,0	211,1	226,2	241,3	256,4	271,4	286,5	293,7	293,7	293,7	293,7
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	202,3	216,8	231,2	245,7	260,1	274,6	289,0	-	-	458,9

Basic performance data (cont.)

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	-	6,9	8,1	9,2	10,4	11,6	14,5	17,3	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	-	-	10,1	11,6	13,0	14,5	18,1	21,7	25,3	28,9	31,4	31,4	-	-	-	-	-	-	-	-	-	-	-	-	31,4
12	-	-	-	13,9	15,6	17,3	21,7	26,0	30,3	34,7	39,0	43,4	45,2	45,2	-	-	-	-	-	-	-	-	-	-	45,2
14	-	-	-	-	-	20,2	25,3	30,3	35,4	40,5	45,5	50,6	55,6	60,7	61,6	61,6	-	-	-	-	-	-	-	-	61,6
16	-	-	-	-	-	-	28,9	34,7	40,5	46,2	52,0	57,8	63,6	69,4	75,1	80,4	80,4	80,4	-	-	-	-	-	-	80,4
20	-	-	-	-	-	-	-	43,4	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	125,7	125,7	125,7	-	-	125,7
25	-	-	-	-	-	-	-	-	63,2	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	-	-	196,4
28	-	-	-	-	-	-	-	-	-	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	246,3	-	246,3
32	-	-	-	-	-	-	-	-	-	-	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	289,0	321,7	321,7
40	-	-	-	-	-	-	-	-	-	-	-	-	-	150,8	163,4	175,9	188,5	201,1	213,6	226,2	238,8	251,3	-	-	502,6

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	10,8	13,0	15,1	17,3	19,5	20,1	20,1	20,1	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	13,5	16,2	18,9	21,6	24,3	27,0	31,4	31,4	31,4	31,4	31,4	31,4	-	-	-	-	-	-	-	-	-	-	-	-	31,4
12	-	18,1	21,1	24,1	27,1	30,2	37,7	45,2	45,2	45,2	45,2	45,2	45,2	45,2	-	-	-	-	-	-	-	-	-	-	45,2
14	-	-	24,6	28,1	31,7	35,2	44,0	52,8	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	-	-	-	-	-	-	-	-	61,6
16	-	-	-	29,8	33,5	37,2	46,5	55,8	65,1	74,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	-	-	-	-	-	-	80,4
20	-	-	-	-	-	46,5	58,1	69,7	81,4	93,0	104,6	116,2	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	-	-	125,7
25	-	-	-	-	-	-	66,8	80,1	93,5	106,8	120,2	133,5	146,9	160,2	173,6	186,9	196,4	196,4	196,4	196,4	196,4	196,4	-	-	196,4
28	-	-	-	-	-	-	-	89,7	104,7	119,6	134,6	149,5	164,5	179,4	194,4	209,4	224,3	239,3	246,3	246,3	246,3	246,3	246,3	-	246,3
32	-	-	-	-	-	-	-	-	105,6	120,6	135,7	150,8	165,9	181,0	196,0	211,1	226,2	241,3	256,4	271,4	286,5	301,6	321,7	321,7	321,7
40	-	-	-	-	-	-	-	-	-	-	-	144,5	159,0	173,4	187,9	202,3	216,8	231,2	245,7	260,1	274,6	289,0	-	-	502,6

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
l_0 [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	18,8	20,1	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	14,5	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,9	31,4	31,4	-	-	-	-	-	-	-	-	-	-	-	-	31,4
12	-	-	20,8	22,5	24,3	26,0	28,2	30,3	32,5	34,7	39,0	43,4	45,2	45,2	-	-	-	-	-	-	-	-	-	-	45,2
14	-	-	-	-	28,3	30,3	32,9	35,4	37,9	40,5	45,5	50,6	55,6	60,7	61,6	61,6	-	-	-	-	-	-	-	-	61,6
16	-	-	-	-	-	-	37,6	40,5	43,4	46,2	52,0	57,8	63,6	69,4	75,1	80,4	80,4	80,4	-	-	-	-	-	-	80,4
20	-	-	-	-	-	-	-	-	-	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	125,7	125,7	125,7	-	-	125,7
25	-	-	-	-	-	-	-	-	-	-	-	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	-	-	196,4
28	-	-	-	-	-	-	-	-	-	-	-	-	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	246,3	-	246,3
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	289,0	321,7	321,7
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	213,6	226,2	238,8	251,3	-	-	502,6

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
l_0 [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	20,1	20,1	20,1	20,1	20,1	20,1	20,1	20,1	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	27,0	29,7	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	-	-	-	-	-	-	-	-	-	-	-	-	31,4
12	30,2	33,2	36,2	39,2	42,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	-	-	-	-	-	-	-	-	-	-	45,2
14	-	38,7	42,2	45,7	49,3	52,8	57,2	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	-	-	-	-	-	-	-	-	61,6
16	-	-	44,6	48,4	52,1	55,8	60,4	65,1	69,7	74,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	-	-	-	-	-	-	80,4
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	104,6	116,2	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	-	-	125,7
25	-	-	-	-	-	-	-	-	100,1	106,8	120,2	133,5	146,9	160,2	173,6	186,9	196,4	196,4	196,4	196,4	196,4	196,4	-	-	196,4
28	-	-	-	-	-	-	-	-	-	-	134,6	149,5	164,5	179,4	194,4	209,4	224,3	239,3	246,3	246,3	246,3	246,3	246,3	-	246,3
32	-	-	-	-	-	-	-	-	-	-	-	150,8	165,9	181,0	196,0	211,1	226,2	241,3	256,4	271,4	286,5	301,6	321,7	321,7	321,7
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	216,8	231,2	245,7	260,1	274,6	289,0	-	-	502,6

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
l_0 [mm] / d_s [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	-	6,9	8,1	9,2	10,4	11,6	14,5	17,3	20,2	21,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	-	-	-	11,6	13,0	14,5	18,1	21,7	25,3	28,9	32,5	34,1	-	-	-	-	-	-	-	-	-	-	-	-	34,1
12	-	-	-	-	15,6	17,3	21,7	26,0	30,3	34,7	39,0	43,4	47,7	49,2	-	-	-	-	-	-	-	-	-	-	49,2
14	-	-	-	-	-	20,2	25,3	30,3	35,4	40,5	45,5	50,6	55,6	60,7	65,8	66,9	-	-	-	-	-	-	-	-	66,9
16	-	-	-	-	-	-	28,9	34,7	40,5	46,2	52,0	57,8	63,6	69,4	75,1	80,9	86,7	87,4	-	-	-	-	-	-	87,4
20	-	-	-	-	-	-	-	43,4	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	130,1	136,6	136,6	-	-	136,6
25	-	-	-	-	-	-	-	-	-	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	-	-	213,4
28	-	-	-	-	-	-	-	-	-	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	252,9	-	267,7
32	-	-	-	-	-	-	-	-	-	-	-	115,6	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	289,0	346,8	349,7
40	-	-	-	-	-	-	-	-	-	-	-	-	-	150,8	163,4	175,9	188,5	201,1	213,6	226,2	238,8	251,3	-	-	546,3

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
l_0 [mm] / d_s [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	10,8	13,0	15,1	17,3	19,5	21,6	21,9	21,9	21,9	21,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	13,5	16,2	18,9	21,6	24,3	27,0	33,8	34,1	34,1	34,1	34,1	34,1	-	-	-	-	-	-	-	-	-	-	-	-	34,1
12	-	18,1	21,1	24,1	27,1	30,2	37,7	45,2	49,2	49,2	49,2	49,2	49,2	49,2	-	-	-	-	-	-	-	-	-	-	49,2
14	-	-	24,6	28,1	31,7	35,2	44,0	52,8	61,6	66,9	66,9	66,9	66,9	66,9	66,9	66,9	-	-	-	-	-	-	-	-	66,9
16	-	-	-	29,8	33,5	37,2	46,5	55,8	65,1	74,4	83,7	87,4	87,4	87,4	87,4	87,4	87,4	87,4	-	-	-	-	-	-	87,4
20	-	-	-	-	-	46,5	58,1	69,7	81,4	93,0	104,6	116,2	127,9	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6	-	-	136,6
25	-	-	-	-	-	-	66,8	80,1	93,5	106,8	120,2	133,5	146,9	160,2	173,6	186,9	200,3	213,4	213,4	213,4	213,4	213,4	-	-	213,4
28	-	-	-	-	-	-	-	89,7	104,7	119,6	134,6	149,5	164,5	179,4	194,4	209,4	224,3	239,3	254,2	267,7	267,7	267,7	267,7	-	267,7
32	-	-	-	-	-	-	-	-	105,6	120,6	135,7	150,8	165,9	181,0	196,0	211,1	226,2	241,3	256,4	271,4	286,5	301,6	349,7	349,7	349,7
40	-	-	-	-	-	-	-	-	-	-	-	-	159,0	173,4	187,9	202,3	216,8	231,2	245,7	260,1	274,6	289,0	-	-	546,3

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
l_0 [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	18,8	20,2	21,7	21,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	-	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,9	32,5	34,1	-	-	-	-	-	-	-	-	-	-	-	-	34,1
12	-	-	-	22,5	24,3	26,0	28,2	30,3	32,5	34,7	39,0	43,4	47,7	49,2	-	-	-	-	-	-	-	-	-	-	49,2
14	-	-	-	-	-	30,3	32,9	35,4	37,9	40,5	45,5	50,6	55,6	60,7	65,8	66,9	-	-	-	-	-	-	-	-	66,9
16	-	-	-	-	-	-	-	40,5	43,4	46,2	52,0	57,8	63,6	69,4	75,1	80,9	86,7	87,4	-	-	-	-	-	-	87,4
20	-	-	-	-	-	-	-	-	-	-	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	130,1	136,6	136,6	-	-	136,6
25	-	-	-	-	-	-	-	-	-	-	-	-	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	-	-	213,4
28	-	-	-	-	-	-	-	-	-	-	-	-	-	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	252,9	-	267,7
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161,9	173,4	185,0	196,5	208,1	219,7	231,2	289,0	346,8	349,7
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	226,2	238,8	251,3	-	-	546,3

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
l_0 [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	21,6	21,9	21,9	21,9	21,9	21,9	21,9	21,9	21,9	21,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	27,0	29,7	32,4	34,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	-	-	-	-	-	-	-	-	-	-	-	-	34,1
12	30,2	33,2	36,2	39,2	42,2	45,2	49,0	49,2	49,2	49,2	49,2	49,2	49,2	49,2	-	-	-	-	-	-	-	-	-	-	49,2
14	-	38,7	42,2	45,7	49,3	52,8	57,2	61,6	66,0	66,9	66,9	66,9	66,9	66,9	66,9	66,9	-	-	-	-	-	-	-	-	66,9
16	-	-	44,6	48,4	52,1	55,8	60,4	65,1	69,7	74,4	83,7	87,4	87,4	87,4	87,4	87,4	87,4	87,4	-	-	-	-	-	-	87,4
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	104,6	116,2	127,9	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6	-	-	136,6
25	-	-	-	-	-	-	-	-	100,1	106,8	120,2	133,5	146,9	160,2	173,6	186,9	200,3	213,4	213,4	213,4	213,4	213,4	-	-	213,4
28	-	-	-	-	-	-	-	-	-	-	134,6	149,5	164,5	179,4	194,4	209,4	224,3	239,3	254,2	267,7	267,7	267,7	267,7	-	267,7
32	-	-	-	-	-	-	-	-	-	-	-	-	165,9	181,0	196,0	211,1	226,2	241,3	256,4	271,4	286,5	301,6	349,7	349,7	349,7
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	231,2	245,7	260,1	274,6	289,0	-	-	546,3

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
l_0 [mm] / d_s [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	-	-	8,1	9,2	10,4	11,6	14,5	17,3	20,2	23,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	-	-	-	-	13,0	14,5	18,1	21,7	25,3	28,9	32,5	36,1	-	-	-	-	-	-	-	-	-	-	-	-	41,0
12	-	-	-	-	-	-	21,7	26,0	30,3	34,7	39,0	43,4	47,7	52,0	-	-	-	-	-	-	-	-	-	-	59,0
14	-	-	-	-	-	-	25,3	30,3	35,4	40,5	45,5	50,6	55,6	60,7	65,8	70,8	-	-	-	-	-	-	-	-	80,3
16	-	-	-	-	-	-	-	34,7	40,5	46,2	52,0	57,8	63,6	69,4	75,1	80,9	86,7	92,5	-	-	-	-	-	-	104,9
20	-	-	-	-	-	-	-	-	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	130,1	137,3	144,5	-	-	163,9
25	-	-	-	-	-	-	-	-	-	-	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	-	-	256,1
28	-	-	-	-	-	-	-	-	-	-	-	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	252,9	-	321,3
32	-	-	-	-	-	-	-	-	-	-	-	-	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	289,0	346,8	419,6
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	188,5	201,1	213,6	226,2	238,8	251,3	-	-	655,6

Basic performance data (cont.)

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
l_0 [mm] / d_s [mm]	100	120	140	160	180	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	10,8	13,0	15,1	17,3	19,5	21,6	26,2	26,2	26,2	26,2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	13,5	16,2	18,9	21,6	24,3	27,0	33,8	40,5	41,0	41,0	41,0	41,0	-	-	-	-	-	-	-	-	-	-	-	-	41,0
12	-	18,1	21,1	24,1	27,1	30,2	37,7	45,2	52,8	59,0	59,0	59,0	59,0	59,0	-	-	-	-	-	-	-	-	-	-	59,0
14	-	-	24,6	28,1	31,7	35,2	44,0	52,8	61,6	70,4	79,2	80,3	80,3	80,3	80,3	80,3	-	-	-	-	-	-	-	-	80,3
16	-	-	-	-	33,5	37,2	46,5	55,8	65,1	74,4	83,7	93,0	102,3	104,9	104,9	104,9	104,9	104,9	-	-	-	-	-	-	104,9
20	-	-	-	-	-	-	58,1	69,7	81,4	93,0	104,6	116,2	127,9	139,5	151,1	162,7	163,9	163,9	163,9	163,9	163,9	163,9	-	-	163,9
25	-	-	-	-	-	-	-	80,1	93,5	106,8	120,2	133,5	146,9	160,2	173,6	186,9	200,3	213,6	227,0	240,3	253,7	256,1	-	-	256,1
28	-	-	-	-	-	-	-	-	104,7	119,6	134,6	149,5	164,5	179,4	194,4	209,4	224,3	239,3	254,2	269,2	284,1	299,1	321,3	-	321,3
32	-	-	-	-	-	-	-	-	-	-	135,7	150,8	165,9	181,0	196,0	211,1	226,2	241,3	256,4	271,4	286,5	301,6	377,0	419,6	419,6
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	187,9	202,3	216,8	231,2	245,7	260,1	274,6	289,0	-	-	655,6

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
l_0 [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	-	12,7	13,9	15,0	16,2	17,3	18,8	20,2	21,7	23,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	-	-	-	18,8	20,2	21,7	23,5	25,3	27,1	28,9	32,5	36,1	-	-	-	-	-	-	-	-	-	-	-	-	41,0
12	-	-	-	-	-	-	28,2	30,3	32,5	34,7	39,0	43,4	47,7	52,0	-	-	-	-	-	-	-	-	-	-	59,0
14	-	-	-	-	-	-	-	-	37,9	40,5	45,5	50,6	55,6	60,7	65,8	70,8	-	-	-	-	-	-	-	-	80,3
16	-	-	-	-	-	-	-	-	-	-	52,0	57,8	63,6	69,4	75,1	80,9	86,7	92,5	-	-	-	-	-	-	104,9
20	-	-	-	-	-	-	-	-	-	-	-	-	79,5	86,7	93,9	101,2	108,4	115,6	122,8	130,1	137,3	144,5	-	-	163,9
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	-	-	256,1
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	151,7	161,9	172,0	182,1	192,2	202,3	252,9	-	321,3
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	196,5	208,1	219,7	231,2	289,0	346,8	419,6
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	655,6

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
l_0 [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	450	500	550	600	650	700	750	800	850	900	950	1000	1250	1500	Steel failure
8	21,6	23,8	25,9	26,2	26,2	26,2	26,2	26,2	26,2	26,2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	27,0	29,7	32,4	35,1	37,8	40,5	41,0	41,0	41,0	41,0	41,0	41,0	-	-	-	-	-	-	-	-	-	-	-	-	41,0
12	30,2	33,2	36,2	39,2	42,2	45,2	49,0	52,8	56,5	59,0	59,0	59,0	59,0	59,0	-	-	-	-	-	-	-	-	-	-	59,0
14	-	38,7	42,2	45,7	49,3	52,8	57,2	61,6	66,0	70,4	79,2	80,3	80,3	80,3	80,3	80,3	-	-	-	-	-	-	-	-	80,3
16	-	-	-	48,4	52,1	55,8	60,4	65,1	69,7	74,4	83,7	93,0	102,3	104,9	104,9	104,9	104,9	104,9	-	-	-	-	-	-	104,9
20	-	-	-	-	-	-	75,6	81,4	87,2	93,0	104,6	116,2	127,9	139,5	151,1	162,7	163,9	163,9	163,9	163,9	163,9	163,9	-	-	163,9
25	-	-	-	-	-	-	-	-	-	-	120,2	133,5	146,9	160,2	173,6	186,9	200,3	213,6	227,0	240,3	253,7	256,1	-	-	256,1
28	-	-	-	-	-	-	-	-	-	-	-	149,5	164,5	179,4	194,4	209,4	224,3	239,3	254,2	269,2	284,1	299,1	321,3	-	321,3
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	196,0	211,1	226,2	241,3	256,4	271,4	286,5	301,6	377,0	419,6	419,6
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	274,6	289,0	-	-	655,6

Basic performance data (cont.)

POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32	Ø40
DESIGN LOAD												
Mean ultimate bond resistance C12/15	f_{bd}	[N/mm²]	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
Mean ultimate bond resistance C16/20	f_{bd}	[N/mm²]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Mean ultimate bond resistance C20/25	f_{bd}	[N/mm²]	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.00
Mean ultimate bond resistance C25/30	f_{bd}	[N/mm²]	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.00
Mean ultimate bond resistance C30/37	f_{bd}	[N/mm²]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	2.70	2.00
Mean ultimate bond resistance C35/45	f_{bd}	[N/mm²]	3.40	3.40	3.40	3.40	3.40	3.40	3.00	3.00	3.00	2.00
Mean ultimate bond resistance C40/50	f_{bd}	[N/mm²]	3.70	3.70	3.70	3.70	3.70	3.40	3.00	3.00	3.00	2.30
Mean ultimate bond resistance C45/55	f_{bd}	[N/mm²]	4.00	4.00	4.00	3.70	3.70	3.40	3.40	3.00	3.00	2.30
Mean ultimate bond resistance C50/60	f_{bd}	[N/mm²]	4.30	4.30	4.00	4.00	3.70	3.70	3.40	3.40	3.00	2.30

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-KER-II-300-S[1)]	300	10	10	840	5.2	5.2	466.8	5906675432045
R-KER-II-400-S[1)]	400	10	10	560	8.2	8.2	489.2	5906675432076

[1)] ETA-17/0874

R-KER with Threaded Rods

High performance vinylester resin approved for use in cracked and non-cracked concrete

Installation movie

Approvals and Reports

- ETA-10/0055

Product overview

Features and benefits

- Approved for use with threaded rods for use in cracked and non-cracked concrete
- Suitable for use in low temperatures (down to -20°C for winter option) enables use throughout the year
- Winter version can be used in warmer temperatures for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- Very high load capacity
- Anchor does not generate tensions in the substrate which enables R-KER to be specified where closer edge and spacing distances are required

Applications

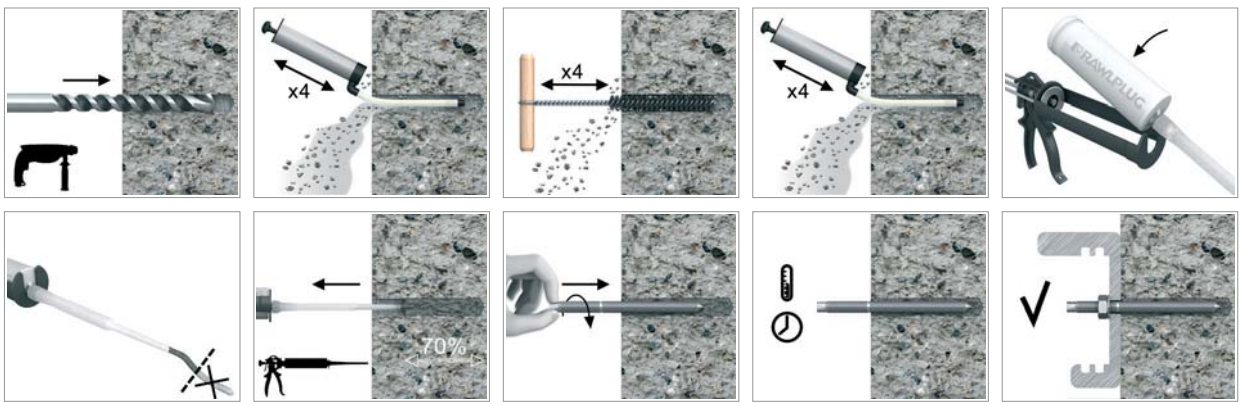
- Curtain walling
- Balustrading
- Handrails
- Canopies
- Large panel reinforcing system -Copy Eco
- Cable conduits and trays
- Fencing & gates manufacturing and installation
- Pipework/ductwork supports
- Platforms
- Pipelines systems
- Passenger lifts

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud size being used.
2. Clean the drill hole thoroughly with brush and hand pump at least four times before installation.
3. Attach nozzle and insert cartridge into gun.
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 stud, 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.
7. Attach fixture and tighten the nut to the required torque.

Product information

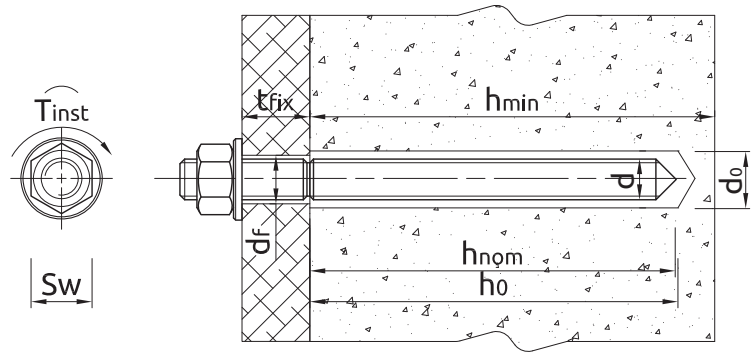
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KER-300	R-KER	Styrene Free Vinylester Resin	300
R-KER-345			345
R-KER-400			400
R-KER-300-W	R-KER-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	300
R-KER-380-W			380
R-KER-400-S	R-KER-S	High Temperature (Summer) / Slow Cure Styrene Free Vinylester Resin	400

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness t_{fix} for:		
				d	L	d_f	$h_{nom,min}$	$h_{nom,std}$	$h_{nom,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	40	20	-
	R-STUDS-08160	-	R-STUDS-08160-A4	8	160	9	90	70	50
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	48	28	-
	R-STUDS-10170	-	R-STUDS-10170-A4	10	170	12	88	68	38
	R-STUDS-10190	-	R-STUDS-10190-A4	10	190	12	108	88	58
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	65	35	-
	R-STUDS-12190	-	R-STUDS-12190-A4	12	190	14	95	65	30
	R-STUDS-12220	-	R-STUDS-12220-A4	12	220	14	125	95	60
	R-STUDS-12260	-	R-STUDS-12260-A4	12	260	14	165	135	100
	R-STUDS-12300	-	R-STUDS-12300-A4	12	300	14	205	175	140
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	71	46	-
	R-STUDS-16220	R-STUDS-16220-88	R-STUDS-16220-A4	16	220	18	101	76	11
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	141	116	51
	R-STUDS-16300	-	R-STUDS-16300-A4	16	300	18	181	156	91
	R-STUDS-16380	-	R-STUDS-16380-A4	16	380	18	261	236	171
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	117	67	-
	R-STUDS-20300	-	R-STUDS-20300-A4	20	300	22	157	107	37
	R-STUDS-20350	-	R-STUDS-20350-A4	20	350	22	207	157	87
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4	24	300	26	132	62	-
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	181	106	-

* Make to order

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Hole diameter in fixture	d_F	[mm]	9	12	14	18	22	26	32
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
Min. substrate thickness	h_{min}	[mm]	h_{nom} + 30 ≥ 100	h_{nom} + 30 ≥ 100	h_{nom} + 30 ≥ 100	h_{nom} + 30 ≥ 100	h_{nom} + $2d_0$	h_{nom} + $2d_0$	h_{nom} + $2d_0$
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
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
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
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min.]			Curing time* [min.]		
°C	°C	R-KER-S	R-KER	R-KER-W	R-KER-S	R-KER	R-KER-W
5	-20	-	-	100	-	-	24 h
5	-15	-	-	60	-	-	16 h
5	-10	-	-	30	-	-	8 h
5	-5	65	60	16	24 h	6 h	4 h
5	0	50	40	12	16 h	3 h	2 h
5	5	35	20	8	12 h	2 h	1 h
10	10	20	12	5	8 h	80	45
15	15	12	8	3	6 h	60	30
20	20	9	5	2	4 h	45	10
25	25	7	3	-	3 h	30	-
25	30	6	2	-	2 h	20	-
25	40	4	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
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]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95	185	321	642
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152	297	513	1028
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107	208	360	721

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M12	M16	M20	M24
CHARACTERISTIC LOAD												
TENSION LOAD N_{Rk}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	18.0	28.6	36.1	50.5	66.4	83.7	107.0	19.6	22.6	30.2	42.2
Maximum embedment depth	[kN]	18.0	41.0	42.0	78.0	122.0	176.0	237.5	35.5	43.0	60.3	87.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	19.6	28.6	36.1	50.5	66.4	83.7	107.0	19.6	22.6	30.2	42.2
Maximum embedment depth	[kN]	29.0	46.0	67.0	105.1	143.3	196.8	237.5	35.5	43.0	60.3	87.5
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	19.6	28.6	36.1	50.5	66.4	83.7	107.0	19.6	22.6	30.2	42.2
Maximum embedment depth	[kN]	26.0	41.0	59.0	105.1	143.3	196.8	237.5	35.5	43.0	60.3	87.5
SHEAR LOAD V_{Rk}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	9.00	20.0	21.0	39.0	61.0	88.0	140.0	21.0	39.0	60.3	84.5
Maximum embedment depth	[kN]	9.00	20.0	21.0	39.0	61.0	88.0	140.0	21.0	39.0	61.0	88.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	214.1	34.0	45.2	60.3	84.5
Maximum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0	34.0	63.0	98.0	141.0
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0	29.0	45.2	60.3	84.5
Maximum embedment depth	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0	29.0	55.0	86.0	124.0

Basic performance data (cont.)

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M12	M16	M20	M24
DESIGN LOAD												
TENSION LOAD N_{Rd}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	10.9	15.9	20.1	28.1	36.9	39.8	51.0	10.9	12.6	16.8	20.1
Maximum embedment depth	[kN]	12.0	21.9	28.0	52.0	79.6	93.7	113.1	19.7	23.9	33.5	41.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	10.9	15.9	20.1	28.1	36.9	39.8	51.0	10.9	12.6	16.8	20.1
Maximum embedment depth	[kN]	18.2	27.2	39.5	58.4	79.6	93.7	113.1	19.7	23.9	33.5	41.7
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	10.9	15.9	20.1	28.1	36.9	39.8	51.0	10.9	12.6	16.8	20.1
Maximum embedment depth	[kN]	13.9	21.9	31.6	58.4	79.6	93.7	113.1	19.7	23.9	33.5	41.7
SHEAR LOAD V_{Rd}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	7.20	12.8	16.8	31.2	48.8	70.4	112.0	16.8	30.2	40.2	56.3
Maximum embedment depth	[kN]	7.20	12.8	16.8	31.2	48.8	70.4	112.0	16.8	31.2	48.8	70.4
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	111.5	142.7	26.1	30.2	40.2	56.3
Maximum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2	27.2	50.4	78.4	112.8
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6	18.6	30.2	40.2	56.3
Maximum embedment depth	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6	18.6	35.3	55.1	79.5
RECOMMENDED LOAD												
TENSION LOAD N_{rec}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	7.78	11.3	14.3	20.0	26.3	28.5	36.4	7.78	8.98	12.0	14.4
Maximum embedment depth	[kN]	8.57	15.7	20.0	37.1	56.9	66.9	80.8	14.1	17.1	23.9	29.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	7.78	11.3	14.3	20.0	26.3	28.5	36.4	7.78	8.98	12.0	14.4
Maximum embedment depth	[kN]	13.0	19.5	28.2	41.7	56.9	66.9	80.8	14.1	17.1	23.9	29.8
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	7.78	11.3	14.3	20.0	26.3	28.5	36.4	7.78	8.98	12.0	14.4
Maximum embedment depth	[kN]	9.93	15.7	22.5	41.7	56.9	66.9	80.8	14.1	17.1	23.9	29.8
SHEAR LOAD V_{rec}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	5.14	9.16	12.0	22.3	34.9	50.3	80.0	12.0	21.5	28.7	40.2
Maximum embedment depth	[kN]	5.14	9.16	12.0	22.3	34.9	50.3	80.0	12.0	22.3	34.9	50.3
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	79.7	101.9	18.7	21.5	28.7	40.2
Maximum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0	19.4	36.0	56.0	80.6
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7	13.3	21.5	28.7	40.2
Maximum embedment depth	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7	13.3	25.2	39.4	56.8

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Codes
		Box	Outer	Pallet	Box	Outer	Pallet	
R-KER-300	300	10	10	840	6.3	6.3	559.2	5906675075167
R-KER-345	345	10	10	840	7.1	7.1	623.3	5906675291086
R-KER-380	380	10	10	560	8.2	8.2	486.6	5906675222707
R-KER-400	400	10	10	560	8.1	8.1	483.8	5906675329444
R-KER-300-W	300	10	10	840	6.3	6.3	559.2	5906675432021
R-KER-380-W	380	10	10	560	8.2	8.2	486.6	5906675222981
R-KER-400-W	400	10	10	560	8.2	8.2	489.2	5906675380445
R-KER-380-S	380	10	10	560	6.5	6.5	391.2	5906675099088
R-KER-400-S	400	10	10	560	8.2	8.2	489.2	5906675380452

R-KER with Sockets

High performance vinylester resin approved for use with internally threaded sockets

Approvals and Reports

- ETA-13/0805

Product overview

Features and benefits

- Approved for use with sockets in non-cracked concrete
- Allows removal of bolt to leave a re-usable socket in place
- Suitable for use in low temperatures (down to -20° C for winter option) enables use throughout the year
- Winter version can be used in warmer temperatures for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- Very high load capacity
- Anchor does not generate tensions in the sub-strate which enables R-KER to be specified where closer edge and spacing distances are required
- Suitable for multiple use. Partly used cartridge can continue to be used after fitting new nozzle

Applications

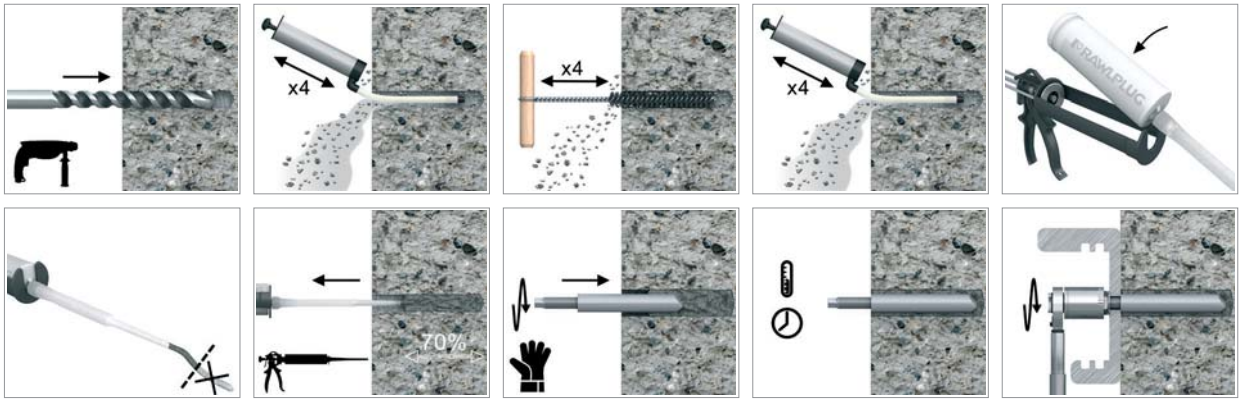
- Temporary works/formworks support systems
- Balustrading
- Cladding restrains
- Masonry support
- Machinery
- Platforms
- Steelwork

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for socket size being used.
2. Clean the drill hole thoroughly with brush and hand pump at least four times before installation.
3. Attach nozzle and insert cartridge into gun.
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 socket, 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.
7. Attach fixture and tighten the bolt to the required torque.

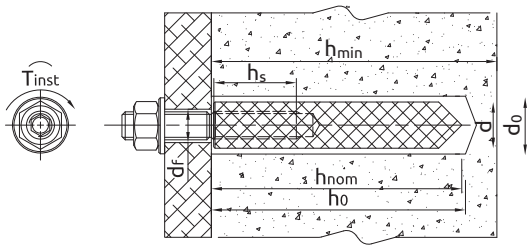
Product information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-KER-300	R-KER	Styrene Free Vinylester Resin	300
R-KER-345			345
R-KER-380			380
R-KER-400			400
R-KER-300-W	R-KER-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	300
R-KER-380-W			380
R-KER-400-W			400
R-KER-380-S	R-KER-S	High Temperature (Summer) / Slow Cure Styrene Free Vinylester Resin	380
R-KER-400-S			400

SOCKETS

Size	Product Code		Anchor			Fixture
	Steel class 5.8	Steel grade A4	Socket diameter d [mm]	Length L [mm]	Internal thread length l_g [mm]	Hole diameter d_f [mm]
M6	R-ITS-Z-06075	R-ITS-A4-06075	10	75	24	7
M8	R-ITS-Z-08075	R-ITS-A4-08075	12	75	25	9
	R-ITS-Z-08090	R-ITS-A4-08090	12	90	25	9
M10	R-ITS-Z-10075	R-ITS-A4-10075	16	75	30	12
	R-ITS-Z-10100	R-ITS-A4-10100	16	100	30	12
M12	R-ITS-Z-12100	R-ITS-A4-12100	16	100	35	14
M16	R-ITS-Z-16125	R-ITS-A4-16125	24	125	50	18

Installation data



Size			M6	M8		M10		M12	M16
Installation depth	h_{nom}	[mm]	75	75	90	75	100	100	125
Thread diameter	d	[mm]	6	8	8	10	10	12	16
Hole diameter in substrate	d_0	[mm]	12	14	14	20	20	20	28
Hole diameter in fixture	d_f	[mm]	7	9	9	12	12	14	18
Thread engagement length; min - max	h_s	[mm]	24	25	25	30	30	35	50
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
Min. substrate thickness	h_{min}	[mm]	105	105	120	115	140	140	181
Installation torque	T_{inst}	[Nm]	3	5	5	10	10	20	40
Min. spacing	s_{min}	[mm]	40	40	45	40	50	50	63
Min. edge distance	c_{min}	[mm]	40	40	45	40	50	50	63

Installation data

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min.]			Curing time* [min.]		
°C	°C	R-KER-S	R-KER	R-KER-W	R-KER-S	R-KER	R-KER-W
5	-20	-	-	100	-	-	24h
5	-15	-	-	60	-	-	16h
5	-10	-	-	30	-	-	8h
5	-5	65	60	16	24h	6h	4h
5	0	50	40	12	16h	3h	2h
5	5	35	20	8	12h	2h	1h
10	10	20	12	5	8h	80	45
15	15	12	8	3	6h	60	30
20	20	9	5	2	4h	45	10
25	25	7	3	-	3h	30	-
25	30	6	2	-	2h	20	-
25	40	5	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

SOCKETS

Size			M6	M8	M10	M12	M16
R-ITS-A4 INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.21	50.27	98.17	169.65	402.12
R-ITS-Z INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.21	50.27	98.17	169.65	402.12
R-STUDS METRIC THREADED RODS - steel class 5.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	8	19	37	65	166
Design bending resistance	M	[Nm]	6	15	30	52	133
Allowable bending resistance	M_{rec}	[Nm]	5	11	21	37	95
R-STUDS METRIC THREADED RODS - steel class 8.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	12	30	60	105	266
Design bending resistance	M	[Nm]	10	24	48	84	213
Allowable bending resistance	M_{rec}	[Nm]	7	17	34	60	152
R-STUDS METRIC THREADED RODS - A4							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	11	26	52	92	233
Design bending resistance	M	[Nm]	7	17	34	59	149
Allowable bending resistance	M_{rec}	[Nm]	5	12	24	42	107

Basic performance data

SOCKETS

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

Size		M6	M8		M10		M12	M16
Substrate		Non-cracked concrete						
Embedment depth h_{nom}	[mm]	75		90	75	100		125
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	10.0	18.0	18.0	29.0	29.0	42.0	66.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	16.0	25.4	29.0	32.8	46.0	42.7	66.0
R-STUDS METRIC THREADED RODS - A4	[kN]	14.0	25.4	26.0	32.8	41.0	42.7	66.0
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.0	9.0	9.0	14.0	14.0	21.0	39.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.0	15.0	15.0	23.0	23.0	34.0	63.0
R-STUDS METRIC THREADED RODS - A4	[kN]	7.0	13.0	13.0	20.0	20.0	29.0	55.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	6.7	12.0	12.0	18.2	19.3	23.7	36.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	9.82	14.1	17.0	18.2	26.5	23.7	36.7
R-STUDS METRIC THREADED RODS - A4	[kN]	7.49	13.9	13.9	18.2	21.9	23.7	36.7
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.0	7.2	7.2	11.2	11.2	16.8	31.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	6.4	12.0	12.0	18.4	18.4	27.2	50.4
R-STUDS METRIC THREADED RODS - A4	[kN]	4.49	8.33	8.33	12.8	12.8	18.6	35.3
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.79	8.57	8.57	13.0	13.8	16.9	26.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	7.01	10.1	12.1	13.0	18.9	16.9	26.2
R-STUDS METRIC THREADED RODS - A4	[kN]	5.35	9.93	9.93	13.0	15.6	16.9	26.2
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	2.86	5.14	5.14	8.0	8.0	12.0	22.3
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	4.57	8.57	8.57	13.1	13.1	19.4	36.0
R-STUDS METRIC THREADED RODS - A4	[kN]	3.21	5.95	5.95	9.16	9.16	13.3	25.2

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Codes
		Box	Outer	Pallet	Box	Outer	Pallet	
R-KER-300	300	10	10	840	6.3	6.3	559.2	5906675075167
R-KER-345	345	10	10	840	7.1	7.1	623.3	5906675291086
R-KER-400	400	10	10	560	8.1	8.1	483.8	5906675329444
R-KER-300-W	300	10	10	840	6.3	6.3	559.2	5906675432021
R-KER-380-W	380	10	10	560	8.2	8.2	486.6	5906675222981
R-KER-400-S	400	10	10	560	8.2	8.2	489.2	5906675380452

R-KER with Rebar as an Anchor

High performance vinylester resin approved for use with reinforcement bars

Installation movie

Approvals and Reports

- ETA-13/0805

ETA CE

Product overview

Features and benefits

- Approved for use with rebar as an anchor in non-cracked concrete
- Suitable for use in low temperatures (down to -20° C for winter option) enables use throughout the year
- Winter version can be used in warmer temperatures for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- Very high load capacity
- Anchor does not generate tensions in the sub-strate which enables R-KER to be specified where closer edge and spacing distances are required
- Suitable for multiple use. Partly used cartridge can continue to be used after fitting new nozzle

Applications

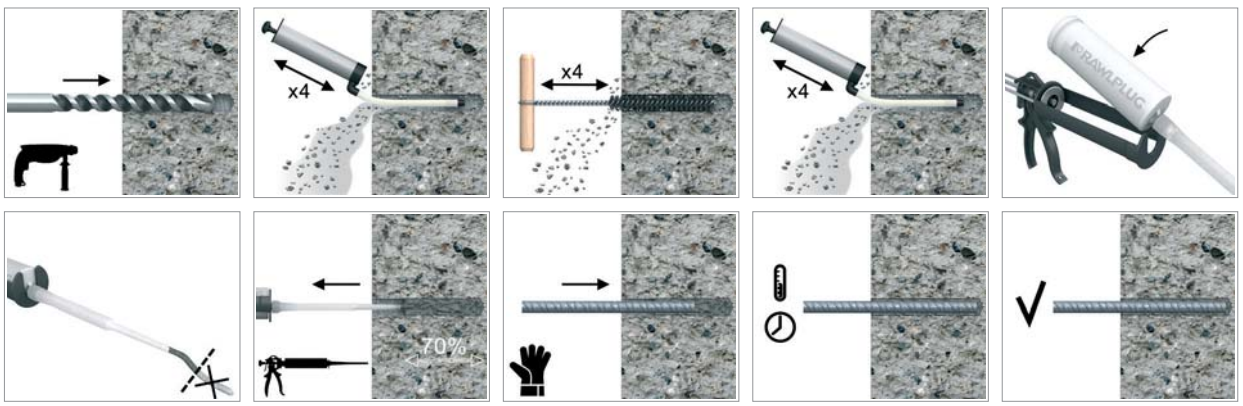
- Curtain walling
- Balustrading
- Barriers
- Cable trays
- Cladding restraints
- Steelwork
- Rebar dowelling
- Starter bars
- Rebar missed-outs

Base materials

Approved for use in:

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

Installation guide



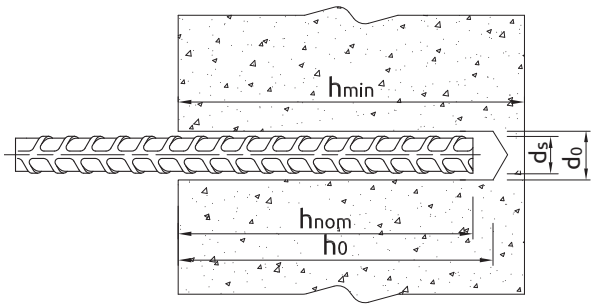
Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar size being used.
2. Clean the drill hole thoroughly with brush and hand pump at least four times before installation.
3. Attach nozzle and insert cartridge into gun.
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 access resin around the hole before it sets and leave it undisturbed until the curing time elapses.

Product information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-KER-300	R-KER	Styrene Free Vinylester Resin	300
R-KER-345			345
R-KER-400			400
R-KER-300-W	R-KER-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	300
R-KER-380-W			380
R-KER-400-S	R-KER-S	High Temperature (Summer) / Slow Cure Styrene Free Vinylester Resin	400

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										
Installation depth	$h_{nom, min}$	[mm]	60	70	80	80	100	120	140	165
MAXIMUM EMBEDMENT DEPTH										
Installation depth	$h_{nom, max}$	[mm]	100	120	145	145	190	240	290	360

Installation data (cont.)

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min.]			Curing time* [min.]		
°C	°C	R-KER-S	R-KER	R-KER-W	R-KER-S	R-KER	R-KER-W
5	-20	-	-	100	-	-	24h
5	-15	-	-	60	-	-	16h
5	-10	-	-	30	-	-	8h
5	-5	65	60	16	24h	6h	4h
5	0	50	40	12	16h	3h	2h
5	5	35	20	8	12h	2h	1h
10	10	20	12	5	8h	80	45
15	15	12	8	3	6h	60	30
20	20	9	5	2	4h	45	10
25	25	7	3	-	3h	30	-
25	30	6	2	-	2h	20	-
25	40	5	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
fuk = 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]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
fuk = 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]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
fuk = 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]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217

Basic performance data

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Substrate		Non-cracked concrete							
CHARACTERISTIC LOAD									
TENSION LOAD N_{Rk}									
fuk = 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	107.0
Maximum embedment depth	[kN]	27.1	37.7	54.7	57.4	86.0	113.1	159.4	235.2
fuk = 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	107.0
Maximum embedment depth	[kN]	27.7	37.7	54.7	57.4	86.0	113.1	159.4	235.2
fuk = 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	107.0
Maximum embedment depth	[kN]	27.7	37.7	54.7	57.4	86.0	113.1	159.4	235.2
SHEAR LOAD V_{Rk}									
fuk = 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	214.1
Maximum embedment depth	[kN]	13.6	21.2	30.5	41.6	54.3	84.8	132.5	217.2
fuk = 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	214.1
Maximum embedment depth	[kN]	14.5	22.6	32.5	44.3	57.8	90.3	141.1	231.2
fuk = 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	214.1
Maximum embedment depth	[kN]	15.6	24.4	35.1	47.7	62.3	97.4	152.2	249.3
DESIGN LOAD									
TENSION LOAD N_{Rd}									
fuk = 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	59.5
Maximum embedment depth	[kN]	15.4	20.9	30.4	31.9	47.8	62.8	88.6	130.7
fuk = 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	59.5
Maximum embedment depth	[kN]	15.4	20.9	30.4	31.9	47.8	62.8	88.6	130.7
fuk = 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	59.5
Maximum embedment depth	[kN]	15.4	20.9	30.4	31.9	47.8	62.8	88.6	130.7
SHEAR LOAD V_{Rd}									
fuk = 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	142.7
Maximum embedment depth	[kN]	9.05	14.1	20.4	27.7	36.2	56.6	88.4	144.8
fuk = 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	142.7
Maximum embedment depth	[kN]	9.63	15.1	21.7	29.5	38.5	60.2	94.1	154.2
fuk = 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	142.7
Maximum embedment depth	[kN]	10.4	16.2	23.4	31.8	41.6	64.9	101.5	166.2

Basic performance data (cont.)

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
RECOMMENDED LOAD									
TENSION LOAD N_{rec}									
fuk = 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	42.3
Maximum embedment depth	[kN]	11.0	15.0	21.7	22.8	34.1	44.9	63.3	93.4
fuk = 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	42.5
Maximum embedment depth	[kN]	11.0	15.0	21.7	22.8	34.1	44.9	63.3	93.4
fuk = 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	42.5
Maximum embedment depth	[kN]	11.0	15.0	21.7	22.8	34.1	44.9	63.3	93.6
SHEAR LOAD V_{rec}									
fuk = 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	101.9
Maximum embedment depth	[kN]	6.46	10.1	14.5	19.8	25.9	40.4	63.1	103.4
fuk = 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	101.9
Maximum embedment depth	[kN]	6.88	10.8	15.5	21.1	27.5	43.0	67.2	110.1
fuk = 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	101.9
Maximum embedment depth	[kN]	7.42	11.6	16.7	22.7	29.7	46.4	72.5	118.7

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Codes
		Box	Outer	Pallet	Box	Outer	Pallet	
R-KER-300	300	10	10	840	6.3	6.3	559.2	5906675075167
R-KER-345	345	10	10	840	7.1	7.1	623.3	5906675291086
R-KER-400	400	10	10	560	8.1	8.1	483.8	5906675329444
R-KER-300-W	300	10	10	840	6.3	6.3	559.2	5906675432021
R-KER-380-W	380	10	10	560	8.2	8.2	486.6	5906675222981
R-KER-400-S	400	10	10	560	8.2	8.2	489.2	5906675380452

R-KER with Post-Installed Rebar

High performance vinylester resin approved for use with post-installed rebar connections

Installation movie

Approvals and Reports

- ETA-12/0319

ETA CE

Product overview

Features and benefits

- Approved for use with post-installed rebars in non-cracked concrete
- Suitable for use in low temperatures (down to -20°C for winter option) enables use throughout the year
- Winter version can be used in warmer temperatures for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- Very high load capacity

Applications

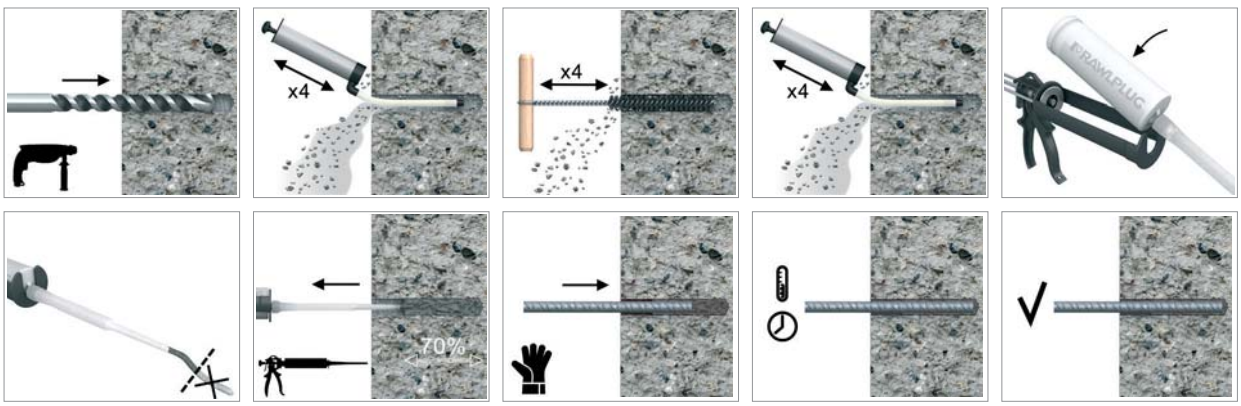
- Post-installed rebar connections
- Rebar
- Temporary works/formworks support systems
- Safety barriers
- Barriers
- Platforms
- Rebar dowelling
- Starter bars
- Rebar missed-outs

Base materials

Approved for use in:

- Concrete C12/C15-C50/60

Installation guide



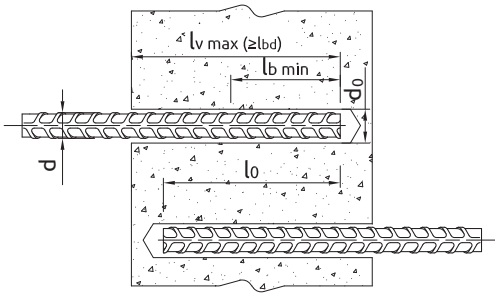
Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar size being used.
2. Clean the drill hole thoroughly with brush and hand pump at least four times before installation.
3. Attach nozzle and insert cartridge into gun.
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. Attach fixture and tighten the nut to the required torque.

Product information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-KER-300	R-KER	Styrene Free Vinylester Resin	300
R-KER-345			345
R-KER-400			400
R-KER-300-W	R-KER-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	300
R-KER-380-W			380
R-KER-400-S	R-KER-S	High Temperature (Summer) / Slow Cure Styrene Free Vinylester Resin	400

Installation data



POST-INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Rebar diameter	d_s	[mm]	8	10	12	14	16	20	25	28	32
Hole diameter in substrate	d_0	[mm]	12	14	16	18	20	25	30	35	40
Brush diameter	-	[mm]	14	16	18	20	22	27	32	37	42
Min. anchorage length	$l_{b,min.}$	[mm]	115	145	170	200	230	285	355	400	455
Min. lap length (overlap splice)	$l_{0,min.}$	[mm]	200	200	200	210	240	300	375	420	480
Max. anchorage length	$l_{v,max.}$	[mm]	400	500	600	700	800	1000	1000	1000	1000

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min.]			Curing time* [min.]		
°C	°C	R-KER-S	R-KER	R-KER-W	R-KER-S	R-KER	R-KER-W
5	-20	-	-	100	-	-	24h
5	-15	-	-	60	-	-	16h
5	-10	-	-	30	-	-	8h
5	-5	65	60	16	24h	6h	4h
5	0	50	40	12	16h	3h	2h
5	5	35	20	8	12h	2h	1h
10	10	20	12	5	8h	80	45
15	15	12	8	3	6h	60	30
20	20	9	5	2	4h	45	10
25	25	7	3	-	3h	30	-
25	30	6	2	-	2h	20	-
25	40	5	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø30	Ø32
fyk = 410 (e.g. 34GS acc. to EC2)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	410	410	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	706.9	804.2
fyk = 420 (e.g. G-60 acc. to ASTM 615)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	706.9	804.2
fyk = 460 (e.g. 460 B acc. to BS 4449)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	460	460	460	460	460	460	460	460	460	460
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	706.9	804.2
fyk = 500 (e.g. B 500 SP acc. to EC2; 500 B acc. to BS 4449; B 500 B acc. to SS 560)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	706.9	804.2
fyk = 600 (e.g. B 600 B acc. to SS 560)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	600	600	600	600	600	600	600	600	600	600
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	706.9	804.2

Basic performance data

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 410 [N/mm²]

l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	5,8	6,9	8,1	9,2	10,4	11,6	13,3	15,0	16,8	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	-	8,7	10,1	11,6	13,0	14,5	16,6	18,8	21,0	23,1	25,3	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	28,0
12	-	-	12,1	13,9	15,6	17,3	19,9	22,5	25,1	27,7	30,3	34,7	39,0	40,3	40,3	40,3	-	-	-	-	-	-	-	-	40,3
14	-	-	-	-	18,2	20,2	23,3	26,3	29,3	32,4	35,4	40,5	45,5	50,6	54,9	54,9	54,9	54,9	-	-	-	-	-	-	54,9
16	-	-	-	-	-	23,1	26,6	30,1	33,5	37,0	40,5	46,2	52,0	57,8	63,6	69,4	71,7	71,7	71,7	71,7	-	-	-	-	71,7
20	-	-	-	-	-	-	-	37,6	41,9	46,2	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	112,0	112,0	112,0	112,0	112,0	112,0
25	-	-	-	-	-	-	-	-	-	57,8	63,2	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	175,0	175,0
28	-	-	-	-	-	-	-	-	-	-	70,8	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	219,5
30	-	-	-	-	-	-	-	-	-	-	75,9	86,7	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	252,0
32	-	-	-	-	-	-	-	-	-	-	-	92,5	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	286,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 410 [N/mm²]

l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	225	250	275	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	10,8	13,0	15,1	17,3	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	13,5	16,2	18,9	21,6	24,3	27,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	28,0
12	-	19,5	22,7	25,9	29,2	32,4	36,5	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	-	-	-	-	-	-	-	-	40,3
14	-	-	26,5	30,3	34,0	37,8	42,6	47,3	52,0	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	-	-	-	-	-	-	54,9
16	-	-	-	32,2	36,2	40,2	45,2	50,3	55,3	60,3	70,4	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	-	-	-	-	71,7
20	-	-	-	-	-	46,5	52,3	58,1	63,9	69,7	81,4	93,0	104,6	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0
25	-	-	-	-	-	-	-	58,9	64,8	70,7	82,5	94,2	106,0	117,8	129,6	141,4	153,2	164,9	175,0	175,0	175,0	175,0	175,0	175,0	175,0
28	-	-	-	-	-	-	-	-	-	79,2	92,4	105,6	118,8	131,9	145,1	158,3	171,5	184,7	197,9	211,1	219,5	219,5	219,5	219,5	219,5
30	-	-	-	-	-	-	-	-	-	76,3	89,1	101,8	114,5	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	252,0	252,0
32	-	-	-	-	-	-	-	-	-	-	95,0	108,6	122,1	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	286,7

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 410 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	17,9	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	14,5	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,0	28,0	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	28,0
12	-	19,1	20,8	22,5	24,3	26,0	28,2	30,3	32,5	34,7	36,9	39,0	40,3	40,3	40,3	40,3	-	-	-	-	-	-	-	-	40,3
14	-	-	-	26,3	28,3	30,3	32,9	35,4	37,9	40,5	43,0	45,5	48,1	50,6	54,9	54,9	54,9	54,9	-	-	-	-	-	-	54,9
16	-	-	-	-	32,4	34,7	37,6	40,5	43,4	46,2	49,1	52,0	54,9	57,8	63,6	69,4	71,7	71,7	71,7	71,7	-	-	-	-	71,7
20	-	-	-	-	-	-	-	50,6	54,2	57,8	61,4	65,0	68,6	72,3	79,5	86,7	93,9	101,2	108,4	112,0	112,0	112,0	112,0	112,0	112,0
25	-	-	-	-	-	-	-	-	-	-	-	81,3	85,8	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	175,0	175,0
28	-	-	-	-	-	-	-	-	-	-	-	-	-	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	219,5
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	252,0
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	286,7

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 410 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	27,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	28,0
12	32,4	35,7	38,9	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	-	-	-	-	-	-	-	-	40,3
14	-	41,6	45,4	49,2	53,0	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	-	-	-	-	-	-	54,9
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	-	-	-	-	71,7
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	98,8	104,6	110,4	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0
25	-	-	-	-	-	-	-	-	88,4	94,2	100,1	106,0	111,9	117,8	129,6	141,4	153,2	164,9	175,0	175,0	175,0	175,0	175,0	175,0	175,0
28	-	-	-	-	-	-	-	-	-	-	112,2	118,8	125,3	131,9	145,1	158,3	171,5	184,7	197,9	211,1	219,5	219,5	219,5	219,5	219,5
30	-	-	-	-	-	-	-	-	-	-	-	114,5	120,9	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	252,0	252,0
32	-	-	-	-	-	-	-	-	-	-	-	-	-	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	286,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	5,8	6,9	8,1	9,2	10,4	11,6	13,3	15,0	16,8	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	-	8,7	10,1	11,6	13,0	14,5	16,6	18,8	21,0	23,1	25,3	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	28,7
12	-	-	-	13,9	15,6	17,3	19,9	22,5	25,1	27,7	30,3	34,7	39,0	41,3	41,3	41,3	-	-	-	-	-	-	-	-	41,3
14	-	-	-	-	18,2	20,2	23,3	26,3	29,3	32,4	35,4	40,5	45,5	50,6	55,6	56,2	56,2	56,2	-	-	-	-	-	-	56,2
16	-	-	-	-	-	23,1	26,6	30,1	33,5	37,0	40,5	46,2	52,0	57,8	63,6	69,4	73,4	73,4	73,4	73,4	-	-	-	-	73,4
20	-	-	-	-	-	-	-	37,6	41,9	46,2	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	114,8	114,8	114,8	114,8	114,8	114,8
25	-	-	-	-	-	-	-	-	-	57,8	63,2	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	179,3	179,3
28	-	-	-	-	-	-	-	-	-	-	70,8	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	224,9
30	-	-	-	-	-	-	-	-	-	-	-	86,7	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	258,2
32	-	-	-	-	-	-	-	-	-	-	-	92,5	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	293,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	10,8	13,0	15,1	17,3	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	13,5	16,2	18,9	21,6	24,3	27,0	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	28,7
12	-	19,5	22,7	25,9	29,2	32,4	37,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	-	-	-	-	-	-	-	-	41,3
14	-	-	26,5	30,3	34,0	37,8	43,5	49,2	54,8	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	-	-	-	-	-	-	56,2
16	-	-	-	32,2	36,2	40,2	46,2	52,3	58,3	64,3	70,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	-	-	-	-	73,4
20	-	-	-	-	-	46,5	53,5	60,4	67,4	74,4	81,4	93,0	104,6	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8
25	-	-	-	-	-	-	-	61,3	68,3	75,4	82,5	94,2	106,0	117,8	129,6	141,4	153,2	164,9	176,7	179,3	179,3	179,3	179,3	179,3	179,3
28	-	-	-	-	-	-	-	-	76,5	84,4	92,4	105,6	118,8	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	224,9	224,9	224,9	224,9
30	-	-	-	-	-	-	-	-	-	81,4	89,1	101,8	114,5	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	258,2
32	-	-	-	-	-	-	-	-	-	-	95,0	108,6	122,1	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	293,7

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	18,4	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	14,5	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,7	28,7	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	28,7
12	-	19,1	20,8	22,5	24,3	26,0	28,2	30,3	32,5	34,7	36,9	39,0	41,2	41,3	41,3	41,3	-	-	-	-	-	-	-	-	41,3
14	-	-	-	26,3	28,3	30,3	32,9	35,4	37,9	40,5	43,0	45,5	48,1	50,6	55,6	56,2	56,2	56,2	-	-	-	-	-	-	56,2
16	-	-	-	-	-	34,7	37,6	40,5	43,4	46,2	49,1	52,0	54,9	57,8	63,6	69,4	73,4	73,4	73,4	73,4	-	-	-	-	73,4
20	-	-	-	-	-	-	-	-	54,2	57,8	61,4	65,0	68,6	72,3	79,5	86,7	93,9	101,2	108,4	114,8	114,8	114,8	114,8	114,8	114,8
25	-	-	-	-	-	-	-	-	-	-	-	81,3	85,8	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	179,3	179,3
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	224,9
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	258,2
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	293,7

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	27,0	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	28,7
12	32,4	35,7	38,9	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	-	-	-	-	-	-	-	-	41,3
14	-	41,6	45,4	49,2	53,0	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	-	-	-	-	-	-	56,2
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	-	-	-	-	73,4
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	98,8	104,6	110,4	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8
25	-	-	-	-	-	-	-	-	88,4	94,2	100,1	106,0	111,9	117,8	129,6	141,4	153,2	164,9	176,7	179,3	179,3	179,3	179,3	179,3	179,3
28	-	-	-	-	-	-	-	-	-	-	112,2	118,8	125,3	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	224,9	224,9	224,9	224,9
30	-	-	-	-	-	-	-	-	-	-	-	-	120,9	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	258,2
32	-	-	-	-	-	-	-	-	-	-	-	-	-	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	293,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	-	6,9	8,1	9,2	10,4	11,6	13,3	15,0	16,8	18,5	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	-	-	10,1	11,6	13,0	14,5	16,6	18,8	21,0	23,1	25,3	28,9	31,4	31,4	-	-	-	-	-	-	-	-	-	-	31,4
12	-	-	-	13,9	15,6	17,3	19,9	22,5	25,1	27,7	30,3	34,7	39,0	43,4	45,2	45,2	-	-	-	-	-	-	-	-	45,2
14	-	-	-	-	-	20,2	23,3	26,3	29,3	32,4	35,4	40,5	45,5	50,6	55,6	60,7	61,6	61,6	-	-	-	-	-	-	61,6
16	-	-	-	-	-	-	26,6	30,1	33,5	37,0	40,5	46,2	52,0	57,8	63,6	69,4	75,1	80,4	80,4	80,4	-	-	-	-	80,4
20	-	-	-	-	-	-	-	-	41,9	46,2	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	125,7	125,7	125,7	125,7
25	-	-	-	-	-	-	-	-	-	-	63,2	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	196,4
28	-	-	-	-	-	-	-	-	-	-	-	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	246,3
30	-	-	-	-	-	-	-	-	-	-	-	86,7	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	282,7
32	-	-	-	-	-	-	-	-	-	-	-	-	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	321,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	10,8	13,0	15,1	17,3	19,5	20,1	20,1	20,1	20,1	20,1	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	13,5	16,2	18,9	21,6	24,3	27,0	31,1	31,4	31,4	31,4	31,4	31,4	31,4	31,4	-	-	-	-	-	-	-	-	-	-	31,4
12	-	19,5	22,7	25,9	29,2	32,4	37,3	42,1	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	-	-	-	-	-	-	-	-	45,2
14	-	-	26,5	30,3	34,0	37,8	43,5	49,2	54,8	60,5	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	-	-	-	-	-	-	61,6
16	-	-	-	32,2	36,2	40,2	46,2	52,3	58,3	64,3	70,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	-	-	-	-	80,4
20	-	-	-	-	-	46,5	53,5	60,4	67,4	74,4	81,4	93,0	104,6	116,2	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7
25	-	-	-	-	-	-	-	61,3	68,3	75,4	82,5	94,2	106,0	117,8	129,6	141,4	153,2	164,9	176,7	188,5	196,4	196,4	196,4	196,4	196,4
28	-	-	-	-	-	-	-	-	76,5	84,4	92,4	105,6	118,8	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	237,5	246,3	246,3	246,3
30	-	-	-	-	-	-	-	-	-	-	89,1	101,8	114,5	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	282,7
32	-	-	-	-	-	-	-	-	-	-	-	108,6	122,1	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	321,7

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	18,8	20,1	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	14,5	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,9	30,7	31,4	31,4	31,4	-	-	-	-	-	-	-	-	-	-	31,4
12	-	-	20,8	22,5	24,3	26,0	28,2	30,3	32,5	34,7	36,9	39,0	41,2	43,4	45,2	45,2	-	-	-	-	-	-	-	-	45,2
14	-	-	-	-	28,3	30,3	32,9	35,4	37,9	40,5	43,0	45,5	48,1	50,6	55,6	60,7	61,6	61,6	-	-	-	-	-	-	61,6
16	-	-	-	-	-	-	37,6	40,5	43,4	46,2	49,1	52,0	54,9	57,8	63,6	69,4	75,1	80,4	80,4	80,4	-	-	-	-	80,4
20	-	-	-	-	-	-	-	-	-	57,8	61,4	65,0	68,6	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	125,7	125,7	125,7	125,7
25	-	-	-	-	-	-	-	-	-	-	-	-	-	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	196,4
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	246,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	282,7
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	321,7

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	20,1	20,1	20,1	20,1	20,1	20,1	20,1	20,1	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	27,0	29,7	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	-	-	-	-	-	-	-	-	-	-	31,4
12	32,4	35,7	38,9	42,1	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	-	-	-	-	-	-	-	-	45,2
14	-	41,6	45,4	49,2	53,0	56,7	61,5	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	-	-	-	-	-	-	61,6
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	75,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	-	-	-	-	80,4
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	98,8	104,6	110,4	116,2	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7
25	-	-	-	-	-	-	-	-	88,4	94,2	100,1	106,0	111,9	117,8	129,6	141,4	153,2	164,9	176,7	188,5	196,4	196,4	196,4	196,4	196,4
28	-	-	-	-	-	-	-	-	-	-	112,2	118,8	125,3	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	237,5	246,3	246,3	246,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	282,7
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	321,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	-	6,9	8,1	9,2	10,4	11,6	13,3	15,0	16,8	18,5	20,2	21,9	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	-	-	-	11,6	13,0	14,5	16,6	18,8	21,0	23,1	25,3	28,9	32,5	34,1	-	-	-	-	-	-	-	-	-	-	34,1
12	-	-	-	-	15,6	17,3	19,9	22,5	25,1	27,7	30,3	34,7	39,0	43,4	47,7	49,2	-	-	-	-	-	-	-	-	49,2
14	-	-	-	-	-	20,2	23,3	26,3	29,3	32,4	35,4	40,5	45,5	50,6	55,6	60,7	65,8	66,9	-	-	-	-	-	-	66,9
16	-	-	-	-	-	-	26,6	30,1	33,5	37,0	40,5	46,2	52,0	57,8	63,6	69,4	75,1	80,9	86,7	87,4	-	-	-	-	87,4
20	-	-	-	-	-	-	-	-	41,9	46,2	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	130,1	136,6	136,6	136,6
25	-	-	-	-	-	-	-	-	-	-	-	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	213,4
28	-	-	-	-	-	-	-	-	-	-	-	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	267,7
30	-	-	-	-	-	-	-	-	-	-	-	-	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	307,3
32	-	-	-	-	-	-	-	-	-	-	-	-	-	115,6	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	349,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	10,8	13,0	15,1	17,3	19,5	21,6	21,9	21,9	21,9	21,9	21,9	21,9	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	13,5	16,2	18,9	21,6	24,3	27,0	31,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	-	-	-	-	-	-	-	-	-	-	34,1
12	-	19,5	22,7	25,9	29,2	32,4	37,3	42,1	47,0	49,2	49,2	49,2	49,2	49,2	49,2	49,2	-	-	-	-	-	-	-	-	49,2
14	-	-	26,5	30,3	34,0	37,8	43,5	49,2	54,8	60,5	66,2	66,9	66,9	66,9	66,9	66,9	66,9	66,9	-	-	-	-	-	-	66,9
16	-	-	-	32,2	36,2	40,2	46,2	52,3	58,3	64,3	70,4	80,4	87,4	87,4	87,4	87,4	87,4	87,4	87,4	87,4	-	-	-	-	87,4
20	-	-	-	-	-	46,5	53,5	60,4	67,4	74,4	81,4	93,0	104,6	116,2	127,9	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6
25	-	-	-	-	-	-	-	-	68,3	75,4	82,5	94,2	106,0	117,8	129,6	141,4	153,2	164,9	176,7	188,5	200,3	212,1	213,4	213,4	213,4
28	-	-	-	-	-	-	-	-	-	84,4	92,4	105,6	118,8	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	237,5	250,7	263,9	267,7
30	-	-	-	-	-	-	-	-	-	-	-	101,8	114,5	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	307,3
32	-	-	-	-	-	-	-	-	-	-	-	108,6	122,1	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	349,7

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	18,8	20,2	21,7	21,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	-	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,9	30,7	32,5	34,1	34,1	-	-	-	-	-	-	-	-	-	-	34,1
12	-	-	-	22,5	24,3	26,0	28,2	30,3	32,5	34,7	36,9	39,0	41,2	43,4	47,7	49,2	-	-	-	-	-	-	-	-	49,2
14	-	-	-	-	-	30,3	32,9	35,4	37,9	40,5	43,0	45,5	48,1	50,6	55,6	60,7	65,8	66,9	-	-	-	-	-	-	66,9
16	-	-	-	-	-	-	-	40,5	43,4	46,2	49,1	52,0	54,9	57,8	63,6	69,4	75,1	80,9	86,7	87,4	-	-	-	-	87,4
20	-	-	-	-	-	-	-	-	-	-	-	65,0	68,6	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	130,1	136,6	136,6	136,6
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	213,4
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	267,7
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	307,3
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161,9	173,4	185,0	196,5	208,1	219,7	231,2	349,7

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	21,6	21,9	21,9	21,9	21,9	21,9	21,9	21,9	21,9	21,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	27,0	29,7	32,4	34,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	-	-	-	-	-	-	-	-	-	-	34,1
12	32,4	35,7	38,9	42,1	45,4	48,6	49,2	49,2	49,2	49,2	49,2	49,2	49,2	49,2	49,2	49,2	-	-	-	-	-	-	-	-	49,2
14	-	41,6	45,4	49,2	53,0	56,7	61,5	66,2	66,9	66,9	66,9	66,9	66,9	66,9	66,9	66,9	66,9	66,9	-	-	-	-	-	-	66,9
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	75,4	80,4	85,5	87,4	87,4	87,4	87,4	87,4	87,4	87,4	87,4	87,4	-	-	-	-	87,4
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	98,8	104,6	110,4	116,2	127,9	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6
25	-	-	-	-	-	-	-	-	-	-	100,1	106,0	111,9	117,8	129,6	141,4	153,2	164,9	176,7	188,5	200,3	212,1	213,4	213,4	213,4
28	-	-	-	-	-	-	-	-	-	-	-	-	125,3	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	237,5	250,7	263,9	267,7
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	307,3
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	349,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	-	-	8,1	9,2	10,4	11,6	13,3	15,0	16,8	18,5	20,2	23,1	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	-	-	-	-	13,0	14,5	16,6	18,8	21,0	23,1	25,3	28,9	32,5	36,1	-	-	-	-	-	-	-	-	-	-	41,0
12	-	-	-	-	-	-	19,9	22,5	25,1	27,7	30,3	34,7	39,0	43,4	47,7	52,0	-	-	-	-	-	-	-	-	59,0
14	-	-	-	-	-	-	-	26,3	29,3	32,4	35,4	40,5	45,5	50,6	55,6	60,7	65,8	70,8	-	-	-	-	-	-	80,3
16	-	-	-	-	-	-	-	-	33,5	37,0	40,5	46,2	52,0	57,8	63,6	69,4	75,1	80,9	86,7	92,5	-	-	-	-	104,9
20	-	-	-	-	-	-	-	-	-	-	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	130,1	137,3	144,5	163,9
25	-	-	-	-	-	-	-	-	-	-	-	-	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	256,1
28	-	-	-	-	-	-	-	-	-	-	-	-	-	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	321,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	368,8
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	419,6

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	10,8	13,0	15,1	17,3	19,5	21,6	24,9	26,2	26,2	26,2	26,2	26,2	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	13,5	16,2	18,9	21,6	24,3	27,0	31,1	35,1	39,2	41,0	41,0	41,0	41,0	41,0	-	-	-	-	-	-	-	-	-	-	41,0
12	-	19,5	22,7	25,9	29,2	32,4	37,3	42,1	47,0	51,9	56,7	59,0	59,0	59,0	59,0	59,0	-	-	-	-	-	-	-	-	59,0
14	-	-	26,5	30,3	34,0	37,8	43,5	49,2	54,8	60,5	66,2	75,6	80,3	80,3	80,3	80,3	80,3	80,3	-	-	-	-	-	-	80,3
16	-	-	-	32,2	36,2	40,2	46,2	52,3	58,3	64,3	70,4	80,4	90,5	100,5	104,9	104,9	104,9	104,9	104,9	104,9	-	-	-	-	104,9
20	-	-	-	-	-	-	53,5	60,4	67,4	74,4	81,4	93,0	104,6	116,2	127,9	139,5	151,1	162,7	163,9	163,9	163,9	163,9	163,9	163,9	163,9
25	-	-	-	-	-	-	-	-	-	-	82,5	94,2	106,0	117,8	129,6	141,4	153,2	164,9	176,7	188,5	200,3	212,1	223,8	235,6	256,1
28	-	-	-	-	-	-	-	-	-	-	-	105,6	118,8	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	237,5	250,7	263,9	321,3
30	-	-	-	-	-	-	-	-	-	-	-	-	114,5	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	368,8
32	-	-	-	-	-	-	-	-	-	-	-	-	-	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	419,6

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	-	12,7	13,9	15,0	16,2	17,3	18,8	20,2	21,7	23,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	-	-	-	18,8	20,2	21,7	23,5	25,3	27,1	28,9	30,7	32,5	34,3	36,1	-	-	-	-	-	-	-	-	-	-	41,0
12	-	-	-	-	-	-	28,2	30,3	32,5	34,7	36,9	39,0	41,2	43,4	47,7	52,0	-	-	-	-	-	-	-	-	59,0
14	-	-	-	-	-	-	-	-	37,9	40,5	43,0	45,5	48,1	50,6	55,6	60,7	65,8	70,8	-	-	-	-	-	-	80,3
16	-	-	-	-	-	-	-	-	-	-	49,1	52,0	54,9	57,8	63,6	69,4	75,1	80,9	86,7	92,5	-	-	-	-	104,9
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	79,5	86,7	93,9	101,2	108,4	115,6	122,8	130,1	137,3	144,5	163,9
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	256,1
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	151,7	161,9	172,0	182,1	192,2	202,3	321,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	173,4	184,3	195,1	205,9	216,8	368,8
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	196,5	208,1	219,7	231,2	419,6

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	21,6	23,8	25,9	26,2	26,2	26,2	26,2	26,2	26,2	26,2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	27,0	29,7	32,4	35,1	37,8	40,5	41,0	41,0	41,0	41,0	41,0	41,0	41,0	41,0	-	-	-	-	-	-	-	-	-	-	41,0
12	32,4	35,7	38,9	42,1	45,4	48,6	52,7	56,7	59,0	59,0	59,0	59,0	59,0	59,0	59,0	59,0	-	-	-	-	-	-	-	-	59,0
14	-	41,6	45,4	49,2	53,0	56,7	61,5	66,2	70,9	75,6	80,3	80,3	80,3	80,3	80,3	80,3	80,3	80,3	-	-	-	-	-	-	80,3
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	75,4	80,4	85,5	90,5	95,5	100,5	104,9	104,9	104,9	104,9	104,9	104,9	-	-	-	-	104,9
20	-	-	-	-	-	-	75,6	81,4	87,2	93,0	98,8	104,6	110,4	116,2	127,9	139,5	151,1	162,7	163,9	163,9	163,9	163,9	163,9	163,9	163,9
25	-	-	-	-	-	-	-	-	-	-	-	-	-	117,8	129,6	141,4	153,2	164,9	176,7	188,5	200,3	212,1	223,8	235,6	256,1
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	145,1	158,3	171,5	184,7	197,9	211,1	224,3	237,5	250,7	263,9	321,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	178,1	190,9	203,6	216,3	229,0	241,7	254,5	368,8
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	190,0	203,6	217,1	230,7	244,3	257,9	271,4	419,6

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Codes
		Box	Outer	Pallet	Box	Outer	Pallet	
R-KER-300	300	10	10	840	6.3	6.3	559.2	5906675075167
R-KER-345	345	10	10	840	7.1	7.1	623.3	5906675291086
R-KER-400	400	10	10	560	8.1	8.1	483.8	5906675329444
R-KER-300-W	300	10	10	840	6.3	6.3	559.2	5906675432021
R-KER-380-W	380	10	10	560	8.2	8.2	486.6	5906675222981
R-KER-400-S	400	10	10	560	8.2	8.2	489.2	5906675380452

R-KEM II with Threaded Rods for Concrete

Universal polyester (styrene free) resin - European Approval for 15 substrates

Installation movie

Approvals and Reports

- ETA-12/039

Product overview

Features and benefits

- The most convenient bonded anchor for general purpose use
- Quick, secure and simple installation
- Product with wide spectrum of use in the medium load capacity area
- Ideal for applications where mechanical anchors are not suitable
- Suitable for multiple use. Partly used product can be reused after fitting spare nozzle

Applications

- Consoles
- Staircases
- Gates
- High racking
- Canopies
- Sanitary appliances
- Steel constructions
- Railings
- Handrails
- Ladders
- Cable trays

Base materials

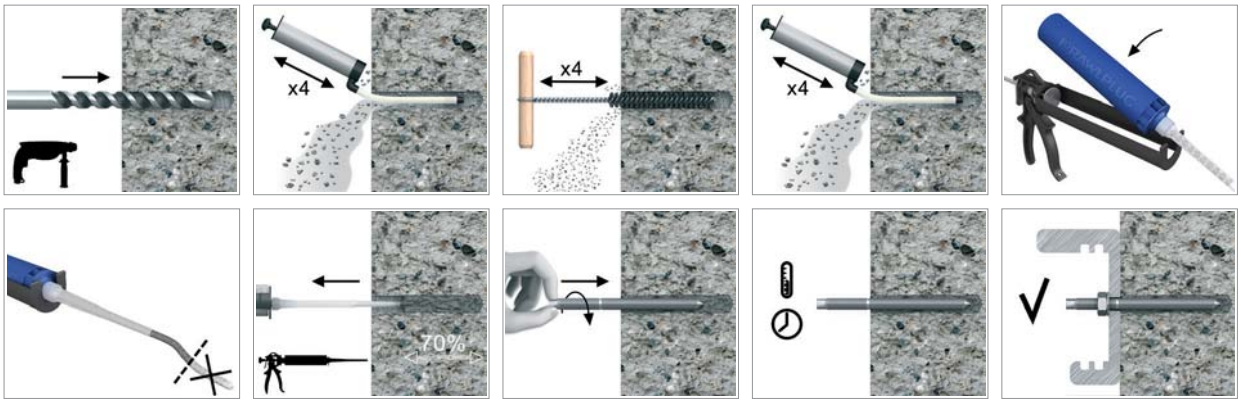
Approved for use in:

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

Also suitable for use in:

- Natural Stone (after site testing)

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud size being used.
2. Solid substartes: Clean the drill hole thoroughly with brush and hand pump at least four times before installation.
3. Attach nozzle and insert cartridge into gun.
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 stud, 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.
7. Attach fixture and tighten the nut to the required torque.

Product information

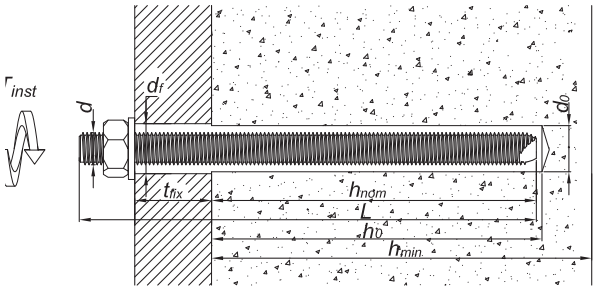
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KEM-II-175	R-KEMII	Styrene Free Polyester Resin	175
R-KEM-II-300			300
R-KEM-II-380			380
R-KEM-II-410			410
R-KEM-II-175-W	R-KEMII-W	Low Temperature (Winter) / Rapid Cure Styrene Free Polyester Resin	175
R-KEM-II-300-W			300
R-KEM-II-175-S	R-KEMII-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	175
R-KEM-II-300-S			300
R-KEM-II-175-SET	R-KEMII-SET	Set with 4 studs and plastic sleeves	175
R-KEM-II-300-SET			300
R-KEM-II-300-STONE	R-KEMII-STONE	Stone colour Styrene Free Polyester Resin	
R-KEM-II-410-STONE			410
R-KEM-II-300-GREY	R-KEMII-GREY	Grey colour Styrene Free Polyester Resin	300
R-KEM-II-410-GREY			410

R-STUDS

Size	Product Code			Anchor		Fixture
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter
				d	L	d_f
				[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9
	R-STUDS-08160	-	R-STUDS-08160-A4	8	160	9
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12
	R-STUDS-10170	-	R-STUDS-10170-A4	10	170	12
	R-STUDS-10190	-	R-STUDS-10190-A4	10	190	12
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14
	R-STUDS-12190	-	R-STUDS-12190-A4	12	190	14
	R-STUDS-12220	-	R-STUDS-12220-A4	12	220	14
	R-STUDS-12260	-	R-STUDS-12260-A4	12	260	14
	R-STUDS-12300	-	R-STUDS-12300-A4	12	300	14
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18
	R-STUDS-16220	-	R-STUDS-16220-A4	16	220	18
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18
	R-STUDS-16300	-	R-STUDS-16300-A4	16	300	18
	R-STUDS-16380	-	R-STUDS-16380-A4	16	380	18
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22
	R-STUDS-20300	-	R-STUDS-20300-A4	20	300	22
	R-STUDS-20350	-	R-STUDS-20350-A4	20	350	22
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4	24	300	26
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32

* Make to order

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Hole diameter in fixture	d_f	[mm]	9	12	14	18	24	28	35
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
Min. substrate thickness	h_{min}	[mm]	h_{nom} + $2d_0 \geq 100$	h_{nom} + $2d_0 \geq 100$	h_{nom} + $2d_0 \geq 100$	h_{nom} + $2d_0 \geq 100$	h_{nom} + $2d_0 \geq 100$	h_{nom} + $2d_0 \geq 100$	h_{nom} + $2d_0 \geq 100$
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. spacing	s_{min}	[mm]	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$
Min. edge distance	c_{min}	[mm]	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min]		
[°C]	[°C]	R-KEMII-S	R-KEMII	R-KEMII-W	R-KEMII-S	R-KEMII	R-KEMII-W
5	-20	-	-	45	-	-	24h
5	-15	-	-	30	-	-	18h
5	-10	-	-	20	-	-	8h
5	-5	3h	70	11	24h	8h	5h
5	0	2h	45	7	18h	4h	2h
5	5	1h	25	5	12h	2h	1h
10	10	45	15	2	8h	90	45
15	15	25	9	1,5	6h	60	30
20	20	15	5	1	4h	45	15
25	30	7	2	-	1.5h	30	-
25	35	6	-	-	1h	-	-
25	40	5	-	-	45	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
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]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95	185	321	642
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152	297	513	1028
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107	208	360	721

Basic performance data

R-STUDS

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

CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	14.3	20.9	27.1	40.2	60.3	68.6	85.5
Maximum embedment depth	[kN]	18.0	29.0	42.0	76.4	120.6	142.1	186.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	14.3	20.9	27.1	40.2	60.3	68.6	85.5
Maximum embedment depth	[kN]	23.9	35.8	49.2	76.4	120.6	142.1	186.6
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	14.3	20.9	27.1	40.2	60.3	68.6	85.5
Maximum embedment depth	[kN]	23.9	35.8	49.2	76.4	120.6	142.1	186.6
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	9.00	14.0	21.0	39.0	61.0	88.0	140.0
Maximum embedment depth	[kN]	9.00	14.0	21.0	39.0	61.0	88.0	140.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	137.2	171.1
Maximum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	13.0	20.0	29.0	86.0	86.0	124.0	171.1
Maximum embedment depth	[kN]	13.0	20.0	29.0	86.0	86.0	124.0	196.0

Basic performance data (cont.)

R-STUDS

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

DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	6.82	11.6	15.1	22.3	33.5	38.1	47.5
Maximum embedment depth	[kN]	11.4	19.3	27.3	42.5	67.0	79.0	103.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	6.82	11.6	15.1	22.3	33.5	38.1	47.5
Maximum embedment depth	[kN]	11.4	19.9	27.3	42.5	67.0	79.0	103.7
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	6.82	11.6	15.1	22.3	33.5	38.1	47.5
Maximum embedment depth	[kN]	11.4	19.9	27.3	42.5	67.0	79.0	103.7
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	112.0
Maximum embedment depth	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	112.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	91.5	114.0
Maximum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	8.33	12.8	18.6	55.1	55.1	79.5	114.0
Maximum embedment depth	[kN]	8.33	12.8	18.6	55.1	55.1	79.5	125.6
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	4.87	8.29	10.8	16.0	23.9	27.2	33.9
Maximum embedment depth	[kN]	8.12	13.8	19.5	30.3	47.9	56.4	74.1
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	4.87	8.29	10.8	16.0	23.9	27.2	33.9
Maximum embedment depth	[kN]	8.12	14.2	19.5	30.3	47.9	56.4	74.1
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	4.87	8.29	10.8	16.0	23.9	27.2	33.9
Maximum embedment depth	[kN]	8.12	14.2	19.5	30.3	47.9	56.4	74.1
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	5.14	8.00	12.0	22.3	34.9	50.3	80.0
Maximum embedment depth	[kN]	5.14	8.00	12.0	22.3	34.9	50.3	80.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	65.4	81.5
Maximum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	5.95	9.16	13.3	39.4	39.4	56.8	81.5
Maximum embedment depth	[kN]	5.95	9.16	13.3	39.4	39.4	56.8	89.7

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Codes
		Box	Outer	Pallet	Box	Outer	Pallet	
R-KEM-II-175[1)]	175	10	50	600	3.8	18.9	257.2	5906675050249
R-KEM-II-300[1)]	300	10	10	840	5.9	5.9	529.0	5906675050256
R-KEM-II-380[1)]	380	10	10	560	8.2	8.2	486.3	5906675097770
R-KEM-II-410[1)]	410	10	10	560	8.4	8.4	498.7	5906675408163
R-KEM-II-175-W[1)]	175	10	50	600	3.8	19.2	260.6	5906675064659
R-KEM-II-300-W[1)]	300	10	50	600	5.9	29.6	385.1	5906675064666
R-KEM-II-175-S[1)]	175	10	50	600	6.0	30.0	390.0	5906675064635
R-KEM-II-300-S[1)]	300	10	50	600	6.0	30.0	390.0	5906675064642
R-KEM-II-175-SET[1)]	175	5	5	525	3.0	3.0	348.3	5906675057866
R-KEM-II-300-SET[1)]	300	5	5	320	4.9	4.9	345.9	5906675057859
R-KEM-II-300-STONE[1)]	300	10	50	600	6.0	30.0	390.0	5906675038124
R-KEM-II-410-STONE[1)]	410	10	10	560	8.4	8.4	498.7	5906675424958
R-KEM-II-300-GREY[1)]	300	10	50	600	6.0	30.0	390.0	5906675038131
R-KEM-II-410-GREY[1)]	410	10	10	560	8.4	8.4	498.7	5906675424941

1) ETA-12/0394

R-KEM II with Threaded Rods for Masonry

Universal polyester (styrene free) resin - European Approval for 15 substrates

Installation movie

Approvals and Reports

- ETA-12/0528

Product overview

Features and benefits

- The most convenient bonded anchor for general purpose use
- Approved for 15 substrates
- Quick, secure and simple installation
- Product with wide spectrum of use in the medium load capacity area
- Ideal for applications where mechanical anchors are not suitable
- Easy dosage thanks to patented self-opening system and use of manual or pneumatic gun
- Option of using standard manual silicone gun
- Suitable for multiple use. Partly used product can be reused after fitting spare nozzle

Applications

- Gates
- Window elements
- Canopies
- Sanitary appliances
- Railings
- Handrails
- Consoles
- Ladders
- Cable trays

Base materials

Approved for use in:

- Solid Brick
- Solid Sand-lime Brick
- Hollow Sand-lime Brick
- Hollow Brick
- Hollow Lightweight Concrete Block
- Aerated Concrete Block

Installation guide

Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud size being used.

2a. Solid substrates: Clean the drill hole thoroughly with brush and hand pump at least four times before installation.

2b. Hollow substrates: Insert mesh sleeve into the hole.

3. Attach nozzle and insert cartridge into gun.

4. Dispense to waste until even colour is obtained.

5a. Solid Substrates: 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.

5b. Hollow substrate: Insert the mixer nozzle to the bottom of the drill hole and inject resin, slowly withdrawing the nozzle as the hole is filled to the surface.

6. Immediately insert the stud, 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.

7. Attach fixture and tighten the nut to the required torque.

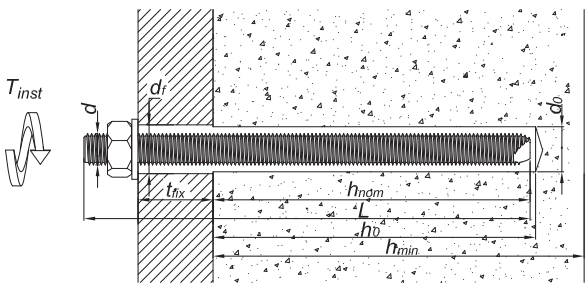
Product information

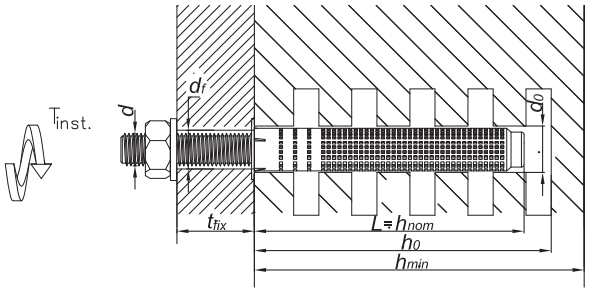
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KEM-II-175	R-KEMII	Styrene Free Polyester Resin	175
R-KEM-II-300			300
R-KEM-II-410			410
R-KEM-II-175-W	R-KEMII-W	Low Temperature (Winter) / Rapid Cure Styrene Free Polyester Resin	175
R-KEM-II-300-W			300
R-KEM-II-175-S	R-KEMII-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	175
R-KEM-II-300-S			300
R-KEM-II-175-SET	R-KEMII-SET	Set with 4 studs and plastic sleeves	175
R-KEM-II-300-SET			300
R-KEM-II-300-STONE	R-KEMII-STONE	Stone colour Styrene Free Polyester Resin	300
R-KEM-II-410-STONE			410
R-KEM-II-300-GREY	R-KEMII-GREY	Grey colour Styrene Free Polyester Resin	300
R-KEM-II-410-GREY			410

R-STUDS

Size	Product Code			Anchor		Fixture							
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness Solid substrates	Max. thickness Hollow substrates		Max. thickness t_{fix} for: R-STUDS		Max. thickness t_{fix} for: R-STUDS_MIX	
				d	L	d_f	t_{fix} Standard	t_{fix} Standard	t_{fix} Maximum	$h_{nom,\ min}$	$h_{nom,\ max}$	$h_{nom,\ min}$	$h_{nom,\ max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	20	50	20	40	-	40	-
	R-STUDS-08160	-	R-STUDS-08160-A4	8	160	9	70	100	70	90	-	90	-
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	33	33	-	58	-	48	-
	R-STUDS-10170	-	R-STUDS-10170-A4	10	170	12	73	73	33	98	-	88	-
	R-STUDS-10190	-	R-STUDS-10190-A4	10	190	12	93	93	53	118	-	108	-
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	50	60	20	85	-	65	-
	R-STUDS-12190	-	R-STUDS-12190-A4	12	190	14	80	90	50	115	-	95	-
	R-STUDS-12220	-	R-STUDS-12220-A4	12	220	14	110	120	80	145	-	125	-
	R-STUDS-12260	-	R-STUDS-12260-A4	12	260	14	150	160	120	185	-	165	-
	R-STUDS-12300	-	R-STUDS-12300-A4	12	300	14	190	200	160	225	45	205	45
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	66	86	-	111	-	71	-
	R-STUDS-16220	-	R-STUDS-16220-A4	16	220	18	96	116	-	141	-	101	-
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	136	156	-	181	-	141	-
	R-STUDS-16300	-	R-STUDS-16300-A4	16	300	18	176	196	-	221	-	181	-
	R-STUDS-16380	-	R-STUDS-16380-A4	16	380	18	256	276	-	301	41	261	41

Installation data





SOLID SUBSTRATES

Size			Mw8	M10	M12	M16	M8	M10	M12	M16
Substrate			Ceramic solid substrates				Aerated concrete			
Thread diameter	d	[mm]	8	10	12	16	8	10	12	16
Hole diameter in substrate	d_0	[mm]	10	12	14	18	10	12	14	18
Installation torque	T_{inst}	[Nm]	3	8	6	10	5	8	10	15
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
Installation depth	$h_{nom,min}$	[mm]	80	85	95	105	80	85	95	105
Min. spacing	s_{min}	[mm]	50	50	50	54	50	50	50	54
Min. edge distance	c_{min}	[mm]	50	50	50	54	50	50	50	54

HOLLOW SUBSTRATES

Size			M8		M10		M12		M16
Plastic mesh sleeve size	dxl		12x50	12x80	16x130	16x85	16x130	16x85	20x85
Thread diameter	d	[mm]	8	8	10	10	12	12	16
Hole diameter in substrate	d_0	[mm]	12	12	16	16	16	16	20
Installation torque	T_{inst}	[Nm]	3	3	4	4	6	6	10
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
Min. spacing	s_{min}	[mm]	100	100	100	100	100	100	120
Min. edge distance	c_{min}	[mm]	100	100	100	100	100	100	120
STANDARD EMBEDMENT DEPTH									
Installation depth	$h_{nom,s}$	[mm]	50	-	-	85	-	85	85
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	-	80	125	-	125	-	-

Installation data

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min]		
[°C]	[°C]	R-KEMII-S	R-KEMII	R-KEMII-W	R-KEMII-S	R-KEMII	R-KEMII-W
5	-20	-	-	45	-	-	24 h
5	-15	-	-	30	-	-	18 h
5	-10	-	-	20	-	-	8 h
5	-5	3 h	70	11	24 h	8 h	5 h
5	0	2 h	45	7	18 h	4 h	2 h
5	5	1 h	25	5	12 h	2 h	1 h
10	10	45	15	2	8 h	1.5 h	45
15	15	25	9	1.5	6 h	1 h	30
20	20	15	5	1	4 h	45	15
25	30	7	2	-	1.5 h	30	-
25	35	6	-	-	1 h	-	-
25	40	5	-	-	45	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16
R-STUDS Metric Threaded Rods - Steel Class 5.8						
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166
Design bending resistance	M	[Nm]	15	30	52	133
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95
R-STUDS Metric Threaded Rods - Steel Class 8.8						
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266
Design bending resistance	M	[Nm]	24	48	84	213
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152
R-STUDS Metric Threaded Rods - A4						
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233
Design bending resistance	M	[Nm]	17	34	59	149
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107

Basic performance data

SOLID SUBSTRATES

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

Size		M8	M10	M12	M16
Substrate		Solid substrates			
CHARACTERISTIC LOAD*					
TENSION LOADS N_{Rk}					
Solid clay brick min 20 MPa (eg Mz20/2.0)	[kN]	6.00	7.00	7.00	7.00
Autoclaved aerated concrete block min 6.0 MPa (AAC7)	[kN]	1.50	2.00	2.50	3.00
Solid silicate brick min 20 MPa (eg KS NF 20/2.0)	[kN]	5.00	5.00	5.00	5.00

Basic performance data (cont.)

SOLID SUBSTRATES

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

Size		M8	M10	M12	M16
SHEAR LOADS VRk					
Solid clay brick min 20 MPa (eg Mz20/2.0)	[kN]	3.50	5.00	7.00	7.00
Autoclaved aerated concrete block min 6.0 MPa (AAC7)	[kN]	1.50	2.00	2.50	2.50
Solid silicate brick min 20 MPa (eg KS NF 20/2.0)	[kN]	3.50	5.00	5.00	5.00
DESIGN LOAD					
TENSION LOAD N_{Rd}					
Solid clay brick min 20 MPa (eg Mz20/2.0)	[kN]	2.40	2.80	2.80	2.80
Autoclaved aerated concrete block min 6.0 MPa (AAC7)	[kN]	0.75	1.00	1.25	1.50
Solid silicate brick min 20 MPa (eg KS NF 20/2.0)	[kN]	2.00	2.00	2.00	2.00
SHEAR LOAD V_{Rd}					
Solid clay brick min 20 MPa (eg Mz20/2.0)	[kN]	1.40	2.00	2.80	2.80
Autoclaved aerated concrete block min 6.0 MPa (AAC7)	[kN]	0.75	1.00	1.25	1.25
Solid silicate brick min 20 MPa (eg KS NF 20/2.0)	[kN]	1.40	2.00	2.00	2.00
RECOMMENDED LOAD**					
TENSION LOAD N_{rec}					
Solid clay brick min 20 MPa (eg Mz20/2.0)	[kN]	1.71	2.00	2.00	2.00
Autoclaved aerated concrete block min 6.0 MPa (AAC7)	[kN]	0.54	0.71	0.89	1.07
Solid silicate brick min 20 MPa (eg KS NF 20/2.0)	[kN]	1.43	1.43	1.43	1.43
SHEAR LOAD V_{rec}					
Solid clay brick min 20 MPa (eg Mz20/2.0)	[kN]	1.00	1.43	2.00	2.00
Autoclaved aerated concrete block min 6.0 MPa (AAC7)	[kN]	0.54	0.71	0.89	0.89
Solid silicate brick min 20 MPa (eg KS NF 20/2.0)	[kN]	1.00	1.43	1.43	1.43

*According to ETAG 029, **Partial safety factor 1.4

Basic performance data

HOLLOW SUBSTRATES

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

Size		M8		M10		M12		M16
Substrate		Hollow substrates						
Plastic mesh sleeve (dxl)	[mm]	12x50	12x80	15x85	15x125	15x85	15x125	20x85
CHARACTERISTIC LOAD								
TENSION AND SHEAR LOAD F_{Rk}								
Silicate hollow block min 12 MPa (eg KS Ratio Block 8 DF)	[kN]	2.50	2.50	2.50	3.50	3.00	3.00	3.00
Perforated ceramic blocks min 12 MPa (eg Proton Hlz 12/0.9 DF)	[kN]	2.00	2.50	2.50	2.50	2.50	2.50	2.50
Perforated ceramic blocks min 15 MPa (eg Wienerberger Porotherm)	[kN]	1.50	2.00	2.00	2.50	2.50	2.50	2.50
Perforated ceramic blocks min 10 MPa (eg Leiter Thermopor)	[kN]	1.50	2.00	2.00	2.50	2.50	2.50	2.50
Perforated ceramic blocks min 15 MPa (eg MEGA MAX)	[kN]	2.00	2.50	2.50	2.50	2.50	2.50	2.50
Perforated ceramic blocks min 6.0 MPa (eg LS Tableau Mono Rect)	[kN]	0.90	0.90	1.50	2.00	2.00	2.00	1.20
Perforated ceramic blocks min 6.0 MPa (eg LS Tableau Rect)	[kN]	0.90	1.20	1.50	1.50	1.50	2.00	1.50
Perforated ceramic blocks min 6.0 MPa (eg LS Monomur)	[kN]	0.90	0.90	1.20	1.50	1.50	1.50	1.50
Perforated ceramic blocks min 6 MPa (eg SM BGV Thermo)	[kN]	0.90	0.90	1.50	1.50	1.50	1.50	1.50
Perforated ceramic blocks min 6.0 MPa (eg SM BGV Thermo Plus)	[kN]	0.90	1.20	0.90	0.90	1.20	1.50	1.20
Lightweight concrete hollow block min 2.0 MPa	[kN]	1.20	1.50	2.50	2.00	2.50	2.50	2.50

Basic performance data (cont.)

HOLLOW SUBSTRATES

Size		M8		M10		M12		M16
DESIGN LOAD								
TENSION AND SHEAR LOADS F_{Rd}								
Silicate hollow block min 12 MPa (eg KS Ratio Block 8 DF)	[kN]	1.00	1.00	1.00	1.40	1.20	1.20	1.20
Perforated ceramic blocks min 12 MPa (eg Proton Hlz 12/0.9 DF)	[kN]	0.88	1.00	1.20	1.40	1.40	1.60	1.60
Perforated ceramic blocks min 15 MPa (eg Wienerberger Porotherm)	[kN]	0.60	0.80	1.00	1.00	1.40	1.40	1.00
Perforated ceramic blocks min 10 MPa (eg Leiter Thermopor)	[kN]	0.60	0.80	0.80	1.00	1.00	1.40	1.20
Perforated ceramic blocks min 15 MPa (eg MEGA MAX)	[kN]	0.80	1.00	1.40	1.40	1.60	1.60	1.60
Perforated ceramic blocks min 6.0 MPa (eg LS Tableau Mono Rect)	[kN]	0.36	0.36	0.80	0.80	0.80	0.80	0.60
Perforated ceramic blocks min 6.0 MPa (eg LS Tableau Rect)	[kN]	0.48	0.48	0.60	0.60	0.80	0.80	0.60
Perforated ceramic blocks min 6.0 MPa (eg LS Monomur)	[kN]	0.36	0.36	0.60	0.60	0.60	0.60	0.60
Perforated ceramic blocks min 6 MPa (eg SM BGV Thermo)	[kN]	0.36	0.36	0.60	0.60	0.60	0.60	0.60
Perforated ceramic blocks min 6.0 MPa (eg SM BGV Thermo Plus)	[kN]	0.48	0.48	0.48	0.48	0.48	0.60	0.48
Lightweight concrete hollow block min 2.0 MPa	[kN]	0.48	0.60	1.00	1.00	1.00	1.40	1.40
RECOMMENDED LOAD								
TENSION AND SHEAR LOADS F_{rec}								
Silicate hollow block min 12 MPa (eg KS Ratio Block 8 DF)	[kN]	0.71	0.71	0.71	1.00	0.86	0.86	0.86
Perforated ceramic blocks min 12 MPa (eg Proton Hlz 12/0.9 DF)	[kN]	0.63	0.71	0.86	1.00	1.00	1.14	1.14
Perforated ceramic blocks min 15 MPa (eg Wienerberger Porotherm)	[kN]	0.43	0.57	0.71	0.71	1.00	1.00	0.71
Perforated ceramic blocks min 10 MPa (eg Leiter Thermopor)	[kN]	0.43	0.57	0.57	0.71	0.71	1.00	0.86
Perforated ceramic blocks min 15 MPa (eg MEGA MAX)	[kN]	0.57	0.71	1.00	1.00	1.14	1.14	1.14
Perforated ceramic blocks min 6.0 MPa (eg LS Tableau Mono Rect)	[kN]	0.26	0.26	0.57	0.57	0.57	0.57	0.43
Perforated ceramic blocks min 6.0 MPa (eg LS Tableau Rect)	[kN]	0.34	0.34	0.43	0.43	0.57	0.57	0.43
Perforated ceramic blocks min 6.0 MPa (eg LS Monomur)	[kN]	0.26	0.26	0.43	0.43	0.43	0.43	0.43
Perforated ceramic blocks min 6 MPa (eg SM BGV Thermo)	[kN]	0.26	0.26	0.43	0.43	0.43	0.43	0.43
Perforated ceramic blocks min 6.0 MPa (eg SM BGV Thermo Plus)	[kN]	0.34	0.34	0.34	0.34	0.34	0.43	0.34
Lightweight concrete hollow block min 2.0 MPa	[kN]	0.34	0.43	0.71	0.71	0.71	1.00	1.00

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Codes
		Box	Outer	Pallet	Box	Outer	Pallet	
R-KEM-II-175	175	10	50	600	3.8	18.9	257.2	5906675050249
R-KEM-II-300	300	10	10	840	5.9	5.9	529.0	5906675050256
R-KEM-II-410	410	10	10	560	8.4	8.4	498.7	5906675408163
R-KEM-II-175-W	175	10	50	600	3.8	19.2	260.6	5906675064659
R-KEM-II-300-W	300	10	50	600	5.9	29.6	385.1	5906675064666
R-KEM-II-175-S	175	10	50	600	6.0	30.0	390.0	5906675064635
R-KEM-II-300-S	300	10	50	600	6.0	30.0	390.0	5906675064642
R-KEM-II-175-SET	175	5	5	525	3.0	3.0	348.3	5906675057866
R-KEM-II-300-SET	300	5	5	320	4.9	4.9	345.9	5906675057859
R-KEM-II-300-STONE	300	10	50	600	6.0	30.0	390.0	5906675038124
R-KEM-II-410-STONE	410	10	10	560	8.4	8.4	498.7	5906675424958
R-KEM-II-300-GREY	300	10	50	600	6.0	30.0	390.0	5906675038131
R-KEM-II-410-GREY	410	10	10	560	8.4	8.4	498.7	5906675424941

R-KF2 with Threaded Rods

Economy polyester resin approved for use in non-cracked concrete

Approvals and Reports

- ETA-11/0141

ETA CE

Product overview

Features and benefits

- Economical fixings resin for medium duty load applications
- Can be used in damp conditions and underwater applications
- Wide range of steel studs with different lengths and diameters
- Small edge and spacing distances
- Suitable for repetitive use. Partly used product can be reused by fitting a new mixing nozzle

Applications

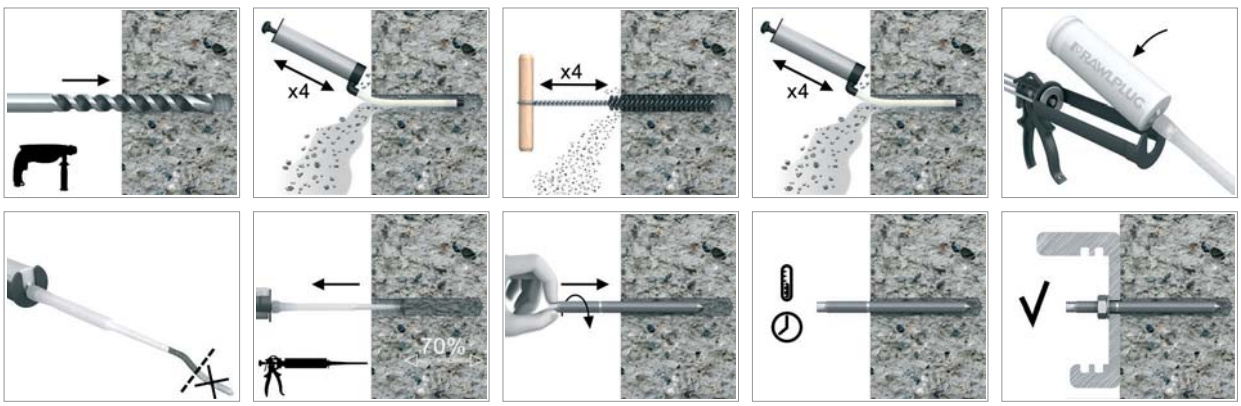
- Guard rails
- Handrails
- Canopies
- Masonry support
- Balustrading
- Cable trays
- Curtain walling
- Fencing & gates manufacturing and installation

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud size being used.
2. Clean the drill hole thoroughly with brush and hand pump at least four times before installation.
3. Insert cartridge 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 stud, 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.
7. Attach fixture and tighten the nut to the required torque.

Product information

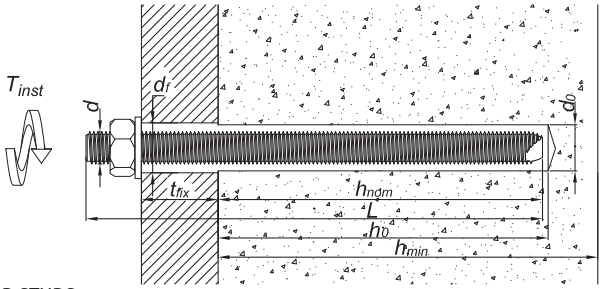
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KF2-300	R-KF2	Polyester Resin	300
R-KF2-345			345
R-KF2-380			380
R-KF2-400			400

R-STUDS

Size	Product Code			Anchor		Fixture		
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness	
				d	L	d_f	t_{fix} for $h_{nom,min}$	t_{fix} for $h_{nom,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	40	-
	R-STUDS-08160	-	R-STUDS-08160-A4*	8	160	9	90	50
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	48	-
	R-STUDS-10170	-	R-STUDS-10170-A4*	10	170	12	88	38
	R-STUDS-10190	-	R-STUDS-10190-A4*	10	190	12	108	58
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	65	-
	R-STUDS-12190	-	R-STUDS-12190-A4*	12	190	14	95	30
	R-STUDS-12220	-	R-STUDS-12220-A4*	12	220	14	125	60
	R-STUDS-12260	-	R-STUDS-12260-A4*	12	260	14	165	100
	R-STUDS-12300	-	R-STUDS-12300-A4*	12	300	14	205	140
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	71	-
	R-STUDS-16220	R-STUDS-16220-88	R-STUDS-16220-A4*	16	220	18	101	11
	R-STUDS-16260	-	R-STUDS-16260-A4*	16	260	18	141	51
	R-STUDS-16300	-	R-STUDS-16300-A4*	16	300	18	181	91
	R-STUDS-16380	-	R-STUDS-16380-A4*	16	380	18	261	171
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	117	-
	R-STUDS-20300	R-STUDS-20300-88	R-STUDS-20300-A4*	20	300	22	157	37
	R-STUDS-20350	-	R-STUDS-20350-A4*	20	350	22	207	87
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4*	24	300	26	132	-
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	181	-

* Make to order

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{nom} + 5						
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360
Min. substrate thickness	h_{min}	[mm]	h_{nom} + 30 ≥ 100				h_{nom} + 2*d_0		
Min. spacing	s_{min}	[mm]	0.5 * h_{nom} ≥ 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{nom} ≥ 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	60	360
5	0	40	180
5	5	20	120
10	10	12	80
15	15	8	60
20	20	5	45
25	30	2	20

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	520	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	20	39	68	173	338	583	1166
Design bending resistance	M	[Nm]	11	22	39	99	193	333	666
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1793
Design bending resistance	M	[Nm]	17	34	60	152	297	513	1025

Mechanical properties (cont.)

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	785	1569
Design bending resistance	M	[Nm]	12	24	42	107	208	360	719

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	14.3	22	28.7	45.2	64.1	73.9	77.8
Maximum embedment depth	[kN]	18	29	42	78	122	153.1	169.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	14.3	22	28.7	45.2	64.1	73.9	77.8
Maximum embedment depth	[kN]	23.9	37.7	51.9	86	128.2	153.1	169.6
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	14.3	22	28.7	45.2	64.1	73.9	77.8
Maximum embedment depth	[kN]	23.9	37.7	51.9	86	128.2	153.1	169.6
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	9.00	14.0	21.0	39.0	61.0	88.0	140.0
Maximum embedment depth	[kN]	9.00	14.0	21.0	39.0	61.0	88.0	140.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	155.5
Maximum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	155.5
Maximum embedment depth	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	7.94	12.2	15.9	25.1	35.6	35.2	37.1
Maximum embedment depth	[kN]	12.0	19.3	28.0	47.8	71.2	72.9	80.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	7.94	12.2	15.9	25.1	35.6	35.2	37.1
Maximum embedment depth	[kN]	13.3	20.9	28.8	47.8	71.2	72.9	80.8
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	7.94	12.2	15.9	25.1	35.6	35.2	37.1
Maximum embedment depth	[kN]	13.3	20.9	28.8	47.8	71.2	72.9	80.8
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	103.7
Maximum embedment depth	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	112.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	103.7
Maximum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	103.7
Maximum embedment depth	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6

Basic performance data (cont.)

R-STUDS

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

RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	5.68	8.73	11.4	18.0	25.4	25.1	26.5
Maximum embedment depth	[kN]	8.57	13.8	20.0	34.1	50.9	52.1	57.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	5.67	8.73	11.4	17.9	25.4	25.1	26.5
Maximum embedment depth	[kN]	8.57	13.8	20.0	34.1	50.9	52.1	57.7
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	5.67	8.73	11.4	17.9	25.4	25.1	26.5
Maximum embedment depth	[kN]	8.57	13.8	20.0	34.1	50.9	52.1	57.7
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	5.14	8.00	12.0	22.3	34.9	50.3	74.1
Maximum embedment depth	[kN]	5.14	8.00	12.0	22.3	34.9	50.3	80.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	74.1
Maximum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	74.1
Maximum embedment depth	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Codes
		Box	Outer	Pallet	Box	Outer	Pallet	
R-KF2-300	300	10	10	840	5.9	5.9	529.0	5906675431017
R-KF2-345	345	10	10	840	7.0	7.0	618.0	5906675343396
R-KF2-380	380	10	10	560	8.2	8.2	486.1	5010445602009
R-KF2-400	400	10	10	560	8.2	8.2	489.2	5906675392080

CFS+
CARTRIDGE FREE SYSTEM

- RV200
  - with Threaded Rods
  - with Sockets
  - with Rebar as an Anchor
  - with Post-Installed Rebar
- RM50
  - with Threaded Rods for Concrete
  - with Threaded Rods for Masonry
- RP30
  - with Threaded Rods

RV200 with Threaded Rods (CFS+)

High performance vinylester resin approved for use in cracked and non-cracked concrete - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-10/0055

Installation movie

Product overview

Features and benefits

- Approved for use with threaded rods for use in cracked and non-cracked concrete (ETAG001 Option 1)
- Suitable for use in low temperatures (down to -20°C for winter option) enables use throughout the year
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Anchor does not generate tensions in the substrate which enables RV200 to be specified where closer edge and spacing distances are required
- Unique soft foil pack for less waste
- Effortless extrusion due to the patented self-opening system with manual or battery dispenser guns
- Very high load capacity

Applications

- Curtain walling
- Balustrading
- Handrails
- Canopies
- Cable trays
- Formwork support systems
- Heavy machinery
- Lighting columns
- Public seating
- Large panel reinforcing system -Copy Eco

Base materials

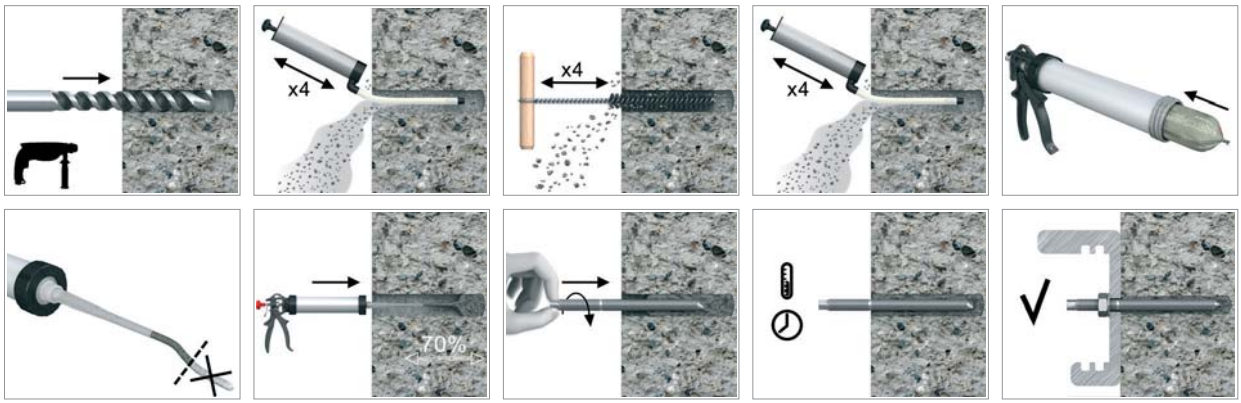
Approved for use in:

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

Also suitable for use in:

- High-Density Natural Stone (after site testing)
- Natural Stone
- Solid Brick
- Solid Concrete Block
- Solid Sand-lime Brick
- Reinforced concrete

Installation guide



Installation guide (cont.)

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 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.
7. Attach fixture and tighten the nut to the required torque.

Product information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-CFS+RV200-4	RV200	Styrene Free Vinylester Resin	300
R-CFS+RV200W-4	RV200-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-CFS+RV200S-4	RV200-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	
R-CFS+RV200-600-8	RV200	Styrene Free Vinylester Resin	600
R-CFS+RV200TW-6008	RV200TW	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	

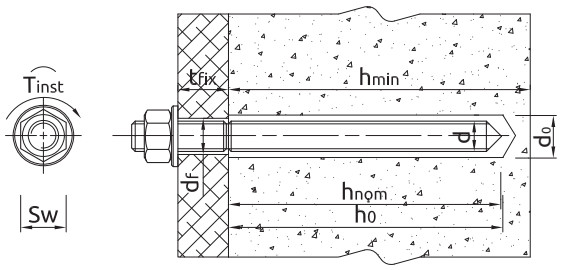
R-STUDS

Size	Product Code			Anchor		Fixture		
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness	
				d	L	d_f	t_{fix} for $h_{nom,min}$	t_{fix} for $h_{nom,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	40	-
	R-STUDS-08160	-	R-STUDS-08160-A4*	8	160	9	90	50
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	48	-
	R-STUDS-10170	-	R-STUDS-10170-A4*	10	170	12	88	38
	R-STUDS-10190	-	R-STUDS-10190-A4*	10	190	12	108	58
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	65	-
	R-STUDS-12190	-	R-STUDS-12190-A4*	12	190	14	95	30
	R-STUDS-12220	-	R-STUDS-12220-A4*	12	220	14	125	60
	R-STUDS-12260	-	R-STUDS-12260-A4*	12	260	14	165	100
	R-STUDS-12300	-	R-STUDS-12300-A4*	12	300	14	205	140
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	71	-
	R-STUDS-16220	R-STUDS-16220-88	R-STUDS-16220-A4*	16	220	18	101	11
	R-STUDS-16260	-	R-STUDS-16260-A4*	16	260	18	141	51
	R-STUDS-16300	-	R-STUDS-16300-A4*	16	300	18	181	91
	R-STUDS-16380	-	R-STUDS-16380-A4*	16	380	18	261	171
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	117	-
	R-STUDS-20300	R-STUDS-20300-88	R-STUDS-20300-A4*	20	300	22	157	37
	R-STUDS-20350	-	R-STUDS-20350-A4*	20	350	22	207	87
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4*	24	300	26	132	-
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	181	-

* Make to order

Installation data

R-STUDS



Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{nom} + 5						
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360
Min. substrate thickness	h_{min}	[mm]	h_{nom} + 30 ≥ 100				h_{nom} + 2*d_0		
Min. spacing	s_{min}	[mm]	0.5 * h_{nom} ≥ 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{nom} ≥ 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min.]			Curing time* [min.]		
°C	°C	RV200-S	RV200	RV200-W	RV200-S	RV200	RV200-W
5	-20	-	-	100	-	-	24 h
5	-15	-	-	60	-	-	16 h
5	-10	-	-	30	-	-	8 h
5	-5	65	60	16	24 h	6 h	4 h
5	0	50	40	12	16 h	3 h	2 h
5	5	35	20	8	12 h	2 h	1 h
10	10	20	12	5	8 h	80	45
15	15	12	8	3	6 h	60	30
20	20	9	5	2	4 h	45	10
25	25	7	3	-	3 h	30	-
25	30	6	2	-	2 h	20	-
25	40	4	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
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]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95	185	321	642

Mechanical properties (cont.)

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152	297	513	1028
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107	208	360	721

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M12	M16	M20	M24
Substrate		Non-cracked concrete							Cracked concrete			
CHARACTERISTIC LOAD												
TENSION LOAD N_{Rk}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	18.0	28.6	36.1	50.5	66.4	83.7	107.0	19.6	22.6	30.2	42.2
Maximum embedment depth	[kN]	18.0	41.0	42.0	78.0	122.0	176.0	237.5	35.5	43.0	60.3	87.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	19.6	28.6	36.1	50.5	66.4	83.7	107.0	19.6	22.6	30.2	42.2
Maximum embedment depth	[kN]	29.0	46.0	67.0	105.1	143.3	196.8	237.5	35.5	43.0	60.3	87.5
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	19.6	28.6	36.1	50.5	66.4	83.7	107.0	19.6	22.6	30.2	42.2
Maximum embedment depth	[kN]	26.0	41.0	59.0	105.1	143.3	196.8	237.5	35.5	43.0	60.3	87.5
SHEAR LOAD V_{Rk}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	9.00	20.0	21.0	39.0	61.0	88.0	140.0	21.0	39.0	60.3	84.5
Maximum embedment depth	[kN]	9.00	20.0	21.0	39.0	61.0	88.0	140.0	21.0	39.0	61.0	88.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	214.1	34.0	45.2	60.3	84.5
Maximum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0	34.0	63.0	98.0	141.0
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0	29.0	45.2	60.3	84.5
Maximum embedment depth	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0	29.0	55.0	86.0	124.0
DESIGN LOAD												
TENSION LOAD N_{Rd}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	10.9	15.9	20.1	28.1	36.9	39.8	51.0	10.9	12.6	16.8	20.1
Maximum embedment depth	[kN]	12.0	21.9	28.0	52.0	79.6	93.7	113.1	19.7	23.9	33.5	41.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	10.9	15.9	20.1	28.1	36.9	39.8	51.0	10.9	12.6	16.8	20.1
Maximum embedment depth	[kN]	18.2	27.2	39.5	58.4	79.6	93.7	113.1	19.7	23.9	33.5	41.7
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	10.9	15.9	20.1	28.1	36.9	39.8	51.0	10.9	12.6	16.8	20.1
Maximum embedment depth	[kN]	18.2	21.9	31.6	58.4	79.6	93.7	113.1	19.7	23.9	33.5	41.7

Basic performance data (cont.)

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M12	M16	M20	M24
SHEAR LOAD V_{Rd}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	7.20	12.8	16.8	31.2	48.8	70.4	112.0	16.8	30.2	40.2	56.3
Maximum embedment depth	[kN]	7.20	12.8	16.8	31.2	48.8	70.4	112.0	16.8	31.2	48.8	70.4
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	111.5	142.7	26.1	30.2	40.2	56.3
Maximum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2	27.2	50.4	78.4	112.8
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6	18.6	30.2	40.2	56.3
Maximum embedment depth	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6	18.6	35.3	55.1	79.5
RECOMMENDED LOAD												
TENSION LOAD N_{rec}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	7.78	11.3	14.3	20.0	26.3	28.5	36.4	7.78	8.98	12.0	14.4
Maximum embedment depth	[kN]	8.57	15.7	20.0	37.1	56.9	66.9	80.8	14.1	17.1	23.9	29.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	7.78	11.3	14.3	20.0	26.3	28.5	36.4	7.78	8.98	12.0	14.4
Maximum embedment depth	[kN]	8.57	19.5	28.2	41.7	56.9	66.9	80.8	14.1	17.1	23.9	29.8
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	7.78	11.3	14.3	20.0	26.3	28.5	36.4	7.78	8.98	12.0	14.4
Maximum embedment depth	[kN]	9.93	15.7	22.5	41.7	56.9	66.9	80.8	14.1	17.1	23.9	29.8
SHEAR LOAD V_{rec}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	5.14	9.16	12.0	22.3	34.9	50.3	80.0	12.0	21.5	28.7	40.2
Maximum embedment depth	[kN]	5.14	9.16	12.0	22.3	34.9	50.3	80.0	12.0	22.3	34.9	50.3
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	79.7	101.9	18.7	21.5	28.7	40.2
Maximum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0	19.4	36.0	56.0	80.6
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7	13.3	21.5	28.7	40.2
Maximum embedment depth	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7	13.28	25.2	39.4	56.8

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Codes
		Box	Outer	Pallet	Box	Outer	Pallet	
R-CFS+RV200-4	300	1	8	96	2.4	19.3	261.3	5906675205830
R-CFS+RV200W-4	300	1	8	96	2.4	19.5	264.2	5906675375762
R-CFS+RV200S-4	300	1	8	96	2.4	-	-	5906675201375
R-CFS+RV200-600-8	600	1	1	36	10.0	10.0	390.0	5906675119045
R-CFS+RV200TW-6008	600	1	1	36	10.0	10.0	390.0	5906675328270

RV200 with Sockets (CFS+)

High performance vinylester resin approved for use with internally threaded sockets - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-13/0805

Product overview

Features and benefits

- Allows removal of bolt to leave a re-usable socket in place
- Approved 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 and wet substrates as well as holes and substrates covered with water
- Anchor does not generate tensions in the substrate which enables RV200 to be specified where closer edge and spacing distances are required
- Unique soft foil pack for less waste
- Effortless extrusion due to patented self-opening system with manual or battery dispenser guns

Applications

- Curtain walling
- Balustrading
- Handrails
- Canopies
- Cable trays
- Formwork support systems
- Heavy machinery
- Lighting columns
- Public seating

Base materials

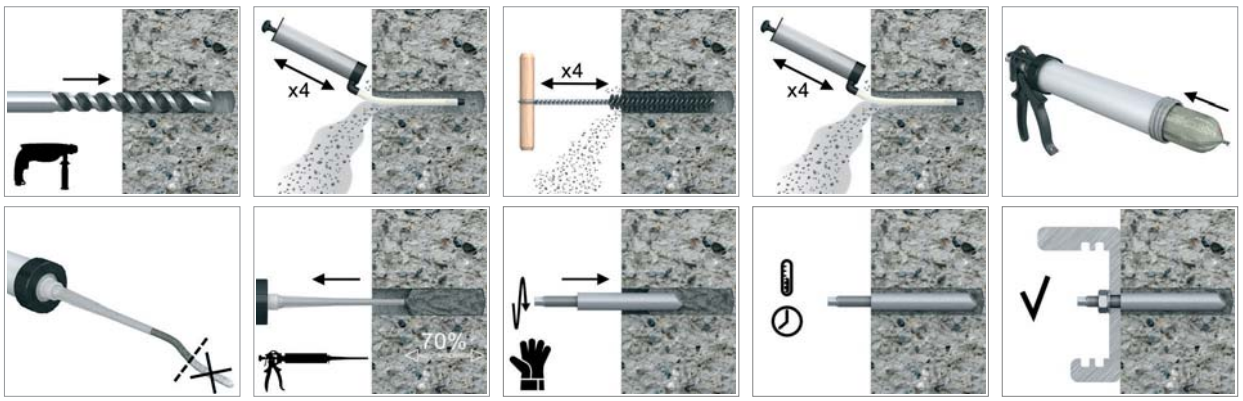
Approved for use in:

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

Also suitable for use in:

- Natural Stone
- Solid Concrete Block
- Solid Brick

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for socket 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 stud, 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.

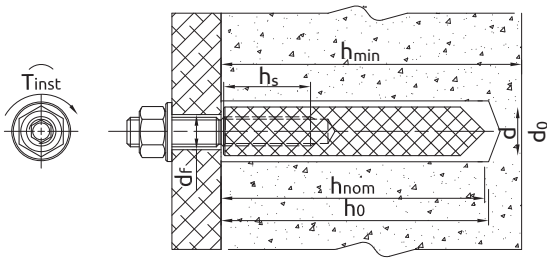
Product information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-CFS+RV200-4	RV200	Styrene Free Vinylester Resin	300
R-CFS+RV200W-4	RV200-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-CFS+RV200S-4	RV200-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	
R-CFS+RV200-600-8	RV200	Styrene Free Vinylester Resin	600
R-CFS+RV200TW-6008	RV200TW	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	

SOCKETS

Size	Product Code		Anchor			Fixture
	Steel class 5.8	Steel grade A4	Socket diameter	Length	Internal thread length	Hole diameter
			d	L	l_g	d_f
			[mm]	[mm]	[mm]	[mm]
M6	R-ITS-Z-06075	R-ITS-A4-06075	10	75	24	7
M8	R-ITS-Z-08075	R-ITS-A4-08075	12	75	25	9
	R-ITS-Z-08090	R-ITS-A4-08090	12	90	25	9
M10	R-ITS-Z-10075	R-ITS-A4-10075	16	75	30	12
	R-ITS-Z-10100	R-ITS-A4-10100	16	100	30	12
M12	R-ITS-Z-12100	R-ITS-A4-12100	16	100	35	14
M16	R-ITS-Z-16125	R-ITS-A4-16125	24	125	50	18

Installation data



SOCKETS

Size			M6	M8		M10		M12	M16
Thread diameter	d	[mm]	6	8	8	10	10	12	16
Hole diameter in substrate	d_0	[mm]	12	14	14	20	20	20	28
Hole diameter in fixture	d_f	[mm]	7	9	9	12	12	14	18
Installation torque	T_{inst}	[Nm]	3	5	5	10	10	20	40
Thread engagement length; min-max	h_s	[mm]	6-24	8-25	8-25	10-30	10-30	12-35	16-50
Min. hole depth in substrate	h_0	[mm]	h_{nom} + 5						

Installation data (cont.)

SOCKETS

Size			M6	M8		M10		M12	M16
Effective Installation depth	h_{nom}	[mm]	75	75	90	75	100	100	125
Min. substrate thickness	h_{min}	[mm]	105	105	120	115	140	140	181
Min. spacing	s_{min}	[mm]	40	40	45	40	50	50	63
Min. edge distance	c_{min}	[mm]	40	40	45	40	50	50	63

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min]		
[°C]	[°C]	RV200-S	RV200	RV200-W	RV200-S	RV200	RV200-W
5	-20	-	-	100	-	-	24h
5	-15	-	-	60	-	-	16h
5	-10	-	-	30	-	-	8h
5	-5	65	60	16	24h	6h	4h
5	0	50	40	12	16h	3h	2h
5	5	35	20	8	12h	2h	1h
10	10	20	12	5	8h	80	45
15	15	12	8	3	6h	60	30
20	20	9	5	2	4h	45	10
25	25	7	3	-	3h	30	-
25	30	6	2	-	2h	20	-
25	40	5	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

SOCKETS

Size			M6	M8	M10	M12	M16
R-ITS-A4 INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.21	50.27	98.17	169.65	402.12
R-ITS-Z INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.21	50.27	98.17	169.65	402.12
R-STUDS METRIC THREADED RODS - steel class 5.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	8	19	37	65	166
Design bending resistance	M	[Nm]	6	15	30	52	133
Allowable bending resistance	M_{rec}	[Nm]	5	11	21	37	95
R-STUDS METRIC THREADED RODS - steel class 8.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	12	30	60	105	266
Design bending resistance	M	[Nm]	10	24	48	84	213
Allowable bending resistance	M_{rec}	[Nm]	7	17	34	60	152
R-STUDS METRIC THREADED RODS - A4							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	11	26	52	92	233
Design bending resistance	M	[Nm]	7	17	34	59	149
Allowable bending resistance	M_{rec}	[Nm]	5	12	24	42	107

Basic performance data

SOCKETS

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

Size		M6	M8		M10		M12	M16
Substrate		Non-cracked concrete						
Embedment depth h_{nom}	[mm]	75	75	90	75	100	100	125
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	10.00	18.0	18.0	29.0	29.0	42.0	66.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	16.0	25.4	29.0	32.8	46.0	42.7	66.0
R-STUDS METRIC THREADED RODS - A4	[kN]	14.0	25.4	26.0	32.8	41.0	42.7	66.0
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.00	9.00	9.00	14.0	14.0	21.0	39.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.00	15.0	15.0	23.0	23.0	34.0	63.0
R-STUDS METRIC THREADED RODS - A4	[kN]	7.00	13.0	13.0	20.0	20.0	29.0	55.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	6.70	12.0	12.0	18.2	19.3	23.7	36.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	9.82	14.1	17.0	18.2	26.5	23.7	36.7
R-STUDS METRIC THREADED RODS - A4	[kN]	7.49	13.9	13.9	18.2	21.9	23.7	36.7
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.00	7.20	7.20	11.2	11.2	16.8	31.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	6.40	12.0	12.0	18.4	18.4	27.2	50.4
R-STUDS METRIC THREADED RODS - A4	[kN]	4.49	8.33	8.33	12.8	12.8	18.6	35.3
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.79	8.57	8.57	13.0	13.8	16.9	26.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	7.01	10.1	12.1	13.0	18.9	16.9	26.2
R-STUDS METRIC THREADED RODS - A4	[kN]	5.35	9.93	9.93	13.0	15.6	16.9	26.2
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	2.86	5.14	5.14	8.00	8.00	12.0	22.3
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	4.57	8.57	8.57	13.1	13.1	19.4	36.0
R-STUDS METRIC THREADED RODS - A4	[kN]	3.21	5.95	5.95	9.16	9.16	13.3	25.2

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+RV200W-4[1)]	300	1	8	96	2.4	19.5	264.2	5906675375762
R-CFS+RV200S-4[1)]	300	1	8	96	-	-	-	5906675201375
R-CFS+RV200-600-8[1)]	600	1	1	36	10.0	10.0	390.0	5906675119045
R-CFS+RV200TW-6008[1)]	600	1	1	36	10.0	10.0	390.0	5906675328270

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

Installation movie

Product overview

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 and wet substrates as well as holes and substrates covered with water
- 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

Applications

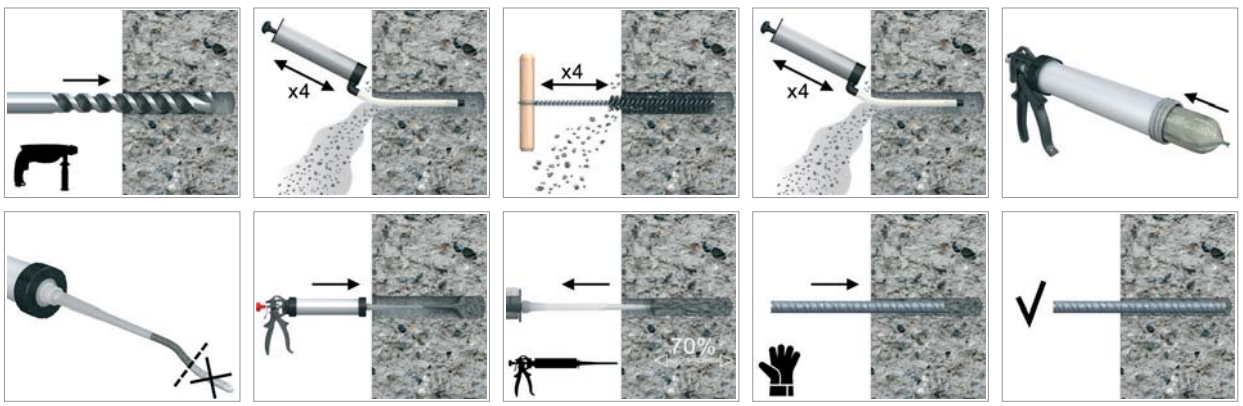
- Replacement of incorrectly placed / missing reinforcing bars
- Renovation of: buildings, bridges and other civil structures,
- Re-strengthening of concrete
- Anchoring structural steel connections (e.g. steel columns, beams, etc.)
- Rebar doweling / connection of secondary post-installed rebars
- Anchoring secondary steel elements
- Connectors for additional concrete layer

Base materials

Approved for use in:

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

Installation guide



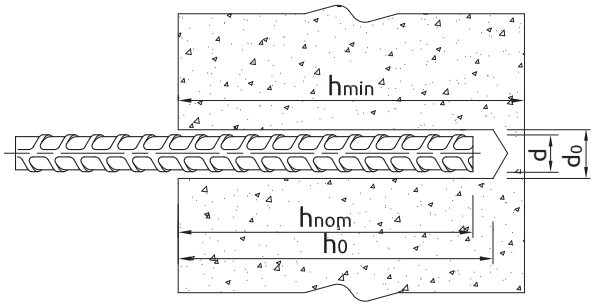
Installation guide (cont.)

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 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 information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-CFS+RV200-4	RV200	Styrene Free Vinylester Resin	300
R-CFS+RV200W-4	RV200-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-CFS+RV200S-4	RV200-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	
R-CFS+RV200-600-8	RV200	Styrene Free Vinylester Resin	600
R-CFS+RV200TW-6008	RV200TW	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	

Installation data



REBARS AS ANCHORS

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

Installation data (cont.)

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min.]		
°C	°C	RV200-S	RV200	RV200-W	RV200-S	RV200	RV200-W
5	-20	-	-	100	-	-	24 h
5	-15	-	-	60	-	-	16 h
5	-10	-	-	30	-	-	8 h
5	-5	65	60	16	24 h	6 h	4 h
5	0	50	40	12	16 h	3 h	2 h
5	5	35	20	8	12 h	2 h	1 h
10	10	20	12	5	8 h	80	45
15	15	12	8	3	6 h	60	30
20	20	9	5	2	4 h	45	10
25	25	7	3	-	3 h	30	-
25	30	6	2	-	2 h	20	-
25	40	5	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*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]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm²]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
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]	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]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm²]	50.3	98.2	169.6	269.4	402.1	785.4	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]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm²]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217

Basic performance data

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Substrate		Non-cracked concrete							
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	107.0
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	107.0
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	107.0
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	214.1
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	214.1
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	214.1
Maximum embedment depth	[kN]	15.6	24.4	35.1	47.7	62.3	97.4	152.2	249.3
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	59.5
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	59.5
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	59.5
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	142.7
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	142.7
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	142.7
Maximum embedment depth	[kN]	10.4	16.2	23.4	31.8	41.6	64.9	101.5	166.2

Basic performance data (cont.)

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
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	42.3
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	42.5
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	42.5
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	101.9
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	101.9
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	101.9
Maximum embedment depth	[kN]	7.42	11.6	16.7	22.7	29.7	46.4	72.5	118.7

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-CFS+RV200-4	300	4	32	384	2.44	7.32	263.52	5906675205830	18
R-CFS+RV200W-4	300	4	32	384	2.44	7.32	263.52	5906675375762	12
R-CFS+RV200S-4	300	4	32	384	2.44	7.32	263.52	5906675201375	12
R-CFS+RV200-600-8	600	8	-	288	8.30	8.30	298.8	5906675119045	18
R-CFS+RV200TW-600-8	600	8	-	288	8.30	8.30	298.8	5906675328270	12

RV200 with Post-Installed Rebar (CFS+)

High performance vinylester resin approved for use with post-installed rebar connections - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-12/0319

Installation movie

Product overview

Features and benefits

- Approved for use with post-installed rebar in concrete
- Suitable for most solid substrates including overhead applications
- Very high load capacity
- Suitable for use in low temperatures (down to -20° C for winter option) enables use throughout the year; 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 pneumatic dispenser guns
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- Suitable for multiple use. Partly used cartridge can continue to be used after fitting new nozzle

Applications

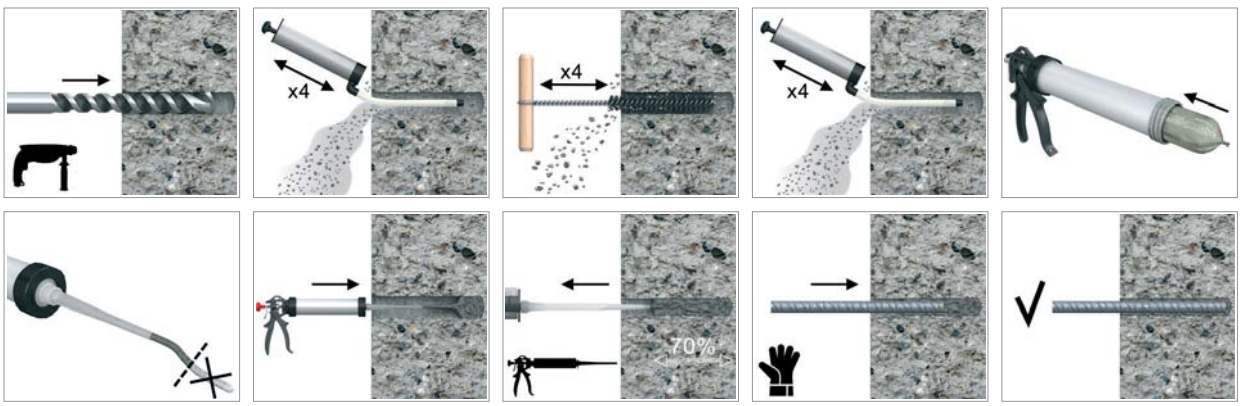
- Shear dowel connections
- Foundation wall connections
- Post-instaled rebar connections
- Rebar
- Rebar dowelling
- Rebar missed-outs
- Strengthening reinforced concrete structures
- Starter bars
- Expansion of the stairs
- Renovation and modernization of bridges

Base materials

Approved for use in:

- Concrete C12/15-C50/60

Installation guide



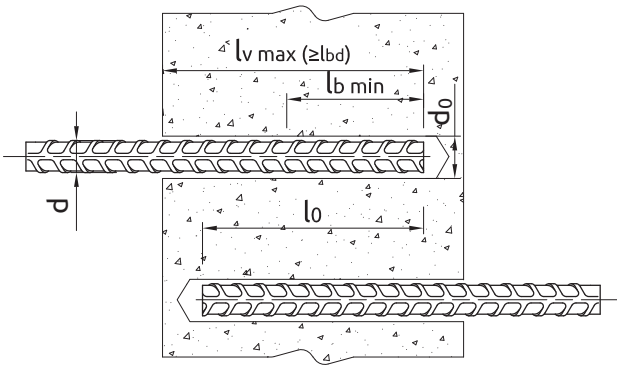
Installation guide (cont.)

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 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 information

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



POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø30	Ø32
Rebar diameter	d_s	[mm]	8	10	12	14	16	20	25	28	30	32
Hole diameter in substrate	d_0	[mm]	12	14	16	18	20	25	30	35	35	40
Brush diameter		[mm]	14	16	18	20	22	27	32	37	37	42
Min. anchorage length	$l_{b,min.}$	[mm]	115	145	170	200	230	285	355	400	420	455
Min. lap length (overlap splice)	$l_{0,min.}$	[mm]	200	215	255	300	340	430	540	600	640	480
Max. anchorage length	$l_{v,max.}$	[mm]	400	500	600	700	800	1000	1000	1000	1000	1000

Minimum working and curing time

Resin temperature [°C]	Concrete temperature [°C]	Working time [min]	Curing time* [min]
5	-5	60	360
5	0	40	180
5	5	20	120
10	10	12	80
15	15	8	60
20	20	5	45
25	30	2	20
25	40	0.5	10

*For wet concrete the curing time must be doubled

Mechanical properties

POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø30	Ø32
f_{yk} = 410 (e.g. 34GS acc. to EC2)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	410	410	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	706.9	804.2
f_{yk} = 420 (e.g. G-60 acc. to ASTM 615)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	706.9	804.2
f_{yk} = 460 (e.g. 460 B acc. to BS 4449)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	460	460	460	460	460	460	460	460	460	460
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	706.9	804.2
f_{yk} = 500 (e.g. B 500 SP acc. to EC2; 500 B acc. to BS 4449; B 500 B acc. to SS 560)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	706.9	804.2
fyk = 600 (e.g. B 600 B acc. to SS 560)												
Nominal yield strength - tension	f_{yk}	[N/mm²]	600	600	600	600	600	600	600	600	600	600
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	706.9	804.2

Basic performance data

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk} = 410 [N/mm²]

l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	5,8	6,9	8,1	9,2	10,4	11,6	13,3	15,0	16,8	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	-	8,7	10,1	11,6	13,0	14,5	16,6	18,8	21,0	23,1	25,3	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	28,0
12	-	-	12,1	13,9	15,6	17,3	19,9	22,5	25,1	27,7	30,3	34,7	39,0	40,3	40,3	40,3	-	-	-	-	-	-	-	-	40,3
14	-	-	-	-	18,2	20,2	23,3	26,3	29,3	32,4	35,4	40,5	45,5	50,6	54,9	54,9	54,9	54,9	-	-	-	-	-	-	54,9
16	-	-	-	-	-	23,1	26,6	30,1	33,5	37,0	40,5	46,2	52,0	57,8	63,6	69,4	71,7	71,7	71,7	71,7	-	-	-	-	71,7
20	-	-	-	-	-	-	-	37,6	41,9	46,2	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	112,0	112,0	112,0	112,0	112,0	112,0
25	-	-	-	-	-	-	-	-	-	57,8	63,2	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	175,0	175,0
28	-	-	-	-	-	-	-	-	-	-	70,8	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	219,5
30	-	-	-	-	-	-	-	-	-	-	75,9	86,7	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	252,0
32	-	-	-	-	-	-	-	-	-	-	-	92,5	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	286,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk} = 410 [N/mm²]

l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	225	250	275	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	10,8	13,0	15,1	17,3	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	13,5	16,2	18,9	21,6	24,3	27,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	28,0
12	-	19,5	22,7	25,9	29,2	32,4	36,5	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	-	-	-	-	-	-	-	-	40,3
14	-	-	26,5	30,3	34,0	37,8	42,6	47,3	52,0	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	-	-	-	-	-	-	54,9
16	-	-	-	32,2	36,2	40,2	45,2	50,3	55,3	60,3	70,4	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	-	-	-	-	71,7
20	-	-	-	-	-	46,5	52,3	58,1	63,9	69,7	81,4	93,0	104,6	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0
25	-	-	-	-	-	-	-	58,9	64,8	70,7	82,5	94,2	106,0	117,8	129,6	141,4	153,2	164,9	175,0	175,0	175,0	175,0	175,0	175,0	175,0
28	-	-	-	-	-	-	-	-	-	79,2	92,4	105,6	118,8	131,9	145,1	158,3	171,5	184,7	197,9	211,1	219,5	219,5	219,5	219,5	219,5
30	-	-	-	-	-	-	-	-	-	76,3	89,1	101,8	114,5	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	252,0	252,0
32	-	-	-	-	-	-	-	-	-	-	95,0	108,6	122,1	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	286,7

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 410 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	17,9	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	14,5	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,0	28,0	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	28,0
12	-	19,1	20,8	22,5	24,3	26,0	28,2	30,3	32,5	34,7	36,9	39,0	40,3	40,3	40,3	40,3	-	-	-	-	-	-	-	-	40,3
14	-	-	-	26,3	28,3	30,3	32,9	35,4	37,9	40,5	43,0	45,5	48,1	50,6	54,9	54,9	54,9	54,9	-	-	-	-	-	-	54,9
16	-	-	-	-	32,4	34,7	37,6	40,5	43,4	46,2	49,1	52,0	54,9	57,8	63,6	69,4	71,7	71,7	71,7	71,7	-	-	-	-	71,7
20	-	-	-	-	-	-	-	50,6	54,2	57,8	61,4	65,0	68,6	72,3	79,5	86,7	93,9	101,2	108,4	112,0	112,0	112,0	112,0	112,0	112,0
25	-	-	-	-	-	-	-	-	-	-	-	81,3	85,8	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	175,0	175,0
28	-	-	-	-	-	-	-	-	-	-	-	-	-	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	219,5
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	252,0
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	286,7

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 410 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	17,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,9
10	27,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	-	-	-	-	-	-	-	-	-	-	28,0
12	32,4	35,7	38,9	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	40,3	-	-	-	-	-	-	-	-	40,3
14	-	41,6	45,4	49,2	53,0	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	54,9	-	-	-	-	-	-	54,9
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	71,7	-	-	-	-	71,7
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	98,8	104,6	110,4	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0	112,0
25	-	-	-	-	-	-	-	-	88,4	94,2	100,1	106,0	111,9	117,8	129,6	141,4	153,2	164,9	175,0	175,0	175,0	175,0	175,0	175,0	175,0
28	-	-	-	-	-	-	-	-	-	-	112,2	118,8	125,3	131,9	145,1	158,3	171,5	184,7	197,9	211,1	219,5	219,5	219,5	219,5	219,5
30	-	-	-	-	-	-	-	-	-	-	-	114,5	120,9	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	252,0	252,0
32	-	-	-	-	-	-	-	-	-	-	-	-	-	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	286,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	5,8	6,9	8,1	9,2	10,4	11,6	13,3	15,0	16,8	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	-	8,7	10,1	11,6	13,0	14,5	16,6	18,8	21,0	23,1	25,3	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	28,7
12	-	-	-	13,9	15,6	17,3	19,9	22,5	25,1	27,7	30,3	34,7	39,0	41,3	41,3	41,3	-	-	-	-	-	-	-	-	41,3
14	-	-	-	-	18,2	20,2	23,3	26,3	29,3	32,4	35,4	40,5	45,5	50,6	55,6	56,2	56,2	56,2	-	-	-	-	-	-	56,2
16	-	-	-	-	-	23,1	26,6	30,1	33,5	37,0	40,5	46,2	52,0	57,8	63,6	69,4	73,4	73,4	73,4	73,4	-	-	-	-	73,4
20	-	-	-	-	-	-	-	37,6	41,9	46,2	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	114,8	114,8	114,8	114,8	114,8	114,8
25	-	-	-	-	-	-	-	-	-	57,8	63,2	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	179,3	179,3
28	-	-	-	-	-	-	-	-	-	-	70,8	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	224,9
30	-	-	-	-	-	-	-	-	-	-	-	86,7	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	258,2
32	-	-	-	-	-	-	-	-	-	-	-	92,5	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	293,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	10,8	13,0	15,1	17,3	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	13,5	16,2	18,9	21,6	24,3	27,0	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	28,7
12	-	19,5	22,7	25,9	29,2	32,4	37,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	-	-	-	-	-	-	-	-	41,3
14	-	-	26,5	30,3	34,0	37,8	43,5	49,2	54,8	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	-	-	-	-	-	-	56,2
16	-	-	-	32,2	36,2	40,2	46,2	52,3	58,3	64,3	70,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	-	-	-	-	73,4
20	-	-	-	-	-	46,5	53,5	60,4	67,4	74,4	81,4	93,0	104,6	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8
25	-	-	-	-	-	-	-	61,3	68,3	75,4	82,5	94,2	106,0	117,8	129,6	141,4	153,2	164,9	176,7	179,3	179,3	179,3	179,3	179,3	179,3
28	-	-	-	-	-	-	-	-	76,5	84,4	92,4	105,6	118,8	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	224,9	224,9	224,9	224,9
30	-	-	-	-	-	-	-	-	-	81,4	89,1	101,8	114,5	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	258,2
32	-	-	-	-	-	-	-	-	-	-	95,0	108,6	122,1	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	293,7

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	18,4	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	14,5	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,7	28,7	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	28,7
12	-	19,1	20,8	22,5	24,3	26,0	28,2	30,3	32,5	34,7	36,9	39,0	41,2	41,3	41,3	41,3	-	-	-	-	-	-	-	-	41,3
14	-	-	-	26,3	28,3	30,3	32,9	35,4	37,9	40,5	43,0	45,5	48,1	50,6	55,6	56,2	56,2	56,2	-	-	-	-	-	-	56,2
16	-	-	-	-	-	34,7	37,6	40,5	43,4	46,2	49,1	52,0	54,9	57,8	63,6	69,4	73,4	73,4	73,4	73,4	-	-	-	-	73,4
20	-	-	-	-	-	-	-	-	54,2	57,8	61,4	65,0	68,6	72,3	79,5	86,7	93,9	101,2	108,4	114,8	114,8	114,8	114,8	114,8	114,8
25	-	-	-	-	-	-	-	-	-	-	-	81,3	85,8	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	179,3	179,3
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	224,9
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	258,2
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	293,7

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 420 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	18,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,4
10	27,0	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	28,7	-	-	-	-	-	-	-	-	-	-	28,7
12	32,4	35,7	38,9	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	41,3	-	-	-	-	-	-	-	-	41,3
14	-	41,6	45,4	49,2	53,0	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	56,2	-	-	-	-	-	-	56,2
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	73,4	-	-	-	-	73,4
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	98,8	104,6	110,4	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8	114,8
25	-	-	-	-	-	-	-	-	88,4	94,2	100,1	106,0	111,9	117,8	129,6	141,4	153,2	164,9	176,7	179,3	179,3	179,3	179,3	179,3	179,3
28	-	-	-	-	-	-	-	-	-	-	112,2	118,8	125,3	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	224,9	224,9	224,9	224,9
30	-	-	-	-	-	-	-	-	-	-	-	-	120,9	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	258,2
32	-	-	-	-	-	-	-	-	-	-	-	-	-	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	293,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	-	6,9	8,1	9,2	10,4	11,6	13,3	15,0	16,8	18,5	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	-	-	10,1	11,6	13,0	14,5	16,6	18,8	21,0	23,1	25,3	28,9	31,4	31,4	-	-	-	-	-	-	-	-	-	-	31,4
12	-	-	-	13,9	15,6	17,3	19,9	22,5	25,1	27,7	30,3	34,7	39,0	43,4	45,2	45,2	-	-	-	-	-	-	-	-	45,2
14	-	-	-	-	-	20,2	23,3	26,3	29,3	32,4	35,4	40,5	45,5	50,6	55,6	60,7	61,6	61,6	-	-	-	-	-	-	61,6
16	-	-	-	-	-	-	26,6	30,1	33,5	37,0	40,5	46,2	52,0	57,8	63,6	69,4	75,1	80,4	80,4	80,4	-	-	-	-	80,4
20	-	-	-	-	-	-	-	-	41,9	46,2	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	125,7	125,7	125,7	125,7
25	-	-	-	-	-	-	-	-	-	-	63,2	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	196,4
28	-	-	-	-	-	-	-	-	-	-	-	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	246,3
30	-	-	-	-	-	-	-	-	-	-	-	86,7	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	282,7
32	-	-	-	-	-	-	-	-	-	-	-	-	104,0	115,6	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	321,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	10,8	13,0	15,1	17,3	19,5	20,1	20,1	20,1	20,1	20,1	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	13,5	16,2	18,9	21,6	24,3	27,0	31,1	31,4	31,4	31,4	31,4	31,4	31,4	31,4	-	-	-	-	-	-	-	-	-	-	31,4
12	-	19,5	22,7	25,9	29,2	32,4	37,3	42,1	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	-	-	-	-	-	-	-	-	45,2
14	-	-	26,5	30,3	34,0	37,8	43,5	49,2	54,8	60,5	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	-	-	-	-	-	-	61,6
16	-	-	-	32,2	36,2	40,2	46,2	52,3	58,3	64,3	70,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	-	-	-	-	80,4
20	-	-	-	-	-	46,5	53,5	60,4	67,4	74,4	81,4	93,0	104,6	116,2	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7
25	-	-	-	-	-	-	-	61,3	68,3	75,4	82,5	94,2	106,0	117,8	129,6	141,4	153,2	164,9	176,7	188,5	196,4	196,4	196,4	196,4	196,4
28	-	-	-	-	-	-	-	-	76,5	84,4	92,4	105,6	118,8	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	237,5	246,3	246,3	246,3
30	-	-	-	-	-	-	-	-	-	-	89,1	101,8	114,5	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	282,7
32	-	-	-	-	-	-	-	-	-	-	-	108,6	122,1	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	321,7

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	18,8	20,1	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	14,5	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,9	30,7	31,4	31,4	31,4	-	-	-	-	-	-	-	-	-	-	31,4
12	-	-	20,8	22,5	24,3	26,0	28,2	30,3	32,5	34,7	36,9	39,0	41,2	43,4	45,2	45,2	-	-	-	-	-	-	-	-	45,2
14	-	-	-	-	28,3	30,3	32,9	35,4	37,9	40,5	43,0	45,5	48,1	50,6	55,6	60,7	61,6	61,6	-	-	-	-	-	-	61,6
16	-	-	-	-	-	-	37,6	40,5	43,4	46,2	49,1	52,0	54,9	57,8	63,6	69,4	75,1	80,4	80,4	80,4	-	-	-	-	80,4
20	-	-	-	-	-	-	-	-	-	57,8	61,4	65,0	68,6	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	125,7	125,7	125,7	125,7
25	-	-	-	-	-	-	-	-	-	-	-	-	-	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	196,4
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	246,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	282,7
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	321,7

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 460 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	20,1	20,1	20,1	20,1	20,1	20,1	20,1	20,1	20,1	20,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,1
10	27,0	29,7	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	31,4	-	-	-	-	-	-	-	-	-	-	31,4
12	32,4	35,7	38,9	42,1	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	45,2	-	-	-	-	-	-	-	-	45,2
14	-	41,6	45,4	49,2	53,0	56,7	61,5	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	61,6	-	-	-	-	-	-	61,6
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	75,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	80,4	-	-	-	-	80,4
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	98,8	104,6	110,4	116,2	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7	125,7
25	-	-	-	-	-	-	-	-	88,4	94,2	100,1	106,0	111,9	117,8	129,6	141,4	153,2	164,9	176,7	188,5	196,4	196,4	196,4	196,4	196,4
28	-	-	-	-	-	-	-	-	-	-	112,2	118,8	125,3	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	237,5	246,3	246,3	246,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	282,7
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	321,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	-	6,9	8,1	9,2	10,4	11,6	13,3	15,0	16,8	18,5	20,2	21,9	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	-	-	-	11,6	13,0	14,5	16,6	18,8	21,0	23,1	25,3	28,9	32,5	34,1	-	-	-	-	-	-	-	-	-	-	34,1
12	-	-	-	-	15,6	17,3	19,9	22,5	25,1	27,7	30,3	34,7	39,0	43,4	47,7	49,2	-	-	-	-	-	-	-	-	49,2
14	-	-	-	-	-	20,2	23,3	26,3	29,3	32,4	35,4	40,5	45,5	50,6	55,6	60,7	65,8	66,9	-	-	-	-	-	-	66,9
16	-	-	-	-	-	-	26,6	30,1	33,5	37,0	40,5	46,2	52,0	57,8	63,6	69,4	75,1	80,9	86,7	87,4	-	-	-	-	87,4
20	-	-	-	-	-	-	-	-	41,9	46,2	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	130,1	136,6	136,6	136,6
25	-	-	-	-	-	-	-	-	-	-	-	72,3	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	213,4
28	-	-	-	-	-	-	-	-	-	-	-	80,9	91,0	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	267,7
30	-	-	-	-	-	-	-	-	-	-	-	-	97,5	108,4	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	307,3
32	-	-	-	-	-	-	-	-	-	-	-	-	-	115,6	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	349,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	10,8	13,0	15,1	17,3	19,5	21,6	21,9	21,9	21,9	21,9	21,9	21,9	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	13,5	16,2	18,9	21,6	24,3	27,0	31,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	-	-	-	-	-	-	-	-	-	-	34,1
12	-	19,5	22,7	25,9	29,2	32,4	37,3	42,1	47,0	49,2	49,2	49,2	49,2	49,2	49,2	49,2	-	-	-	-	-	-	-	-	49,2
14	-	-	26,5	30,3	34,0	37,8	43,5	49,2	54,8	60,5	66,2	66,9	66,9	66,9	66,9	66,9	66,9	66,9	-	-	-	-	-	-	66,9
16	-	-	-	32,2	36,2	40,2	46,2	52,3	58,3	64,3	70,4	80,4	87,4	87,4	87,4	87,4	87,4	87,4	87,4	87,4	-	-	-	-	87,4
20	-	-	-	-	-	46,5	53,5	60,4	67,4	74,4	81,4	93,0	104,6	116,2	127,9	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6
25	-	-	-	-	-	-	-	-	68,3	75,4	82,5	94,2	106,0	117,8	129,6	141,4	153,2	164,9	176,7	188,5	200,3	212,1	213,4	213,4	213,4
28	-	-	-	-	-	-	-	-	-	84,4	92,4	105,6	118,8	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	237,5	250,7	263,9	267,7
30	-	-	-	-	-	-	-	-	-	-	-	101,8	114,5	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	307,3
32	-	-	-	-	-	-	-	-	-	-	-	108,6	122,1	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	349,7

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	11,6	12,7	13,9	15,0	16,2	17,3	18,8	20,2	21,7	21,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	-	15,9	17,3	18,8	20,2	21,7	23,5	25,3	27,1	28,9	30,7	32,5	34,1	34,1	-	-	-	-	-	-	-	-	-	-	34,1
12	-	-	-	22,5	24,3	26,0	28,2	30,3	32,5	34,7	36,9	39,0	41,2	43,4	47,7	49,2	-	-	-	-	-	-	-	-	49,2
14	-	-	-	-	-	30,3	32,9	35,4	37,9	40,5	43,0	45,5	48,1	50,6	55,6	60,7	65,8	66,9	-	-	-	-	-	-	66,9
16	-	-	-	-	-	-	-	40,5	43,4	46,2	49,1	52,0	54,9	57,8	63,6	69,4	75,1	80,9	86,7	87,4	-	-	-	-	87,4
20	-	-	-	-	-	-	-	-	-	-	-	65,0	68,6	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	130,1	136,6	136,6	136,6
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	213,4
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	267,7
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	307,3
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161,9	173,4	185,0	196,5	208,1	219,7	231,2	349,7

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 500 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	21,6	21,9	21,9	21,9	21,9	21,9	21,9	21,9	21,9	21,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,9
10	27,0	29,7	32,4	34,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	34,1	-	-	-	-	-	-	-	-	-	-	34,1
12	32,4	35,7	38,9	42,1	45,4	48,6	49,2	49,2	49,2	49,2	49,2	49,2	49,2	49,2	49,2	49,2	-	-	-	-	-	-	-	-	49,2
14	-	41,6	45,4	49,2	53,0	56,7	61,5	66,2	66,9	66,9	66,9	66,9	66,9	66,9	66,9	66,9	66,9	66,9	-	-	-	-	-	-	66,9
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	75,4	80,4	85,5	87,4	87,4	87,4	87,4	87,4	87,4	87,4	87,4	87,4	-	-	-	-	87,4
20	-	-	-	-	-	69,7	75,6	81,4	87,2	93,0	98,8	104,6	110,4	116,2	127,9	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6	136,6
25	-	-	-	-	-	-	-	-	-	-	100,1	106,0	111,9	117,8	129,6	141,4	153,2	164,9	176,7	188,5	200,3	212,1	213,4	213,4	213,4
28	-	-	-	-	-	-	-	-	-	-	-	-	125,3	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	237,5	250,7	263,9	267,7
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	307,3
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	349,7

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	-	-	8,1	9,2	10,4	11,6	13,3	15,0	16,8	18,5	20,2	23,1	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	-	-	-	-	13,0	14,5	16,6	18,8	21,0	23,1	25,3	28,9	32,5	36,1	-	-	-	-	-	-	-	-	-	-	41,0
12	-	-	-	-	-	-	19,9	22,5	25,1	27,7	30,3	34,7	39,0	43,4	47,7	52,0	-	-	-	-	-	-	-	-	59,0
14	-	-	-	-	-	-	-	26,3	29,3	32,4	35,4	40,5	45,5	50,6	55,6	60,7	65,8	70,8	-	-	-	-	-	-	80,3
16	-	-	-	-	-	-	-	-	33,5	37,0	40,5	46,2	52,0	57,8	63,6	69,4	75,1	80,9	86,7	92,5	-	-	-	-	104,9
20	-	-	-	-	-	-	-	-	-	-	50,6	57,8	65,0	72,3	79,5	86,7	93,9	101,2	108,4	115,6	122,8	130,1	137,3	144,5	163,9
25	-	-	-	-	-	-	-	-	-	-	-	-	81,3	90,3	99,4	108,4	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	256,1
28	-	-	-	-	-	-	-	-	-	-	-	-	-	101,2	111,3	121,4	131,5	141,6	151,7	161,9	172,0	182,1	192,2	202,3	321,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	119,2	130,1	140,9	151,7	162,6	173,4	184,3	195,1	205,9	216,8	368,8
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	127,2	138,7	150,3	161,9	173,4	185,0	196,5	208,1	219,7	231,2	419,6

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	230	260	290	320	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	10,8	13,0	15,1	17,3	19,5	21,6	24,9	26,2	26,2	26,2	26,2	26,2	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	13,5	16,2	18,9	21,6	24,3	27,0	31,1	35,1	39,2	41,0	41,0	41,0	41,0	41,0	-	-	-	-	-	-	-	-	-	-	41,0
12	-	19,5	22,7	25,9	29,2	32,4	37,3	42,1	47,0	51,9	56,7	59,0	59,0	59,0	59,0	59,0	-	-	-	-	-	-	-	-	59,0
14	-	-	26,5	30,3	34,0	37,8	43,5	49,2	54,8	60,5	66,2	75,6	80,3	80,3	80,3	80,3	80,3	80,3	-	-	-	-	-	-	80,3
16	-	-	-	32,2	36,2	40,2	46,2	52,3	58,3	64,3	70,4	80,4	90,5	100,5	104,9	104,9	104,9	104,9	104,9	104,9	-	-	-	-	104,9
20	-	-	-	-	-	-	53,5	60,4	67,4	74,4	81,4	93,0	104,6	116,2	127,9	139,5	151,1	162,7	163,9	163,9	163,9	163,9	163,9	163,9	163,9
25	-	-	-	-	-	-	-	-	-	-	82,5	94,2	106,0	117,8	129,6	141,4	153,2	164,9	176,7	188,5	200,3	212,1	223,8	235,6	256,1
28	-	-	-	-	-	-	-	-	-	-	-	105,6	118,8	131,9	145,1	158,3	171,5	184,7	197,9	211,1	224,3	237,5	250,7	263,9	321,3
30	-	-	-	-	-	-	-	-	-	-	-	-	114,5	127,2	140,0	152,7	165,4	178,1	190,9	203,6	216,3	229,0	241,7	254,5	368,8
32	-	-	-	-	-	-	-	-	-	-	-	-	-	135,7	149,3	162,9	176,4	190,0	203,6	217,1	230,7	244,3	257,9	271,4	419,6

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	100	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	-	12,7	13,9	15,0	16,2	17,3	18,8	20,2	21,7	23,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	-	-	-	18,8	20,2	21,7	23,5	25,3	27,1	28,9	30,7	32,5	34,3	36,1	-	-	-	-	-	-	-	-	-	-	41,0
12	-	-	-	-	-	-	28,2	30,3	32,5	34,7	36,9	39,0	41,2	43,4	47,7	52,0	-	-	-	-	-	-	-	-	59,0
14	-	-	-	-	-	-	-	-	37,9	40,5	43,0	45,5	48,1	50,6	55,6	60,7	65,8	70,8	-	-	-	-	-	-	80,3
16	-	-	-	-	-	-	-	-	-	-	49,1	52,0	54,9	57,8	63,6	69,4	75,1	80,9	86,7	92,5	-	-	-	-	104,9
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	79,5	86,7	93,9	101,2	108,4	115,6	122,8	130,1	137,3	144,5	163,9
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	117,4	126,4	135,5	144,5	153,5	162,6	171,6	180,6	256,1
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	151,7	161,9	172,0	182,1	192,2	202,3	321,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	173,4	184,3	195,1	205,9	216,8	368,8
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	196,5	208,1	219,7	231,2	419,6

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, NOMINAL YIELD STRENGTH FOR TENSION - f_{yk}= 600 [N/mm²]																									
l_{bd} [mm] / d_s [mm]	200	220	240	260	280	300	325	350	375	400	425	450	475	500	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	21,6	23,8	25,9	26,2	26,2	26,2	26,2	26,2	26,2	26,2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,2
10	27,0	29,7	32,4	35,1	37,8	40,5	41,0	41,0	41,0	41,0	41,0	41,0	41,0	41,0	-	-	-	-	-	-	-	-	-	-	41,0
12	32,4	35,7	38,9	42,1	45,4	48,6	52,7	56,7	59,0	59,0	59,0	59,0	59,0	59,0	59,0	59,0	-	-	-	-	-	-	-	-	59,0
14	-	41,6	45,4	49,2	53,0	56,7	61,5	66,2	70,9	75,6	80,3	80,3	80,3	80,3	80,3	80,3	80,3	80,3	-	-	-	-	-	-	80,3
16	-	-	48,3	52,3	56,3	60,3	65,3	70,4	75,4	80,4	85,5	90,5	95,5	100,5	104,9	104,9	104,9	104,9	104,9	104,9	-	-	-	-	104,9
20	-	-	-	-	-	-	75,6	81,4	87,2	93,0	98,8	104,6	110,4	116,2	127,9	139,5	151,1	162,7	163,9	163,9	163,9	163,9	163,9	163,9	163,9
25	-	-	-	-	-	-	-	-	-	-	-	-	-	117,8	129,6	141,4	153,2	164,9	176,7	188,5	200,3	212,1	223,8	235,6	256,1
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	145,1	158,3	171,5	184,7	197,9	211,1	224,3	237,5	250,7	263,9	321,3
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	178,1	190,9	203,6	216,3	229,0	241,7	254,5	368,8
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	190,0	203,6	217,1	230,7	244,3	257,9	271,4	419,6

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-12/0319

RM50 with Threaded Rods for Concrete (CFS+)

Universal polyester (styrene free) resin - European Approval for 15 substrates - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-12/0394

Installation movie

Product overview

Features and benefits

- The most contemporary general use bonded anchor
- Quick, secure and simple installation
- Unique soft foil pack for less waste
- Effortless extrusion due to patented self-opening system with manual or pneumatic dispenser guns
- Product with wide spectrum of use in the medium load capacity area
- Ideal for applications without the possibility of mechanical anchorage
- Suitable for multiple use. Partly used product can be reused after fitting spare nozzle

Applications

- Balustrading
- Handrails
- Canopies
- Curtain walling
- Consoles
- Staircases
- Gates
- High racking
- Sanitary appliances
- Steel constructions
- Railings
- Ladders
- Cable trays

Base materials

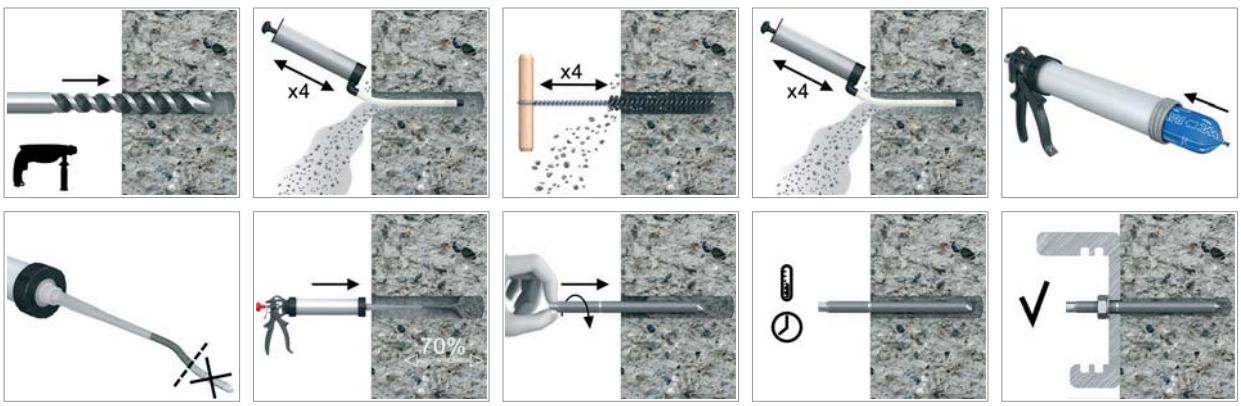
Approved for use in:

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

Also suitable for use in:

- Natural Stone

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud 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 stud, 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.
7. Attach fixture and tighten the nut to the required torque.

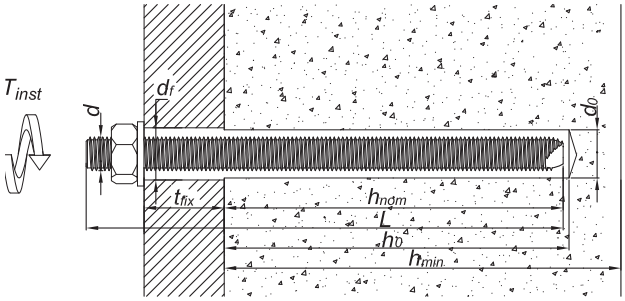
Product information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-CFS+RM50-4	RM50	Styrene Free Polyester Resin	300
R-CFS+RM50S-4	RM50-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	
R-CFS+RM50W-4	RM50-W	Low Temperature (Winter) / Rapid Cure Styrene Free Polyester Resin	
R-CFS+RM50-600-8	RM50	Styrene Free Polyester Resin	600

R-STUDS

Size	Product Code			Anchor		Fixture		
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness t_{fix} for:	
				d	L	d_f	$h_{nom,\ min}$	$h_{nom,\ max}$
				[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	40	-
	R-STUDS-08160	-	R-STUDS-08160-A4	8	160	9	90	50
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	48	-
	R-STUDS-10170	-	R-STUDS-10170-A4	10	170	12	88	38
	R-STUDS-10190	-	R-STUDS-10190-A4	10	190	12	108	58
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	65	-
	R-STUDS-12190	-	R-STUDS-12190-A4	12	190	14	95	30
	R-STUDS-12220	-	R-STUDS-12220-A4	12	220	14	125	60
	R-STUDS-12260	-	R-STUDS-12260-A4	12	260	14	165	100
	R-STUDS-12300	-	R-STUDS-12300-A4	12	300	14	205	140
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	71	-
	R-STUDS-16220	R-STUDS-16220-88	R-STUDS-16220-A4	16	220	18	101	11
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	141	51
	R-STUDS-16300	-	R-STUDS-16300-A4	16	300	18	181	91
	R-STUDS-16380	-	R-STUDS-16380-A4	16	380	18	261	171
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	117	-
	R-STUDS-20300	-	R-STUDS-20300-A4	20	300	22	157	37
	R-STUDS-20350	-	R-STUDS-20350-A4	20	350	22	207	87
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4	24	300	26	132	-
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	181	-

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Hole diameter in fixture	d_f	[mm]	9	12	14	18	24	28	35
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
Min. substrate thickness	h_{min}	[mm]	h_{nom} + $2d_0 \geq 100$	h_{nom} + $2d_0 \geq 100$	h_{nom} + $2d_0 \geq 100$	h_{nom} + $2d_0 \geq 100$	h_{nom} + $2d_0 \geq 100$	h_{nom} + $2d_0 \geq 100$	h_{nom} + $2d_0 \geq 100$
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. spacing	s_{min}	[mm]	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$
Min. edge distance	c_{min}	[mm]	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$	0.5 * $h_{nom} \geq 40$
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min]		
[°C]	[°C]	RM50-S	RM50	RM50-W	RM50-S	RM50	RM50-W
5	-20	-	-	45	-	-	24h
5	-15	-	-	30	-	-	18h
5	-10	-	-	20	-	-	8h
5	-5	3h	70	11	24h	8h	5h
5	0	2h	45	7	18h	4h	2h
5	5	1h	25	5	12h	2h	1h
10	10	45	15	2	8h	90	45
15	15	25	9	1,5	6h	60	30
20	20	15	5	1	4h	45	15
25	30	7	2	-	1.5h	30	-
25	35	6	-	-	1h	-	-
25	40	5	-	-	45	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
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]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95	185	321	642
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152	297	513	1028
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107	208	360	721

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	14.3	20.9	27.1	40.2	60.3	68.6	85.5
Maximum embedment depth	[kN]	18.0	29.0	42.0	76.4	120.6	142.1	186.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	14.3	20.9	27.1	40.2	60.3	68.6	85.5
Maximum embedment depth	[kN]	23.9	35.8	49.2	76.4	120.6	142.1	186.6
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	14.3	20.9	27.1	40.2	60.3	68.6	85.5
Maximum embedment depth	[kN]	23.9	35.8	49.2	76.4	120.6	142.1	186.6
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	9.00	14.0	21.0	39.0	61.0	88.0	140.0
Maximum embedment depth	[kN]	9.00	14.0	21.0	39.0	61.0	88.0	140.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	137.2	171.1
Maximum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	13.0	20.0	29.0	86.0	86.0	124.0	171.1
Maximum embedment depth	[kN]	13.0	20.0	29.0	86.0	86.0	124.0	196.0

Basic performance data (cont.)

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	6.82	11.6	15.1	22.3	33.5	38.1	47.5
Maximum embedment depth	[kN]	11.4	19.3	27.3	42.5	67.0	79.0	103.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	6.82	11.6	15.1	22.3	33.5	38.1	47.5
Maximum embedment depth	[kN]	11.4	19.9	27.3	42.5	67.0	79.0	103.7
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	6.82	11.6	15.1	22.3	33.5	38.1	47.5
Maximum embedment depth	[kN]	11.4	19.9	27.3	42.5	67.0	79.0	103.7
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	112.0
Maximum embedment depth	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	112.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	91.5	114.0
Maximum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	8.33	12.8	18.6	55.1	55.1	79.5	114.0
Maximum embedment depth	[kN]	8.33	12.8	18.6	55.1	55.1	79.5	125.6
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	4.87	8.29	10.8	16.0	23.9	27.2	33.9
Maximum embedment depth	[kN]	8.12	13.8	19.5	30.3	47.9	56.4	74.1
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	4.87	8.29	10.8	16.0	23.9	27.2	33.9
Maximum embedment depth	[kN]	8.12	14.2	19.5	30.3	47.9	56.4	74.1
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	4.87	8.29	10.8	16.0	23.9	27.2	33.9
Maximum embedment depth	[kN]	8.12	14.2	19.5	30.3	47.9	56.4	74.1
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	5.14	8.00	12.0	22.3	34.9	50.3	80.0
Maximum embedment depth	[kN]	5.14	8.00	12.0	22.3	34.9	50.3	80.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	65.4	81.5
Maximum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	5.95	9.16	13.3	39.4	39.4	56.8	81.5
Maximum embedment depth	[kN]	5.95	9.16	13.3	39.4	39.4	56.8	89.7

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Codes
		Box	Outer	Pallet	Box	Outer	Pallet	
CFS+RM50-4[1)]	300							
CFS+RM50S-4[1)]	300							
CFS+RM50W-4[1)]	300							
R-CFS+RM50-600-8[1)]	600	1	1	36	8.4	8.4	333.6	5906675078823

RM50 with Threaded Rods for Masonry (CFS+)

Universal polyester (styrene free) resin - European Approval for 15 substrates - Cartridge Free System (CFS+)

Installation movie

Approvals and Reports

- ETA-12/0528

ETA CE

Product overview

Features and benefits

- The most contemporary general use bonded anchor for masonry
- Approved for 15 substrates
- Quick, secure and simple installation
- Unique soft foil pack for less waste
- Effortless extrusion due to patented self-opening system with manual or battery dispenser guns
- Product with wide spectrum of use in the medium load capacity area
- Ideal for applications without the possibility of mechanical anchorage
- Suitable for multiple use. Partly used product can be reused after fitting spare nozzle

Applications

- Balustrading
- Handrails
- Canopies
- Curtain walling
- Bathroom fittings
- Cable trays
- Barriers
- Cladding restraint
- Fencing & gates
- Pipework

Base materials

Approved for use in:

- Solid Brick
- Solid Sand-lime Brick
- Hollow Sand-lime Brick
- Hollow Brick
- Hollow Lightweight Concrete Block
- Aerated Concrete Block

Installation guide

Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud size being used.
2. Insert mesh sleeve into the hole.
3. Insert foil into gun and attach nozzle.
4. Dispense to waste until even colour is obtained. 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.
5. Immediately insert the stud, 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.
6. Attach fixture and tighten the nut to the required installation torque

Product information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-CFS+RM50-4	RM50	Styrene Free Polyester Resin	300
R-CFS+RM50-600-8	RM50	Styrene Free Polyester Resin	600

R-STUDS

Size	Product Code			Anchor		Fixture		
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness	
				d	L	d_f	t_{Fix} for $h_{nom,min}$	t_{Fix} for $h_{nom,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	40	-
	R-STUDS-08160	-	R-STUDS-08160-A4*	8	160	9	90	50
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	48	-
	R-STUDS-10170	-	R-STUDS-10170-A4*	10	170	12	88	38
	R-STUDS-10190	-	R-STUDS-10190-A4*	10	190	12	108	58
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	65	-
	R-STUDS-12190	-	R-STUDS-12190-A4*	12	190	14	95	30
	R-STUDS-12220	-	R-STUDS-12220-A4*	12	220	14	125	60
	R-STUDS-12260	-	R-STUDS-12260-A4*	12	260	14	165	100
	R-STUDS-12300	-	R-STUDS-12300-A4*	12	300	14	205	140
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	71	-
	R-STUDS-16220	R-STUDS-16220-88	R-STUDS-16220-A4*	16	220	18	101	11
	R-STUDS-16260	-	R-STUDS-16260-A4*	16	260	18	141	51
	R-STUDS-16300	-	R-STUDS-16300-A4*	16	300	18	181	91
	R-STUDS-16380	-	R-STUDS-16380-A4*	16	380	18	261	171

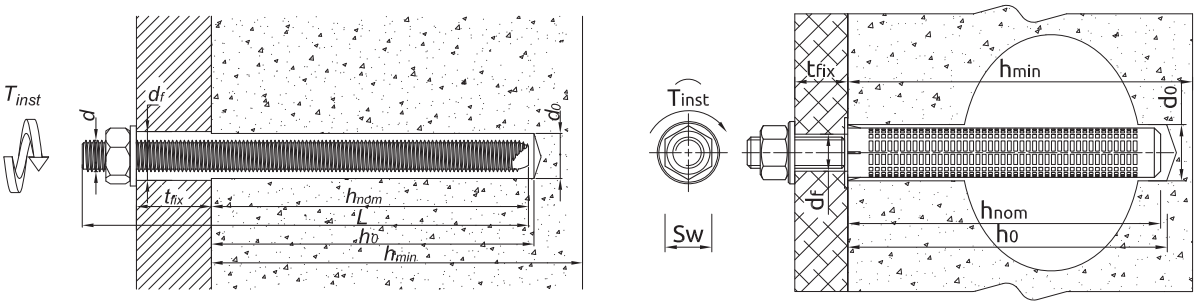
* Make to order

Product information (cont.)

R-PLS Plastic Mesh Sleeves and SP-CE Mesh Sleeves

Product Code	Size		Quantity [pcs]		Weight [kg]		Bar Code
	Sleeve [mm]	Stud	Outer	Pallet	Box	Outer	
R-PLS-12050-10	12x50	M8	700	8400	0.06	4.2	5906675377520
R-PLS-16085-10	16x85	M10-M12	500	6000	0.05	2.5	5906675347547
R-PLS-16130-10	16x130	M10-M12	400	4800	0.10	4.0	5906675347554
R-PLS-20085-10	20x85	M16	400	4800	0.8	0.8	5906675291864
SP-CE-R08	12X1000	M6-M8	10	5430	-	0.64	5906675266138
SP-CE-R10	14x1000	M8-M10	10	1500	-	0.56	5906675610122
SP-CE-R12	16x1000	M12	10	1300	-	0.66	5906675610320
SP-CE-R16	20x1000	M16	10	384	-	1.29	5906675610528
SP-CE-R20	24x1000	M20	5	280	-	0.57	5906675610726

Installation data



SOLID SUBSTRATES

Size			M8	M10	M12	M16	M8	M10	M12	M16
Substrate			Ceramic solid substrates				Aerated concrete			
Thread diameter	d	[mm]	8	10	12	16	8	10	12	16
Hole diameter in substrate	d_0	[mm]	10	12	14	18	10	12	14	18
Installation torque	T_{inst}	[Nm]	5	8	10	15	3	4	6	10
Min. hole depth in substrate	h_0	[mm]	h_{nom} + 5							
Installation depth	$h_{nom,min}$	[mm]	80	85	95	105	80	85	95	105
Min. spacing	s_{min}	[mm]	50	50	50	54	50	50	50	54
Min. edge distance	c_{min}	[mm]	50	50	50	54	50	50	50	54

HOLLOW SUBSTRATES

Size			M10		M10		M12		M16
Substrate			Hollow substrates						
Thread diameter	d	[mm]	8	8	10	10	12	12	16
Plastic mesh sleeve size	dxl	[mm]	12x50	12x80	16x85	16x130	16x85	16x130	20x85
Hole diameter in substrate	d_0	[mm]	12	12	16	16	16	16	20
Installation torque	T_{inst}	[Nm]	3	3	4	4	6	6	10
Min. hole depth in substrate	h_0	[mm]	h_{nom} + 5						
Installation depth	$h_{nom,std}$	[mm]	50	-	85	-	85	-	85
	$h_{nom,max}$	[mm]	-	80	-	125	-	125	-
Min. spacing	s_{min}	[mm]	100	100	100	100	100	100	120
Min. edge distance	c_{min}	[mm]	100	100	100	100	100	100	120

Installation data (cont.)

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min]		
[°C]	[°C]	RM50-S	RM50	RM50-W	RM50-S	RM50	RM50-W
5	-20	-	-	45	-	-	24 h
5	-15	-	-	30	-	-	18 h
5	-10	-	-	20	-	-	8 h
5	-5	3 h	70	11	24 h	8 h	5 h
5	0	2 h	45	7	18 h	4 h	2 h
5	5	1 h	25	5	12 h	2 h	1 h
10	10	45	15	2	8 h	1.5 h	45
15	15	25	9	1,5	6 h	1 h	30
20	20	15	5	1	4 h	45	15
25	30	7	2	-	1.5 h	30	-
25	35	6	-	-	1 h	-	-
25	40	5	-	-	45	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16
R-STUDS METRIC THREADED RODS - steel class 5.8						
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166
Design bending resistance	M	[Nm]	15	30	52	133
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95
R-STUDS METRIC THREADED RODS - steel class 8.8						
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266
Design bending resistance	M	[Nm]	24	48	84	213
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152
R-STUDS METRIC THREADED RODS - A4						
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233
Design bending resistance	M	[Nm]	17	34	59	149
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107

Basic performance data

SOLID SUBSTRATES

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

Size		M8	M10	M12	M16
Substrate		Solid substrates			
CHARACTERISTIC LOAD*					
TENSION LOADS N_{Rk}					
Solid clay brick min 20 MPa (eg Mz20/2.0)	[kN]	6.00	7.00	7.00	7.00
Autoclaved aerated concrete block min 6.0 MPa (AAC7)	[kN]	1.50	2.00	2.50	3.00
Solid silicate brick min 20 MPa (eg KS NF 20/2.0)	[kN]	5.00	5.00	5.00	5.00

Basic performance data (cont.)

SOLID SUBSTRATES

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

Size		M8	M10	M12	M16
SHEAR LOADS V_{Rk}					
Solid clay brick min 20 MPa (eg Mz20/2.0)	[kN]	3.50	5.00	7.00	7.00
Autoclaved aerated concrete block min 6.0 MPa (AAC7)	[kN]	1.50	2.00	2.50	2.50
Solid silicate brick min 20 MPa (eg KS NF 20/2.0)	[kN]	3.50	5.00	5.00	5.00
DESIGN LOAD					
TENSION LOAD N_{Rd}					
Solid clay brick min 20 MPa (eg Mz20/2.0)	[kN]	2.40	2.80	2.80	2.80
Autoclaved aerated concrete block min 6.0 MPa (AAC7)	[kN]	0.75	1.00	1.25	1.50
Solid silicate brick min 20 MPa (eg KS NF 20/2.0)	[kN]	2.00	2.00	2.00	2.00
SHEAR LOAD V_{Rd}					
Solid clay brick min 20 MPa (eg Mz20/2.0)	[kN]	1.40	2.00	2.80	2.80
Autoclaved aerated concrete block min 6.0 MPa (AAC7)	[kN]	0.75	1.00	1.25	1.25
Solid silicate brick min 20 MPa (eg KS NF 20/2.0)	[kN]	1.40	2.00	2.00	2.00
RECOMMENDED LOAD**					
TENSION LOAD N_{rec}					
Solid clay brick min 20 MPa (eg Mz20/2.0)	[kN]	1.71	2.00	2.00	2.00
Autoclaved aerated concrete block min 6.0 MPa (AAC7)	[kN]	0.54	0.71	0.89	1.07
Solid silicate brick min 20 MPa (eg KS NF 20/2.0)	[kN]	1.43	1.43	1.43	1.43
SHEAR LOAD V_{rec}					
Solid clay brick min 20 MPa (eg Mz20/2.0)	[kN]	1.00	1.43	2.00	2.00
Autoclaved aerated concrete block min 6.0 MPa (AAC7)	[kN]	0.54	0.71	0.89	0.89
Solid silicate brick min 20 MPa (eg KS NF 20/2.0)	[kN]	1.00	1.43	1.43	1.43

*According to ETAG 029, **Partial safety factor 1.4

HOLLOW SUBSTRATES

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

Size		M8		M10		M12		M16
Substrate		Hollow substrates						
Plastic mesh sleeve (dxl)	[mm]	12x50	12x80	16x85	15x130	16x85	16x130	20x85
CHARACTERISTIC LOAD								
TENSION AND SHEAR LOADS F_{Rk}								
Silicate hollow block min 12 MPa (eg KS Ratio Block 8 DF)	[kN]	2.50	2.50	2.50	3.50	3.00	3.00	3.00
Perforated ceramic blocks min 12 MPa (eg Proton Hlz 12/0.9 DF)	[kN]	2.00	2.50	2.50	2.50	2.50	2.50	2.50
Perforated ceramic blocks min 15 MPa (eg Wienerberger Porotherm)	[kN]	1.50	2.00	2.00	2.50	2.50	2.50	2.50
Perforated ceramic blocks min 10 MPa (eg Leiter Thermopor)	[kN]	1.50	2.00	2.00	2.50	2.50	2.50	2.50
Perforated ceramic blocks min 15 MPa (eg MEGA MAX)	[kN]	2.00	2.50	2.50	2.50	2.50	2.50	2.50
Perforated ceramic blocks min 6.0 MPa (eg LS Tableau Mono Rect)	[kN]	0.90	0.90	1.50	2.00	2.00	2.00	1.20
Perforated ceramic blocks min 6.0 MPa (eg LS Tableau Rect)	[kN]	0.90	1.20	1.50	1.50	1.50	2.00	1.50
Perforated ceramic blocks min 6.0 MPa (eg LS Monomur)	[kN]	0.90	0.90	1.20	1.50	1.50	1.50	1.50
Perforated ceramic blocks min 6 MPa (eg SM BGV Thermo)	[kN]	0.90	0.90	1.50	1.50	1.50	1.50	1.50
Perforated ceramic blocks min 6.0 MPa (eg SM BGV Thermo Plus)	[kN]	0.90	1.20	0.90	0.90	1.20	1.50	1.20
Lightweight concrete hollow block min 2.0 MPa	[kN]	1.20	1.50	2.50	2.00	2.50	2.50	2.50

Basic performance data (cont.)

HOLLOW SUBSTRATES

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

Size		M8		M10		M12		M16
DESIGN LOAD								
TENSION AND SHEAR LOADS F_{Rd}								
Silicate hollow block min 12 MPa (eg KS Ratio Block 8 DF)	[kN]	1.00	1.00	1.40	1.00	1.20	1.20	1.20
Perforated ceramic blocks min 12 MPa (eg Proton Hlz 12/0.9 DF)	[kN]	0.88	1.00	1.40	1.20	1.40	1.60	1.60
Perforated ceramic blocks min 15 MPa (eg Wienerberger Porotherm)	[kN]	0.60	0.80	1.00	1.00	1.40	1.40	1.00
Perforated ceramic blocks min 10 MPa (eg Leiter Thermopor)	[kN]	0.60	0.80	1.00	0.80	1.00	1.40	1.20
Perforated ceramic blocks min 15 MPa (eg MEGA MAX)	[kN]	0.80	1.00	1.40	1.40	1.60	1.60	1.60
Perforated ceramic blocks min 6.0 MPa (eg LS Tableau Mono Rect)	[kN]	0.36	0.36	0.80	0.80	0.80	0.80	0.60
Perforated ceramic blocks min 6.0 MPa (eg LS Tableau Rect)	[kN]	0.48	0.48	0.60	0.60	0.80	0.80	0.60
Perforated ceramic blocks min 6.0 MPa (eg LS Monomur)	[kN]	0.36	0.36	0.60	0.60	0.60	0.60	0.60
Perforated ceramic blocks min 6 MPa (eg SM BGV Thermo)	[kN]	0.36	0.36	0.60	0.60	0.60	0.60	0.60
Perforated ceramic blocks min 6.0 MPa (eg SM BGV Thermo Plus)	[kN]	0.48	0.48	0.48	0.48	0.48	0.60	0.48
Lightweight concrete hollow block min 2.0MPa	[kN]	0.48	0.60	1.00	1.00	1.00	1.40	1.40
RECOMMENDED LOAD								
TENSION AND SHEAR LOADS F_{rec}								
Silicate hollow block min 12 MPa (eg KS Ratio Block 8 DF)	[kN]	0.71	0.71	1.00	0.71	0.86	0.86	0.86
Perforated ceramic blocks min 12 MPa (eg Proton Hlz 12/0.9 DF)	[kN]	0.63	0.71	1.00	0.86	1.00	1.14	1.14
Perforated ceramic blocks min 15 MPa (eg Wienerberger Porotherm)	[kN]	0.43	0.57	0.71	0.71	1.00	1.00	0.71
Perforated ceramic blocks min 10 MPa (eg Leiter Thermopor)	[kN]	0.43	0.57	0.71	0.57	0.71	1.00	0.86
Perforated ceramic blocks min 15 MPa (eg MEGA MAX)	[kN]	0.57	0.71	1.00	1.00	1.14	1.14	1.14
Perforated ceramic blocks min 6.0 MPa (eg LS Tableau Mono Rect)	[kN]	0.26	0.26	0.57	0.57	0.57	0.57	0.43
Perforated ceramic blocks min 6.0 MPa (eg LS Tableau Rect)	[kN]	0.34	0.34	0.43	0.43	0.57	0.57	0.43
Perforated ceramic blocks min 6.0 MPa (eg LS Monomur)	[kN]	0.26	0.26	0.43	0.43	0.43	0.43	0.43
Perforated ceramic blocks min 6 MPa (eg SM BGV Thermo)	[kN]	0.26	0.26	0.43	0.43	0.43	0.43	0.43
Perrforated ceramic blocks min 6.0 MPa (eg SM BGV Thermo Plus)	[kN]	0.34	0.34	0.34	0.34	0.34	0.43	0.34
Lightweight concrete hollow block min 2.0 MPa	[kN]	0.34	0.43	0.71	0.71	0.71	1.00	1.00

*According to ETAG 029, **Partial safety factor 1.4

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-CFS+RM50-4	300	1	3	108	2.44	7.32	263.52	5906675205892	18
R-CFS+RM50-600-8	600	1	1	36	8.30	8.30	298.8	5906675078823	18

RP30 (CFS+) with Threaded Rods for Concrete

Economy polyester resin approved for use in non-cracked concrete - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-11/0141

Installation movie

Product overview

Features and benefits

- Effortless extrusion due to patented self-opening system with manual or battery dispenser guns
- Medium load capacity in non-cracked concrete
- Wide range of steel studs with different lengths and diameters
- Small edge and space distances

Applications

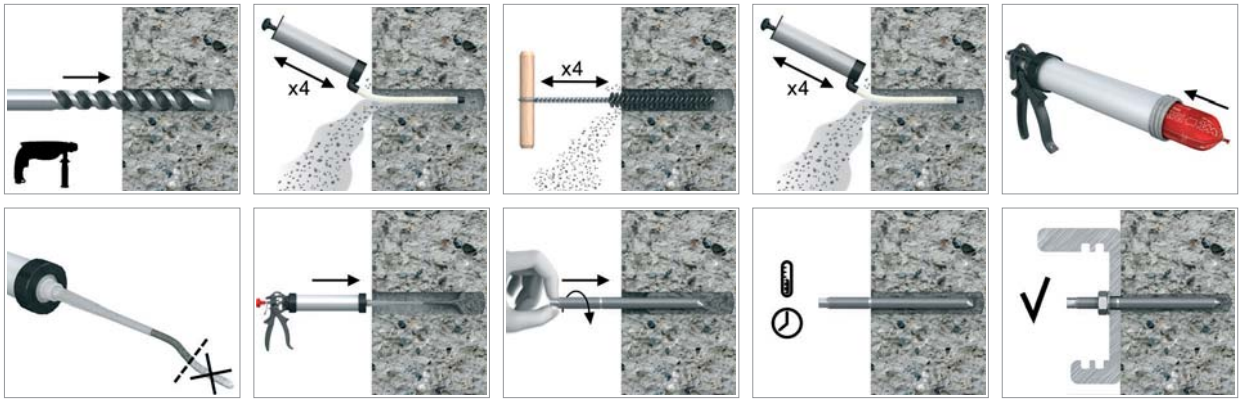
- Cable trays
- Handrails
- Fencing & gates manufacturing and installation
- Pipework installation
- Consoles
- Staircases
- Gates
- High racking
- Canopies
- Sanitary appliances
- Railings
- Ladders
- Cable trays

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud 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 stud, 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.
7. Attach fixture and tighten the nut to the required torque.

Product information

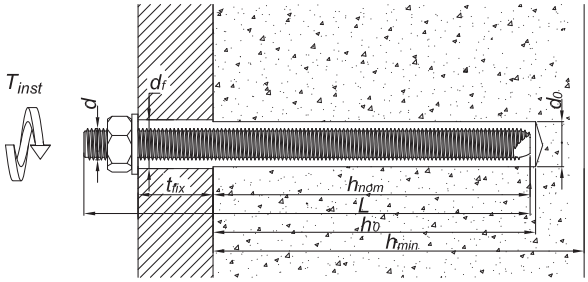
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-CFS+RP30-4	RP30	Polyester Resin	300
R-CFS+RP30-600-8	RP30	Polyester Resin	600

R-STUDS

Size	Product Code			Anchor		Fixture		
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness	
				d	L	d_f	t_{fix} for $h_{nom,min}$	t_{fix} for $h_{nom,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	40	-
	R-STUDS-08160	-	R-STUDS-08160-A4*	8	160	9	90	50
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	48	-
	R-STUDS-10170	-	R-STUDS-10170-A4*	10	170	12	88	38
	R-STUDS-10190	-	R-STUDS-10190-A4*	10	190	12	108	58
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	65	-
	R-STUDS-12190	-	R-STUDS-12190-A4*	12	190	14	95	30
	R-STUDS-12220	-	R-STUDS-12220-A4*	12	220	14	125	60
	R-STUDS-12260	-	R-STUDS-12260-A4*	12	260	14	165	100
	R-STUDS-12300	-	R-STUDS-12300-A4*	12	300	14	205	140
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	71	-
	R-STUDS-16220	R-STUDS-16220-88	R-STUDS-16220-A4*	16	220	18	101	11
	R-STUDS-16260	-	R-STUDS-16260-A4*	16	260	18	141	51
	R-STUDS-16300	-	R-STUDS-16300-A4*	16	300	18	181	91
	R-STUDS-16380	-	R-STUDS-16380-A4*	16	380	18	261	171
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	117	-
	R-STUDS-20300	R-STUDS-20300-88	R-STUDS-20300-A4*	20	300	22	157	37
	R-STUDS-20350	-	R-STUDS-20350-A4*	20	350	22	207	87
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4*	24	300	26	132	-
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	181	-

* Make to order

Installation data



Installation data (cont.)

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	$h_{nom} + 5$						
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360
Min. substrate thickness	h_{min}	[mm]	$h_{nom} + 30$ 100				$h_{nom} + 2*d_0$		
Min. spacing	s_{min}	[mm]	$0.5 * h_{nom} \geq 40$						
Min. edge distance	c_{min}	[mm]	$0.5 * h_{nom} \geq 40$						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	60	360
5	0	40	180
5	5	20	120
10	10	12	80
15	15	8	60
20	20	5	45
25	30	2	20

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	520	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	20	39	68	173	338	583	1166
Design bending resistance	M	[Nm]	11	22	39	99	193	333	666
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1793
Design bending resistance	M	[Nm]	17	34	60	152	297	513	1025
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	785	1569
Design bending resistance	M	[Nm]	12	24	42	107	208	360	719

Basic performance data

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

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	14.3	22.0	28.7	45.2	64.1	73.9	77.8
Maximum embedment depth	[kN]	18.0	29.0	42.0	78.0	122.0	153.1	169.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	14.3	22.0	28.7	45.2	64.1	73.9	77.8
Maximum embedment depth	[kN]	23.9	37.7	51.9	86.0	128.2	153.1	169.7
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	14.3	22.0	28.7	45.2	64.1	73.9	77.8
Maximum embedment depth	[kN]	23.9	37.7	51.9	86.0	128.2	153.1	169.7
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	9.00	14.0	21.0	39.0	61.0	88.0	140.0
Maximum embedment depth	[kN]	9.00	14.0	21.0	39.0	61.0	88.0	140.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	155.5
Maximum embedment depth	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	155.5
Maximum embedment depth	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	7.96	12.2	15.9	25.1	35.6	35.2	37.0
Maximum embedment depth	[kN]	12.0	19.3	28.0	47.8	71.2	72.9	80.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	7.96	12.2	15.9	25.1	35.6	35.2	37.0
Maximum embedment depth	[kN]	13.3	20.9	28.9	47.8	71.2	72.9	80.8
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	7.96	12.2	15.9	25.1	35.6	35.2	37.0
Maximum embedment depth	[kN]	13.3	20.9	28.9	47.8	71.2	72.9	80.8
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	103.7
Maximum embedment depth	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	112.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	98.5	103.7
Maximum embedment depth	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	103.7
Maximum embedment depth	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6

Basic performance data (cont.)

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

Size		M8	M10	M12	M16	M20	M24	M30
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	5.68	8.73	11.4	18.0	25.4	25.1	26.5
Maximum embedment depth	[kN]	8.57	13.8	20.0	34.1	50.9	52.1	57.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	5.68	8.73	11.4	18.0	25.4	25.1	26.5
Maximum embedment depth	[kN]	9.47	15.0	20.6	34.1	50.9	52.1	57.7
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	5.68	8.73	11.4	18.0	25.4	25.1	26.5
Maximum embedment depth	[kN]	9.47	15.0	20.6	34.1	50.9	52.1	57.7
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	5.14	8.00	12.0	22.3	34.9	50.3	74.1
Maximum embedment depth	[kN]	5.14	8.00	12.0	22.3	34.9	50.3	80.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	70.4	74.1
Maximum embedment depth	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	74.1
Maximum embedment depth	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-CFS+RP30-4	300	1	3	108	2.44	7.32	263.52	5906675205861	18
R-CFS+RP30-600-8	600	1	1	36	8.30	8.30	298.8	5906675085876	18

Resin consumption for bonded anchors

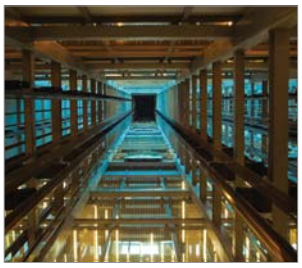
Cartridge size	Stud diameter	d	[mm]	M8	M10	M12	M16	M20	M24	M30
	Hole diameter in substrate	**d_0**	**[mm]**	**10**	**12**	**14**	**18**	**24**	**28**	**35**
175ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**42**	**28**	**19**	**11**	**4,7**	**3,2**	**1,8**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**32**	**22**	**14**	**9**	**3,4**	**4**	**2,1**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**26**	**17**	**11**	**6**	**2,4**	**1,6**	**0,8**
280 ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**73**	**49**	**34**	**19**	**8,3**	**5,6**	**3,1**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**57**	**39**	**26**	**16**	**6,0**	**3,8**	**2,2**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**46**	**30**	**20**	**10**	**4,3**	**2,8**	**1,5**
300 ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**79**	**53**	**37**	**21**	**9,0**	**6,0**	**3,4**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**61**	**42**	**28**	**17**	**6,5**	**4,1**	**2,4**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**50**	**32**	**21**	**11**	**4,6**	**3,0**	**1,6**
310 ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**82**	**55**	**38**	**22**	**9,3**	**6,3**	**3,5**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**64**	**44**	**29**	**18**	**6,7**	**4,3**	**2,4**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**52**	**33**	**22**	**12**	**4,8**	**3,1**	**1,6**
345 ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**93**	**62**	**43**	**24**	**10,5**	**7,1**	**4,0**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**72**	**49**	**32**	**20**	**7,6**	**4,8**	**2,8**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**59**	**38**	**25**	**13**	**5,4**	**3,5**	**1,9**
380 ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**104**	**69**	**48**	**27**	**11,7**	**7,9**	**4,4**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**80**	**55**	**36**	**22**	**8,4**	**5,4**	**3,1**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**65**	**42**	**28**	**15**	**6,1**	**3,9**	**2,1**
385 ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**105**	**70**	**49**	**28**	**11,8**	**8,0**	**4,5**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**81**	**56**	**37**	**22**	**8,5**	**5,4**	**3,1**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**66**	**43**	**28**	**15**	**6,1**	**4,0**	**2,1**

GLASS CAPSULES

- R-CAS-V
  - Spin-In Capsule with Threaded Rods
- R-HAC-V
  - Hammer-In with Threaded Rods
  - Hammer-In with Rebar

R-CAS-V Spin-In Capsule with Threaded Rods

High-performance, quick-setting, styrene-free vinylester resin for concrete



Approvals and Reports

- ETA-10/0108

Installation movie

Product overview

Features and benefits

- Approved for use with threaded rods in non-cracked concrete
- High performance for use safety critical application - heavy-duty fastenings with small spacing and edge distances
- The system relies on the adhesion between the concrete and resin, which is free from expansion forces. This makes it an ideal choice where close edge and spacing distances are required
- Capsule contains a precise volume of constituents making it a very consistent product
- Suitable for making fixings underwater. Adhesive strength is not affected by unpolluted water
- Suitable for dry or wet non-cracked concrete
- Styrene free - odourless

Applications

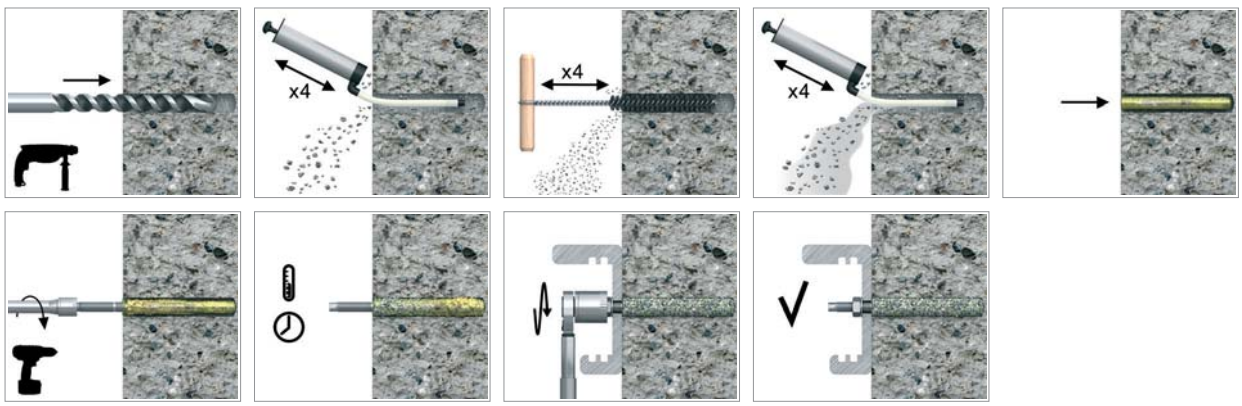
- Threaded rods
- Balustrading
- Railings
- Heavy machinery
- Structural steel
- Steel columns
- Cladding restraints
- Curtain walling
- Fencing & gates
- Formwork supports
- Garage doors
- Guard rails

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for capsule size being used.
2. Clean the hole thoroughly with brush and hand pump at least four times before installation.
3. Insert capsule into the hole. Connect stud to drilling machine using appropriate driver system.
4. Position the stud into the glass capsule then switch on the drilling machine and drive stud into the capsule. Switch off the drilling machine as soon as the bottom of hole is reached.
5. Leave the anchor undisturbed unitl the curing time elapses.
6. Attach fixture and tighten the nut to the required torque.

Product information

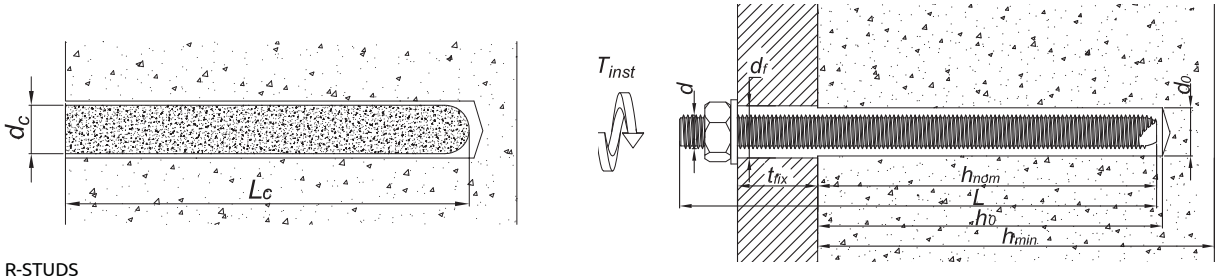
Size	Product Code	Description / Resin Type
M8	R-CAS-V-08	Styrene Free Vinylester Resin
M10	R-CAS-V-10	
M12	R-CAS-V-12	
M16	R-CAS-V-16	
M20	R-CAS-V-20	
M24	R-CAS-V-24	
M30	R-CAS-V-30	

R-STUDS

Size	Product Code			Anchor		Fixture	
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness t_{fix} for:
				d	L	d_f	$h_{nom,std}$
				[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	20
	R-STUDS-08160	-	R-STUDS-08160-A4	8	160	9	70
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	28
	R-STUDS-10170	-	R-STUDS-10170-A4	10	170	12	68
	R-STUDS-10190	-	R-STUDS-10190-A4	10	190	12	88
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	35
	R-STUDS-12190	-	R-STUDS-12190-A4	12	190	14	65
	R-STUDS-12220	-	R-STUDS-12220-A4	12	220	14	95
	R-STUDS-12260	-	R-STUDS-12260-A4	12	260	14	135
	R-STUDS-12300	-	R-STUDS-12300-A4	12	300	14	175
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	46
	R-STUDS-16220	R-STUDS-16220-88	R-STUDS-16220-A4	16	220	18	76
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	116
	R-STUDS-16300	-	R-STUDS-16300-A4	16	300	18	156
	R-STUDS-16380	-	R-STUDS-16380-A4	16	380	18	236
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	67
	R-STUDS-20300	-	R-STUDS-20300-A4	20	300	22	107
	R-STUDS-20350	-	R-STUDS-20350-A4	20	350	22	157
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4	24	300	26	62
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	106

* Make to order

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{nom} + 5						
Installation depth	h_{nom}	[mm]	80	90	110	125	170	210	270
Min. substrate thickness	h_{min}	[mm]	120	130	140	180	230	270	340
Min. spacing	s_{min}	[mm]	0.5 * h_{nom} 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{nom} 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	-	480
5	0	-	240
5	5	-	150
10	10	-	120
15	15	-	90
20	20	-	45
25	30	-	20
25	40	-	10

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	520	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	20	39	68	173	338	583	1166
Design bending resistance	M	[Nm]	11	22	39	99	193	333	666
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1793
Design bending resistance	M	[Nm]	17	34	60	152	297	513	1025
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	785	1569
Design bending resistance	M	[Nm]	12	24	42	107	208	360	719

Basic performance data

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

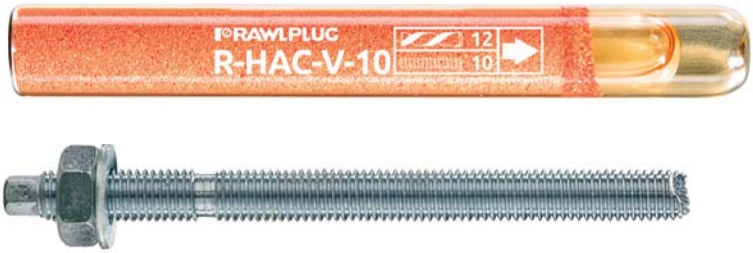
Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
Embedment depth h_{ef}	[mm]	80	90	110	125	170	210	270
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.0	29.0	42.0	60.0	95.0	140.0	200.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	25.0	30.0	50.0	60.0	95.0	140.0	200.0
R-STUDS METRIC THREADED RODS - A4	[kN]	25.0	30.0	50.0	60.0	95.0	140.0	200.0
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9.00	14.0	21.0	39.0	61.0	88.0	140.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0
R-STUDS METRIC THREADED RODS - A4	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	12.0	16.7	27.8	33.3	52.8	77.8	111.1
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	13.9	16.7	27.8	33.3	52.8	77.8	111.1
R-STUDS METRIC THREADED RODS - A4	[kN]	13.9	16.7	27.8	33.3	52.8	77.8	111.1
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	112.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	8.57	11.9	19.8	23.8	37.7	55.6	79.4
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	9.92	11.9	19.8	23.8	37.7	55.6	79.4
R-STUDS METRIC THREADED RODS - A4	[kN]	9.92	11.9	19.8	23.8	37.7	55.6	79.4
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.14	8.00	12.0	22.3	34.9	50.3	80.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0
R-STUDS METRIC THREADED RODS - A4	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7

Product commercial data

Product Code	Size	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-CAS-V-08	M8	10	480	5760	0.16	7.7	121.9	5906675280189	18
R-CAS-V-10	M10	10	480	5760	0.21	10.0	150.2	5906675280196	18
R-CAS-V-12	M12	10	480	5760	0.26	12.7	182.3	5906675280202	18
R-CAS-V-16	M16	10	480	5760	0.38	18.0	246.1	5906675280219	18
R-CAS-V-20	M20	6	108	1296	0.78	14.1	199.0	5906675280226	18
R-CAS-V-24	M24	6	108	1296	1.04	18.8	255.3	5906675280233	18
R-CAS-V-30	M30	4	32	384	1.75	14.0	197.8	5906675280240	18

R-HAC-V Hammer-In with Threaded Rods

Heavy duty anchor with small spacing and edge distances, simply installed by hammering the threaded rods



Approvals and Reports

- ETA-11/0002

Installation movie

Product overview

Features and benefits

- High performance anchor, for use in safety critical applications
- The system relies on the adhesion between concrete and resin, which is free from expansion forces. This makes it an ideal choice where close edge and spacing distances are required
- Capsule contains precise amounts of ingredients making it a very consistent product
- Adhesive bond strength is not affected by unpolluted water
- Suitable for dry or wet non-cracked concrete
- Low cost tooling required for installation, quick and easy to install
- Styrene free - virtually odourless
- Approved for use with threaded rods in non-cracked concrete

Applications

- Balustrading & handrails
- Cable trays
- Guard rails
- Machinery
- Threaded rods
- Cladding restraints
- Curtain walling
- Fencing & gates

Base materials

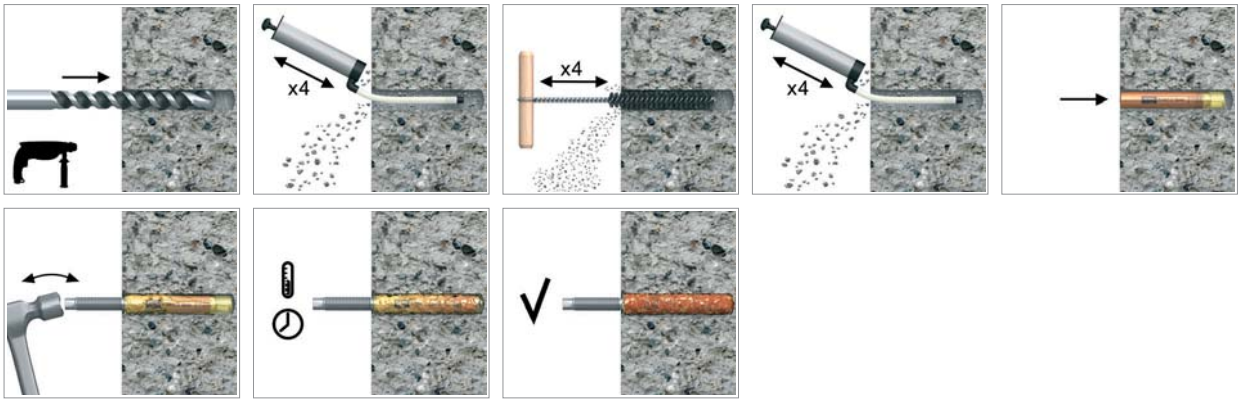
Approved for use in:

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

Also suitable for use in:

- Natural Stone

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud size being used.
2. Clean the hole thoroughly with brush and hand pump at least four times before installation.
3. Insert capsule into the hole.
4. The stud is simply hammered through the capsule using a manual or mechanical hammer (M16-M30).
5. Leave the anchor undisturbed unitl the curing time elapses.
6. Attach fixture and tighten the nut to the required torque.

Product information

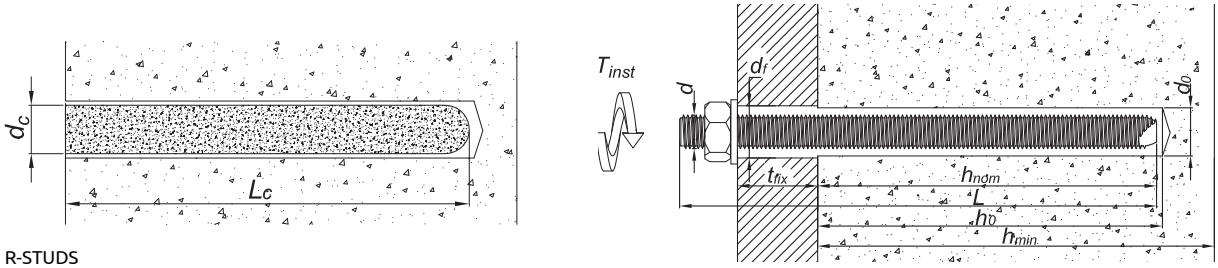
Size	Product Code	Description / Resin Type
M8	R-HAC-V-08	Styrene Free Vinylester Resin
M10	R-HAC-V-10	
M12	R-HAC-V-12	
M16	R-HAC-V-16	
M20	R-HAC-V-20	
M24	R-HAC-V-24	
M30	R-HAC-V-30	

R-STUDS

Size	Product Code			Anchor		Fixture	
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness t_{fix} for:
				d	L	d_f	$h_{nom,std}$
				[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	20
	R-STUDS-08160	-	R-STUDS-08160-A4	8	160	9	70
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	28
	R-STUDS-10170	-	R-STUDS-10170-A4	10	170	12	68
	R-STUDS-10190	-	R-STUDS-10190-A4	10	190	12	88
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	35
	R-STUDS-12190	-	R-STUDS-12190-A4	12	190	14	65
	R-STUDS-12220	-	R-STUDS-12220-A4	12	220	14	95
	R-STUDS-12260	-	R-STUDS-12260-A4	12	260	14	135
	R-STUDS-12300	-	R-STUDS-12300-A4	12	300	14	175
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	46
	R-STUDS-16220	R-STUDS-16220-88	R-STUDS-16220-A4	16	220	18	76
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	116
	R-STUDS-16300	-	R-STUDS-16300-A4	16	300	18	156
	R-STUDS-16380	-	R-STUDS-16380-A4	16	380	18	236
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	67
	R-STUDS-20300	-	R-STUDS-20300-A4	20	300	22	107
	R-STUDS-20350	-	R-STUDS-20350-A4	20	350	22	157
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4	24	300	26	62
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	106

* Make to order

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{nom} + 5						
Installation depth	h_{nom}	[mm]	80	90	110	125	170	210	270
Min. substrate thickness	h_{min}	[mm]	120	130	140	180	230	270	340
Min. spacing	s_{min}	[mm]	0.5 * h_{nom} ≥ 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{nom} ≥ 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	-	1440
5	0	-	840
5	5	-	240
10	10	-	180
15	15	-	90
20	20	-	45
25	30	-	20
25	40	-	10

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	520	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	20	39	68	173	338	583	1166
Design bending resistance	M	[Nm]	11	22	39	99	193	333	666
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1793
Design bending resistance	M	[Nm]	17	34	60	152	297	513	1025
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	785	1569
Design bending resistance	M	[Nm]	12	24	42	107	208	360	719

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
Embedment depth h_{nom}	[mm]	80	90	110	125	170	210	270
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.0	25.0	40.0	50.0	95.0	115.0	170.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	20.0	25.0	40.0	50.0	95.0	115.0	170.0
R-STUDS METRIC THREADED RODS - A4	[kN]	20.0	25.0	40.0	50.0	95.0	115.0	170.0
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9.0	14.0	21.0	39.0	61.0	88.0	140.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0
R-STUDS METRIC THREADED RODS - A4	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9.52	11.9	22.2	23.8	45.2	54.8	81.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	9.52	11.9	22.2	23.8	45.2	54.8	81.0
R-STUDS METRIC THREADED RODS - A4	[kN]	9.52	11.9	22.2	23.8	45.2	54.8	81.0
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	112.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	6.80	8.50	15.90	17.00	32.30	39.10	57.80
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	6.80	8.50	15.90	17.00	32.30	39.10	57.80
R-STUDS METRIC THREADED RODS - A4	[kN]	6.80	8.50	15.90	17.00	32.30	39.10	57.80
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.14	8.00	12.0	22.3	34.9	50.3	80.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0
R-STUDS METRIC THREADED RODS - A4	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7

Product commercial data

Product Code	Quantity [pcs]			Weight [kg]			Bar Code
	Box	Outer	Pallet	Box	Outer	Pallet	
R-HAC-V-08	10	480	5760	0.15	7.1	115.5	5906675377827
R-HAC-V-10	10	480	5760	0.17	8.2	128.1	5906675379913
R-HAC-V-12	10	480	5760	0.21	10.2	152.0	5906675379920
R-HAC-V-16	10	480	5760	0.29	13.8	195.7	5906675379937
R-HAC-V-20	6	108	1296	0.56	10.1	151.7	5906675379944
R-HAC-V-24	6	108	1296	0.75	13.4	191.1	5906675379951
R-HAC-V-30	4	32	384	1.19	9.6	144.7	5906675379968

R-HAC-V Hammer-In with Rebar

Heavy duty anchor with small spacing and edge distances, simply installed by hammering the rebar

Approvals and Reports

- ETA-11/0002

Installation movie

Product overview

Features and benefits

- Approved for use with rebar in non-cracked concrete (ETAG001 Option 7)
- High performance anchor, for use in safety critical applications
- The system relies on the adhesion between concrete and resin, which is free from expansion forces. This makes it an ideal choice where close edge and spacing distances are required
- Capsule contains precise amounts of ingredients making it a very consistent product
- Adhesive bond strength is not affected by unpolluted water
- Suitable for dry or wet non-cracked concrete
- Ideal for starter bar applications
- Low cost tooling required for installation, quick and easy to install
- Styrene free - virtually odourless

Applications

- Reinforcement bars
- Cable trays
- Heavy machinery
- Fencing & gates manufacturing and installation
- Formwork support systems

Base materials

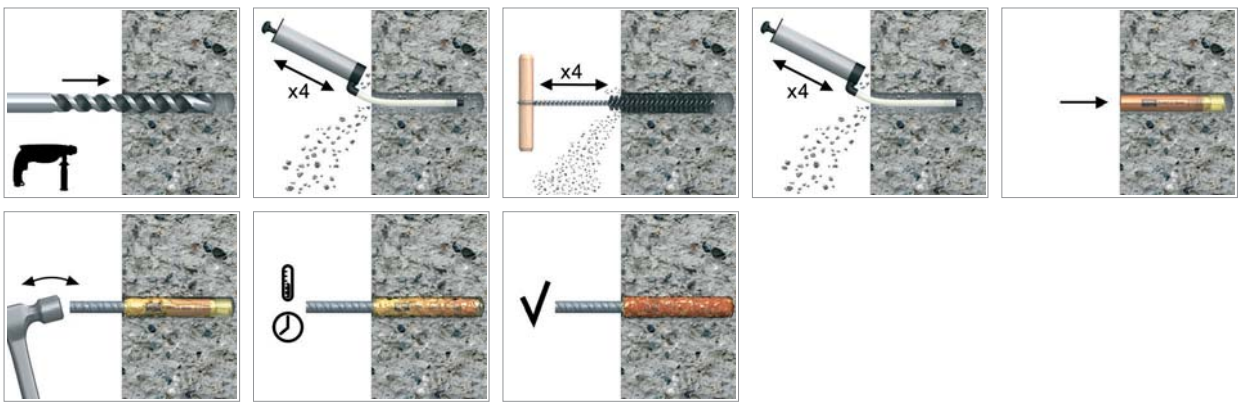
Approved for use in:

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

Also suitable for use in:

- Natural Stone

Installation guide



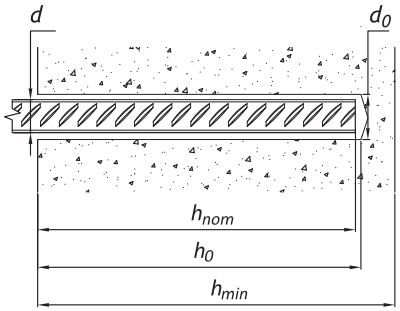
Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud size being used.
2. Clean the hole thoroughly with brush and hand pump at least four times before installation.
3. Insert capsule into the hole.
4. The stud is simply hammered through the capsule using a manual hammer.
5. Leave the anchor undisturbed unitl the curing time elapses.

Product information

Product Code	Description / Resin Type
R-HAC-V-08	Styrene Free Vinylester Resin
R-HAC-V-10	
R-HAC-V-12	
R-HAC-V-16	
R-HAC-V-20	
R-HAC-V-24	
R-HAC-V-30	

Installation data



REBARS

Size			Ø08	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
Rebar diameter	d_s	[mm]	8	10	12	14	16	20	25
Hole diameter in substrate	d_0	[mm]	12	14	16	18	22	26	35
Min. hole depth in substrate	h_0	[mm]	85	95	115	130	175	215	275
Embedment depth	h_{nom}	[mm]	80	90	110	125	170	210	270
Min. spacing	s_{min}	[mm]	40	45	55	62	85	105	135
Min. edge distance	c_{min}	[mm]	40	45	55	62	85	105	135

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	-	1440
5	0	-	840
5	5	-	240
10	10	-	180
15	15	-	90
20	20	-	45
25	30	-	20
25	40	-	10

*For wet concrete the curing time must be doubled

Mechanical properties

REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
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
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534
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
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534
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
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534

Basic performance data

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

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
Substrate		Non-cracked concrete						
CHARACTERISTIC LOAD								
TENSION LOADS N_{Rk}								
A-II (18G2)								
Standard Embedment Depth	[kN]	16.0	20.0	30.0	40.0	50.0	60.0	95.0
A-III (34GS)								
Standard Embedment Depth	[kN]	16.0	20.0	30.0	40.0	50.0	60.0	95.0
A-IIIN (RB500, BSt500S, B500SP)								
Standard Embedment Depth	[kN]	16.0	20.0	30.0	40.0	50.0	60.0	95.0
SHEAR LOADS V_{Rk}								
A-II (18G2)	[kN]	12.1	18.8	27.1	36.9	48.3	75.4	117.8
A-III (34GS)	[kN]	12.6	19.6	28.3	38.5	50.3	78.5	122.7
A-IIIN (RB500, BSt500S, B500SP)	[kN]	13.8	21.6	31.1	42.3	55.3	86.4	135.0
DESIGN LOAD								
TENSION LOADS N_{Rd}								
A-II (18G2)								
Standard Embedment Depth	[kN]	8.9	11.1	16.7	22.2	27.8	33.3	52.8
A-III (34GS)								
Standard Embedment Depth	[kN]	8.9	11.1	16.7	22.2	27.8	33.3	52.8
A-IIIN (RB500, BSt500S, B500SP)								
Standard Embedment Depth	[kN]	8.9	11.1	16.7	22.2	27.8	33.3	52.8
SHEAR LOADS V_{Rd}								
A-II (18G2)	**[kN]**	8.0	12.6	18.1	24.6	32.2	50.3	78.5
A-III (34GS)	**[kN]**	8.4	13.1	18.8	25.7	33.5	52.4	81.8
A-IIIN (RB500, BSt500S, B500SP)	**[kN]**	9.2	14.4	20.7	28.2	36.9	57.6	90.0

Basic performance data (cont.)

R-STUDS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
Substrate		Non-cracked concrete						
RECOMMENDED LOAD*								
TENSION LOADS N_{rec}								
A-II (18G2)								
Standard Embedment Depth	[kN]	6.35	7.9	11.9	15.9	19.8	23.8	37.7
A-III (34GS)								
Standard Embedment Depth	[kN]	6.35	7.9	11.9	15.9	19.8	23.8	37.7
A-IIIN (RB500, BSt500S, B500SP)								
Standard Embedment Depth	[kN]	6.35	7.9	11.9	15.9	19.8	23.8	37.7
SHEAR LOADS V_{rec}								
A-II (18G2)	[kN]	5.74	8.98	12.9	17.6	23.0	35.9	56.1
A-III (34GS)	[kN]	5.98	9.35	13.5	18.3	23.9	37.4	58.4
A-IIIN (RB500, BSt500S, B500SP)	[kN]	6.58	10.3	14.8	20.2	26.3	41.1	64.3

Product commercial data

Product Code	Quantity [pcs]			Weight [kg]			Bar Codes
	Box	Outer	Pallet	Box	Outer	Pallet	
R-HAC-V-08[1)]	10	480	5760	0.15	7.1	115.5	5906675377827
R-HAC-V-10[1)]	10	480	5760	0.17	8.2	128.1	5906675379913
R-HAC-V-12[1)]	10	480	5760	0.21	10.2	152.0	5906675379920
R-HAC-V-16[1)]	10	480	5760	0.29	13.8	195.7	5906675379937
R-HAC-V-20[1)]	6	108	1296	0.56	10.1	151.7	5906675379944
R-HAC-V-24[1)]	6	108	1296	0.75	13.4	191.1	5906675379951
R-HAC-V-30[1)]	4	32	384	1.19	9.6	144.7	5906675379968

1) ETA-11/0002

ACCESSORIES

- R-STUDS
- R-ITS
- R-BRUSH
- R-BLOWPUMP
- Plastic and Wire Mesh Sleeves R-PLS
- R-NOZ Mixer Nozzles
- R-GUN Dispenser Guns

R-STUDS Threaded Rods with Hexagonal or Flat Head

Threaded rod with hexagonal or flat head for use with bonded anchors.

Hexagonal Head

Flat Head

Product overview

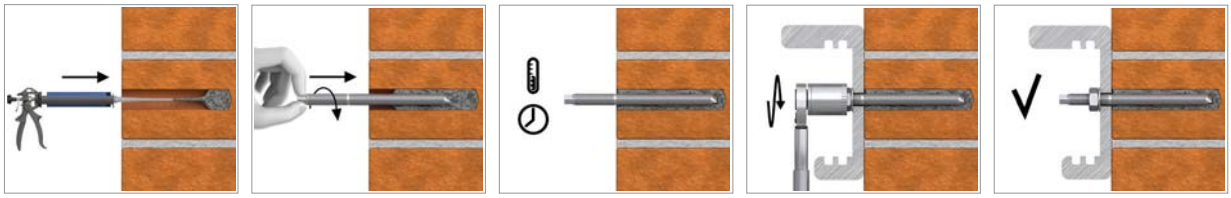
Features and benefits

- High load-bearing capacities when used with Rawlplug high-performance bonded anchor resins
- Hexagonal head for convenient use with torque wrench
- Flat head for quick manual installation
- A4 stainless steel version for use outdoors and in damp conditions
- Class 8.8 carbon steel version offers improved load-bearing capacities (relative to standard carbon steel)
- Suitable for use with special mesh sleeves in hollow substrates
- Can be post-installed through fixture in some cases. (Consult technical advisory service)
- Possibility of removal when used with internally threaded socket

Applications

- Balustrading & handrails
- Supports
- Barriers
- Racking systems
- Consoles
- Railings
- Window elements
- Scaffolding
- Machinery
- Facades
- Copy-eco systems
- Cable trays
- Curtain walling
- Formwork supports
- Heavy machinery
- Lamps
- Safety barriers
- Road Signs
- Railings
- Public seating

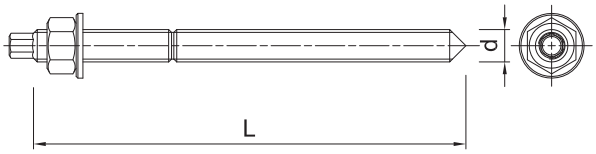
Installation guide



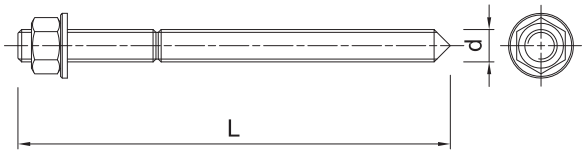
1. Drill hole to the required diameter and depth for stud size being used.
2. Clean the hole thoroughly with hand pump and hole brush
3. If required, insert the mesh sleeve into position
4. Fill hole with the required resin to the recommended fill level. (Follow the relevant instructions for the resin product)
5. Insert the threaded stud slowly and with a slight twisting motion, until the required embedment depth is reached
6. Leave undisturbed until curing time of resin has elapsed
7. Attach fixture and tighten the nut to the required installation torque

Product information

Hexagonal Head



Flat Head



Size	Product Code	Anchor		Fixture			
		Diameter	Length	Max. thickness			Hole diameter
		d	L	$t_{fix,\,min}$	$t_{fix,\,s}$	$t_{fix,\,max}$	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
R-STUDS Metric Threaded Rods - Steel Class 5.8							
M8	R-STUDS-08110 / R-STUDS-08110-FL	8	110	40	20	-	9
	R-STUDS-08160 / R-STUDS-08160-FL	8	160	90	70	50	9
M10	R-STUDS-10130 / R-STUDS-10130-FL	10	130	48	28	-	12
	R-STUDS-10170 / R-STUDS-10170-FL	10	170	88	68	38	12
M12	R-STUDS-12160 / R-STUDS-12160-FL	12	160	65	35	-	14
	R-STUDS-12190 / R-STUDS-12190-FL	12	190	95	65	30	14
	R-STUDS-12220 / R-STUDS-12220-FL	12	220	125	95	60	14
	R-STUDS-12260 / R-STUDS-12260-FL	12	260	165	135	100	14
M16	R-STUDS-16190 / R-STUDS-16190-FL	16	190	71	46	-	18
	R-STUDS-16220 / R-STUDS-16220-FL	16	220	101	76	11	18
	R-STUDS-16260 / R-STUDS-16260-FL	16	260	141	116	51	18
M20	R-STUDS-20260 / R-STUDS-20260-FL	20	260	117	67	-	22
	R-STUDS-20300 / R-STUDS-20300-FL	20	300	157	107	37	22
	R-STUDS-20350 / R-STUDS-20350-FL	20	350	207	157	87	22
M24	R-STUDS-24300 / R-STUDS-24300-FL	24	300	132	62	-	26
M30	R-STUDS-30380 / R-STUDS-30380-FL	30	380	181	106	-	32
R-STUDS Metric Threaded Rods - Steel Class 8.8							
M8	R-STUDS-08110-88 -	8	110	40	20	-	9
M10	R-STUDS-10130-88 -	10	130	48	28	-	12
M12	R-STUDS-12160-88 -	12	160	65	35	-	14
M16	R-STUDS-16190-88 -	16	190	71	46	-	18
	R-STUDS-16220-88 -	16	220	101	76	11	18
M20	R-STUDS-20260-88 -	20	260	117	67	-	22
M24	R-STUDS-24300-88 -	24	300	132	62	-	26
M30	R-STUDS-30380-88 -	30	380	181	76	-	32

Product information

Size	Product Code	Anchor		Fixture				
		Diameter	Length	Max. thickness t_{fix} for:			Hole diameter	Max. thickness
		d	L	$h_{nom,min}$	$h_{nom,std}$	$h_{nom,max}$	d_f	t_{fix}
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
R-STUDS Metric Threaded Rods - A4								
M8	R-STUDS-08110-A4 / R-STUDS-08110-A4FL	8	110	40	20	0	9	20
	R-STUDS-08160-A4	8	160	90	70	50	9	70
M10	R-STUDS-10130-A4 / R-STUDS-10130-A4FL	10	130	48	28	0	12	33
	R-STUDS-10170-A4 / R-STUDS-10170-A4FL	10	170	88	68	38	12	73
	R-STUDS-10190-A4 / R-STUDS-10190-A4FL	10	190	108	88	58	12	93
M12	R-STUDS-12160-A4 / R-STUDS-12160-A4FL	12	160	65	35	0	14	50
	R-STUDS-12190-A4 / R-STUDS-12190-A4FL	12	190	95	65	30	14	80
	R-STUDS-12220-A4	12	220	125	95	60	14	110
	R-STUDS-12260-A4	12	260	165	135	100	14	150
	R-STUDS-12300-A4	12	300	205	175	140	14	190
M16	R-STUDS-16190-A4 / R-STUDS-16190-A4FL	16	190	71	46	0	18	66
	R-STUDS-16220-A4 / R-STUDS-16220-A4FL	16	220	101	76	11	18	96
	R-STUDS-16260-A4 / R-STUDS-16260-A4FL	16	260	141	116	51	18	136
	R-STUDS-16300-A4	16	300	181	156	91	18	176
	R-STUDS-16380-A4	16	380	261	236	171	18	256
M20	R-STUDS-20260-A4 / R-STUDS-20260-A4FL	20	260	117	67	0	22	-
	R-STUDS-20300-A4	20	300	157	107	37	22	-
	R-STUDS-20350-A4	20	350	207	157	87	22	-
M24	R-STUDS-24300-A4 / R-STUDS-24300-A4FL	24	300	132	62	0	26	-
M30	R-STUDS-30380-A4 / R-STUDS-30380-A4FL	30	380	181	76	0	32	-

Product commercial data

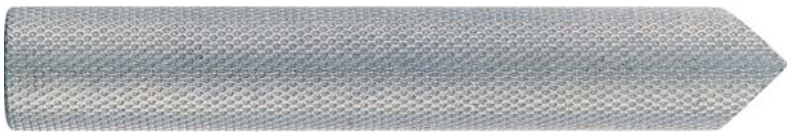
Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Codes
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
R-STUDS Metric Threaded Rods - Steel Class 5.8										
M8	R-STUDS-08110	8	110	10	500	4200	0.43	21.6	211.4	5906675127477
	R-STUDS-08160	8	160	10	150	4200	0.61	9.1	284.1	5906675234649
M10	R-STUDS-10130	10	130	10	300	9000	0.77	23.1	723.9	5906675127484
	R-STUDS-10170	10	170	10	10	4200	1.01	1.01	453.4	5906675234663
	R-STUDS-10190	10	190	10	250	9000	1.09	27.4	1014.6	5906675234670
M12	R-STUDS-12160	12	160	10	120	5400	1.45	17.4	813.0	5906675127491
	R-STUDS-12190	12	190	10	120	5760	1.57	18.8	931.4	5906675234694
	R-STUDS-12220	12	220	10	120	5760	1.77	21.3	1051.2	5906675234700
	R-STUDS-12260	12	260	10	90	4200	2.1	19.0	914.9	5906675234717
	R-STUDS-12300	12	300	10	10	4500	2.4	2.4	1110.0	5906675234731
M16	R-STUDS-16190	16	190	10	60	3600	2.8	17.0	1049.2	5906675130903
	R-STUDS-16220	16	220	10	60	2880	3.3	19.7	975.8	5906675234748
	R-STUDS-16260	16	260	10	60	1920	3.8	22.8	760.9	5906675234755
	R-STUDS-16300	16	300	5	5	270	2.2	2.2	148.3	5906675234762
	R-STUDS-16380	16	380	1	40	1300	0.57	23.0	776.5	5906675234779
M20	R-STUDS-20260	20	260	5	40	1600	2.9	23.4	964.1	5906675234786
	R-STUDS-20300	20	300	5	5	870	3.5	3.5	632.4	5906675379463
	R-STUDS-20350	20	350	2	2	-	1.57	1.57	-	5906675324883
M24	R-STUDS-24300	24	300	2	12	1000	2.0	11.7	1004.0	5906675260433
M30	R-STUDS-30380	30	380	2	2	500	3.9	3.9	1011.5	5010445001611
R-STUDS Metric Threaded Rods - Steel Class 8.8										
M8	R-STUDS-08110-88	8	110	10	10	5040	0.42	0.42	241.7	5906675076171
M10	R-STUDS-10130-88	10	130	10	250	-	0.77	19.4	--	5906675076188
M12	R-STUDS-12160-88	12	160	10	120	-	1.33	15.9	-	5906675076195

Product commercial data (cont.)

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Codes
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
M16	R-STUDS-16190-88	16	190	10	60	-	2.8	17.0	-	5906675076201
	R-STUDS-16220-88	16	220	10	10	1990	3.2	3.2	666.8	5906675060514
M20	R-STUDS-20260-88	20	260	5	40	-	2.9	23.4	-	5906675076218
M24	R-STUDS-24300-88	24	300	2	2	-	2.0	2.0	-	5906675076225
M30	R-STUDS-30380-88	30	380	2	2	-	3.9	3.9	-	5906675076232
R-STUDS Metric Threaded Rods - Steel Class 5.8, Flat Head										
M8	R-STUDS-08110-FL	8	110	10	10	5040	0.43	0.43	245.7	5010445001468
	R-STUDS-08160-FL	8	160	10	10	2030	0.43	0.43	117.3	5906675260372
M10	R-STUDS-10130-FL	10	130	10	250	5040	0.77	19.3	419.6	5010445001482
	R-STUDS-10170-FL	10	170	10	10	3780	1.01	1.01	412.5	5906675260389
M12	R-STUDS-12160-FL	12	160	10	100	7200	1.35	13.5	1001.3	5010445001512
	R-STUDS-12190-FL	12	190	10	120	1000	1.56	18.7	186.1	5906675262338
	R-STUDS-12220-FL	12	220	10	120	3200	1.79	21.5	604.1	5906675261706
	R-STUDS-12260-FL	12	260	10	10	1100	2.1	2.1	259.7	5906675260396
M16	R-STUDS-16190-FL	16	190	10	60	3840	2.9	17.2	1127.5	5010445001550
	R-STUDS-16220-FL	16	220	10	10	1920	3.3	3.3	660.3	5906675260402
	R-STUDS-16260-FL	16	260	10	10	1920	3.8	3.8	759.6	5906675260419
M20	R-STUDS-20260-FL	20	260	6	36	1728	3.6	21.5	1062.5	5010445001598
	R-STUDS-20300-FL	20	300	5	30	270	3.4	20.6	215.4	5906675262468
	R-STUDS-20350-FL	20	350	10	10	960	8.1	8.1	802.8	5906675234793
M24	R-STUDS-24300-FL	24	300	2	2	770	2.0	2.0	779.2	5906675240794
M30	R-STUDS-30380-FL	30	380	1	1	500	1.94	1.94	999.0	5906675234816
R-STUDS Metric Threaded Rods - A4										
M8	R-STUDS-08110-A4	8	110	10	10	4200	0.43	0.43	210.2	5010445001642
	R-STUDS-08160-A4	8	160	10	10	-	6.0	6.0	-	5906675324920
M10	R-STUDS-10130-A4	10	130	10	10	900	0.79	0.79	101.5	5906675234823
	R-STUDS-10170-A4	10	170	10	10	-	10.1	10.1	-	5906675324937
	R-STUDS-10190-A4	10	190	10	10	-	1.10	1.10	-	5906675324944
M12	R-STUDS-12160-A4	12	160	10	120	5760	1.37	16.5	820.8	5906675234830
	R-STUDS-12190-A4	12	190	10	10	-	1.80	1.80	-	5906675324951
	R-STUDS-12220-A4	12	220	10	10	5760	1.77	1.77	1048.4	5906675089416
	R-STUDS-12260-A4	12	260	10	10	-	2.2	2.2	-	5906675324968
	R-STUDS-12300-A4	12	300	10	10	-	2.5	2.5	-	5906675324975
M16	R-STUDS-16190-A4	16	190	10	10	4200	2.9	2.9	1243.8	5906675234847
	R-STUDS-16220-A4	16	220	10	10	-	3.0	3.0	-	5906675324982
	R-STUDS-16260-A4	16	260	10	10	240	41.0	41.0	1014.0	5906675176420
	R-STUDS-16300-A4	16	300	10	10	-	4.5	4.5	-	5906675325002
	R-STUDS-16380-A4	16	380	10	10	-	5.5	5.5	-	5906675325019
M20	R-STUDS-20260-A4	20	260	5	5	1584	3.0	3.0	977.5	5906675234854
	R-STUDS-20300-A4	20	300	2	2	-	1.40	1.40	-	5906675324906
	R-STUDS-20350-A4	20	350	2	2	-	1.80	1.80	-	5906675324913
M24	R-STUDS-24300-A4	24	300	2	2	260	2.1	2.1	300.1	5906675176406
M30	R-STUDS-30380-A4	30	380	2	2	-	3.9	3.9	-	5906675176444
R-STUDS Metric Threaded Rods - A4, Flat Head										
	R-STUDS-08110-A4FL	8	110	10	10	4200	0.43	0.43	210.2	5906675260440
	R-STUDS-10130-A4FL	10	130	10	10	9600	0.80	0.80	799.9	5906675260457
	R-STUDS-10170-A4FL	10	170	10	10	530	1.02	1.02	83.8	5906675261409
	R-STUDS-12160-A4FL	12	160	10	120	1800	1.37	16.5	277.3	5010445001727
	R-STUDS-12190-A4FL	12	190	10	10	5760	1.62	1.62	962.5	5906675261393
	R-STUDS-16190-A4FL	16	190	10	10	960	2.9	2.9	309.3	5906675260471
	R-STUDS-16220-A4FL	16	220	10	10	1000	3.3	3.3	361.6	5906675267425
	R-STUDS-16260-A4FL	16	260	10	10	240	41.0	41.0	1014.0	5906675176468
	R-STUDS-20260-A4FL	20	260	5	5	1600	3.0	3.0	1002.2	5906675260488
	R-STUDS-24300-A4FL	24	300	2	2	770	2.1	2.1	841.2	5906675260495
	R-STUDS-30380-A4FL	30	380	2	2	-	3.9	3.9	-	5906675176482

R-ITS Internally Threaded Sockets

Internally threaded socket for the attachment of suitable bolt or threaded rod.



Product overview

Features and benefits

- Allows removal of bolt to leave a re-usable socket in place
- High load-bearing capacity
- Close edge and spacing distances
- Expansion free functioning
- Available in zinc plated and stainless steel versions

Applications

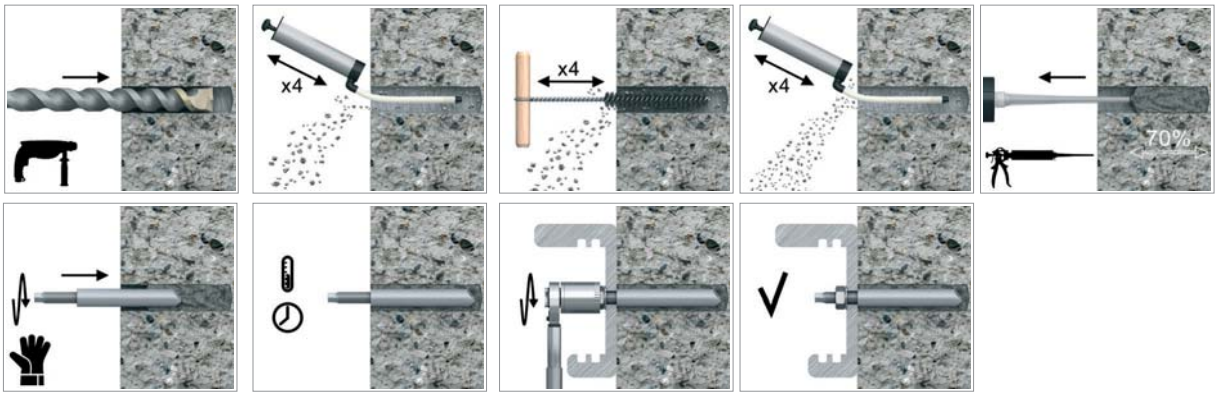
- For fastening of threaded rods or bolts
- Safety barriers
- Temporary works/formworks support systems

Base materials

Approved for use in:

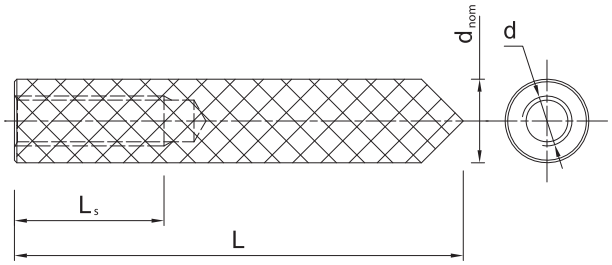
- Non-cracked concrete C20/25-C50/60

Installation guide



1. After injecting resin, immediately insert the socket anchor, slowly and with a slight twisting motion until flush with surface
2. Remove excess resin, then leave anchorage undisturbed until curing time has elapsed
3. After injecting resin, immediately insert the socket anchor, slowly and with a slight twisting motion until flush with surface
4. For installation with a drilling machine, insert the setting tool into socket and spin in using rotary hammer action
5. Remove excess resin, then leave anchorage undisturbed until curing time has elapsed

Product information



Size	Product Code	Anchor				Fixture
		Diameter	Diameter	Length	Internal thread length	Hole diameter
		d	d_{nom}	L	L_s	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
R-ITS-Z						
M6	R-ITS-Z-06075	6	10	75	24	7
M8	R-ITS-Z-08075	8	12	75	25	9
	R-ITS-Z-08090	8	12	90	25	9
M10	R-ITS-Z-10075	10	16	75	30	12
	R-ITS-Z-10100	10	16	100	30	12
M12	R-ITS-Z-12100	12	16	100	35	14
M16	R-ITS-Z-16125	16	24	125	50	18
R-ITS-A4						
M6	R-ITS-A4-06075	6	10	75	24	7
M8	R-ITS-A4-08075	8	12	75	25	9
	R-ITS-A4-08090	8	12	90	25	9
M10	R-ITS-A4-10075	10	16	75	30	12
	R-ITS-A4-10100	10	16	100	30	12
M12	R-ITS-A4-12100	12	16	100	35	14
M16	R-ITS-A4-16125	16	24	125	50	18

Product commercial data

	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter	Length	Box	Outer	Pallet	Box	Outer	Pallet	
R-ITS-Z										
M6	R-ITS-Z-06075	11	75	10	10	5600	0.41	0.41	260.7	5010445606205
M8	R-ITS-Z-08075	12.5	75	10	10	5600	0.65	0.65	394.0	5906675087719
	R-ITS-Z-08090	12.5	90	10	10	5600	0.70	11.2	422.0	5010445606236
M10	R-ITS-Z-10075	16.5	75	10	10	5600	0.77	0.77	461.2	5010445606243
	R-ITS-Z-10100	16.5	100	10	10	3360	1.36	21.7	486.0	5010445606267
M12	R-ITS-Z-12100	18	100	6	6	2016	0.69	0.69	261.8	5906675087726
M16	R-ITS-Z-16125	22	125	6	6	2016	2.0	2.0	699.3	5906675087733
R-ITS-A4										
M6	R-ITS-A4-06075	11	75	10	10	3780	0.40	0.40	181.2	5906675087740
M8	R-ITS-A4-08075	12.5	75	10	10	7000	0.62	0.62	464.0	5906675087757
	R-ITS-A4-08090	12.5	90	10	10	3780	0.62	0.62	264.4	5906675087764
M10	R-ITS-A4-10075	16.5	75	10	10	3780	1.29	1.29	517.6	5010445609893
	R-ITS-A4-10100	16.5	100	10	10	4200	1.04	1.04	466.8	5010445609923
M12	R-ITS-A4-12100	18	100	6	6	2400	1.15	1.15	490.8	5010445609930
M16	R-ITS-A4-16125	22	125	6	6	2400	1.57	1.57	658.8	5906675087771

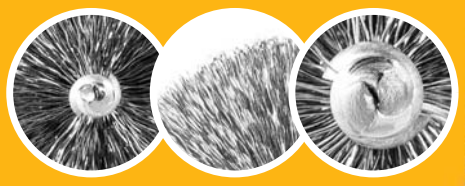
R-BRUSH

MANUAL AND AUTOMATIC WIRE BRUSHES

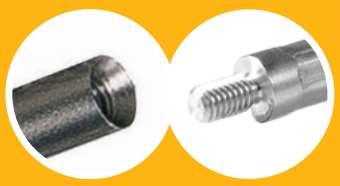
Ideal for cleaning dust from drilled holes prior to applying bonded anchors or installing mechanical anchors. Hole cleaning is necessary for correct loads.
Suitable for variable anchor embedment depths.
Suitable for repetitive and frequent use.

Durability and strength

Right quality of the brush ensures adequate cleaning of holes from debris and dust

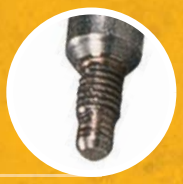


Select the right diameter of brushes. Do not use brushes which are too small During cleaning, resistance must be encountered after insertion into the hole that has been drilled.



Brushes and extensions can be connected to the required depth of the hole

Extensions are **made of stainless steel**, which makes them rugged and suitable for long-term operation in tough conditions



Are **appropriate for manual cleaning** holes drilled in concrete and masonry

Can be operated automatically with an SDS PLUS

R-BRUSH Manual and automatic Wire Brushes

Brush accessory for cleaning out holes prior to anchor installation

R-BRUSH /M

R-BRUSH TC | R-BRUSH-LT | R-BRUSH-LH

NEW PRODUCT

R-BRUSH TC | R-BRUSH-EXT-H-TC | R-BRUSH-EXT-H-SDS

Features and benefits

- Ideal for cleaning dust from drilled holes prior to applying bonded anchors or installing mechanical anchors
- Hole cleaning is necessary for correct loads
- Suitable for variable anchor embedment depths.
- Suitable for repetitive and frequent use.

Installation guide for brushes and blow pump

1. Drill hole to the required diameter and depth for stud size being used.
2. Choose a brush for the diameter of the hole
3. Connect the brush with the correct extension for the hole depth
4. Connect the brush set to the hammer drill (automatic cleaning 2x2x2)
5. Clean the hole thoroughly with compressed air at least two times before installation
6. Insert the brush set into the hole and turn on the drill to reach the bottom of the hole 2 times.
7. Insert compressed air into the bottom of the hole and two times blow the hole until the air stream is free notieceable of dust.

Product commercial data

Product Code	Drill diameter [mm]	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
Manual Wire Brushes								
R-BRUSH-M08/M	10	1	10	300	0.10	1.01	60.3	5906675249759
R-BRUSH-M10/M	12	1	10	500	0.10	1.01	80.6	5906675249766
R-BRUSH-M12/M	14	1	10	500	0.10	1.01	80.6	5906675249773
R-BRUSH-M16/M	18	1	10	400	0.10	1.01	70.5	5906675249780
R-BRUSH-M20/M	24	1	10	250	0.10	1.01	55.3	5906675249797
R-BRUSH-M24/M	28	1	10	250	0.10	1.01	55.3	5906675249803
R-BRUSH-M30/M	35	1	10	300	0.10	1.01	60.3	5906675249810
Manual Plastic Brushes								
R-BRUSH-M08/10	M8-M10	1	1	3600	0.03	0.03	127.2	5906675130897
R-BRUSH-M10/14	M12-M14	1	1	3600	0.03	0.03	127.2	5906675127446
R-BRUSH-M16/28	M16	1	1	3600	0.06	0.06	246.0	5906675127453
Wire brush with threaded coupling								
R-BRUSH-12-TC	12	1	1	-	0.05	0.05	-	5906675432656
R-BRUSH-14-TC	14	1	1	-	0.05	0.05	-	5906675432663
R-BRUSH-16-TC	16	1	1	-	0.06	0.06	-	5906675432670
R-BRUSH-18-TC	18	1	1	-	0.06	0.06	-	5906675432687
R-BRUSH-20-TC	20	1	1	-	0.07	0.07	-	5906675432694
R-BRUSH-22-TC	22	1	1	-	0.07	0.07	-	5906675432700
R-BRUSH-27-TC	27	1	1	-	0.10	0.10	-	5906675432717
R-BRUSH-32-TC	32	1	1	-	0.11	0.11	-	5906675432724
R-BRUSH-37-TC	37	1	1	-	0.13	0.13	-	5906675432731
R-BRUSH-42-TC	42	1	1	-	0.15	0.15	-	5906675432748
R-BRUSH-52-TC	52	1	1	-	0.15	0.15	-	5906675432755
Extendsion for R-BRUSH with threaded coupling								
R-BRUSH-EXT-LH	-	1	1	-	0.15	0.15	-	5906675432762
R-BRUSH-EXT-LT	-	1	1	-	0.15	0.15	-	5906675432779
Extension for machine cleaning R-BRUSH with threaded coupling								
R-BRUSH-EXT-H-TC		1	10	-	0.35	3.5		5906675436104
R-BRUSH-EXT-H-SDS		1	10		0.35	3.5		5906675436111

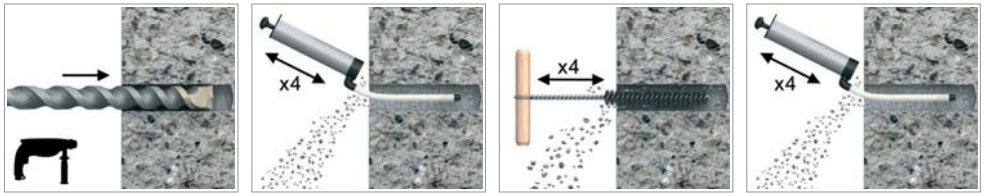
R-BLOWPUMP Blow Pump

Manual blow pump ideal for cleaning dust from drilled holes prior to applying bonded anchors or installing mechanical anchors

Features and benefits

- Ideal for cleaning dust from drilled holes prior to applying bonded anchors or installing mechanical anchors
- Hole cleaning is necessary for correct loads
- Manual, easy to use
- Serial application

Installation guide for brushes and blow pump



1. Before inserting anchor, clear debris from hole
2. Insert pipe to bottom of hole and pump air repeatedly four times
3. Additional use of hole brush is recommended, four times

Product commercial data

Product Code	Quantity [pcs]	Weight [kg]		Bar Code
		Box	Outer	
R-BLOWPUMP	1	12.0	12.0	5906675102412

RT-MAXH Hollow drill bits Dustlessdrill SDS max

Hollow drill bits SDS max for dust-free drilling in reinforced concrete

Certificate

Installation movie

Product information

Features and benefits

- Two holes in the tip of the drill bit allows you to drill and extract dust simultaneously (due to the possibility of fastening a vacuum cleaner)
- Drilling, along with dust extraction, make the hole smooth and clean
- Quick removal of dust increases drilling speed and enhances drill bit durability (reduces friction)
- Drilled holes do not require cleaning before fastening, which greatly reduces assembly time
- Rubber adapter, which is built-in the bit, enables you to fasten a vacuum cleaner hose and to drill holes without dust

Applications

- Drilling holes in reinforced concrete, concrete, stone and hard brick

Base materials

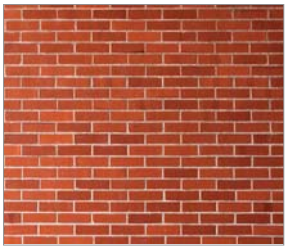
- Reinforced concrete
- Concrete
- Solid Brick
- Solid Concrete Block

Commercial product data

Index	Drill diameter	Length	Working length	Quantity	Weight	Outer weight	EAN
	[mm]	[mm]	[mm]	[pcs]	kg	kg	
RT-MAXH-14/600	14	600	400	1	0.82	4.11	5906675397085
RT-MAXH-16/600	16	600	400	1	0.92	4.59	5906675397092
RT-MAXH-18/600	18	600	400	1	0.99	4.97	5906675397108
RT-MAXH-20/600	20	600	400	1	1.13	5.64	5906675397115
RT-MAXH-22/600	22	600	400	1	1.13	5.64	5906675397122
RT-MAXH-25/600	25	600	400	1	1.12	5.62	5906675397139
RT-MAXH-28/600	28	600	400	1	1.29	6.44	5906675397146
RT-MAXH-30/600	30	600	400	1	1.44	7.18	5906675397153
RT-MAXH-32/600	32	600	400	1	1.48	7.40	5906675397160
RT-MAXH-35/600	35	600	400	1	1.59	7.93	5906675397177

RT-SDSH Hollow drill bits Dustlessdrill SDS plus

Hollow drill bits SDS plus for dust-free drilling in concrete



Certificate

Installation movie

Product information

Features and benefits

- Two holes in the tip of the drill bit allows you to drill and extract dust simultaneously (due to the possibility of fastening a vacuum cleaner)
- Drilling, along with dust extraction, make the hole smooth and clean
- Quick removal of dust increases drilling speed and enhances drill bit durability (reduces friction)
- Drilled holes do not require cleaning before fastening, which greatly reduces assembly time
- Centring point for quick commencement of drilling without the drill slipping
- Very deep seating of carbide plate significantly improves connection with the drill core, which affects quality

Applications

- Drilling holes in reinforced concrete, concrete, stone and hard brick

Base materials

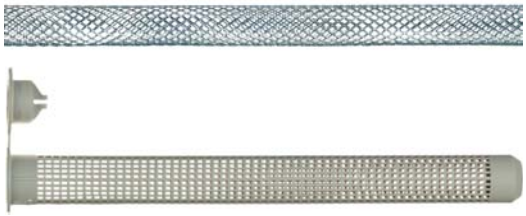
- Concrete
- Solid Brick
- Solid Concrete Block
- Natural stone

Commercial product data

Index	Drill diameter	Length	Working length	Quantity	Weight	Outer weight	EAN
	[mm]	[mm]	[mm]	[pcs]	kg	kg	
RT-SDSH-8/270	8	270	150	1	0.22	1.10	5906675397184
RT-SDSH-10/270	10	270	150	1	0.25	1.25	5906675397191
RT-SDSH-12/320	12	320	200	1	0.31	1.56	5906675397207
RT-SDSH-14/370	14	370	250	1	0.39	1.95	5906675397214
RT-SDSH-15/370	15	370	250	1	0.50	2.48	5906675397221
RT-SDSH-16/370	16	370	250	1	0.43	2.17	5906675397238
RT-SDSH-18/370	18	370	250	1	0.53	2.63	5906675397245
RT-SDSH-20/370	20	370	250	1	0.62	3.11	5906675397252
RT-SDSH-24/370	24	370	250	1	0.01	0.05	5906675397269

Plastic and Wire Mesh Sleeves

Mesh sleeves for reduced mortar consumption and optimal mechanical interlock for masonry



Product overview

Features and benefits

- Plastic version cap in ensures the anchor rod is properly centred
- Reduces consumption of resin
- User-friendly installation in hollow substrates
- Wire mesh must be cut to suit required hole depth
- Hole cleaning is not necessary

Applications

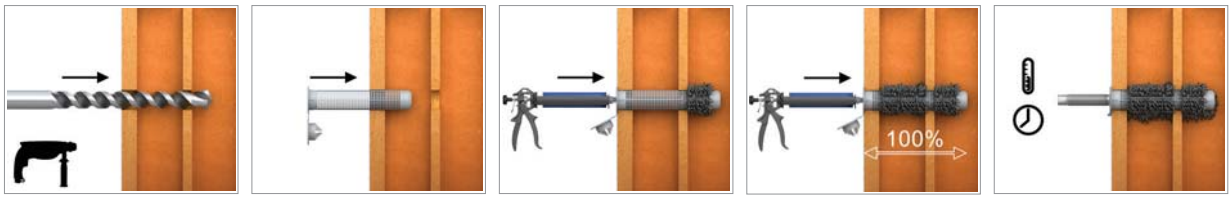
- For use with R-STUDS threaded rods in hollow base materials

Base materials

Approved for use in:

- Hollow Brick
- Hollow Lightweight Concrete Block
- Hollow Sand-lime Brick
- Hollow-core Slab

Installation guide



1. Simply insert the sleeve into pre-drilled hole before injection of the resin.

Product commercial data

Product Code	Size		Quantity [pcs]			Weight [kg]			Bar Code
	Sleeve [mm]	Stud	Box	Outer	Pallet	Box	Outer	Pallet	
R-PLS-12050-10	12x50	M8	10	480	8400	0.06	4.2	80.4	5906675377520
R-PLS-16085-10	16x85	M10-M12	10	6000	6000	0.05	2.5	60.0	5906675347547
R-PLS-16130-10	16x130	M10-M12	10	6000	4800	0.06	2.6	60.7	5906675347554
R-PLS-20085-10	20x85	M16	10	4800	4800	0.10	4.0	78.0	5906675291864
SP-CE-R08	10X1000	M8	10	10	5430	0.64	0.64	375.3	5906675266138
SP-CE-R10	12x1000	M10	10	10	1500	0.56	0.56	113.3	5906675610122
SP-CE-R12	16x1000	M12	10	10	1110	0.66	0.66	115.8	5906675610320
SP-CE-R16	22x1000	M16	10	10	384	1.29	1.29	79.5	5906675610528
SP-CE-R20	28x1000	M20	5	5	280	0.57	0.57	61.6	5906675610726

R-NOZ Mixer Nozzles

Static mixer for bonded anchors in cartridges and CFS+ system

R-NOZ

R-NOZ-KER-II

R-NOZ-KEX-II

Product overview

Features and benefits

- Covenient extrusion and mixing of resin and hardener
- Available with or without hanger
- Ideal for serial applications: rebar or anchoring
- R-NOZ fits R-KER, R-KEM II and R-KF2
- Specially dedicated nozzles for R-NOZ-KER II fits for hybride resin R-KER II resin, R-NOZ-KEX II fits R-KEX II epoxy resin
- Possibility of extension- attach R-NOZ-EXT - 1m extension nozzle

Applications

- For use in a wide range of fastening applications in concrete and solid masonry structures

Installation guide

1. Simply screw the mixer nozzle onto the resin cartridge (after removing cap) or CFS+ system
2. Before inserting nozzle to the hole inject resin until even colour is obtained
3. Insert mixing nozzle to the far end the hole and inject resin, slowly withdrawing the nozzle

Product commercial data

Product Code	Suitable for	Length [mm]	Quantity [pcs]		Weight [kg]		Bar Code
			Box	Outer	Box	Outer	
R-NOZ-10	R-KEM-II, R-KF2, R-KER	200	10	200	0.01	2.0	5906675127460
R-NOZ-100/100	R-KEM-II, R-KF2, R-KER	200	100	700	0.008	5.5	5010445606427
R-NOZ-KEX-II-10	R-KEX-II	250	10	100	0.2	2.0	5906675078373
R-NOZ-KEX-II-100	R-KEX-II	250	100	500	1.5	7.6	5906675078380
R-NOZ-KER-II-10	R-KER-II	215	10	200	0.10	2.0	5906675423593
R-NOZ-KER-II-100	R-KER-II	215	100	700	0.78	5.5	5906675423609

Nozzle extension

Static mixer for bonded anchors in cartridges and CFS+ system

SP-CE-DE-1M

R-NOZ-EXT

Product overview

Features and benefits

- **SP-CE-DE-1M** Rigid extension pipe used or cleaning deep holes starting from the bottom of the hole
- **R-NOZ-EXT** An extension hose, making it possible to clean the hole uniformly, with no dust. To achieve this, the hose is connected to the compresor. Rawlplug offers extensions making it possible to clean over a lenght of up to 3 metres. It is important that the hoses can be conveniently cut to the required lenght.

Applications

- Ensure thorough cleaning of the hole, with removal of all drill dust, to make sure the appropriate load capacity is achieved
- Can be used in holes of different depths
- Are suitable for repeated and frequent use together with the brushes they form an approved cleaning system

Product commercial data

Product Code	Suitable for	Length [mm]	Quantity [pcs]		Weight [kg]		Bar Code
			Box	Outer	Box	Outer	
SP-CE-ED-1M	Extension for mixer nozzle	1000	10	10	0.02	0.02	5906675601120
R-NOZ-EXT-200	Extension for mixer nozzle	200	50	1000	0.20	4.0	5906675423357
R-NOZ-EXT-300	Extension for mixer nozzle	300	50	1000	0.30	6.0	5906675423517
R-NOZ-EXT-3000	Extension for mixer nozzle	3000	1	1	0.06	0.06	5906675430041

Dosing piston plug R-NOZ-P

Dosing piston plug

NEW PRODUCT

Product overview

Features and benefits

- Piston plug and flexible nozzle extension ensure correct, consistent injection of adhesive into the drilled hole free of air voids
- Allows anchoring in holes flooded with water and overhead applications
- Enables precise deep anchoring

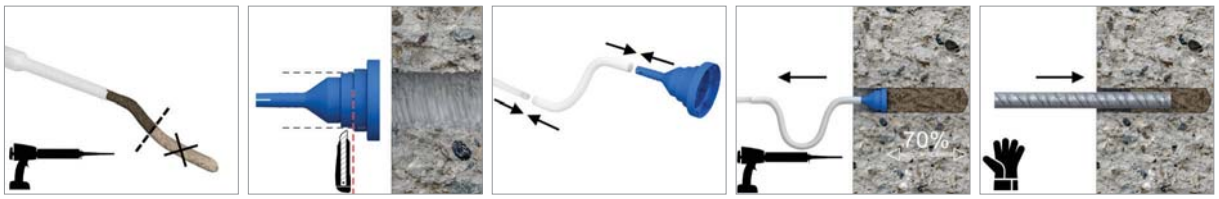
Applications

- Full control over the degree to which the hole is filled with resin
- Uniform resin injection into the hole
- Absence of air bubbles in the hole
- Dispensing of the appropriate volume of the resin

Product commercial data

Product Code	Drill diameter	Quantity [pcs]		Weight [kg]		Bar Code
		Box	Outer	Box	Outer	
R-NOZ-P-16-26	16-26 mm	10	500			5906675433974
R-NOZ-P-28-50	28-50 mm	10	500			5906675433981

Installation guide for brushes and blow pump (cont.)



1. After hole cleaning dispense resin to waste until even colour is obtained (min. 10 cm)
2. Adjust (cut) the piston plug to the drilled diameter
3. Plug the piston plug into the extension and enter to the bottom of hole
4. The other end of the extension connects to the nozzle
5. Start injecting resin, piston plug will slide out of the hole (piston action)

R-GUN Dispenser Guns

Professional manual dispensing system for resin anchors in cartridges

R-GUN 385 ml

R-GUN 600 ml

Features and benefits

- Manual operation - no need for external power supply
- Type of gun used for anchoring strictly depends on the type of cartridge
- Fast and effortless resin injection
- Convenient dispensing tool for a range of situations
- Robust design for all jobsite conditions

Applications

- Dispenser guns suitable for 385ml, 600ml cartridges

Product commercial data

Product Code	Description	Quantity [pcs]		Weight [kg]		Bar Code
		Box	Outer	Box	Outer	
R-GUN-385-P	Cartridge Gun 385 ml for R-KEX II	1	150	1.7	255	5906675217482
R-GUN-600-P	Cartridge Gun 600 ml for R-KEX II	1	150	2.00	300	5906675314044

R-GUN MULTI

NEW PRODUCT

Features and benefits

- Perfect for professionals application
- Robust and durable design for all kinds of working conditions
- Quick and easy resin dispensing
- Manual operaion - no need to use power supply
- One extrude for all kinds of cartridges
- Good leverage allows quick and easy resin dispensing
- Convenient to use
- Very high pressure power and injection comfort
- Release pressure system
- Realible metal frame structure
- Durable design meets the high requirements for the construction site and thus offers a long service life

Applications

- Dispenser guns suitable for 175, 280, 300, 310, 380, 385, 400, 410, 600 ml cartridges

Product commercial data

Product Code	Description	Quantity [pcs]		Weight [kg]		Bar Code
		Box	Outer	Box	Outer	
R-GUN-MULTI	Manual dispensing system for cartridges: R-KEX-II-600, R-KEX-II-385 R-KER-II-400, R-KER-II-300, R-KER-380, R-KER-300, R-KEM-II-410, R-KEM-II-380, R-KEM-II-300, R-KEM-II-175	1	10	1.320	14	5906675418131

R-GUN Dispenser Guns

Professional manual dispensing system for bounded resin anchors in cartridges

R-GUN 300 N

R-GUN 345 N

R-GUN 380 P

Features and benefits

- Fast and effortless resin injection
- Convenient dispensing tool for a range of situations
- Type of gun used for anchoring strictly depends on the type of cartridge
- Robust design for all jobsite conditions

Applications

- Dispenser guns suitable for 175, 280, 300, 310, 345, 380-410ml cartridges

Installation guide

1. Open the cartridge and attach the proper nozzle.
2. Put the cartridge into the gun thoroughly.
3. Make sure that the nozzle is in correct position and lies in the fence.
4. By pressing the trigger dose the required amount of the product.
5. After finished work empty the gun and clean if necessary.

Product commercial data

Product Code	Suitable for	Description	Quantity [pcs]		Weight [kg]		Bar Code
			Box	Outer	Box	Outer	
R-GUN-300-N	R-KEM-II-300, R-KER-300, R-KER-II-300	Cartridge Gun 280, 300, 310 ml	12	12	12	12	5906675280141
R-GUN-345-N	R-KER-345, R-KER-II-345, R-KF2-345	Cartridge Gun 345 ml	12	12	12.0	12.0	5906675280158
R-GUN-380-P	R-KEM-II-380,410, R-KF2-380,400, R-KER-II-400, R-KER-380, R-KER-400	Cartridge Gun 380, 400, 410 ml	1	10	1.2	12.2	5906675280165

R-GUN Pneumatic Dispenser Guns

NEW

Professional pneumatic dispensing system for resin anchors in cartridges

R-GUN-PNEU 380 ml

R-GUN-PNEU 600 ml

Features and benefits

- Fast and effortless resin injection
- Convenient dispensing tool for a range of situations
- Robust design for all jobsite conditions
- Dispenser gun for professional use
- Professional dispensing system for resin anchors in cartridges
- Type of gun used for anchoring strictly depends on the type of cartridge

Applications

- Pneumatic dispenser gun suitable for: 380 ml and 600 ml cartridges

Product commercial data

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-GUN-380-PNEU	Cartridge Pneumatic Gun suitable for R-KF2, R-KER	1	1	584	1.30	1.30	789.2	5906675286068
R-GUN-KEX-600-PNEU	Cartridge Pneumatic Gun suitable for R-KEX-II 385ml, 600ml	1	1	150	2.40	2.40		5906675433097

R-GUN Electric Dispenser Gun for cartridges

Professional battery-powered cartridge bonded anchors dispenser gun

R-GUN 380 ml

Applications

- Battery-powered dispenser suitable for 380ml cartridges

Product commercial data

Product Code	Description	Quantity [pcs]		Weight [kg]		Bar Code
		Box	Outer	Box	Outer	
R-GUN-380-AKU	380ml Cartridges Electric Dispenser	1	50	2.2	110	5906675317250

R-GUN Battery Extrusion Gun with Dosing

Professional dispensing system for resin anchors in cartridges

R-GUN-380 ml-AKUDOSE

NEW PRODUCT

R-GUN-600 ml-AKUDOSE

Features and benefits

- Quick and easy application of resins
- Wireless work thanks to a powerful battery
- A unique option of memorizing the dose
- Smooth regulation of the dosing speed
- Anti-drip function
- Option of memorizing the dose
- Regulation of the dosing speed
- Battery powered - high performance lithium-ion battery
- Memory function - enables precise dispensing of a repetitive amount of resin

Applications

- Battery dispenser suitable for cartridges: 380ml, 385 ml, 400ml, 410ml, 600 ml
- Professional battery-powered guns, types:

R-GUN-380-AKUDOSE
intended for:
R-KEM-II 410ml,
R-KER 380ml, 400ml, R-KER-II 400ml, R-KF2 380ml, 400ml

R-GUN-KEX600-AKUDOSE
intended for:
R-KEX 385ml, R-KEX 600ml

Product commercial data

Product Code	Suitable for	Description	Quantity [pcs]		Weight [kg]		Bar Code
			Box	Outer	Box	Outer	
R-GUN-380-AKUDOSE	for 380-410ml (10:1 ratio) coaxial cartridges.	Battery squeezer for bonded anchors 380-410ml with adjustable dose	1	1	5.2	5.2	5906675322018
R-GUN-KEX600-AKUDOSE	for R-KEX II 385ml, R-KEX II 600 ml /coaxial cartridges.	Battery squeezer for bonded anchors 385-600ml with adjustable dose	1	1	8.2	8.2	5906675433080

R-GUN Dispenser Gun CFS+

Professional dispensing system for resin anchors in CFS+ foils

R-CFS+-GUN 300 ml

Applications

- Dispenser gun suitable for: 300 ml CFS+ system

R-CFS+GUN 600 ml

Applications

- Dispenser gun suitable for: 600 ml CFS+ system

Features and benefits

- Fast and effortless resin injection
- Convenient dispensing tool for a range of situations
- Robust design for all jobsite conditions
- Dispenser gun for professional use
- Professional dispensing system for resin anchors in cartridges

Product commercial data

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-CFS+-GUN	300 ml Cartridge Gun for RV200, RM50 & RP30	1	12	180	1.00	12.0	210.0	5906675239804
R-CFS+GUN-600	600 ml Cartridge Gun	1		150	0.8		120.0	5906675379289

R-GUN Electric Dispenser Gun CFS+

Professional electric dispensing gun for resin anchors in CFS+ foils

R-CFS+GUN 600 ml

Applications

- Battery-powered dispenser suitable for 600ml CFS+ foils

Product Code	Description	Quantity [pcs]		Weight [kg]		Bar Code
		Box	Outer	Box	Outer	
R-CFS+GUN-600-AKU	Electric Dispenser for 600ml cfs+ foils	1	100	2.0	200	5906675620022

R-GUN-300-N

Suitable for:

R-KER 300ml
R-KER-II 300ml
R-KEM-II 175ml
R-KEM-II 300ml

R-GUN-345-N

Suitable for:

R-KER 345ml
R-KER-II 345ml
R-KF2 345ml

R-GUN-380-P

Suitable for:

R-KER 380ml, 400ml
R-KER-II 400ml
R-KEM-II 380ml, 410 ml
R-KF2 380ml, 400 ml

R-GUN-385-P

Suitable for:

R-KEX-II 385ml

R-GUN-600-P

Suitable for:

R-KEX-II 385ml, 600ml

R-GUN-MULTI

Suitable for:

R-KER 300ml, 380ml, 400ml
R-KER-II 300ml, 400ml
R-KEM-II 175ml, 300ml, 380ml, 410ml
R-KEX-II 385ml, 600ml

R-CFS+GUN-600
R-GUN-CFS+300-P

Suitable for:

R-CFS+ RV200 300ml, 600ml
R-CFS+ RM50 300ml, 600ml
R-CFS+ RP30 300ml, 600ml
R-CFS+ RV200 600ml
R-CFS+ RV200W 600ml

R-CFS+GUN-600-AKU

Suitable for:

R-CFS+RV200 600ml, 300ml
R-CFS+RM50 600ml, 300ml
R-CFS+RP30 600ml, 300ml

R-GUN-380-AKU

Suitable for:

R-KEM-II 410ml
R-KF2 380ml, 400ml

R-GUN-380-AKUDOSE

Suitable for:

R-KEM-II 410ml
R-KER 380ml, 400ml
R-KER-II 400ml
R-KF2 380ml, 400ml

R-GUN-600-AKUDOSE

Suitable for:

R-KEX II 385ml, 600ml

R-GUN-380-PNEU

Suitable for:

R-KEX II 385ml, 600ml