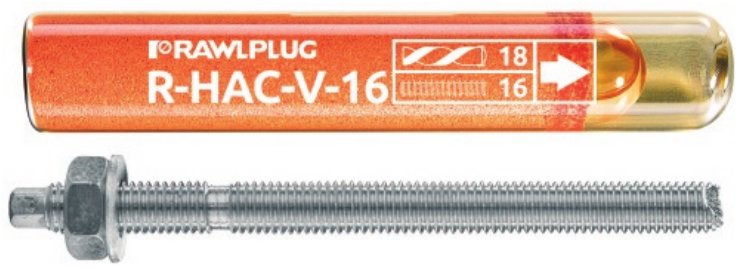
R-HAC-V Hammer-In with Threaded Rods

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



Approvals and Reports

- ETA-11/0002

Product information

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 (ETAG001 Option 7)

Applications

- Balustrading & handrails
- Cable trays
- Guard rails
- Heavy machinery
- Threaded rods
- Cladding restraints
- Curtain walling
- Fencing & gates manufacturing and installation
- Reinforcement bars

Base materials

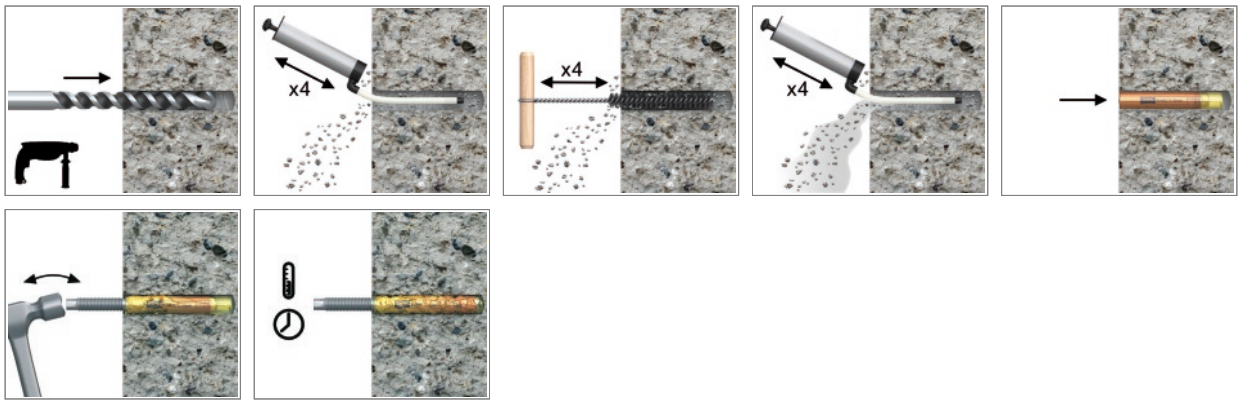
Approved for use in:

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

Also suitable for use in:

- Natural Stone (after site testing)

Installation guide

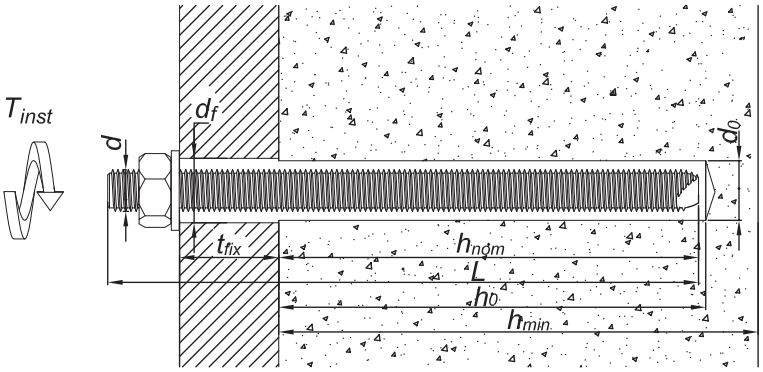


Product information

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 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



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
Capsule size		[mm]	8	10	12	16	20	24	30
Capsule diameter	d_c	[mm]	9.25	10.75	12.65	16.75	21.55	23.75	33.2
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
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. 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	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 working and curing time

Resin temperature	Concrete temperature	Curing time*	Working 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	-

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]	37	58	84	157	245	353	560
Elastic section modulus	W_{el}	[mm³]	31	62	109	278	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]	37	58	84	157	245	353	560
Elastic section modulus	W_{el}	[mm³]	31	62	109	278	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]	450	450	450	450	450	450	450
Cross sectional area - tension	A_s	[mm²]	37	58	84	157	245	353	560
Elastic section modulus	W_{el}	[mm³]	31	62	109	278	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 - ETAG 001

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.9	30.5	44.1	75.4	115.4	171.0	213.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	26.5	37.3	49.8	75.4	115.4	171.0	213.8
R-STUDS METRIC THREADED RODS - A4	[kN]	26.5	37.3	49.8	75.4	115.4	171.0	213.8
SHEAR LOAD $V_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	11.3	18.3	26.5	49.1	76.9	110.9	176.4
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	18.3	29.0	42.2	79.4	123.5	177.7	282.9
R-STUDS METRIC THREADED RODS - A4	[kN]	16.4	25.8	37.2	69.3	107.7	155.6	247.6

Basic performance data

Size		M8	M10	M12	M16	M20	M24	M30
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.0	29.0	41.5	62.8	96.1	142.5	178.1
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	22.1	31.1	41.5	62.8	96.1	142.5	178.1
R-STUDS METRIC THREADED RODS - A4	[kN]	22.1	31.1	41.5	62.8	96.1	142.5	178.1
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]	10.5	14.8	23.0	29.9	45.8	67.9	84.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	10.5	14.8	23.0	29.9	45.8	67.9	84.8
R-STUDS METRIC THREADED RODS - A4	[kN]	10.5	14.8	23.0	29.9	45.8	67.9	84.8
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]	7.52	10.6	16.5	21.4	32.7	48.5	60.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	7.52	10.6	16.5	21.4	32.7	48.5	60.6
R-STUDS METRIC THREADED RODS - A4	[kN]	7.52	10.6	16.5	21.4	32.7	48.5	60.6
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

Design performance data

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Effective embedment depth	h_{ef}	[mm]	80.00	90.00	110.00	125.00	170.00	210.00	270.00
TENSION LOAD									
STEEL FAILURE; STEEL CLASS 5.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	18.00	29.00	42.00	78.00	122.00	176.00	280.00
Partial safety factor	γ_{Ms}	-	1.50	1.50	1.50	1.50	1.50	1.50	1.50
STEEL FAILURE; STEEL CLASS 8.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	29.00	46.00	67.00	126.00	196.00	282.00	448.00
Partial safety factor	γ_{Ms}	-	1.50	1.50	1.50	1.50	1.50	1.50	1.50
STEEL FAILURE; STEEL GRADE A4-70									
Characteristic resistance	$N_{Rk,s}$	[kN]	26.00	41.00	59.00	110.00	171.00	247.00	392.00
Partial safety factor	γ_{Ms}	-	1.87	1.87	1.87	1.87	1.87	1.87	1.87
COMBINED PULL-OUT AND CONCRETE CONE FAILURE; NON-CRACKED CONCRETE, C20/25 (40°C/24°C)									
Characteristic bond resistance	T_{Rk}	[N/mm^2]	11.00	11.00	10.00	10.00	9.00	9.00	7.00
COMBINED PULL-OUT AND CONCRETE CONE FAILURE; NON-CRACKED CONCRETE, C20/25 (80°C/50°C)									
Characteristic bond resistance	T_{Rk}	[N/mm^2]	9.50	9.00	8.50	8.00	7.00	7.00	6.00
COMBINED PULL-OUT AND CONCRETE CONE FAILURE									
Installation safety factor	γ_2	-	1.40	1.40	1.20	1.40	1.40	1.40	1.40
Increasing factors for $N_{Rd,p}$ - C30/37	Ψ_c	-	1.04	1.04	1.04	1.04	1.04	1.00	1.00
Increasing factors for $N_{Rd,p}$ - C40/50	Ψ_c	-	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Increasing factors for $N_{Rd,p}$ - C50/60	Ψ_c	-	1.09	1.09	1.09	1.09	1.09	1.09	1.09
CONCRETE CONE FAILURE									
Installation safety factor	γ_2	-	1.40	1.40	1.20	1.40	1.40	1.40	1.40
Factor for non-cracked concrete	k	-	10.10	10.10	10.10	10.10	10.10	10.10	10.10
Factor for non-cracked concrete	$k_{ucr,N}$	-	11.00	11.00	11.00	11.00	11.00	11.00	11.00
Edge distance	$c_{cr,N}$	[mm]	$1.5*h_{ef}$	$1.5*h_{ef}$	$1.5*h_{ef}$	$1.5*h_{ef}$	$1.5*h_{ef}$	$1.5*h_{ef}$	$1.5*h_{ef}$
Spacing	$s_{cr,N}$	[mm]	$3.0*h_{ef}$	$3.0*h_{ef}$	$3.0*h_{ef}$	$3.0*h_{ef}$	$3.0*h_{ef}$	$3.0*h_{ef}$	$3.0*h_{ef}$
CONCRETE SPLITTING FAILURE									
Installation safety factor	γ_2	-	1.40	1.40	1.20	1.40	1.40	1.40	1.40

Design performance data

Size			M8	M10	M12	M16	M20	M24	M30
SHEAR LOAD									
STEEL FAILURE; STEEL CLASS 5.8									
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	9.00	14.00	21.00	39.00	61.00	88.00	140.00
Ductility factor	k_7	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Characteristic resistance with lever arm	$M_{Rk,s}$	[Nm]	19.00	37.00	65.00	166.00	324.00	561.00	1124.00
Partial safety factor	γ_{Ms}	-	1.25	1.25	1.25	1.25	1.25	1.25	1.25
STEEL FAILURE; STEEL CLASS 8.8									
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	15.00	23.00	34.00	63.00	98.00	141.00	224.00
Ductility factor	k_7	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Characteristic resistance with lever arm	$M_{Rk,s}$	[Nm]	30.00	60.00	105.00	266.00	519.00	898.00	1799.00
Partial safety factor	γ_{Ms}	-	1.25	1.25	1.25	1.25	1.25	1.25	1.25
STEEL FAILURE; STEEL GRADE A4-70									
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	13.00	20.00	29.00	55.00	86.00	124.00	196.00
Ductility factor	k_7	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Characteristic resistance with lever arm	$M_{Rk,s}$	[Nm]	26.00	52.00	92.00	233.00	454.00	786.00	1574.00
Partial safety factor	γ_{Ms}	-	1.56	1.56	1.56	1.56	1.56	1.56	1.56
CONCRETE PRY-OUT FAILURE									
Factor	k	-	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Installation safety factor	γ_2	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CONCRETE EDGE FAILURE									
Anchor diameter	d_{nom}	[mm]	8.00	10.00	12.00	16.00	20.00	24.00	30.00
Effective length of anchor	ℓ_f	[mm]	80.00	90.00	110.00	125.00	170.00	210.00	270.00
Installation safety factor	γ_2	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Combined pull-out and concrete cone failure (TR 029, p.5.2.2.3. acc. to formula 5.2a - $N^0_{Rk,p}=\pi*d*h_{ef}*\tau_{Rk}$).
Concrete cone failure (TR 029, p.5.2.2.4. acc. to formula 5.3a - $N^0_{Rk,c}=k_1*f_{ck,cube}{}^{0,5}*h_{ef}{}^{1,5}$).
$h_{ef} = h_{nom}$

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