Vorpa **VF CE RESIN CAPSULES**

Vinylester resin capsule with ETA option 7 for non-cracked concrete “spin-in” type

Non-cracked concrete

Products group

VF CE RESIN CAPSULE

Suitable for
- non-cracked concrete

To fix
- starter bar applications
- reinforcement bars
- threaded studs
- crush barriers
- machinery
- steel columns

ETA CE
European Technical Approval
Option 7 for non-cracked concrete

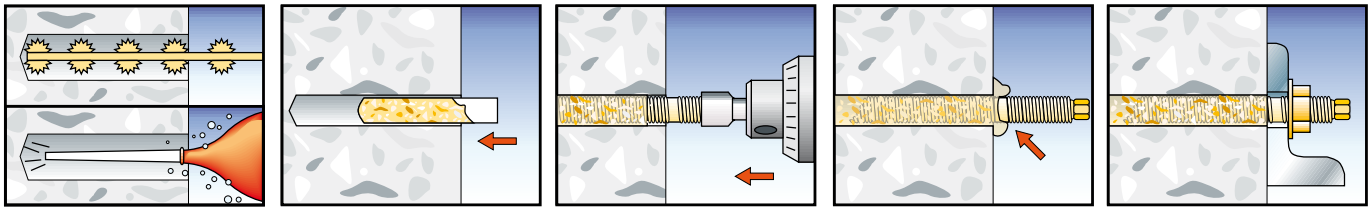
Product information

Characteristics
- Chemical anchors VF CE consist of a capsule containing a blend of resin, quarts, sand and special hardener encapsulated in a small glass capsule. The capsule is placed into a drilled hole previously cleaned and threaded rod is driven by machine with turning.

Benefits
- Capsules can be set in either direction.
- No electrical setting tool required.
- Quick curing and gel time.
- No waste of material. Safe and easy to use.
- Chemical corrosion resistant.
- Can be installed in wet concrete or in hole filled with water.
- Product with ETA option 7 for non-cracked concrete.
- Ideal to be used with reinforcing bars.
- Suitable for close edge applications, no tension on base material.

Suggestion for use
- If temperatures is below -5°C warm the stud before setting.
- Avoid direct sunlight.
- Clean out hole thoroughly before application.
- In case of misplaced hole drill new hole at a distance of at least twice the depth of the first hole.
- Anchors to be tightened with calibrated torque wrench.
- Rod must be cut 45°C.

Installation sequence



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Technical data

Code	Description	Length mm
5900	VF CE M 8	85
5901	VF CE M 10	85
5902	VF CE M 12	95
5904	VF CE M 16	95
5906	VF CE M 20	180
5908	VF CE M 24	215
5940	VF CE M 30	270

Storage
Shelf life

Store in cool and dry place between +5°C and + 25°C.

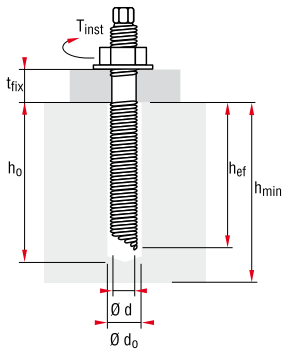
Self life 24 months from the manufacture date.

(N_{rk}) = Characteristic resistance under tension
(V_{rk}) = Characteristic resistance under shear
(N_{rd}) = Design load under tension
(V_{rd}) = Design load under shear
(N_{rec}) = Recommended load under tension
(V_{rec}) = Recommended load under shear
($C_{cr,N}$) = Edge distance – tension
($V_{ce,v}$) = Edge distance – shear
f ck cube = Characteristic compression strength
(h_{ef}) = Effective anchorage depth

Minimum curing time* and working time

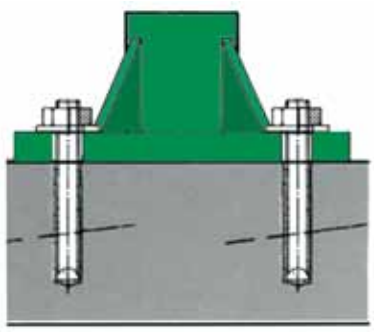
Resin temperature (°C)	Concrete temperature (°C)	Minimum curing time*
5	-5	480
	0	240
	5	150
10	10	120
15	15	90
20	20	45
25	30	20
	40	10

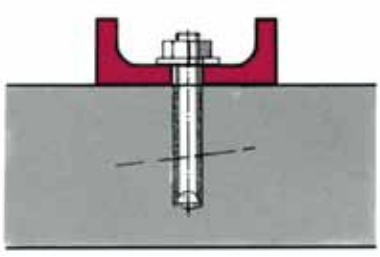
* For wet concrete the curing time must be double



Specification data

			M8	M10	M12	M16	M20	M24	M30
Stud diameter	d	mm	8	10	12	16	20	24	30
Hole diameter	d_0	mm	10	12	14	18	24	28	35
Hole diameter in fixture	d_{fix}	mm	9	12	14	18	22	26	32
Minimum hole depth	h_0	mm	h_{ef} + 5						
Embedment depth	h_{ef}	mm	80	90	110	125	170	210	270
Minimum slab thickness	h_{min}	mm	120	130	140	180	230	270	340
Torque moment	T_{inst}	Nm	10	20	40	80	120	180	300
Minimum spacing	S_{min}	mm	$0.5xh_{ef}$						
Minimum edge distance	C_{min}	mm	$0.5xh_{ef}$						





Vorpa **VF CE RESIN CAPSULES**

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Non-cracked concrete

Technical data

Performance data

Threaded size			M8	M10	M12	M16	M20	M24	M30
Embedment depth	h_{ef}	mm	80	90	110	125	170	210	270
Tension load									
Steel Failure, Steel Grade 5.8									
Characteristic resistance	$N_{Rk,s}$	kN	18.0	29.0	42.0	78.0	122.0	176.0	280.0
Design resistance γ_{Ms}=1.5	$N_{Rd,s}$	kN	12.0	19.3	28.0	52.0	81.3	117.3	186.7
Steel Failure, Steel Grade 8.8									
Characteristic resistance	$N_{Rk,s}$	kN	29.0	46.0	67.0	126.0	196.0	282.0	449.0
Design resistance γ_{Ms}=1.5	$N_{Rd,s}$	kN	19.3	30.7	44.7	84.0	130.7	188.0	299.3
Steel Failure, A4 - 70 Steel Grade									
Characteristic resistance	$N_{Rk,s}$	kN	26.0	41.0	59.0	110.0	171.0	247.0	393.0
Design resistance γ_{Ms}=1.87	$N_{Rd,s}$	kN	13.9	21.9	31.6	58.8	91.4	132.1	210.2
Pull out and concrete cone failure in non-cracked concrete C20/25 (80°C/50°C)									
Characteristic resistance	$N_{Rk,s}$	kN	25.0	30.0	50.0	60.0	95.0	140.0	200.0
Design resistance*	$N_{Rd,s}$	kN	13.9	16.7	27.8	33.3	52.8	77.8	111.1
	C30/37	--			1.04			1.0	
Increasing factor and partial safety factor	C40/50	--			1.07			1.0	
	C50/60	--			1.09			1.0	
Shear load									
Concrete edge failure C20/25									
Edge distance	c	mm	111	130	160.5	202.5	244	277.5	336
Characteristic resistance	$V_{Rk,c}$	kN	11.8	16.4	24.7	39.1	58.8	78.6	117.8
Design resistance γ_{Ms}=1.5	$V_{Rd,c}$	kN	7.9	10.9	16.5	26.1	39.2	52.4	78.5
Steel Failure, Steel Grade 5.8									
Characteristic resistance	$V_{Rk,c}$	kN	9.0	14.0	21.0	39.0	61.0	88.0	140.0
Design resistance γ_{Ms}=1.5	$V_{Rd,c}$	kN	7.2	11.2	16.8	31.2	48.8	70.4	112.0
Steel Failure, Steel Grade 8.8									
Characteristic resistance	$V_{Rk,c}$	kN	15.0	23.0	34.0	63.0	98.0	141.0	224.0
Design resistance γ_{Ms}=1.25	$V_{Rd,c}$	kN	12.0	18.4	27.2	50.4	78.4	112.8	179.2
Steel Failure, A4 - 70 Steel Grade									
Characteristic resistance	$V_{Rk,c}$	kN	13.0	20.0	29.0	55.0	86.0	124.0	196.0
Design resistance γ_{Ms}=1.56	$V_{Rd,c}$	kN	8.3	12.8	18.6	35.3	55.1	79.5	125.6

*Partial safety factors for use in substrate category 2 (wet substrate) Ymc= 2.1

Vorpa **VF CE RESIN CAPSULES**

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Non-cracked concrete

Technical data

Edge distance and spacing

Edge distance (tension load)

C_N mm	M8	M10	M12	M16	M20	M24	M30
40	0.55						
45	0.58	0.54					
55	0.63	0.59	0.54				
65	0.69	0.64	0.58	0.53			
75	0.76	0.69	0.62	0.56			
85	0.82	0.74	0.66	0.59	0.54		
95	0.89	0.80	0.70	0.62	0.57		
105	0.96	0.85	0.74	0.65	0.59	0.56	
120	1.00	0.94	0.81	0.70	0.63	0.59	
135		1.00	0.88	0.75	0.67	0.63	0.58
150			0.95	0.80	0.71	0.66	0.60
175			1.00	0.89	0.79	0.72	0.65
200				0.99	0.86	0.79	0.70
225				1.00	0.94	0.85	0.75
250					1.00	0.92	0.81
275						0.99	0.86
300						1.00	0.92
335							1.00

Edge distance (shear)

C_V mm	M8	M10	M12	M16	M20	M24	M30
40	0.36						
50	0.45	0.38					
60	0.54	0.46	0.37				
70	0.63	0.54	0.44	0.35			
80	0.72	0.62	0.50	0.40			
90	0.81	0.69	0.56	0.44	0.37		
100	0.90	0.77	0.62	0.49	0.41		
120	1.08	0.92	0.75	0.59	0.49	0.43	
140	1.26	1.08	0.87	0.69	0.57	0.50	0,42
160	1.44	1.23	1.00	0.79	0.66	0.58	0.48
180		1.38	1.12	0.89	0.74	0.65	0.54
200		1.54	1.25	0.99	0.82	0.72	0.60
220			1.37	1.09	0.90	0.79	0.65
260			1.62	1.28	1.07	0.94	0.77
320				1.58	1.31	1.15	0.95
360					1.48	1.30	1.07
405						1.46	1.21
450							1.34
490							1.46

Spacing

S mm	M8	M10	M12	M16	M20	M24	M30
40	0.59						
50	0.61	0.60					
60	0.64	0.62	0.59				
70	0.66	0.63	0.61	0.59			
80	0.68	0.65	0.62	0.60			
90	0.70	0.67	0.64	0.61	0.59		
100	0.73	0.69	0.66	0.62	0.60		
120	0.77	0.73	0.69	0.65	0.62	0.61	
140	0.82	0.77	0.72	0.67	0.64	0.63	0.60
160	0.86	0.81	0.75	0.70	0.66	0.64	0.62
180	0.91	0.85	0.78	0.72	0.68	0.66	0.63
200	0.95	0.88	0.81	0.75	0.70	0.68	0.65
220	1.00	0.92	0.84	0.77	0.73	0.70	0.66
260		1.00	0.90	0.82	0.77	0.73	0.69
320			1.00	0.90	0.83	0.79	0.74
360				0.94	0.87	0.82	0.77
405				1.00	0.91	0.86	0.80
450					0.96	0.91	0.83
490					1.00	0.94	0.86
550						1.00	0.91
600							0.95
670							1.00

Vorpa **VFP RESIN CAPSULE**

Polyester resin capsule “hammer-in” type

Concrete

Products group

VFP RESIN CAPSULE

Suitable for
- concrete

To fix
- starter bar applications
- reinforcement bars
- threaded studs

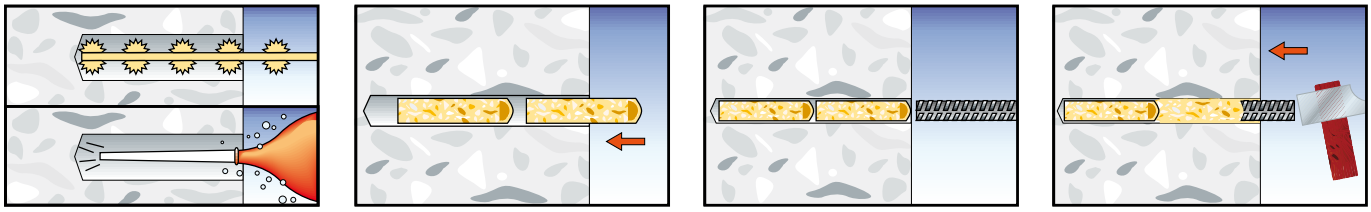
Product information

Characteristics
- Chemical anchors VF CE consist of a capsule containing a blend of resin, quarts, sand and special hardener encapsulated in a small glass capsule. The capsule is crushed into the hole by impact of rebar hammered-in to the bottom of the hole. No electrical setting tool is required.

Benefits
- Capsules can be set in either direction.
- No electrical setting tool required.
- Quick curing and gel time.
- No waste of material. Safe and easy to use.
- Chemical corrosion resistant.
- Can be installed in wet concrete or in hole filled with water.
- Ideal to be used with reinforcing bars.
- Suitable for close edge applications, no tension on base material.

Suggestion for use
- If temperatures is below -5°C warm the stud before setting.
- Avoid direct sunlight.
- Clean out hole thoroughly before application.
- In case of misplaced hole drill new hole at a distance of at least twice the depth of the first hole.
- Anchors to be tightened with calibrated torque wrench.

Installation sequence



Vorpa **VFP RESIN CAPSULE**

Polyester resin capsule “hammer-in” type

Concrete

Technical data

Code	Description	Length mm
3901	VFP M 10	80
3902	VFP M 12	95
3904	VFP M 16	95
3906	VFP M 20	175
3908	VFP M 24	210
3910	VFP M 30	265

Storage
Shelf life

Store in cool and dry place between +5°C and + 25°C.

Self life 24 months from the manufacture date.

(N_{rk}) = Characteristic resistance under tension
(V_{rk}) = Characteristic resistance under shear
(N_{rd}) = Design load under tension
(V_{rd}) = Design load under shear
(N_{rec}) = Recommended load under tension
(V_{rec}) = Recommended load under shear
($C_{cr,N}$) = Edge distance – tension
($V_{ce,V}$) = Edge distance – shear
f ck cube = Characteristic compression strength
(h_{ef}) = Effective anchorage depth

Product application specification

For threaded studs — **Setting data**

Anchor size (mm)		Installation details (mm)			Structural details (mm)			Recommended working loads (kN)			
								Tensile[1] Concretre			Shear[2]
Diameter	Length	Hole diameter	Embedment depth	Capsule length (mm)	Minimum anchor spacing	Minimum edge distance	Minimum structure thickness	20MPa	30MPa	40MPa	
10	130	12	90	80	60	40	120	6.0	7.4	8.5	9.2
12	160	14	110	95	75	50	140	8.6	10.5	12.2	13.3
16	190	18	125	95	100	65	160	12.6	15.4	17.8	24.8
20	260	25	170	175	120	80	210	23.8	29.1	33.6	38.7
24	300	28	210	210	145	100	260	32.9	40.3	46.5	55.8
30	380	35	280	280	180	120	340	54.8	67.1	77.5	88.6

Note: (1) Safety factor 3.0
(2) Safety factor 2.5

For reinforcement bars

Name	Bar size	Installation details (mm)		Structural details (mm)		Ultimate loads (kN)			
						Tensile			
						Concrete			Shear
		Hole diameter	Embedment depth	Minimum anchor spacing	Minimum edge distance	20MPa	30MPa	40MPa	460 N/mm²
VFP 10	10	12	90	60	40	18.1	22.2	25.6	36.1
			150			30.2	37.0	42.7	
			180			36.2	44.4	51.2	
VFP 12	12	15	110	75	50	27.7	33.9	39.1	52.0
			180			45.3	55.5	64.0	
			220			55.3	67.8	78.3	
VFP 16	16	20	145	100	65	48.6	59.6	68.3	95.5
			240			80.5	98.6	113.8	
			290			97.3	119.1	137.6	
VFP 20	20	25	180	120	80	75.5	92.4	106.7	144.5
			300			125.8	154.0	177.9	
			360			150.9	184.9	213.5	
VFP 24	25	30	225	150	100	113.2	138.6	160.1	225.8
			375			188.7	231.1	266.8	
			450			226.4	277.3	320.2	
VFP 30	32	38	290	190	130	184.8	226.3	261.4	370
			480			308.9	374.6	432.6	
			580			369.6	452.7	522.7	

Tensile strength of rebar 460 N/mm²

Higher loads can be reached with multiple-capsule application. A reduction of up to 15% of recommended working loads can be expected in horizontal applications.