

chemical anchors



# Vorpa VSF+ CE

High performance styrene free vinylester chemical anchor with European Technical Assessment for cracked concrete, masonry, post installed and reinforcing rebars

products group



### Approved for

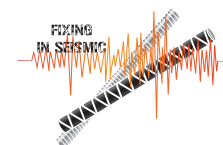
- cracked concrete M8-M16, non-cracked concrete M8-M24, and rebar Ø8-Ø25mm
- seismic action for performance category C1: M8-M16
- seismic action for performance category C2: M12-M16
- post-installed rebar Ø8-Ø25mm
- masonry use category b,c,d M8-M16

### To fix

- heavy duty metal structures
- heavy structural works
- construction joints
- scaffolding links
- wall ties, starter bars, studs, bolts & large screws
- electric installations plumbing

### Also suitable for

- natural stone
- wood



EAD 330087-01-0601  
post-installed rebar Ø8-Ø25  
Fire resistance in ETA for post-installed rebar

EAD 330499-01-0601  
cracked concrete M8-M16, non cracked concrete M8-M24 and Ø8-Ø25 rebar  
Seismic class C1-C2

EAD 330076-00-0604  
masonry cat. b,c,d M8-M16



### product code

Code	Description	Content ml	Gun to be used	Shelf life
1320	VSF+ 300	300	silicone type	12 months
1322	VSF+ 400	400	coaxial	18 months



+5°C/+25°C

Store upright

### Examples of applications





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## product information

### Characteristics

- vinylester styrene free chemical anchoring injection system with very high bond strength, developed principally to anchor threaded rods and rebar into concrete
- high bond strength with high load resistance
- used in dry and wet concrete, critical or overhead applications
- used in corrosive environments
- low shrinkage enables large diameter installations
- close edge distance and small spacing, high chemical resistance
- performance based on clean holes

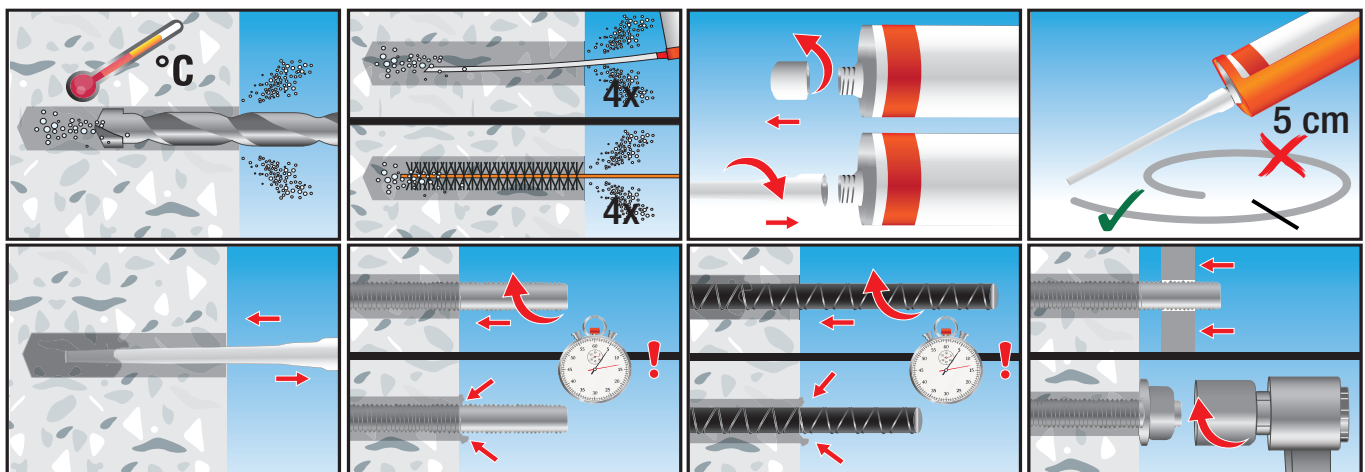
### Approval/certifications/testing

- ETA 23/0228 - M8-M24, Ø8 to Ø25 for non cracked concrete and M8-M16 for cracked concrete/ Seismic action C1+C2
- ETA 23/0233 - Hollow Wall / masonry Installations M8-M16
- ETA 23/0227 - Post Installed Rebar Installation Ø8-Ø25+ Fire approval in ETA
- Tested according to LEED VOC A+ Rating (Volatile Organic Content)

### Suggestion for use

- **Clean the hole before the installation**
- HAMMER DRILLED – blown and then brushed with a stiff metal brush and blown again

## installation sequence



## technical data

Physical Properties	Result	Test Method
UV resistance	Pass	-
Watertightness	0 mm	DIN EN 12390-8
Temperature stability	120° C	-
pH-value	>12	-
Density	1,77 kg / dm <sup>3</sup>	-
Compressive strength	88 N / mm <sup>2</sup>	EN 196 Teil1
Flexural strength	15 N / mm <sup>2</sup>	EN 196 Teil1
E modulus	14.000 N / mm <sup>2</sup>	DIN EN ISO 527-2
Shrinkage	< 0,3 %	DIN 52450
Hardness Shore D	90	DIN EN ISO 868
Electrical resistance	3,6 10 <sup>9</sup> W m	IEC 93
Thermal conductivity	0,65 W / m·K	IEC 60093

### Reactivity

Base material Temperature	Gel-working Time	Full curing time in dry base material
-5° to -1°C	90 min	6 h
0° to 4°C	45 min	3 h
5° to 9°C	25 min	2 h
10° to 14°C	20 min	100 min
15° to 19°C	15 min	80 min
20° to 29°C	6 min	45 min
30° to 34°C	4 min	25 min
35°C to 39°C	2 min	20 min

Minimum curing time in wet concrete x2  
 All specifications based on supplied mixer  
 Store at temperatures between +5 and +25 degrees, away from direct heat, rain and moisture

## chemical anchors

Vorpa **VSF+ CE**

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## technical data

## Setting parameters threaded rods

Anchor size			M8	M10	M12	M16	M20	M24
Outer diameter of anchor	$d=d_{nom}$	mm	8	10	12	16	20	24
Nominal drill hole diameter	$d_o$	mm	10	12	14	18	24	28
Effectivite embedment depth	$h_{ef min}$	mm	60	60	70	80	90	96
	$h_{ef max}$	mm	160	200	240	320	400	480
Diameter of clearance hole in the fixture <sup>1)</sup>	$d_f \leq$	mm	9	12	14	18	22	26
Maximum torque moment	$T_{inst} \leq$	mm	10	20	40	80	120	160
Minimum thickness of member	$h_{min}$	$h_{ef} + 30mm \geq 100mm$		$h_{ef} + 2d_o$		$h_{ef} + 2d_o$		$h_{ef} + 2d_o$
Minimum spacing	$S_{min}$	mm	40	50	60	80	100	120
Minimum edge distance	$C_{min}$	mm	40	50	60	80	100	120

## Recommended loads-Threaded rod.

## Property class 8.8 - Concrete C20/25 wet / dry - Hammer (HD)

The recommended loads are only valid for single anchor for a roughly design, if the following conditions are valid

- $C \geq 1,5 \times h_{ef}$   $S \geq 3,0 \times h_{ef}$   $h \geq 2,0 \times h_{ef}$
- $\psi_{SUS} = 1,0$ ; per  $\alpha_{SUS} \leq \psi_{SUS}$
- The recommended loads have been calculated using the partial safety factors for resistances stated in the ETA and with a partial safety factor for actions of  $\gamma = 1,4$ . The partial safety factor for seismic actions is  $\gamma_1 = 1,0$ .
- If the conditions are not fulfilled the loads must be calculated acc.to EN 1992-4. For further details observe ETA-23/0228.

Anchor size			M8	M10	M12	M16	M20	M24	
Tension 40°C/24°C <sup>1)</sup> $\psi_{SUS} = 0,60$	uncracked	$N_{rec,stat}$	kN	6,8	9,0	13,2	19,9	33,9	50,3
		$N_{rec,stat}$	kN	3,6	5,0	7,4	11,2		
	cracked	$N_{rec,eq,C1}$	kN	2,6	3,5	5,3	7,7	NPA	
		$N_{rec,eq,C2}$	kN	NPA	NPA	1,7	3,3		
Tension 80°C/50°C <sup>1)</sup> $\psi_{SUS} = 0,60$	uncracked	$N_{rec,stat}$	kN	5,2	6,7	9,9	15,0	25,4	37,7
		$N_{rec,stat}$	kN	2,8	3,9	5,8	8,7		
	cracked	$N_{rec,eq,C1}$	kN	2,1	2,8	4,1	6,1	NPA	
		$N_{rec,eq,C2}$	kN	NPA	NPA	1,4	2,6		
Recommended shear load without lever arm <sup>2) 3)</sup>	uncracked	$V_{rec,stat}$	kN	6,3	9,7	14,3	20,8	34,1	48,1
		$V_{rec,stat}$	kN	6,3	8,4	11,7	14,8		
	cracked	$V_{rec,eq,C1}$	kN	4,2	5,8	8,5	12,5	NPA	
		$V_{rec,eq,C2}$	kN	NPA	NPA	2,8	5,3		
Effective embedment depth	$h_{ef}$	mm	80	90	110	125	170	210	
Edge distance	$C \geq$	mm	120	135	165	190	255	315	
Axial distance	$S \geq$	mm	240	270	330	375	510	630	

1) Short term temperature / Long term temperature

2) Shear loads are valid for all specified temperature ranges

3) In case of seismic action, the annular gap between the fixture and the anchor rod must be force-filled with mortar, otherwise  $\alpha_{gap} = 0,5$  acc.to ETA 19/0201 must be taken into account

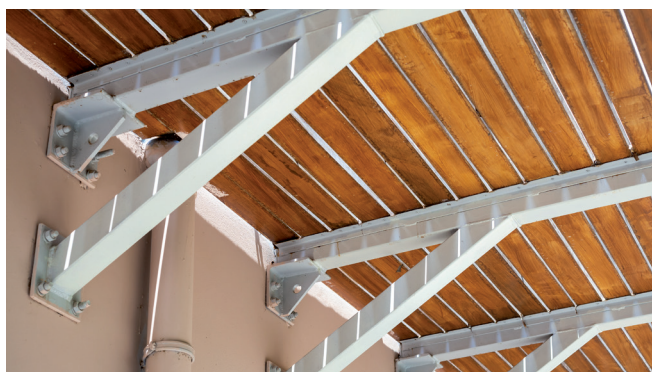
4) Application is not covered by the ETA-23/0228

$N_{rec,stat}$   $V_{rec,stat}$  = Recommended load under static and quasi-static action

$N_{rec,eq}$   $V_{rec,eq}$  = Recommended load under seismic action

NPA = No performance accessed

## Examples of applications



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technical data

### Setting parameters rebar

Anchor size			ø8	ø10	ø12	ø14	ø16	ø20	ø25
Outer diameter of anchor	$d=d_{nom}$	mm	8	10	12	14	16	20	25
Nominal drill hole diameter	$d_o$	mm	12	14	16	18	20	25	32
Effectivite embedment depth	$h_{ef min}$	mm	60	60	70	75	80	90	100
	$h_{ef max}$	mm	160	200	240	280	320	400	500
Minimum thickness of member	$h_{min}$	mm	$h_{ef} + 30mm \geq 100mm$		$h_{ef} + 2d_o$		$h_{ef} + 2d_o$		$h_{ef} + 2d_o$
Minimum spacing	$S_{min}$	mm	50	55	65	70	80	100	130
Minimum edge distance	$C_{min}$	mm	50	55	65	70	80	100	130

### Recommended loads-BSt500 rebar.

#### BSt500 rebar - Concrete C20/25 wet / dry - Hammer (HD)

The recommended loads are only valid for single anchor for a roughly design, if the following conditions are valid

- $C \geq 1,5 \times h_{ef}$     $S \geq 3,0 \times h_{ef}$     $h \geq 2,0 \times h_{ef}$
- $\psi_{SUS} = 1,0$ ; per  $\alpha_{SUS} \leq \psi_{0SUS}$
- The recommended loads have been calculated using the partial safety factors for resistances stated in the ETA and with a partial safety factor for actions of  $\gamma = 1,4$ .
- If the conditions are not fulfilled the loads must be calculated acc.to EN 1992-4. For further details observe ETA-23/0227

Anchor size				ø8	ø10	ø12	ø14	ø16	ø20	ø25		
Tension	non fessurato	$N_{rec,stat}$	kN	5,6	7,9	11,5	14,0	16,2	27,6	42,5		
				40°C/24°C 1) $\psi_{0SUS} = 0,60$								
Tension	non fessurato	$N_{rec,stat}$	kN	4,4	6,2	9,1	11,0	13,7	21,2	32,7		
				80°C/50°C 1) $\psi_{0SUS} = 0,60$								
			non fessurato	$V_{rec,stat}$	kN	6,7	10,5	14,8	18,0	20,8	34,1	48,4
Recommended shear load without lever arm 2) 3)												
Effective embedment depth	$h_{ef}$	mm	80	90	110	115	125	170	210			
Edge distance	$C \geq$	mm	120	135	165	172,5	187,5	255	315			
Axial distance	$S \geq$	mm	240	270	330	345	375	510	630			

1) Short term temperature / Long term temperature  
 2) Shear loads are valid for all specified temperature ranges  
 $N_{rec,stat}$   $V_{rec,stat}$  = Recommended load under static and quasi-static action

### Examples of applications

