chemical anchors

Vorpa **VSM+ Fixing in seismic C1+C2**

High performance styrene free urethan hybrid chemical anchor with European Technical Assesment for cracked concrete, post installed rebars and seismic zone

products group

Approved for

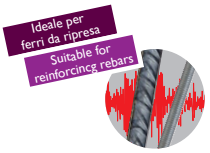
- cracked concrete M8-M30, rebar Ø8-Ø32mm
- seismic action for performance category C1: M8-M30, rebar Ø8-Ø32mm
- seismic action for performance category C2: M12-M24
- post-installed rebar Ø8-Ø32mm

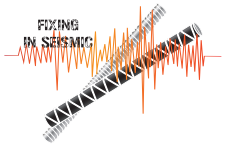
Also suitable for

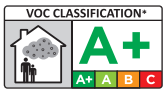
- natural stone
- solid brick
- perforated brick

To fix

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







EAD 330499-01-0601
cracked concrete M8-M30, Ø8-Ø32 rebar
Seismic action Cat.C1: M8-M30, Ø8-Ø32 rebar
Seismic action Cat.C2: M12-M24

EAD 330087-01-0601
post-installed rebar Ø8-Ø32

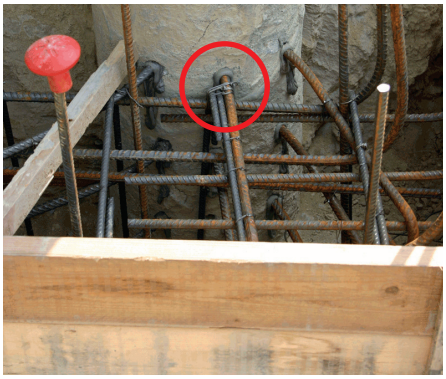
Fire resistance in ETA for post-installed rebar

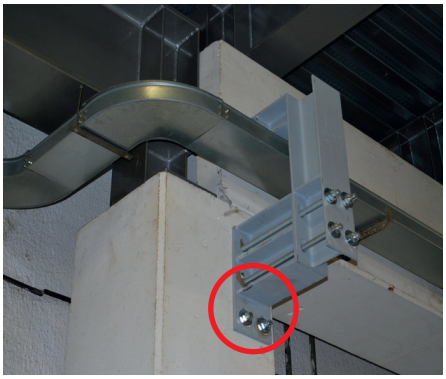
product code

Code	Description	Content ml	Gun to be used	Shelf life
1325	VSM+ 300	280	silicon type	18 months
1326	VSM+ 400	420	coaxial	18 months

Store upright

Examples of applications





Revision 04-2023

Vorpa **VSM+ Fixing in seismic C1+C2**

High performance styrene free urethan hybrid chemical anchor with European Technical Assesment for cracked concrete, post installed rebars and seismic zone

product information

Characteristics

- urethan hybrid styrene free chemical anchoring injection system with very high bond strength, developed principally to anchor threaded rods and rebar into concrete
- suitable for high loads within standard annulus and embedment
- fast working times for early loading in time sensitive applications
- no styrene allows for use indoors and in enclosed spaces
- use in wet or flooded environments and fixing holes
- suitable for overhead application
- used for studs and rebar
- performance based on clean holes

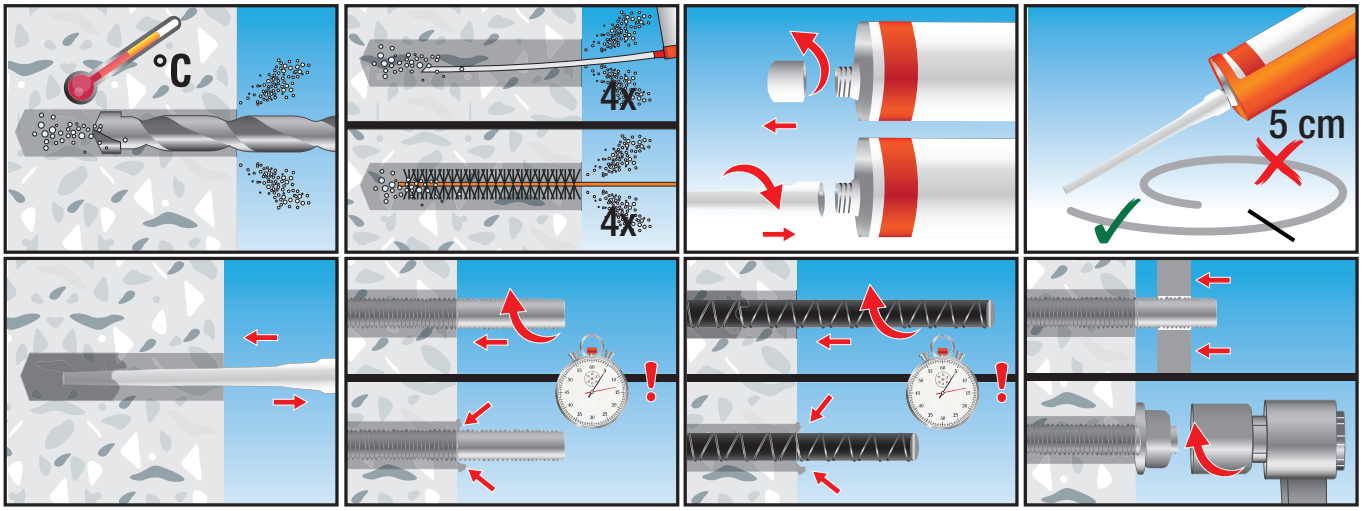
Approval/certifications/testing

- EAD 330499-00-0601 M8-M30 Threaded rod and Ø8-Ø32 Rebar cracked concrete / Seismic action C1+C2
- EAD 330087-00-0601 Ø8-Ø32 Rebar post-installed + Fire test
- ICC-ES Approval in concrete
- NSF Standard 61 Approved for use with Potable drinking water
- LEED tested
- 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	N/mm2 (MPa)	Test Method
UV resistance	Superato	-
Watertightness	0 mm	DIN EN 12390-8
Density	1,78 kg / dm³	-
Compressive strength	126 N / mm²	EN 196 Teil1
Flexural strength	22 N / mm²	EN 196 Teil1
Axial tensile strength	15 N / mm²	DIN EN ISO 527-2
E modulus	8300 N / mm²	DIN EN ISO 527-2
Shrinkage	1,8 ‰	DIN 52450
Hardness Shore A	97	DIN EN ISO 868
Hardness Shore D	-	DIN EN ISO 868
Electrical resistance	7,2 * 10^{13} Ω	IEC 93
Thermal conductivity	1,06 W / m·K	DIN EN 993-15
Spec. Heat capacitybv	1090 J / kg · K	DIN EN 993-15

Minimum Curing Time

Concrete Temperature	Gel-working Time	Minimum curing time in dry concrete
-5 °to -1°C	50 min	5,0 h
0° to 4°C	25 min	3,5 h
5° to 9°C	15 min	2,0 h
10° to 14°C	10 min	1,0 h
15° to 19°C	6 min	40 min
20° to 29°C	3 min	30 min
30° to 40°C	2 min	30 min

* resin temperature must be at least +20°C
Full cure 24 hours All specifications based on supplied mixer
Store at temperatures between +5 and +25 degrees, away from direct heat, rain and moisture

chemical anchors

Vorpa **VSM+ Fixing in seismic C1+C2**

High performance styrene free urethan hybrid chemical anchor with European Technical Assesment for cracked concrete, post installed rebars and seismic zone

technical data

Setting parameters threaded rods

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Outer diameter of anchor	$d=d_{nom}$		mm	8	10	12	16	20	24	27	30
Nominal drill hole diameter	d_o		mm	10	12	14	18	22	28	30	35
Effectivite embedment depth	$h_{ef\ min}$		mm	60	60	70	80	90	96	108	120
	$h_{ef\ max}$		mm	160	200	240	320	400	480	540	600
Diameter of clearance hole in the fixture [1]	pre-positioned anchorage d_f		mm	9	12	14	18	22	26	30	33
	in-place anchorage d_f		mm	12	14	16	20	24	30	33	40
Maximum torque moment	$T_{inst} \leq$			10	20	40[2]	60	100	170	250	300
Minimum thickness of member	h_{min}		mm	h_{ef} + 30mm ≥ 100mm					h_{ef} + $2d_o$		
Minimum spacing	S_{min}		mm	40	50	60	75	95	115	125	140
Minimum edge distance	C_{min}		mm	35	40	45	50	60	65	75	80

1) When used under seismic load, the diameter of the through hole in the fixture must not exceed d_1 + 1mm or alternatively, the annular gap between the fixture and the anchor rod must be force-filled with mortar

2) The maximum torque for M12 with grade 4.6 is 35Nm

Recommended loads-Threaded rod. Working life of 50 years
Property class 8.8 - Concrete C20/25 wet / dry - Hammer (HD) and compressed air drilling (CD)

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 $\alpha_{sus} \leq \psi^0_{sus}$ see table below
- The recommemnded 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 fullfilled the loads must be calculated acc.to EN 1992-4. For further details observe ETA product

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Tension	uncracked	$N_{rec,stat}$	kN	13,8	20,0	27,0	32,7	51,9	71,3	92,6	103,9
80°C/50°C [1]		$N_{rec,stat}$	kN	6,7	10,1	15,8	22,9	36,3	49,9	64,8	72,7
$\psi^0_{sus} = 0{,}79$	cracked	$N_{rec,eq,C1}$	kN	6,7	10,1	15,8	22,9	36,3	49,9	64,8	72,7
		$N_{rec,eq,C2}$	kN	NPA	NPA	10,0	14,7	23,5	24,3	NPA	NPA
Tension	uncracked	$N_{rec,stat}$	kN	13,8	18,8	27,0	32,7	51,9	71,3	92,6	103,9
120°C/72°C [1]		$N_{rec,stat}$	kN	5,7	8,8	13,8	22,4	35,6	45,2	60,6	72,7
$\psi^0_{sus} = 0{,}75$	cracked	$N_{rec,eq,C1}$	kN	5,7	8,8	13,8	22,4	35,6	45,2	60,6	72,7
		$N_{rec,eq,C2}$	kN	NPA	NPA	8,6	12,6	19,9	21,1	NPA	NPA
Tension	uncracked	$N_{rec,stat}$	kN	11,5	14,8	21,7	29,9	48,3	67,9	90,9	103,9
160°C/100°C [1]		$N_{rec,stat}$	kN	5,3	7,4	11,8	19,4	30,5	41,5	55,5	66,6
$\psi^0_{sus} = 0{,}66$	cracked	$N_{rec,eq,C1}$	kN	5,3	7,4	11,8	19,4	30,5	41,5	55,5	66,6
		$N_{rec,eq,C2}$	kN	NPA	NPA	6,9	11,3	17,8	19,0	NPA	NPA
Recommended shear load without lever arm [2] [3]	uncracked	$V_{rec,stat}$	kN	9,7	11,9	16,5	20,8	34,1	48,1	63,5	72,3
		$V_{rec,stat}$	kN	6,9	8,4	11,7	14,8	24,2	34,0	45,0	51,2
	cracked	$V_{rec,eq,C1}$	kN	6,9	8,4	11,7	14,8	24,2	34,0	45,0	51,2
		$V_{rec,eq,C2}$	kN	NPA	NPA	11,7	14,8	24,2	32,3	NPA	NPA
Effective embedment depth		h_{ef}	mm	80	90	110	125	170	210	250	270
Edge distance		C≥	mm	120	135	165	187,5	255	315	375	405
Axial distance		S≥	mm	240	270	330	375	510	630	750	810

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 α_{gap}=0,5 acc.to ETA product must be taken into account

$N_{rec,stat}$, $V_{rec,stat}$ = Recommended load under static and quasi-static action
$N_{rec,eq}$, $V_{rec,eq}$ = Recommended load under seismic action
NPA = No performance accessed

Vorpa **VSM+ Fixing in seismic C1+C2**

High performance styrene free urethan hybrid chemical anchor with European Technical Assesment for cracked concrete, post installed rebars and seismic zone

technical data

Setting parameters rebar

Anchor size			ø8*	ø10*	ø12*	ø14	ø16	ø20	ø24*	ø25*	ø28	ø32
Outer diameter of anchor	$d=d_{nom}$	mm	8	10	12	14	16	20	24	25	28	32
Nominal drill hole diameter	d_o	mm	10-12	12-14	14-16	18	20	25	30-32	30-32	35	40
Effectivite embedment depth	$h_{ef\,min}$	mm	60	60	70	75	80	90	96	100	112	128
	$h_{ef\,max}$	mm	160	200	240	280	320	400	480	500	560	640
Minimum thickness of member	h_{min}	mm	h_{ef} + 30mm ≥ 100mm					h_{ef} + $2d_o$				
Minimum spacing	S_{min}	mm	40	50	60	70	75	95	120	120	130	150
Minimum edge distance	C_{min}	mm	35	40	45	50	50	60	70	70	75	85

*) Both nominal drill hole diameters d_o can be used

Recommended loads-BSt500 rebar. Working life of 50 years
BSt500 rebar - Concrete C20/25 wet / dry - Hammer (HD) and compressed air drilling (CD)

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 $\alpha_{sus} \leq \psi^0_{sus}$ see table below
- The recommemnded 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 fullfilled the loads must be calculated acc.to EN 1992-4. For further details observe ETA product

Anchor size				ø8	ø10	ø12	ø14	ø16	ø20	ø24	ø25	ø28	ø32
Tension	non fessurato	$N_{rec,stat}$	kN	13,4	18,8	27,0	28,9	32,7	51,9	68,8	71,3	92,6	103,9
80°C/50°C 1)		$N_{rec,stat}$	kN	5,3	7,4	11,8	15,7	19,4	33,1	47,8	49,9	64,8	72,7
$\psi^0_{sus} = 0{,}79$	fessurato	$N_{rec,eq,C1}$	kN	5,3	7,4	11,8	15,7	19,4	33,1	47,8	49,9	64,8	72,7
Tension	non fessurato	$N_{rec,stat}$	kN	12,4	16,2	23,7	28,9	32,7	51,9	68,8	71,3	92,6	103,9
120°C/72°C 1)		$N_{rec,stat}$	kN	4,3	6,7	9,9	13,2	16,5	28,0	40,5	47,1	62,8	72,7
$\psi^0_{sus} = 0{,}75$	fessurato	$N_{rec,eq,C1}$	kN	4,3	6,7	9,9	13,2	16,5	28,0	40,5	47,1	62,8	72,7
	non fessurato	$N_{rec,stat}$	kN	9,1	12,8	18,8	21,7	26,9	45,8	66,2	70,7	89,0	103,9
Tension		$N_{rec,stat}$	kN	3,8	6,1	8,9	12,0	15,0	25,4	36,8	39,3	52,4	64,6
160°C/100°C 1)	fessurato	$N_{rec,eq,C1}$	kN	3,8	6,1	8,9	12,0	15,0	25,4	36,8	39,3	52,4	64,6
$\psi^0_{sus} = 0{,}66$													
Recommended shear load without lever arm 2) 3)	non fessurato	$V_{rec,stat}$	kN	6,7	10,5	14,8	18,0	20,8	34,1	46,4	48,4	63,8	73,0
		$V_{rec,stat}$	kN	6,7	8,4	11,7	12,8	14,8	24,2	32,8	34,3	45,2	51,7
	fessurato	$V_{rec,eq,C1}$	kN	6,5	8,4	11,7	12,8	14,8	24,2	32,8	34,3	45,2	51,7
Effective embedment depth		h_{ef}	mm	80	90	110	115	125	170	205	210	250	270
Edge distance		C≥	mm	120	135	165	173	188	255	308	315	375	405
Axial distance		S≥	mm	240	270	330	345	375	510	615	630	750	810

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 α_{gap}=0,5 acc.to ETA product must be taken into account

$N_{rec,stat}$, $V_{rec,stat}$ = Recommended load under static and quasi-static action
$N_{rec,eq}$, $V_{rec,eq}$ = Recommended load under seismic action
NPA = No performance accessed