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**European Technical
Assessment**

**ETA-20/0020
of 30/01/2020**

English translation prepared by CSTB - Original version in French language

General Part

Nom commercial

Trade name

Famille de produit

Product family

Titulaire

Manufacturer

Usine de fabrication

Manufacturing plant

Cette évaluation contient:

This Assessment contains

Base de l'ETE

Basis of ETA

Cette évaluation remplace:

This Assessment replaces

Stronghold Spin Capsule Anhor SH-VM

**Cheville à scellement de type "capsule" pour fixation dans le
béton non fissuré M8, M10, M12, M16, M20, M24 et M30.**

***Bonded capsule anchor for use in non cracked concrete:
sizes M8, M10, M12, M16, M20, M24 and M30***

STRONGHOLD SYSTEMS (ASIA) PTE LTD

10 Anson road 27-15 International Plaza

079903 Singapore

SINGAPORE

STRONGHOLD PLANT NUMBER 2

9 pages incluant 6 annexes qui font partie intégrante de cette
évaluation

***9 pages including 6 annexes which form an integral part of this
assessment***

EAD 330499-00-601, Edition juillet 2017

EAD 330499-00-601, Edition July 2017

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1 Technical description of the product

The Stronghold Spin Capsule Anhor SH-VM adhesive system is a bonded anchor system (capsule type) consisting of glass capsule Stronghold Spin Capsule Anhor SH-VM with a threaded rod with hexagon nut and washer of sizes M8, M10, M12, M16, M20, M24 and M30.

The standard threaded rod can be made of zinc plated carbon steel, stainless steel or high corrosion resistant stainless steel.

The glass capsule is placed into a rotary/percussion previously drilled hole and the threaded rod is driven by machine with simultaneous hammering and turning.

The anchor rod is anchored via the bond between anchor rod, chemical mortar and concrete.

The illustration and the description of the product are given in Annex A1.

2 Specification of the intended use

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annexes B.

The provisions made in this European Technical Assessment are based on an assumed working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic tension resistance for static and quasi-static action	See Annex C1, C2
Characteristic shear resistance for static and quasi-static action	See Annex C1, C2
Displacements	See Annex C1, C2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1
Resistance to fire	No performance determined (NPD)

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances contained in this European Technical Assessment, there may be requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.4 Safety in use (BWR 4)

For Basic Requirement Safety in Use the same criteria are valid as for Basic Requirement Mechanical Resistance and Stability.

3.5 Protection against noise (BWR 5)

Not relevant.

3.6 Energy economy and heat retention (BWR 6)

Not relevant.

3.7 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was determined for this product.

3.8 General aspects relating to fitness for use

Durability and Serviceability are only ensured if the specifications of intended use according to Annex B1 are kept.

4 Assessment and Verification of Constancy of Performance (AVCP)

According to the Decision 96/582/EC of the European Commission¹, as amended, the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

Product	Intended use	Level or class	System
Metal anchors for use in concrete	For fixing and/or supporting to concrete, structural elements (which contributes to the stability of the works) or heavy units	—	1

5 Technical details necessary for the implementation of the AVCP system

Technical details necessary for the implementation of the Assessment and verification of constancy of performance (AVCP) system are laid down in the control plan deposited at Centre Scientifique et Technique du Bâtiment.

The manufacturer shall, on the basis of a contract, involve a notified body approved in the field of anchors for issuing the certificate of conformity CE based on the control plan.

Issued in Marne La Vallée on **30/01/2020** by

The original French version is signed

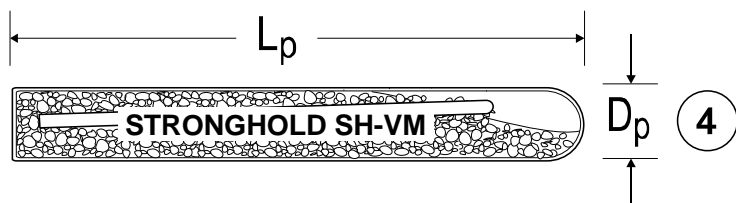
La Cheffe de Division
Anca CRONOPOL

¹

Official Journal of the European Communities L 254 of 08.10.1996

Stronghold Spin Capsule Anchor SH-VM

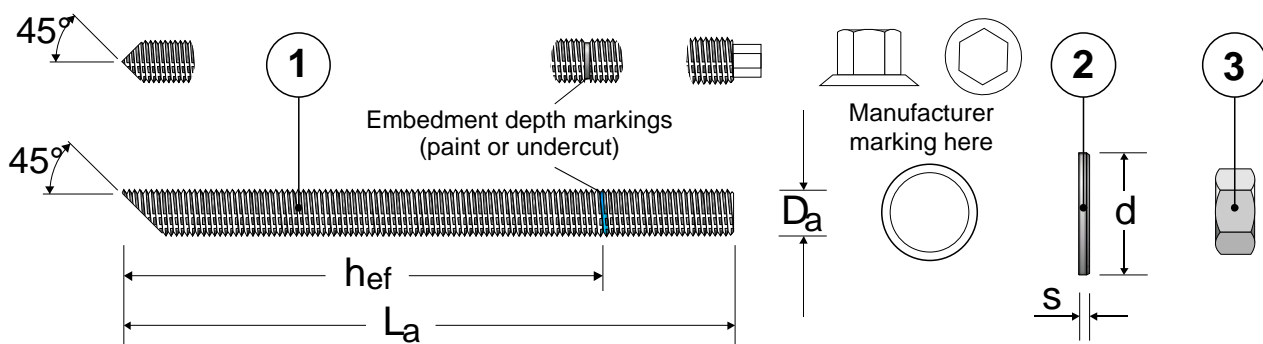
Mortar Capsule SH-V



Capsule marking

Manufacturer:	Stronghold
Capsule type:	SH-V
Capsule size:	M..

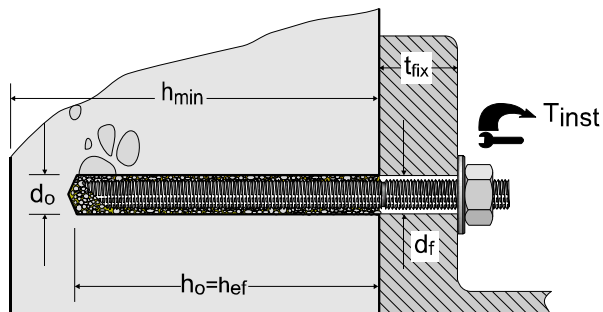
Anchor rod



Marking anchor rod: e.g. B16A

Manufacturer	B		
Size	8, 10, 12, 16, 20, 24, 30		
Material			
Galvanised property class 5.8	A	Stainless steel 1.4401, property class 70	C
Galvanised property class 8.8	B	Stainless steel 1.4404, property class 70	K
Hot dipped galvanised property class 5.8	H	Stainless steel 1.4529, property class 70	E
Hot dipped galvanised property class 8.8	I	Stainless steel 1.4565, property class 70	R
		Stainless steel 1.4571, property class 70	D
		Stainless steel 1.4401, property class 80	M
		Stainless steel 1.4404, property class 80	P
		Stainless steel 1.4571, property class 80	O

Installation



Stronghold Spin Capsule Anchor SH-VM

System Description and Installation

Annex A1

Table A1: Materials

Part	Designation	Material
Steel, zinc plated $\geq 5 \mu\text{m}$ according to EN ISO 4042 or Steel, hot-dip galvanised $\geq 40 \mu\text{m}$ according to EN ISO 1461		
1	Anchor rod	Steel, EN 10087 or EN 10263 Property class 5.8, 8.8, EN ISO 898-1:1999
2	Washer, EN ISO 7089, EN ISO 7093, or EN ISO 7094	Steel, zinc plated
3	Hexagon nut, EN ISO 4032	Property class 5 (for class 5.8 rod) EN 20898-2, Property class 8 (for class 8.8 rod) EN 20898-2
Stainless steel		
1	Anchor rod	Material 1.4401 / 1.4571, EN 10088-1:2005, > M24: Property class 50 EN ISO 3506 \leq M24: Property class 70 EN ISO 3506
2	Washer, EN ISO 7089, EN ISO 7093, or EN ISO 7094	Material 1.4401 or 1.4571, EN 10088
3	Hexagon nut, EN ISO 4032	Material 1.4401 / 1.4571 EN 10088, > M24: Property class 50 (for class 50 rod) EN ISO 3506 \leq M24: Property class 70 (for class 70 rod) EN ISO 3506
High corrosion resistance steel		
1	Anchor rod	Material 1.4529 / 1.4565, EN 10088-1:2005, > M24: Property class 50 EN ISO 3506 \leq M24: Property class 70 EN ISO 3506
2	Washer, EN ISO 7089, EN ISO 7093, or EN ISO 7094	Material 1.4529 / 1.4565, EN 10088
3	Hexagon nut, EN ISO 4032	Material 1.4529 / 1.4565 EN 10088, > M24: Property class 50 (for class 50 rod) EN ISO 3506 \leq M24: Property class 70 (for class 70 rod) EN ISO 3506
Spinning capsule		
4	Glas capsule	Glass, Quartz, Resin, Hardener

Commercial standard rod with:

- Materials, dimensions and mechanical properties (Table A1);
- Inspection certificate 3.1 acc. to EN 10204:2004;
- Marking of embedment depth.

Table A2: Dimensions in mm

Part	Description		M8	M10	M12	M12 /1,5t	M16	M16 /1,5t	M20	M20 /1,5t	M24	M24 /1,5t	M30
1	Threaded rod	D_a	M8	M10	M12		M16		M20		M24		M30
		$L_a \geq$	95	100	120	175	140	205	190	275	235	340	320
		h_{ef}	80	90	110	165	125	190	170	255	210	315	280
2	Washer	S_d	1.6 16	2.1 21	2.5 24		3.0 30		3.0 37		4.0 44		4.0 56
3	Hexagon nut	SW	13	17	19		24		30		36		46
4	Glass capsule	D_p	9	11	13		17		17		22		25
		L_p	80	80	95	125	95	125	160	250	175	245	230

Stronghold Spin Capsule Anchor SH-VM

Materials and Dimensions

Annex A2

Specifications of intended use

Anchorage subject to:

- Static and quasi-static loads

Base materials:

- Non-cracked concrete.
- Dry or wet concrete (Not permitted in flooded holes).
- Reinforced or unreinforced normal weight concrete of strength classes C20/25 at least to C50/60 at most according to EN 206/CN.
- Maximum chloride concrete of 0,40% (CL 0.40) related to the cement content according to EN 206/CN.

Temperature Range:

- I: -40°C to +40°C
(max. short term temperature +40°C and max. long term temperature +24°C)
- II: -40°C to +80°C
(max. short term temperature +80°C and max. long term temperature +50°C)

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions.
(zinc coated steel, stainless steel or high corrosion resistant steel).
- Structures subject to permanently damp internal condition:
 - if no particular aggressive conditions exist (stainless steel or high corrosion resistant steel).
 - with particular aggressive conditions (high corrosion resistant steel).
- Structures subject to external atmospheric exposure including industrial and marine environment:
 - if no particular aggressive conditions exist (stainless steel or high corrosion resistant steel).
 - with particular aggressive conditions (high corrosion resistant steel).

Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

- Overhead installations are permitted.

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages under static or quasi-static actions are designed in accordance with EN 1992-4:2018 or with EOTA Technical Report TR 029.

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.
- Effective anchorage depth, edge distances and spacing not less than the specified values without minus tolerances.
- Hole drilling by hammer drill with conventional bit or hollow drill bit.
- Cleaning of the hole of drilling dust.
- Application of specified torque moment using a calibrated torque wrench.

Stronghold Spin Capsule Anchor SH-VM

Annex B1

Intendend use - Specifications

Table B2: Installation parameters

Anchor size	M8	M10	M12	M12 /1,5t	M16	M16 /1,5t	M20	M20 /1,5t	M24	M24 /1,5t	M30
Nominal drill hole Ø d_0 [mm]	10	12	14		18		22		26		32
Cutting diameter $d_{cut} \leq$ [mm]	10.5	12.5	14.5		18.5		22.5		26.5		32.5
Depth of drill hole h_0 [mm]	80	90	110	165	125	190	170	255	210	315	280
Ø of clearance hole in the fixture d_f [mm]	9	12	14		18		22		26		33
Steel brush Ø D [mm]	11	13	16		20		24		28		34
Torque moment T_{inst} [Nm]	10	20	40		80		120		180		300

Steel brush and installation procedure



Standard Drill Bit **Hollow Drill Bit** **Installation continues as shown**

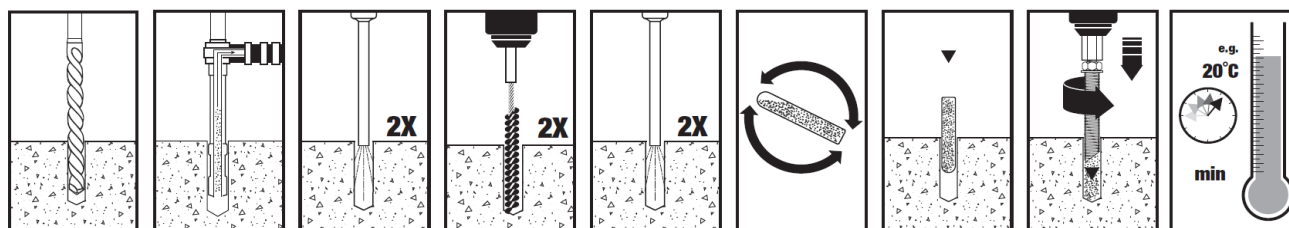


Table B3: Minimum member thickness, edge distance and spacing

Anchor size	M8	M10	M12	M12 /1,5t	M16	M16 /1,5t	M20	M20 /1,5t	M24	M24 /1,5t	M30
Min. member thickness h_{min} [mm]	110	120	140	195	160	225	220	300	260	370	340
Min. edge distance c_{min} [mm]	40	45	55	55	65	65	85	85	105	105	140
Min. spacing s_{min} [mm]	40	45	55	55	65	65	85	85	105	105	140

Table B4: Minimum curing time

Temperature in the concrete member	Minimum curing time in dry concrete	Minimum curing time in wet concrete
$\geq + 0$ °C	5 hrs.	10 hrs.
$\geq + 5$ °C	1 hr.	2 hrs.
$\geq + 20$ °C	20 min.	40 min.
$\geq + 30$ °C	10 min.	20 min.

Stronghold Spin Capsule Anchor SH-VM

Annex B2

Installation data

Table C1: Characteristic values of resistance to tension loads.

Anchor size		M8	M10	M12	M12 /1,5t	M16	M16 /1,5t	M20	M20 /1,5t	M24	M24 /1,5t	M30	
Steel failure													
Characteristic resistance property class 5.8	N _{Rk,S} [kN]	18	29	42		78		123		177		281	
Characteristic resistance property class 8.8	N _{Rk,S} [kN]	29	46	67		126		196		282		449	
Partial safety factor property class 5.8, 8.8	γ _{Ms} ¹⁾ [-]	1.5											
Characteristic resistance Stainless steel A4 and HCR property class 70	N _{Rk,S} [kN]	26	40	59		110		172		247		393	
Partial safety factor Stainless steel A4 and HCR property class 70	γ _{Ms} ¹⁾ [-]	1.87											
Combined Pull-out and Concrete cone failure													
Characteristic bond resistance in non-cracked concrete C20/25													
Temperature range I: 40°C/24°C	τ _{Rk,ucr} [N/mm²]	12	12	12		12		11		11		10	
Temperature range II: 80°C/50°C	τ _{Rk,ucr} [N/mm²]	10	10	10		10		9.5		9.5		9.0	
Partial safety factor	γ _{inst} [-]	1.0											1.2
Effective anchorage depth	h _{ef} [mm]	80	90	110	165	125	190	170	255	210	315	280	
Increasing factors for N _{Rk,p} in non- cracked concrete	Ψ _c C25/30	1.06											
	C30/37	1.14											
	C35/45	1.22											
	C40/50	1.26											
	C45/55	1.30											
	C50/60	1.34											
Splitting failure													
Char. edge distance	C _{cr,sp} [mm]	160	135	140	205	160	240	215	320	265	395	350	
Char. spacing	S _{cr,sp} [mm]	2·C _{cr,sp}											
Partial safety factor	γ _{inst} [-]	1.0											1.2

¹⁾ In absence of other national regulations

Table C2: Displacements under tension loads

Anchor size		M8	M10	M12	M12 /1,5t	M16	M16 /1,5t	M20	M20 /1,5t	M24	M24 /1,5t	M30
Tension load	N [kN]	9.6	13.5	19.7	29.6	29.9	45.5	48.3	72.5	71.6	107.4	94.2
Displacement	δ_{N0} [mm]	0.17	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.20	0.20	0.21
	$\delta_{N\infty}$ [mm]	0.50										

Stronghold Spin Capsule Anchor SH-VM

Annex C1

Characteristic values of resistance to tension loads
Displacements under shear loads

Table C3: Characteristic values of resistance to shear loads.

Anchor size			M8	M10	M12	M12 /1,5t	M16	M16 /1,5t	M20	M20 /1,5t	M24	M24 /1,5t	M30
Steel failure without lever arm													
Characteristic resistance property class 5.8	$V_{Rk,S}$	[kN]	9	14	21		39		61		88		140
Characteristic resistance property class 8.8	$V_{Rk,S}$	[kN]	15	23	34		63		98		141		224
Partial safety factor property class 5.8, 8.8	$\gamma_{Ms}^{1)}$	[-]	1.25										
Characteristic resistance Stainless steel A4 and HCR property class 70	$V_{Rk,S}$	[kN]	13	20	30		55		86		124		140
Partial safety factor Stainless steel A4 and HCR property class 70	$\gamma_{Ms}^{1)}$	[-]	1.56										
Steel failure with lever arm													
Char. bending moment property class 5.8	$M_{Rk,S}^0$	[Nm]	19	37	66		166		325		561		1125
Char. bending moment property class 8.8	$M_{Rk,S}^0$	[Nm]	30	60	105		266		519		898		1799
Partial safety factor property class 5.8, 8.8	$\gamma_{Ms}^{1)}$	[-]	1.25										
Char. bending moment Stainless steel A4 and HCR property class 70	$M_{Rk,S}^0$	[Nm]	26	52	92		233		454		786		1574
Partial safety factor Stainless steel A4 and HCR property class 70	$\gamma_{Ms}^{1)}$	[-]	1.56										
Concrete pryout failure													
Pryout factor	k_B	[-]	2.0										
Partial safety factor	γ_{inst}	[-]	1.0										
Concrete edge failure													
Partial safety factor	γ_{inst}	[-]	1.0										

¹⁾ In absence of other national regulations

Table C4: Displacements under shear loads

Anchor size		M8	M10	M12	M12 /1,5t	M16	M16 /1,5t	M20	M20 /1,5t	M24	M24 /1,5t	M30
Shear load	V [kN]	5.2	8.3	12.0	12.0	22.4	22.4	35.0	35.0	50.4	50.4	80.1
Displacement	δ_{V0} [mm]	2.0	2.1	2.2	2.2	2.5	2.5	2.6	2.6	2.8	2.8	3.0
	$\delta_{V\infty}$ [mm]	2.9	3.1	3.3	3.3	3.7	3.7	4.0	4.0	4.1	4.1	4.4

Stronghold Spin Capsule Anchor SH-VM

Annex C2

Characteristic values of resistance to shear loads
Displacements under shear loads