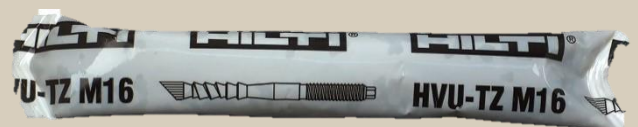




# HILTI HVZ ADHESIVE CAPSULE

**Technical Datasheet**



Update: Oct-20


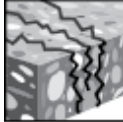

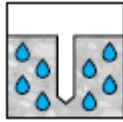
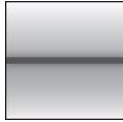



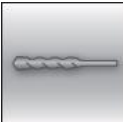

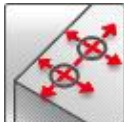


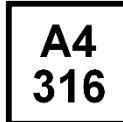






# HVZ (HVU-TZ+HAS-TZ) adhesive anchor system

Anchor design / Rods / Concrete

Anchor version	Benefits
 <p>HVZ Mortar capsule</p>	<ul style="list-style-type: none"> <li>- Suitable for cracked and non-cracked concrete C20/25 to C50/60</li> <li>- High loading capacity</li> <li>- Suitable for dry and water saturated concrete</li> </ul>
 <p>Anchor rod: HAS-TZ HAS-R-TZ HAS-HCR-TZ (M10-M20)</p>	

Base material	Load conditions
 <p>Concrete (non-cracked)</p>	 <p>Concrete (cracked)</p>
 <p>Dry concrete</p>	 <p>Wet concrete</p>
 <p>Static/ quasi-static</p>	 <p>Fire resistance</p>
 <p>Shock</p>	 <p>Fatigue</p>
Installation conditions	Other information
 <p>Hammer drilled holes</p>	 <p>Hilti SafeSet technology</p>
 <p>Small edge distance and spacing</p>	 <p>European Technical Assessment</p>
 <p>CE conformity</p>	 <p>Corrosion resistance</p>
 <p>High corrosion resistance</p>	 <p>PROFIS design Software</p>

## Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment <sup>a)</sup>	DIBt, Berlin	ETA-03/0032 / 2015-08-27
European Technical Assessment <sup>b)</sup>	DIBt, Berlin	ETA-17/0200 / 2020-10-05
Approval for shockproof fastenings in civil defense installations	Federal Office for Civil Protection, Bern	BZS D 09-602 / 2020-10-31
Fire test report ZTV – Tunnel	IBMB, Braunschweig	UB 3357/0550-2 / 2018-06-27
Fire test report	IBMB, Braunschweig	UB 3357/0550-1 / 2018-06-27
Assessment report (fire)	Warringtonfire	WF 327804/B / 2013-07-10

a) All data given in this section according ETA-03/0032, issue 2015-08-27.  
 b) All data given in this section according ETA-17/0200, issue 2020-10-05.

**Static and quasi-static resistance (for a single anchor) - Design method: ETAG 001, Annex C**
**All data in this section applies to:**

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- *Steel* failure
- Base material thickness, as specified in the table
- Embedment depth, as specified in the table
- Anchor material, as specified in the tables
- Concrete C20/25
- Temperature range I  
(min. Base material temperature -40°C, max. Long term/short term base material temperature: +50°C/80°C)

**Effective anchorage depth for static**

Anchor size			M10	M12	M16		M20
Eff. Anchorage depth	$h_{ef}$	[mm]	75	95	105	125	170
Base material thickness	$h_{min}$	[mm]	150	190	210	250	340

**Characteristic resistance**

Anchor size			M10x75	M12x95	M16x105	M16x125	M20x170
<b>Non-cracked concrete</b>							
Tension $N_{Rk}$	HAS-TZ	[kN]	32,8	40,0	54,3	70,6	111,9
	HAS-RTZ, HAS-HCR-TZ		32,8	40,0	54,3	70,6	111,9
Shear $V_{Rk}$	HAS-TZ	[kN]	18,0	27,0	51,0	51,0	88,0
	HAS-RTZ, HAS-HCR-TZ		20,0	30,0	56,0	56,0	98,0
<b>Cracked concrete</b>							
Tension $N_{Rk}$	HAS-TZ	[kN]	23,4	33,3	38,7	50,3	79,8
	HAS-RTZ, HAS-HCR-TZ		23,4	33,3	38,7	50,3	79,8
Shear $V_{Rk}$	HAS-TZ	[kN]	18,0	27,0	51,0	51,0	88,0
	HAS-RTZ, HAS-HCR-TZ		20,0	30,0	56,0	56,0	98,0

**Design resistance**

Anchor size			M10x75	M12x95	M16x105	M16x125	M20x170
<b>Non-cracked concrete</b>							
Tension $N_{Rd}$	HAS-TZ	[kN]	21,9	26,7	36,2	47,1	74,6
	HAS-RTZ, HAS-HCR-TZ		21,9	26,7	36,2	47,1	74,6
Shear $V_{Rd}$	HAS-TZ	[kN]	14,4	21,6	40,8	40,8	70,4
	HAS-RTZ, HAS-HCR-TZ		16,0	24,0	44,8	44,8	78,4
<b>Cracked concrete</b>							
Tension $N_{Rd}$	HAS-TZ	[kN]	15,6	22,2	25,8	33,5	53,2
	HAS-RTZ, HAS-HCR-TZ		15,6	22,2	25,8	33,5	53,2
Shear $V_{Rd}$	HAS-TZ	[kN]	14,4	21,6	40,8	40,8	70,4
	HAS-RTZ, HAS-HCR-TZ		16,0	24,0	44,8	44,8	78,4



Recommended loads <sup>a)</sup>

Anchor size		M10x75	M12x95	M16x105	M16x125	M20x170	
<b>Non-cracked concrete</b>							
Tension $N_{Rec}$	HAS-TZ	[kN]	15,6	19,0	25,9	33,6	53,3
	HAS-RTZ, HAS-HCR-TZ		15,6	19,0	25,9	33,6	53,3
Shear $V_{Rec}$	HAS-TZ	[kN]	10,3	15,4	29,1	29,1	50,3
	HAS-RTZ, HAS-HCR-TZ		11,4	17,1	32,0	32,0	56,0
<b>Cracked concrete</b>							
Tension $N_{Rec}$	HAS-TZ	[kN]	11,1	15,9	18,4	24,0	38,0
	HAS-RTZ, HAS-HCR-TZ		11,1	15,9	18,4	24,0	38,0
Shear $V_{Rec}$	HAS-TZ	[kN]	10,3	15,4	29,1	29,1	50,3
	HAS-RTZ, HAS-HCR-TZ		11,4	17,1	32,0	32,0	56,0

a) With overall partial safety factor for action  $\gamma = 1,4$ . The partial safety factors for action depend on the type of loading and shall be taken from national regulations.

## Fatigue resistance

### All data in this section applies to:

- Correct setting (see setting instruction)
- No edge distance and spacing influence
- Embedment depth, as specified in the table
- One anchor material, as specified in the tables
- Concrete C20/25
- Temperature range I  
(min. Base material temperature -40°C, max. Long term/short term base material temperature: +50°C/80°C)

### Characteristic resistance under tension, shear and combined fatigue load in concrete (design method II acc. to TR 061)

HAS-...	TZ				HCR-TZ	
Anchor size	M10x75	M12x95	M16x105	M16x125	M12x95	M16x125
<b>TENSION FATIGUE LOAD</b>						
<b>Steel failure</b>						
Characteristic resistance $\Delta N_{Rk,s,0,\infty}$ [kN]	10,0	18,0	20,0	26,0	15,0	20,8
Partial factor $\gamma_{Ms,N,fat}$ [-]	1,35					
<b>Concrete failure</b>						
Effective embedment depth $h_{ef}$ [mm]	75	95	105	125	95	125
Reduction factor <sup>1)</sup> $\eta_{k,c,N,fat,\infty}$ [-]	0,6					
Partial factor $\gamma_{Mc,fat}$ [-]	1,5					
Load transfer factor for fastener group $\psi_{FN}$ [-]	0,69					
<b>Pull-out failure</b>						
Partial factor $\gamma_{Mp,N,fat}$ [-]	1,5					
Reduction factor $\eta_{k,p,N,fat,\infty}$ [-]	0,6					
Characteristic resistance in uncracked concrete $N_{Rk,p}$ [kN] C20/25	2)	40	2)	2)	40	2)
Characteristic resistance in cracked concrete $N_{Rk,p}$ [kN] C20/25	2)	2)	2)	2)	2)	2)
<b>SHEAR FATIGUE LOAD</b>						
<b>Steel failure</b>						
Characteristic resistance $\Delta V_{Rk,s,0,\infty}$ [kN]	4,5	8,5	15,0	15,0	8,5	7,6
Partial factor $\gamma_{Ms,V,fat}$ [-]	1,35					
<b>Concrete failure</b>						
Effective length of fastener $l_f$ [mm]	75	95	105	125	95	125
Effective outside diameter of fastener $d_{nom}$ [mm]	10	12	16	16	12	16
Reduction factor <sup>1)</sup> $\eta_{k,c,V,fat,\infty}$ [-]	0,6					
Partial factor $\gamma_{Mc,fat}$ [-]	1,5					
Load transfer factor for fastener group $\psi_{FV}$ [-]	0,77					
<b>COMBINED FATIGUE LOAD</b>						
Exponent for combined fatigue load $\alpha_s$ [-]	0,75	0,85	0,7	0,7	0,5	0,7
$\alpha_c$ [-]	1,5					

1)  $N_{Rk,c}$  according to EN 1992-4:2018 with  $N_{Rk,c}^0$  with  $k_{cr,N} = 7,7$  and  $k_{ucr,N} = 11,0$ ;  $N_{Rk,sp}$  according to EN 1992-4:2018 with  $N_{Rk,sp}^0 = \min(N_{Rk,p}, N_{Rk,c}^0)$ ;  $V_{Rk,c}$  according to EN 1992-4:2018;  $V_{Rk,cp}$  according to EN 1992-4:2018 with  $k_8 = 2,0$ .

2)  $N_{Rk,p} = N_{Rk,c}$  with  $N_{Rk,c}$  according to EN 1992-4:2018 with  $N_{Rk,c}^0$  with  $k_{cr,N} = 7,7$  and  $k_{ucr,N} = 11,0$ .

## Materials

### Mechanical properties

Anchor size		M10x75	M12x95	M16x105	M16x125	M20x170
Nominal tensile strength $f_{uk}$	[N/mm <sup>2</sup> ]	800	800	800	800	800
Yield strength $f_{yk}$	[N/mm <sup>2</sup> ]	640	640	640	640	640
Stressed cross-section $A_s$	tension	44,2	63,6	113	113	227
	shear	50,3	73,9	141	141	245
Moment of resistance W	HVZ [mm <sup>3</sup> ]	50,3	89,6	236	236	541

### Material quality

Part	Material
<b>Metal parts made of zinc coated steel</b>	
Anchor rod HAS-TZ	Coated, elongation at fracture ( $l_0=5d$ ) > 8% ductile
Filling washer	Electroplated zinc coated $\geq 5 \mu\text{m}$
Spherical washer	Electroplated zinc coated $\geq 5 \mu\text{m}$
Nut	Electroplated zinc coated $\geq 5 \mu\text{m}$
Lock Nut	Electroplated zinc coated $\geq 5 \mu\text{m}$
<b>Metal parts made of stainless steel</b>	
Anchor rod HAS-RTZ	Stainless steel 1.4401, 1.4404, elongation at fracture
Filling washer	Stainless steel
Spherical washer	Stainless steel
Nut	Stainless steel
Lock Nut	Stainless steel
<b>Metal parts made of stainless steel and high corrosion resistant steel</b>	
Corrosion resistance class III acc. to EN 1993-1-4: 2006+A1:2015	
Anchor rod HAS-HCR-TZ	Stainless steel 1.4529, elongation at fracture ( $l_0=5d$ ) > 8%
Filling washer	Stainless steel
Spherical washer	Stainless steel
Nut	Stainless steel 1.4529
Lock Nut	Stainless steel

Filling set (contains filling washer, spherical washer and lock nut) needs to be purchased as separate item.

## Setting information

### Installation temperature range:

Static and quasi-static loading: -5°C to +40°C

Fatigue cycling loading: 0°C to +40°C

### In service temperature range:

Hilti HVZ adhesive anchor with anchor rod HAS-TZ may be applied in the temperature ranges given below. An elevated base material temperature may lead to a reduction of the design bond resistance.

Temperature range	Base material temperature	Maximum long term base material temperature	Maximum short term base material temperature
Temperature range I	-40 °C to +80 °C	+ 50°C	+ 80°C

### Max short term base material temperature

Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

### Max long term base material temperature

Long-term elevated base material temperatures are roughly constant over significant periods of time.

### Curing time for mortar capsule HVU-TZ<sup>a)</sup>

Temperature of the base material	Release screwed on setting tool curing time $t_{rel}$	Full load curing time $t_{cure}$
$-5\text{ °C} \leq T_{BM} < 0\text{ °C}$	60 min	5 hour
$0\text{ °C} \leq T_{BM} < 10\text{ °C}$	30 min	1 hour
$10\text{ °C} \leq T_{BM} < 20\text{ °C}$	20 min	30 min
$20\text{ °C} \leq T_{BM} < 40\text{ °C}$	8 min	20 min

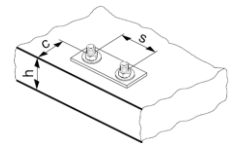
a) The curing time data are valid for dry base material only. In wet base material, the curing times must be doubled.

### Setting details

Anchor size			M10x75	M12x95	M16x105	M16x125	M20x170	
Diameter of element	d	[mm]	10	12	16	16	20	
Nominal diameter of drill bit	d <sub>0</sub>	[mm]	12	14	18	18	25	
Effective anchorage depth	h <sub>ef</sub>	[mm]	75	95	105	125	170	
Drill hole depth	h <sub>1</sub>	[mm]	90	110	125	145	195	
Min. thickness of concrete member	h <sub>min</sub> <sup>a)</sup>	[mm]	150	190	160	190	340	
Standard fixture thickness (without Filling Set)	t <sub>fix</sub> <sup>d)</sup>	[mm]	15 / 30 / 50	25 / 40 / 50 / 100	30 / 60 / 100	30 / 60 / 100	40	
Standard fixture thickness (with Filling Set)	t <sub>fix</sub> <sup>d)</sup>	[mm]	10 / 21 / 41	10 / 30 40 / 90	16 / 19 / 49 / 89	16 / 19 / 49 / 89	-	
Max. diameter of clearance hole in the fixture (without Filling Set)	d <sub>f1</sub>	[mm]	12	14	18	18	22	
Max. diameter of clearance hole in the fixture (with Filling Set)	d <sub>f2</sub>	[mm]	14	16	20	20	-	
<b>Cracked concrete</b>								
Min. spacing	S <sub>min</sub>	[mm]	50	60	70	70	80	
Min. edge distance	C <sub>min</sub>	[mm]	50	60	70	70	80	
<b>Non-cracked concrete</b>								
Min. spacing	S <sub>min</sub>	[mm]	50	60	70	70	80	
Min. edge distance	C <sub>min</sub>	[mm]	50	70	85	85	80	
Critical spacing for splitting failure	S <sub>cr,sp</sub>	[mm]	2 C <sub>cr,sp</sub>					
Critical edge distance for splitting failure <sup>b)</sup>	C <sub>cr,sp</sub>	[mm]	1,5 · h <sub>ef</sub>					
Critical spacing for concrete cone failure	S <sub>cr,N</sub>	[mm]	2 C <sub>cr,N</sub>					
Critical edge distance for concrete cone failure <sup>b)</sup>	C <sub>cr,N</sub>	[mm]	1,5 h <sub>ef</sub>					
Installation torque <sup>c)</sup>	HAS-TZ	T <sub>inst</sub>	[Nm]	40	50	90	90	150
	HAS-RTZ		50	70	100	100	150	
	HAS-HCR-TZ							

For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced.

- a) h: base material thickness ( $h \geq h_{min}$ )
- b) The critical edge distance for concrete cone failure depends on the embedment depth  $h_{ef}$  and the design bond resistance. The simplified formula given in this table is on the safe side.
- c) Max. recommended torque moment to avoid splitting failure during installation with min. spacing and/or edge distance
- d) Other fixture thickness' are possible









### Installation equipment

Anchor size	M10x75	M12x95	M16x105	M16x125	M20x170
Rotary hammer	TE 1 -TE 30		TE 1 – TE 60		TE 30 – TE 80
Tools	compressed air gun and blow out pump, set of cleaning brushes, dispenser				

### Setting tool

HAS-(E-)TZ-...	M10	M12	M16	M20
HAS-TZ	TE-C HEX M10	TE-C HEX M12	TE-C HEX M16	TE-C HEX M120
HAS-E-TZ	TE-C E M10	TE-C E M12	TE-C (Y) M16	TE-C E M20

### Drilling and cleaning parameters

HAS-TZ	Hammer drill	Hollow Drill Bit	Brush HIT-RB
	d <sub>0</sub> [mm]	size [mm]	
			
<b>M10</b>	12	-	12
<b>M12</b>	14	14	14
<b>M16</b>	18	18	18
<b>M20</b>	25	25	25

## Setting instructions

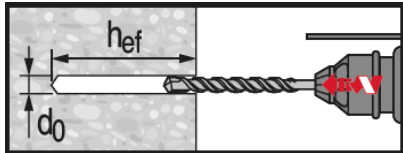
\*For detailed information on installation see instruction for use given with the package of the product.



### Safety regulations.

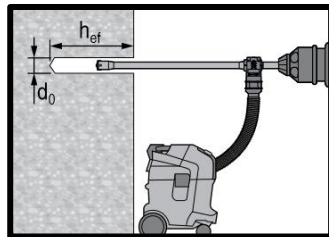
Review the Material Safety Data Sheet (MSDS) before use for proper and safe handling! Wear well-fitting protective goggles and protective gloves when working with Hilti HVZ.

### Hole drilling



#### Hammer drilled hole

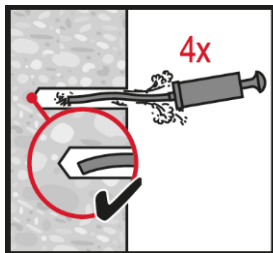
For dry or wet concrete, only.



#### Hammer drilled hole with Hollow drill bit

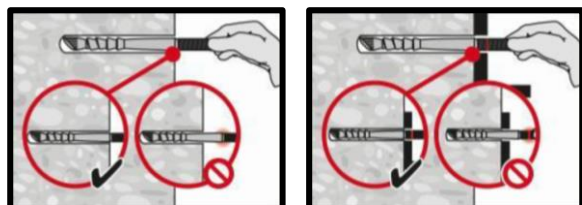
For dry and wet concrete, only.  
No cleaning required.

### Hole cleaning



#### Manual cleaning for hammer drilled hole

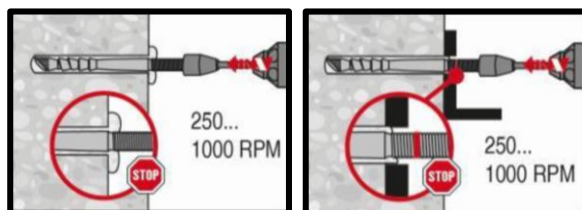
### Setting the element



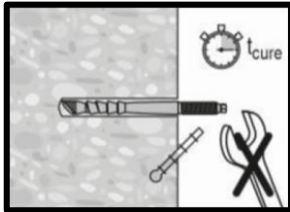
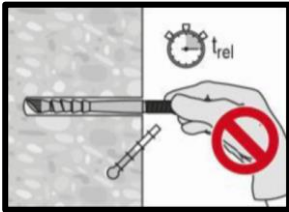
**Check** the setting depth.



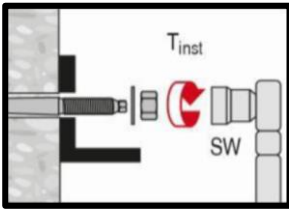
**Insert the foil capsule** with the peak ahead to the back of the hole.



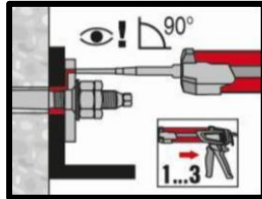
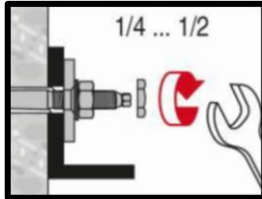
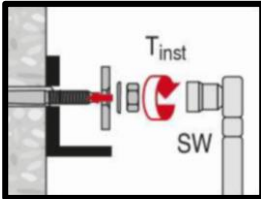
**Drive the anchor rod** with the plugged tool into the hole.



After **required time** remove the screwed on setting tool and excess mortar



**Loading the anchor** after required curing time  $t_{cure}$  and apply installation torque



**Use of filling set.** Apply installation torque after required curing time, apply the lock nut and fill annular gap between anchor rod and fixture using Hilti injection mortar HY 200-A/R or HY 200-R V3.