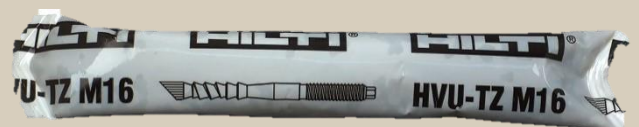




HILTI HVZ ADHESIVE CAPSULE

Technical Datasheet

Update: Jan-23





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

Anchor design / Rods / Concrete

Anchor version



HVZ
Mortar capsule



Anchor rod:
HAS-TZ
HAS-R-TZ
HAS-HCR-TZ
(M10-M20)

Benefits

- Suitable for cracked and non-cracked concrete C20/25 to C50/60
- High loading capacity
- Suitable for dry and water saturated concrete

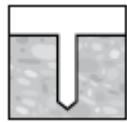
Base material



Concrete
(non-cracked)



Concrete
(cracked)

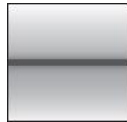


Dry
concrete



Wet
concrete

Load conditions



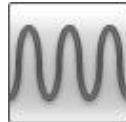
Static/
quasi-static



Fire
resistance

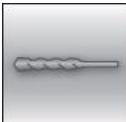


Shock



Fatigue

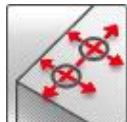
Installation conditions



Hammer
drilled
holes

SAFE-ET

Hilti
SafeSet
technology



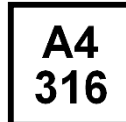
Small edge
distance
and
spacing



European
Technical
Assessment



CE
conformity



Corrosion
resistance



High
corrosion
resistance



PROFIS
Engineerin
g design
Software

Other information

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment ^{a)}	DIBt, Berlin	ETA-03/0032 / 2015-08-27
European Technical Assessment ^{b)}	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.

& PDF

Static and quasi-static resistance (for a single anchor)

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

Anchor size		M10	M12	M16		M20
Effective 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	
Non-cracked concrete							
Tension	HAS-TZ	N_{Rk} [kN]	32,0	40,0	52,9	68,8	109,0
	HAS-RTZ, HAS-HCR-TZ		32,0	40,0	52,9	68,8	109,0
Shear	HAS-TZ	V_{Rk} [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
Cracked concrete							
Tension	HAS-TZ	N_{Rk} [kN]	22,4	31,9	37,1	48,1	76,3
	HAS-RTZ, HAS-HCR-TZ		22,4	31,9	37,1	48,1	76,3
Shear	HAS-TZ	V_{Rk} [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	
Non-cracked concrete							
Tension	HAS-TZ	N_{Rd} [kN]	21,3	26,7	35,3	45,8	72,7
	HAS-RTZ, HAS-HCR-TZ		21,3	26,7	35,3	45,8	72,7
Shear	HAS-TZ	V_{Rd} [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
Cracked concrete							
Tension	HAS-TZ	N_{Rd} [kN]	14,9	21,3	24,7	32,1	50,9
	HAS-RTZ, HAS-HCR-TZ		14,9	21,3	24,7	32,1	50,9
Shear	HAS-TZ	V_{Rd} [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 ^{a)}

Anchor size				M10x75	M12x95	M16x105	M16x125	M20x170
Non-cracked concrete								
Tension	HAS-TZ	N _{Rec}	[kN]	15,2	19,0	25,2	32,7	51,9
	HAS-RTZ, HAS-HCR-TZ			15,2	19,0	25,2	32,7	51,9
Shear	HAS-TZ	V _{Rec}	[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
Cracked concrete								
Tension	HAS-TZ	N _{Rec}	[kN]	10,7	15,2	17,6	22,9	36,3
	HAS-RTZ, HAS-HCR-TZ			10,7	15,2	17,6	22,9	36,3
Shear	HAS-TZ	V _{Rec}	[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
- Steel failure
- Base material thickness, as specified in the table
- 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)
- Anchor is issued with Hilti filling set (see setting instruction)

Effective anchorage depth

Anchor size			M10	M12	M16	
Effective anchorage depth	h_{ef}	[mm]	75	95	105	125
Base material thickness	h_{min}	[mm]	150	190	210	250

Characteristic resistance

Anchor size				M10x75	M12x95	M16x105	M16x125
Non-cracked concrete							
Tension	HAS-TZ	$\Delta N_{Rk,0,\infty}$	[kN]	10,0	16,0	20,0	26,0
	HAS-HCR-TZ			-	15,0	-	20,8
Shear	HAS-TZ	$\Delta V_{Rk,0,\infty}$	[kN]	4,5	8,5	15,0	15,0
	HAS-HCR-TZ			-	8,5	-	7,6
Cracked concrete							
Tension	HAS-TZ	$\Delta N_{Rk,0,\infty}$	[kN]	10,0	15,9	20,0	24,1
	HAS-HCR-TZ			-	15,0	-	20,8
Shear	HAS-TZ	$\Delta V_{Rk,0,\infty}$	[kN]	4,5	8,5	15,0	15,0
	HAS-HCR-TZ			-	8,5	-	7,6

Design resistance

Anchor size				M10x75	M12x95	M16x105	M16x125
Non-cracked concrete							
Tension	HAS-TZ	$\Delta N_{Rd,0,\infty}$	[kN]	7,4	10,7	14,8	19,3
	HAS-HCR-TZ			-	10,7	-	15,4
Shear	HAS-TZ	$\Delta V_{Rd,0,\infty}$	[kN]	3,3	6,3	11,1	11,1
	HAS-HCR-TZ			-	6,3	-	5,6
Cracked concrete							
Tension	HAS-TZ	$\Delta N_{Rd,0,\infty}$	[kN]	7,4	10,6	12,4	16,0
	HAS-HCR-TZ			-	10,6	-	15,4
Shear	HAS-TZ	$\Delta V_{Rd,0,\infty}$	[kN]	3,3	6,3	11,1	11,1
	HAS-HCR-TZ			-	6,3	-	5,6

For more information about different failure modes under fatigue load please see the full ETA-17/0200 report.



Materials

Mechanical properties

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

Material quality

Part	Material
Zinc coated steel	
Anchor rod HAS-TZ	Coated, elongation at fracture ($l_0=5d$) > 8% ductile
Filling washer ^{a)}	Electroplated zinc coated $\geq 5 \mu\text{m}$
Spherical washer ^{a)}	Electroplated zinc coated $\geq 5 \mu\text{m}$
Nut	Electroplated zinc coated $\geq 5 \mu\text{m}$
Lock Nut ^{a)}	Electroplated zinc coated $\geq 5 \mu\text{m}$
Stainless steel	
Anchor rod HAS-RTZ	Stainless steel 1.4401, 1.4404, elongation at fracture
Filling washer ^{a)}	Stainless steel
Spherical washer ^{a)}	Stainless steel
Nut	Stainless steel
Lock Nut ^{a)}	Stainless steel
Stainless steel and high corrosion resistant steel ^{b)}	
Anchor rod HAS-HCR-TZ	Stainless steel 1.4529, elongation at fracture ($l_0=5d$) > 8%
Filling washer ^{a)}	Stainless steel
Spherical washer ^{a)}	Stainless steel
Nut	Stainless steel 1.4529
Lock Nut ^{a)}	Stainless steel

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

b) Corrosion resistance class III acc. to EN 1993-1-4: 2006+A1:2015

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^{a)}

Temperature of the base material	Release screwed on setting tool curing time	Full load curing time
T_{BM}	t_{rel}	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 ₀ [mm]	12	14	18	18	25
Effective anchorage depth	h _{ef} [mm]	75	95	105	125	170
Drill hole depth	h ₁ [mm]	90	110	125	145	195
Min. thickness of concrete member	h _{min} ^{a)} [mm]	150	190	160	190	340
Standard fixture thickness (without Filling Set)	t _{fix} ^{d)} [mm]	15 / 30 / 50	25 / 40 / 50 / 100	30 / 60 / 100	30 / 60 / 100	40
Standard fixture thickness (with Filling Set)	t _{fix} ^{d)} [mm]	10 / 21 / 41	10 / 30 40 / 90	16 / 19 / 49 / 89	16 / 19 / 49 / 89	-
Maximum diameter of clearance hole in the fixture (without Filling Set)	d _{f1} [mm]	12	14	18	18	22
Maximum diameter of clearance hole in the fixture (with Filling Set)	d _{f2} [mm]	14	16	20	20	-
Cracked concrete						
Minimum spacing	s _{min} [mm]	50	60	70	70	80
Minimum edge distance	c _{min} [mm]	50	60	70	70	80
Non-cracked concrete						
Minimum spacing	s _{min} [mm]	50	60	70	70	80
Minimum edge distance	c _{min} [mm]	50	70	85	85	80
Critical spacing for splitting failure	s _{cr,sp} [mm]	2 c _{cr,sp}				
Critical edge distance for splitting failure ^{b)}	c _{cr,sp} [mm]	1,5·h _{ef}				
Critical spacing for concrete cone failure	s _{cr,N} [mm]	2 c _{cr,N}				
Critical edge distance for concrete cone failure ^{b)}	c _{cr,N} [mm]	1,5 h _{ef}				
Installation torque ^{c)}	HAS-TZ	40	50	90	90	150
	HAS-RTZ	T _{inst} [Nm]	50	70	100	100
	HAS-HCR-TZ		50	70	100	100

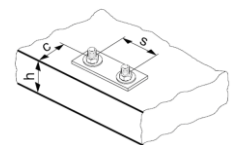
For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced.

a) h: base material thickness (h ≥ 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, setting tool				

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
	d ₀ [mm]	
		
M10	12	-
M12	14	14
M16	18	18
M20	25	25



Setting instructions

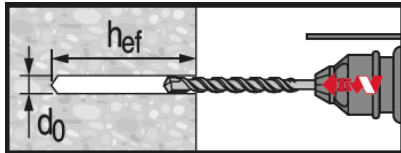
*For detailed information on installation see instruction for use given with the package of the product.



Safety regulations.

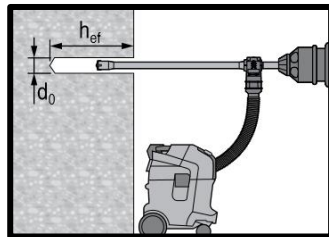
Review the Material Safety Data Sheet (MSDS) before use for proper and safe handling! Wear well-fitting protective goggles and protective gloves when working with Hilti HVZ.

Hole drilling



Hammer drilled hole

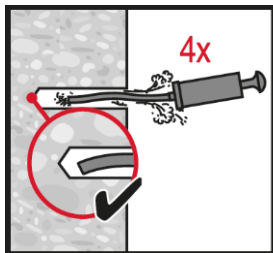
For dry or wet concrete, only.



Hammer drilled hole with Hollow drill bit

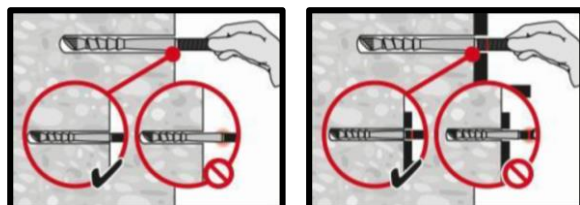
For dry and wet concrete, only.
No cleaning required.

Hole cleaning



Manual cleaning for hammer drilled hole

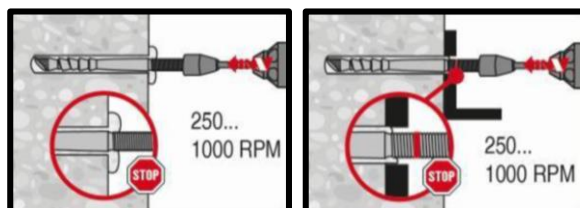
Setting the element



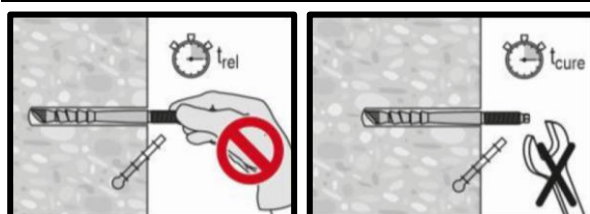
Check the setting depth.



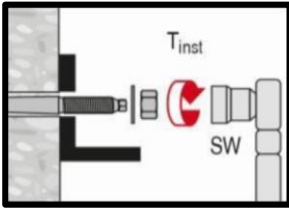
Insert the foil capsule with the peak ahead to the back of the hole.



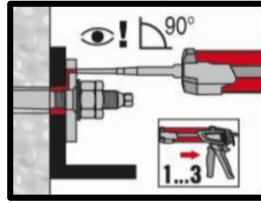
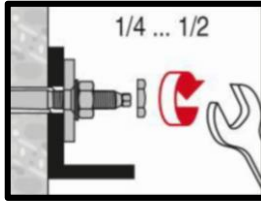
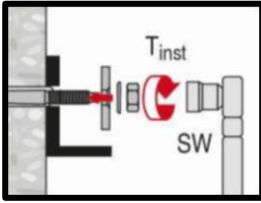
Drive the anchor rod with the plugged tool into the hole.



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.