HILTI HVZ
ADHESIVE CAPSULE

Technical Datasheet

Update: Oct-20

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

Anchor design / Rods / Concrete

Anchor version	Benefits

HVZ
Mortar capsule

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

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

Base material

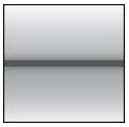
Concrete (non-cracked)

Concrete (cracked)

Dry concrete

Wet concrete

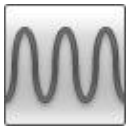
Load conditions



Static/ quasi-static

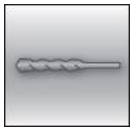
Fire resistance

Shock



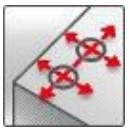
Fatigue

Installation conditions



Hammer drilled holes

Hilti Safe**Set** technology



Small edge distance and spacing

European Technical Assessment

Other information

CE conformity

Corrosion resistance

High corrosion resistance

PROFIS design Software

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.

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 -40ºC, max. Long term/short term base material temperature: +50ºC/80ºC)

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**
Non-cracked concrete							
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*
Cracked concrete							
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**
Non-cracked concrete							
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
Cracked concrete							
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 [a)]

Anchor size			M10x75	M12x95	M16x105	M16x125	M20x170
Non-cracked concrete							
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
Cracked concrete							
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 dafety factor for action γ = 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 -40ºC, max. Long term/short term base material temperature: +50ºC/80ºC)

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**
TENSION FATIGUE LOAD								
Steel failure								
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					
Concrete failure								
Effective embedment depth	h_{ef}	[mm]	75	95	105	125	95	125
Reduction factor[1)]	$\eta_{k,c,N,fat,\infty}$	[-]	0,6					
Partial factor	$\gamma_{Mc,fat}$	[-]	1,5					
Load transfer factor for fastener group	ψ_{FN}	[-]	0,69					
Pull-out failure								
Partial factor	$\gamma_{Mp,N,fat}$	[-]	1,5					
Reduction factor	$\eta_{k,p,N,fat,\infty}$	[-]	0,6					
Characteristic resistance in uncracked concrete C20/25	$N_{Rk,p}$	[kN]	[2)]	40	[2)]	[2)]	40	[2)]
Characteristic resistance in cracked concrete C20/25	$N_{Rk,p}$	[kN]	[2)]	[2)]	[2)]	[2)]	[2)]	[2)]
SHEAR FATIGUE LOAD								
Steel failure								
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					
Concrete failure								
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[1)]	$\eta_{k,c,V,fat,\infty}$	[-]	0,6					
Partial factor	$\gamma_{Mc,fat}$	[-]	1,5					
Load transfer factor for fastener group	ψ_{FV}	[-]	0,77					
COMBINED FATIGUE LOAD								
Exponent for combined fatigue load	α_s	[-]	0,75	0,85	0,7	0,7	0,5	0,7
	α_c	[-]	1,5					

1) $N_{Rk,c}$ according to EN 1992-4:2018 with $N^0_{Rk,c}$ with $k_{cr,N}$ = 7,7 and $k_{ucr,N}$ = 11,0; $N_{Rk,sp}$ according to EN 1992-4:2018 with $N^0_{Rk,sp}$ = min ($N_{Rk,p}$;$N^0_{Rk,c}$); $V_{Rk,c}$ 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 $N^0_{Rk,c}$ 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/mm²]	800	800	800	800	800
Yield strength f_{yk}		[N/mm²]	640	640	640	640	640
Stressed cross-section A_s	tension	[mm²]	44,2	63,6	113	113	227
	shear		50,3	73,9	141	141	245
Moment of resistance W	HVZ	[mm³]	50,3	89,6	236	236	541

Material quality

Part	Material
Metal parts made of zinc coated steel	
Anchor rod HAS-TZ	Coated, elongation at fracture (l_0=5d) > 8% ductile
Filling washer	Electroplated zinc coated ≥ 5 µm
Spherical washer	Electroplated zinc coated ≥ 5 µm
Nut	Electroplated zinc coated ≥ 5 µm
Lock Nut	Electroplated zinc coated ≥ 5 µm
Metal parts made of stainless steel	
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
Metal parts made of stainless steel and high corrosion resistant steel 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	+ 50ºC	+ 80ºC

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 t_{rel}	Full load curing time t_{cure}
-5 ºC ≤ T_{BM} < 0 ºC	60 min	5 hour
0 ºC ≤ T_{BM} < 10 ºC	30 min	1 hour
10 ºC ≤ T_{BM} < 20 ºC	20 min	30 min
20 ºC ≤ T_{BM} < 40 ºC	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	-
Max. diameter of clearance hole in the fixture (without Filling Set)		d_{f1}	[mm]	12	14	18	18	22
Max. diameter of clearance hole in the fixture (with Filling Set)		d_{f2}	[mm]	14	16	20	20	-
Cracked concrete								
Min. spacing		s_{min}	[mm]	50	60	70	70	80
Min. edge distance		c_{min}	[mm]	50	60	70	70	80
Non-cracked concrete								
Min. spacing		s_{min}	[mm]	50	60	70	70	80
Min. 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]	$1{,}5 \cdot h_{ef}$				
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	T_{inst}	[Nm]	40	50	90	90	150
	HAS-RTZ HAS-HCR-TZ			50	70	100	100	150

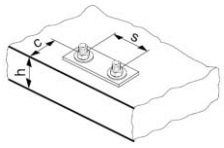
For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced.

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 save 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_0 [mm]	size [mm]	
			
M10	12	-	12
M12	14	14	14
M16	18	18	18
M20	25	25	25

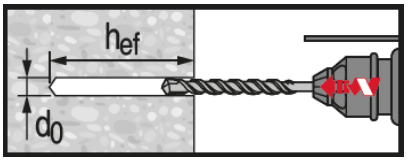
Setting instructions

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

Safety regulations.

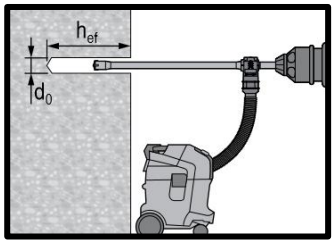
Review the Material Safety Data Sheet (MSDS) before use for proper and safe handling! Wear well-fitting protective goggles and protective gloves when working with Hilti HVZ.

Hole drilling



Hammer drilled hole

For dry or wet concrete, only.

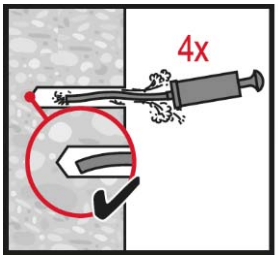


Hammer drilled hole with Hollow drill bit

For dry and wet concrete, only.

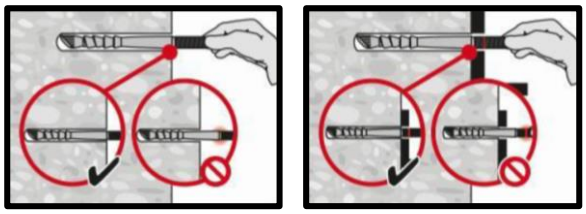
No cleaning required.

Hole cleaning

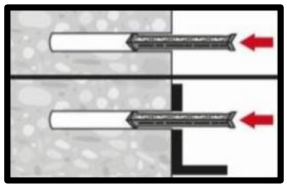


Manual cleaning for hammer drilled hole

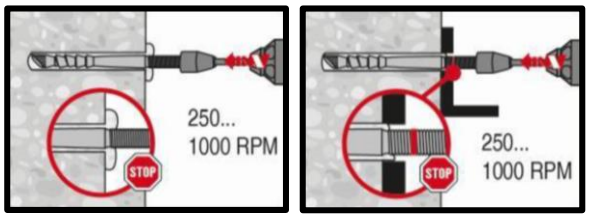
Setting the element



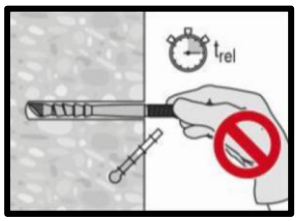
Check the setting depth.

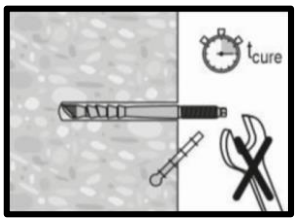


Insert the foil capsule with the peak ahead to the back of the hole.

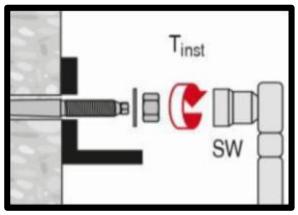


Drive the anchor rod with the plugged tool into the hole.

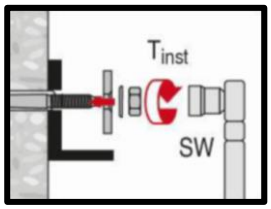


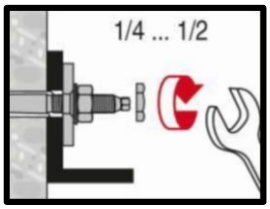


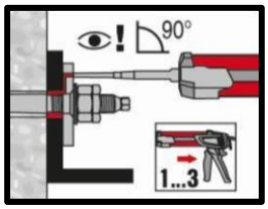
After **required time** remove the screwed on setting tool and excess mortar



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.