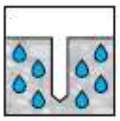
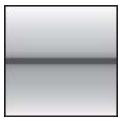
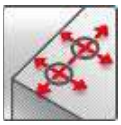
HVZ (HVU-TZ+HAS-TZ) adhesive anchor system

Anchor design (ETAG 001) / Rods&Sleeves / Concrete

Anchor version		Benefits
	HVZ Mortar capsule	- Suitable for cracked and non-cracked concrete C20/25 to C50/60 - High loading capacity - Suitable for dry and water saturated concrete
	Anchor rod: HAS-TZ HAS-R-TZ HAS-HCR-TZ (M10-M20)	

Base material				Load conditions			
							
Concrete (non-cracked)	Concrete (cracked)	Dry concrete	Wet concrete	Static/ quasi-static	Fire resistance	Fatigue	Shock

Installation conditions			Other information				
							
Hammer drilled holes	Hilti SafeSet technology	Small edge distance and spacing	European Technical Assessment	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
Approval for shockproof fastenings in civil defence installations	Federal Office for Cicil Protection, Bern	BZS D 09-602 / 2009-10-28
Fatigue loading	DIBt, Berlin	Z-21.3-1692 / 2016-10-14
Fire test report ZTV – Tunnel	IBMB, Braunchweig	UB 3357/0550-2 / 2001-06-26
Fire test report	IMBM, Brunswick	UB 3357/0550-1 / 2001-04-17
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.

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
- One anchor material, as specified in the tables
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²
- 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

Mean ultimate resistance

Anchor size			M10x75	M12x95	M16x105	M16x125	M20x170
Non-cracked concrete							
Tension $N_{Ru,m}$	HAS-TZ	[kN]	36,8	53,3	72,4	94,1	149,2
	HAS-RTZ, HAS-HCR-TZ		36,8	53,3	72,4	94,1	149,2
Shear $V_{Ru,m}$	HAS-TZ	[kN]	*18,9*	*28,4*	*53,6*	*53,6*	*92,4*
	HAS-RTZ, HAS-HCR-TZ		*21,0*	*31,5*	*58,8*	*58,8*	*102,9*
Cracked concrete							
Tension $N_{Ru,m}$	HAS-TZ	[kN]	31,2	44,4	51,6	67,1	106,4
	HAS-RTZ, HAS-HCR-TZ		31,2	44,4	51,6	67,1	106,4
Shear $V_{Ru,m}$	HAS-TZ	[kN]	*18,9*	*28,4*	*53,6*	*53,6*	*92,4*
	HAS-RTZ, HAS-HCR-TZ		*21,0*	*31,5*	*58,8*	*58,8*	*102,9*

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.

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
HAS-TZ	carbon steel, strength class 8.8
HAS-R-TZ	stainless steel 1.4401 and 1.4571
HAS-HCR-TZ	high corrosion resistance steel 1.4529 and 1.4547

Setting information

Installation temperature range:
-5°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.

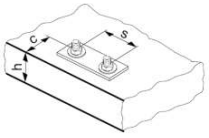
Curing time

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

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	210	250	340
Diameter of clearance hole in the fixture	d_f	[mm]	12	14	18	18	22
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 a)	$c_{cr,sp}$	[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]	$1{,}5\ h_{ef}$				
Torque moment c)		[Nm]	40	50	90	90	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



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				

Drilling and cleaning parameters

HAS-TZ	Hammer drill	Hollow Drill Bit	Brush HIT-RB
	d_0 [mm]	size [mm]	
			
M10	10	-	10
M12	12	-	12
M16	16	16	16
M20	20	20	20

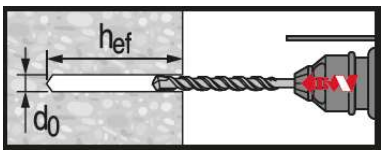
Setting instructions

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

Safety regulations.

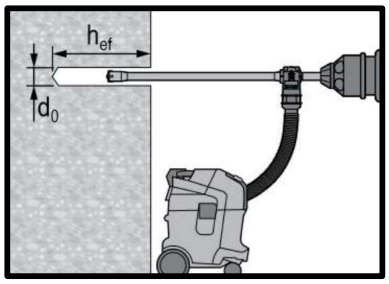
Review the Material Safety Data Sheet (MSDS) before use for proper and safe handling! Wear well-fitting protective goggles and protective gloves when working with Hilti HVZ.

Hole drilling



Hammer drilled hole

For dry or wet concrete and installation in flooded holes (no sea water).

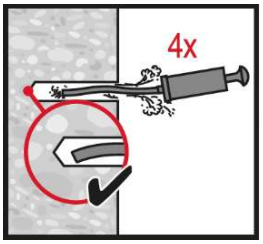


Hammer drilled hole with Hollow drill bit

For dry and wet concrete, only.

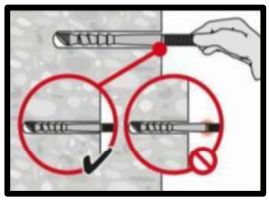
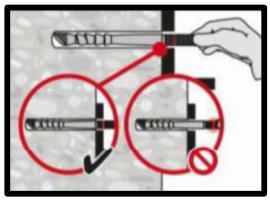
No cleaning required.

Hole cleaning

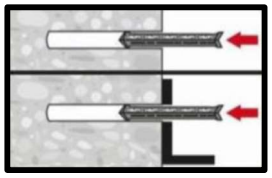


Manual cleaning for hammer drilled hole

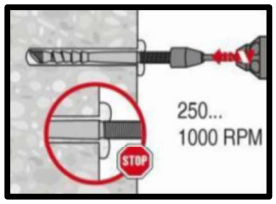
Setting the element

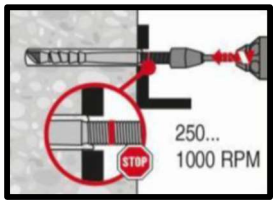



Check the setting depth.

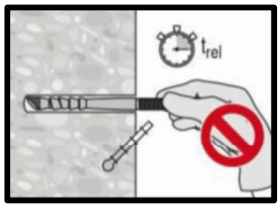


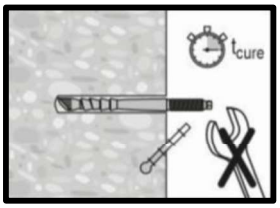
Insert the foil capsule with the peak ahead to the back of the hole.



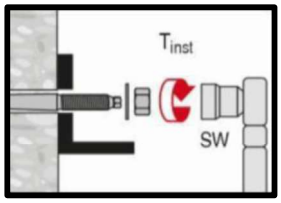


Drive the anchor rod with the plugged tool into the hole.

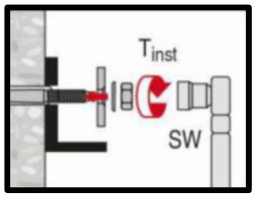


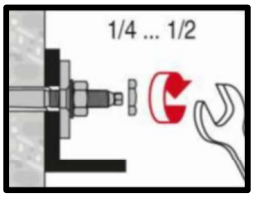


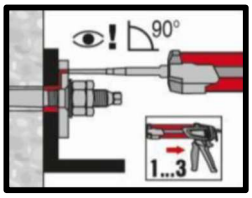
After **required time** remove the screwed on setting tool and excess mortar



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 ficture