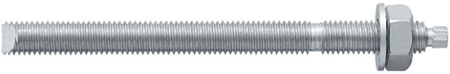
HVU2 adhesive capsule for concrete

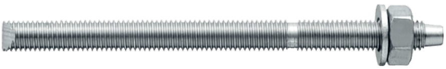
Ultimate performance foil capsule for heavy-duty anchoring in concrete

Anchor version

HVU2
Mortar capsule



Anchor rods:
HAS
HAS-R
HAS-HCR
(M8-M20)



Anchor rods:
HAS-E
HAS-E-R
HAS-E-HCR
(M8-M20)

Internally threaded sleeves:
HIS-N
HIS-RN
(M8-M16)

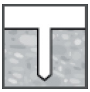
Benefits

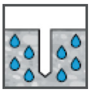
- High loading capacity suitable for restricted on site conditions
- Instant curing down to 5 minutes
- Clean and fast installation that suits hard jobsite conditions
- Pre-dosed volume of mortar per fastening point
- Suitable for cracked and non-cracked concrete C20/25 to C50/60 both for hammer drilled and diamond cored holes
- Suitable for dry and water saturated concrete
- **SafeSet** technology: Hilti hollow drill bit for automatic cleaning

Base material


Uncracked concrete


Cracked concrete


Dry concrete

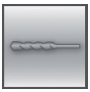

Wet concrete

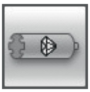
Load conditions


Static/ quasi-static

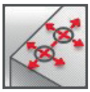

Fire resistance

Installation conditions


Hammer drilled holes


Diamond drilled holes

SAFESET
Hilti **SafeSet** technology


Small edge distance and spacing

Other information

European Technical Assessment

CE conformity

PROFIS Anchor design software

A4 316
Corrosion resistance

HCR highMo
High corrosion resistance

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical Assessment [a)]	DIBt, Berlin	ETA-16/0515 / 2017-07-13
Fire test assessment	ING.Thiele, Pirmasens	21735 / 2017-08-01

a) All data given in this section according ETA-16/0515 issue 2017-07-13

Recommended general notes

* The below clauses based on Hilti product qualifications are for references only. Selection of clauses by the engineer shall be based on the specific application needs. Please contact Hilti's technical team for further details.

- Anchor shall be capsule type adhesive
- Anchor shall be tested for water tightness
- Approved for use in uncracked and cracked concrete under static and quasi-static loading
- Approved for use in diamond cored drilled holes. In such case the performance shall be on the same level of hammer drilled holes when proper installation steps are followed.
- Anchor shall be installed in combination with dust removal drilling accessories to ensure dust free environment and clean borehole.
- Anchor shall be approved for overhead installation.
- Anchors shall obtain the European Technical Assessment (ETA) report.
- The anchor bolt design shall be done either according to "ETAG001 Annex C Design Method" issued by EOTA or "Guides on design of post-installed anchor bolt systems in Hong Kong" issued by HKISC.
- Anchors shall be tested in accordance to either ETAG-001 Annex A or ACI 355.2 by accredited laboratories under HOKLAS Mutual Recognition Arrangement (MRA) Partners.
- Anchor to be approved by NSF for use in contact with drinking water.

For seismic application:
- Approved for use under seismic actions category 1 (C1) and 2 (C2) according to EOTA TR045 "Design of Metal Anchors For Use In Concrete Under Seismic Actions, 02/2013".

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
- Minimum base material thickness
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²

Effective anchorage depth

Anchor size			M8	M10	M12	M16	M20
HAS							
Eff. Anchorage depth	h_{ef}	[mm]	80	90	110	125	170
Base material thickness	h_{min}	[mm]	110	120	140	160	220
HIS-N							
Eff. Anchorage depth	h_{ef}	[mm]	90	110	125	170	-
Base material thickness	h_{min}	[mm]	120	150	170	230	-

Hammer drilled holes and hammer drilled holes with hollow drill bit [a]:

Characteristic resistance

Anchor size			M8	M10	M12	M16	M20
Non-cracked concrete							
Tension N_{Rk}	HAS-(E) 5.8	[kN]	*18,9*	*30,1*	*43,4*	70,6	111,9
	HAS-(E) 8.8		24,1	*42,2*	58,3	70,6	111,9
	HAS-(E-)R		*23,2*	*37,0*	*53,3*	70,6	111,9
	HAS-(E-)HCR		24,1	*42,2*	58,3	70,6	111,9
	HIS-N 8.8		*25,0*	*46,0*	*67,0*	111,9	-
	HIS-RN 70		*26,0*	*41,0*	*59,0*	*110,0*	-
Shear V_{Rk}	HAS-(E) 5.8	[kN]	*9,5*	*15,1*	*21,7*	*41,1*	*56,1*
	HAS-(E) 8.8		*13,3*	*21,1*	*30,5*	*57,7*	*89,7*
	HAS-(E-)R		*11,6*	*18,5*	*26,7*	*50,5*	*78,5*
	HAS-(E-)HCR		*13,3*	*21,1*	*30,5*	*57,7*	*89,7*
	HIS-N 8.8		*13,0*	*23,0*	*34,0*	*63,0*	-
	HIS-RN 70		*13,0*	*20,0*	*30,0*	*55,0*	-
Cracked concrete							
Tension N_{Rk}	HAS-(E) 5.8	[kN]	10,1	24,0	35,2	50,3	79,8
	HAS-(E) 8.8		10,1	24,0	35,2	50,3	79,8
	HAS-(E-)R		10,1	24,0	35,2	50,3	79,8
	HAS-(E-)HCR		10,1	24,0	35,2	50,3	79,8
	HIS-N 8.8		23,0	37,1	50,3	79,8	-
	HIS-RN 70		23,0	37,1	50,3	79,8	-
Shear V_{Rk}	HAS-(E) 5.8	[kN]	*9,5*	*15,1*	*21,7*	*41,1*	*56,1*
	HAS-(E) 8.8		*13,3*	*21,1*	*30,5*	*57,7*	*89,7*
	HAS-(E-)R		*11,6*	*18,5*	*26,7*	*50,5*	*78,5*
	HAS-(E-)HCR		*13,3*	*21,1*	*30,5*	*57,7*	*89,7*
	HIS-N 8.8		*13,0*	*23,0*	*34,0*	*63,0*	-
	HIS-RN 70		*13,0*	*20,0*	*30,0*	*55,0*	-

a) Hilti hollow drill bit is available for the element sizes M12 to M20

Design resistance

Anchor size			M8	M10	M12	M16	M20
Non-cracked concrete							
Tension N_{Rd}	HAS-(E) 5.8	[kN]	12,6	20,1	28,9	47,1	74,6
	HAS-(E) 8.8		16,1	28,1	38,8	47,1	74,6
	HAS-(E-)R		13,8	22,0	31,7	47,1	74,6
	HAS-(E-)HCR		16,1	28,1	38,8	47,1	74,6
	HIS-N 8.8		16,7	30,7	44,7	74,6	-
	HIS-RN 70		13,9	21,9	31,6	58,8	-
Shear V_{Rd}	HAS-(E) 5.8	[kN]	7,6	12,1	17,4	32,9	44,9
	HAS-(E) 8.8		10,6	16,9	24,4	46,2	71,8
	HAS-(E-)R		8,3	13,2	19,1	36,1	50,3
	HAS-(E-)HCR		10,6	16,9	24,4	46,2	71,8
	HIS-N 8.8		10,4	18,4	27,2	50,4	-
	HIS-RN 70		8,3	12,8	19,2	35,3	-
Cracked concrete							
Tension N_{Rd}	HAS-(E) 5.8	[kN]	6,7	16,0	23,5	33,5	53,2
	HAS-(E) 8.8		6,7	16,0	23,5	33,5	53,2
	HAS-(E-)R		6,7	16,0	23,5	33,5	53,2
	HAS-(E-)HCR		6,7	16,0	23,5	33,5	53,2
	HIS-N 8.8		15,3	24,7	33,5	53,2	-
	HIS-RN 70		13,9	21,9	31,6	53,2	-
Shear V_{Rd}	HAS-(E) 5.8	[kN]	7,6	12,1	17,4	32,9	44,9
	HAS-(E) 8.8		10,6	16,9	24,4	46,2	71,8
	HAS-(E-)R		8,3	13,2	19,1	36,1	50,3
	HAS-(E-)HCR		10,6	16,9	24,4	46,2	71,8
	HIS-N 8.8		10,4	18,4	27,2	50,4	-
	HIS-RN 70		8,3	12,8	19,2	35,3	-

a) Hilti hollow drill bit is available for the element sizes M12 to M20

Recommended loads b)

Anchor size			M8	M10	M12	M16	M20
Non-cracked concrete							
Tension N_{Rec}	HAS-(E) 5.8	[kN]	6,3	10.0	14,4	23,5	37,3
	HAS-(E) 8.8		8.0	14.0	19,4	23,5	37,3
	HAS-(E-)R		7,7	12,3	17,7	23,5	37,3
	HAS-(E-)HCR		8.0	14.0	19,4	23,5	37,3
	HIS-N 8.8		8,3	15,3	22,3	37,3	-
	HIS-RN 70		8,6	13,6	19,6	36,6	-
Shear V_{Rec}	HAS-(E) 5.8	[kN]	3,1	5.0	7,2	13,7	18,7
	HAS-(E) 8.8		4,4	7.0	10,1	19,2	29,9
	HAS-(E-)R		3,8	6,1	8,9	16,8	26,1
	HAS-(E-)HCR		4,4	7.0	10,1	19,2	29,9
	HIS-N 8.8		4,3	7,6	11,3	21.0	-
	HIS-RN 70		4,3	6,6	10.0	18,3	-
Cracked concrete							
Tension N_{Rec}	HAS-(E) 5.8	[kN]	3,3	8.0	11,7	16,7	26,6
	HAS-(E) 8.8		3,3	8.0	11,7	16,7	26,6
	HAS-(E-)R		3,3	8.0	11,7	16,7	26,6
	HAS-(E-)HCR		3,3	8.0	11,7	16,7	26,6
	HIS-N 8.8		7,6	12,3	16,7	26,6	-
	HIS-RN 70		7,6	12,3	16,7	26,6	-
Shear V_{Rec}	HAS-(E) 5.8	[kN]	3,1	5.0	7,2	13,7	18,7
	HAS-(E) 8.8		4,4	7.0	10,1	19,2	29,9
	HAS-(E-)R		3,8	6,1	8,9	16,8	26,1
	HAS-(E-)HCR		4,4	7.0	10,1	19,2	29,9
	HIS-N 8.8		4,3	7,6	11,3	21.0	-
	HIS-RN 70		4,3	6,6	10.0	18,3	-

a) Hilti hollow drill bit is available for the element sizes M12 to M20
b) With overall partial safety factor for action γ = 3.0. The recommended loads vary according to the safety factor requirement from national regulations.

Diamond cored holes:

Characteristic resistance

Anchor size			M8	M10	M12	M16	M20
Non-cracked concrete							
Tension N_{Rk}	HAS-(E) 5.8	[kN]	-	*30,1*	*43,4*	70,6	111,9
	HAS-(E) 8.8		-	39,6	58,1	70,6	111,9
	HAS-(E-)R		-	*37,0*	*53,3*	70,6	111,9
	HAS-(E-)HCR		-	39,6	58,1	70,6	111,9
	HIS-N 8.8		*25,0*	*46,0*	*67,0*	111,9	-
	HIS-RN 70		*26,0*	*41,0*	*59,0*	*110,0*	-
Shear V_{Rk}	HAS-(E) 5.8	[kN]	-	*15,1*	*21,7*	*41,1*	*56,1*
	HAS-(E) 8.8		-	*21,1*	*30,5*	*57,7*	*89,7*
	HAS-(E-)R		-	*18,5*	*26,7*	*50,5*	*78,5*
	HAS-(E-)HCR		-	*21,1*	*30,5*	*57,7*	*89,7*
	HIS-N 8.8		*13,0*	*23,0*	*34,0*	*63,0*	-
	HIS-RN 70		*13,0*	*20,0*	*30,0*	*55,0*	-
Cracked concrete							
Tension N_{Rk}	HAS-(E) 5.8	[kN]	-	19,8	29,0	44,0	74,8
	HAS-(E) 8.8		-	19,8	29,0	44,0	74,8
	HAS-(E-)R		-	19,8	29,0	44,0	74,8
	HAS-(E-)HCR		-	19,8	29,0	44,0	74,8
	HIS-N 8.8		17,7	28,5	40,3	67,8	-
	HIS-RN 70		17,7	28,5	40,3	67,8	-
Shear V_{Rk}	HAS-(E) 5.8	[kN]	-	*15,1*	*21,7*	*41,1*	*56,1*
	HAS-(E) 8.8		-	*21,1*	*30,5*	*57,7*	*89,7*
	HAS-(E-)R		-	*18,5*	*26,7*	*50,5*	*78,5*
	HAS-(E-)HCR		-	*21,1*	*30,5*	*57,7*	*89,7*
	HIS-N 8.8		*13,0*	*23,0*	*34,0*	*63,0*	-
	HIS-RN 70		*13,0*	*20,0*	*30,0*	*55,0*	-

Design resistance

Anchor size			M8	M10	M12	M16	M20
Non-cracked concrete							
Tension N_{Rd}	HAS-(E) 5.8	[kN]	-	20,1	28,9	47,1	74,6
	HAS-(E) 8.8		-	26,4	38,7	47,1	74,6
	HAS-(E-)R		-	22,0	31,7	47,1	74,6
	HAS-(E-)HCR		-	26,4	38,7	47,1	74,6
	HIS-N 8.8		16,7	30,7	44,7	74,6	-
	HIS-RN 70		13,9	21,9	31,6	58,8	-
Shear V_{Rd}	HAS-(E) 5.8	[kN]	-	12,1	17,4	32,9	44,9
	HAS-(E) 8.8		-	16,9	24,4	46,2	71,8
	HAS-(E-)R		-	13,2	19,1	36,1	50,3
	HAS-(E-)HCR		-	16,9	24,4	46,2	71,8
	HIS-N 8.8		10,4	18,4	27,2	50,4	-
	HIS-RN 70		8,3	12,8	19,2	35,3	-
Cracked concrete							
Tension N_{Rd}	HAS-(E) 5.8	[kN]	-	13,2	19,4	29,3	49,8
	HAS-(E) 8.8		-	13,2	19,4	29,3	49,8
	HAS-(E-)R		-	13,2	19,4	29,3	49,8
	HAS-(E-)HCR		-	13,2	19,4	29,3	49,8
	HIS-N 8.8		11,8	19,0	26,8	45,2	-
	HIS-RN 70		11,8	19,0	26,8	45,2	-
Shear V_{Rd}	HAS-(E) 5.8	[kN]	-	12,1	17,4	32,9	44,9
	HAS-(E) 8.8		-	16,9	24,4	46,2	71,8
	HAS-(E-)R		-	13,2	19,1	36,1	50,3
	HAS-(E-)HCR		-	16,9	24,4	46,2	71,8
	HIS-N 8.8		10,4	18,4	27,2	50,4	-
	HIS-RN 70		8,3	12,8	19,2	35,3	-

Recommended loads [b)]

Anchor size			M8	M10	M12	M16	M20
Non-cracked concrete							
Tension N_{Rec}	HAS-(E) 5.8	[kN]	-	10.0	14,4	23,5	37,3
	HAS-(E) 8.8		-	13,2	19,3	23,5	37,3
	HAS-(E-)R		-	12,3	17,7	23,5	37,3
	HAS-(E-)HCR		-	13,2	19,3	23,5	37,3
	HIS-N 8.8		8,3	15,3	22,3	37,3	-
	HIS-RN 70		8,6	13,6	19,6	36,6	-
Shear V_{Rec}	HAS-(E) 5.8	[kN]	-	5.0	7,2	13,7	18,7
	HAS-(E) 8.8		-	7.0	10,1	19,2	29,9
	HAS-(E-)R		-	6,1	8,9	16,8	26,1
	HAS-(E-)HCR		-	7.0	10,1	19,2	29,9
	HIS-N 8.8		4,3	7,6	11,3	21.0	-
	HIS-RN 70		4,3	6,6	10.0	18,3	-
Cracked concrete							
Tension N_{Rec}	HAS-(E) 5.8	[kN]	-	6,6	9,6	14,6	24,9
	HAS-(E) 8.8		-	6,6	9,6	14,6	24,9
	HAS-(E-)R		-	6,6	9,6	14,6	24,9
	HAS-(E-)HCR		-	6,6	9,6	14,6	24,9
	HIS-N 8.8		5,9	9,5	13,4	22,6	-
	HIS-RN 70		5,9	9,5	13,4	22,6	-
Shear V_{Rec}	HAS-(E) 5.8	[kN]	-	5.0	7,2	13,7	18,7
	HAS-(E) 8.8		-	7.0	10,1	19,2	29,9
	HAS-(E-)R		-	6,1	8,9	16,8	26,1
	HAS-(E-)HCR		-	7.0	10,1	19,2	29,9
	HIS-N 8.8		4,3	7,6	11,3	21.0	-
	HIS-RN 70		4,3	6,6	10.0	18,3	-

a) With overall partial safety factor for action γ = 3.0. The recommended loads vary according to the safety factor requirement from national regulations.

Materials

Mechanical properties for HAS

Anchor size			M8	M10	M12	M16	M20
Nominal tensile strength f_{uk}	HAS-(E) 5.8	[N/mm²]	570	570	570	570	500
	HAS-(E) 8.8		800	800	800	800	800
	HAS-(E-)R		700	700	700	700	700
	HAS-(E-)HCR		800	800	800	800	800
Yield strength f_{yk}	HAS-(E) 5.8	[N/mm²]	456	456	456	456	400
	HAS-(E) 8.8		640	640	640	640	640
	HAS-(E-)R		500	500	500	500	450
	HAS-(E-)HCR		640	640	640	640	640
Stressed cross-section A_s	HAS	[mm²]	33,2	52,8	76,2	144	224
Moment of resistance W	HAS	[mm³]	27,0	54,1	93,8	244	474

Mechanical properties for HIS-N

Anchor size			M8	M10	M12	M16
Nominal tensile strength f_{uk}	HIS-N	[N/mm²]	490	490	460	460
	Screw 8.8		800	800	800	800
	HIS-RN		700	700	700	700
	Screw 70		700	700	700	700
Yield strength f_{yk}	HIS-N	[N/mm²]	410	410	375	375
	Screw 8.8		640	640	640	640
	HIS-RN		350	350	350	350
	Screw 70		450	450	450	450
Stressed cross-section A_s	HIS-(R)N	[mm²]	51,5	108,0	169,1	256,1
	Screw		36,6	58,0	84,3	157,0
Moment of resistance W	HIS-(R)N	[mm³]	145	430	840	1595
	Screw		31,2	62,3	109,0	277,0

Material quality for HAS

Part	Material
HAS HAS-E	Strength class 5.8 or 8.8; Rupture elongation (l0=5d) > 8% ductile Electroplated zinc coated (≥5 µm); (F) hot dip galvanized ≥45 µm
HAS-R HAS-E-R	For ≤ M24: Strength class 70; Rupture elongation (l0=5d) > 8% ductile Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4438, 1.43362 EN 10088-1:2014
HAS-HCR HAS-E-HCR	Rupture elongation (l_0=5d) > 8% ductile High corrosion resistance steel 1.4529, 1.1.4565 EN 10088-1:2014
Washer	Electroplated zinc coated (≥5 µm); (F) hot dip galvanized ≥45 µm
	Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1:2014
	High corrosion resistance steel 1.4529, 1.1.4565 EN 10088-1:2014
Nut	Strength class adapted to strength class of threaded rod. Electroplated zinc coated (≥5 µm); hot dip galvanized ≥45 µm
	Strength class adapted to strength class of threaded rod. Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1:2014
	Strength class adapted to strength class of threaded rod. High corrosion resistance steel 1.4529, 1.1.4565 EN 10088-1:2014

Material quality for HIS-N

Part		Material
HIS-N	Internal threaded sleeve	C-steel 1.0718; Steel galvanized ≥ 5 µm
	Screw 8.8	Strength class 8.8, A5 > 8 % Ductile Steel galvanized ≥ 5 µm
HIS-RN	Internal threaded sleeve	Stainless steel 1.4401,1.4571
	Screw 70	Strength class 70, A5 > 8 % Ductile Stainless steel 1.4401; 1.4404, 1.4578; 1.4571; 1.4439; 1.4362

Setting information

Installation temperature range:
-10°C to +40°C

Service temperature range
Hilti HVU 2 adhesive 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	Max. long term base material temperature	Max. short term base material temperature
Temperature range I	-40 °C to +40 °C	+24 °C	+40 °C
Temperature range II	-40 °C to +80 °C	+50 °C	+80 °C
Temperature range III	-40 °C to +120 °C	+72 °C	+120 °C

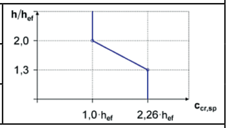
Max short term base material temperature
Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

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

Curing time

Temperature of the base material	Minimum curing time t_{cure}
-10 °C to -6 °C	5 hours
-5 °C to -1 °C	3 hours
0 °C to 4 °C	40 min
5 °C to 9 °C	20 min
10 °C to 19 °C	10 min
20 °C to 40 °C	5 min

Setting details for HAS

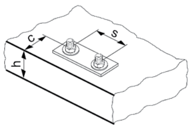
Anchor size			M8	M10	M12	M16	M20
Foil capsule HVU2			**8x80**	**10x90**	**12x110**	**16x125**	**20x170**
Diameter of element	$d_1 = d_{nom}$	[mm]	8	10	12	16	20
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18	22
Eff. Embedment depth and drill hole in the fixture	$h_{ef} = h_0$	[mm]	80	90	110	125	170
Max. diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22
Min. thickness of concrete member	h_{min}	[mm]	110	120	140	160	220
Max. torque moment [a)]	T_{max}	[Nm]	10	20	40	80	150
Min. spacing	s_{min}	[mm]	40	50	60	75	90
Min. edge distance	c_{min}	[mm]	40	45	45	50	55
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]	$2\ c_{cr,sp}$				
Critical edge distance for splitting failure [b)]	$c_{cr,sp}$	[mm]	$\mathbf{1,0 \cdot h_{ef}}$	for $h / h_{ef} \geq 2,0$			
		[mm]	$\mathbf{4,6\ h_{ef} - 1,8\ h}$	for $2,0 > h / h_{ef} > 1,3$			
		[mm]	$\mathbf{2,26\ h_{ef}}$	for $h / h_{ef} \leq 1,3$			
Critical spacing for concrete cone failure	$s_{cr,N}$	[mm]	$2\ c_{cr,N}$				
Critical edge distance for concrete cone failure [c)]	$c_{cr,N}$	[mm]	$1,5\ h_{ef}$				

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

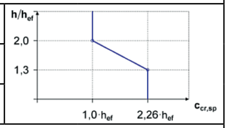
a) Max. recommended torque moment to avoid splitting failure during installation with min. spacing and/or edge distance

b) h: base material thickness ($h \geq h_{min}$)

c) 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.



Setting details of HIS-(R)N

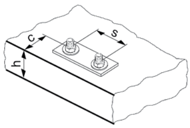
Anchor size			M8	M10	M12	M16
Foil capsule HVU2			**10x90**	**12x110**	**16x125**	**20x170**
Diameter of element	$d_1 = d_{nom}$	[mm]	12,5	16,5	14	25,4
Nominal diameter of drill bit	d_0	[mm]	14	18	22	28
Eff. Embedment depth and drill hole in the fixture	$h_{ef} = h_0$	[mm]	90	110	125	170
Max. diameter of clearance hole in the fixture	d_f	[mm]	120	150	170	230
Min. thickness of concrete member	h_{min}	[mm]	10	20	40	80
Max. torque moment [a]	T_{max}	[Nm]	8-20	10-25	12-30	16-40
Min. spacing	s_{min}	[mm]	60	75	90	115
Min. edge distance	c_{min}	[mm]	40	45	55	65
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]	$2\ c_{cr,sp}$			
Critical edge distance for splitting failure [b]	$c_{cr,sp}$	[mm]	**$1{,}0 \cdot h_{ef}$**	for $h / h_{ef} \geq 2{,}0$		
		[mm]	**$4{,}6\ h_{ef} - 1{,}8\ h$**	for $2{,}0 > h / h_{ef} > 1{,}3$		
		[mm]	**$2{,}26\ h_{ef}$**	for $h / h_{ef} \leq 1{,}3$		
Critical spacing for concrete cone failure	$s_{cr,N}$	[mm]	$2\ c_{cr,N}$			
Critical edge distance for concrete cone failure [c]	$c_{cr,N}$	[mm]	$1{,}5\ h_{ef}$			

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

a) Max. recommended torque moment to avoid splitting failure during installation with min. spacing and/or edge distance

b) h: base material thickness ($h \geq h_{min}$)

c) 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.



Installation equipment

Anchor size		M8	M10	M12	M16	M20
Rotary hammer		TE 1- TE 30		TE 1-TE 60	TE 50-TE 60	TE 50–TE 80
Drill driver	HAS	SF (H)				-
	HIS-N	-				
Other tools		Compressed air gun, blow out pump, Hilti hollow drill bit				
		Set of cleaning brushes				

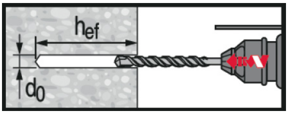
Drilling and cleaning parameters

HIT-V	HIS-N	Hammer drill	Hollow Drill Bit	Diamond coring	Brush HIT-RB
		d_0 [mm]			size [mm]
					
M8	**-**	10	-	-	-
M10	**-**	12	-	12	12
M12	**M8**	14	14	14	14
M16	**M10**	18	18	18	18
M20	**M12**	22	22	22	22
-	**M16**	28	28	28	28

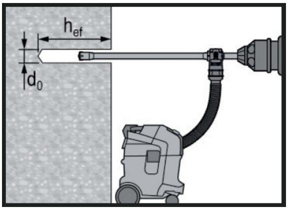
Setting instructions

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

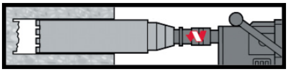
Hole drilling



Hammer drilled hole
For dry and wet concrete and installation in flooded holes (no sea water).

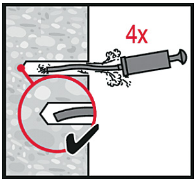


Hammer drilled hole with Hollow Drilled Bit (HDB)
No cleaning required.
For dry and wet concrete only.

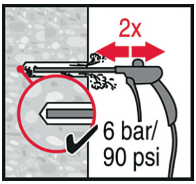


Diamond Coring
For dry and wet concrete only.

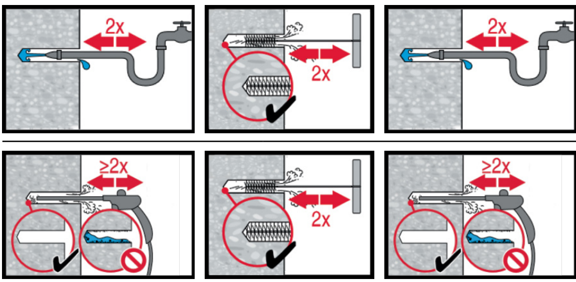
Hole cleaning



Manual cleaning for hammer drilled hole
For drill diameters $d_0 \leq 18$ mm and drill hole depth $h_0 \leq 10 \cdot d$.

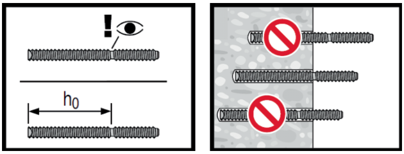


Compressed air cleaning (CAC) for hammer drilled hole
For all drill hole diameters d_0 and drill hole depths h_0.

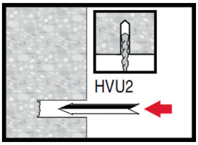


Hammer drilled flooded holes and diamond cored holes:
For all drill hole diameters d_0 and drill hole depths h_0.

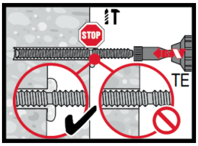
Setting the element

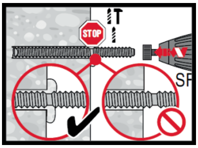


Check the setting depth.

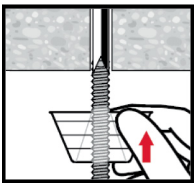


Insert the foil capsule with the peak ahead to the back of the hole.

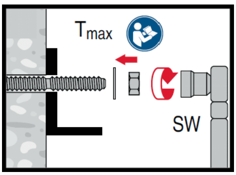




Drive the anchor rod with the plugged tool into the hole.



Overhead installation.



Loading the anchor after required curing time t_{cure}.