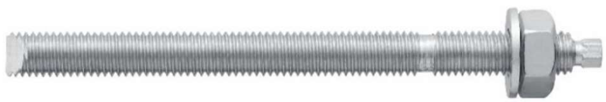
HVU2 adhesive capsule

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

Anchor version

HVU2
Mortar capsule



Anchor rod:
HAS
HAS-R
HAS-HCR
(M8-M30)

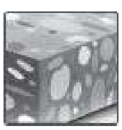
Anchor rod:
HAS-E
HAS-E-R
HAS-E-HCR
(M8-M30)

Internally threaded sleeve:
HIS-N
HIS-RN
(M8-M20)

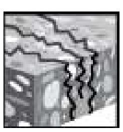
Benefits

- **SafeSet** technology: Hilti hollow drill bit for automatic cleaning
- Suitable for cracked and non-cracked concrete C20/25 to C50/60 both for hammer drilled and diamond cored holes
- Highly reliable and safe anchor for seismic design with ETA C1/C2 approval
- Clean and fast installation that suits hard jobsite conditions
- Suitable for dry and water saturated concrete
- High loading capacity
- Low curing time
- Max. in service temperature range up to 120°C short term / 72°C long term

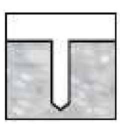
Base material



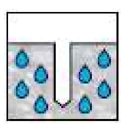
Concrete (non-cracked)



Concrete (cracked)

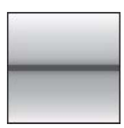


Dry concrete



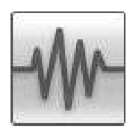
Wet concrete

Load conditions



Static/ quasi-static

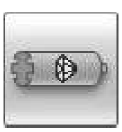
Fire resistance



Seismic ETA-C1/C2

Installation conditions

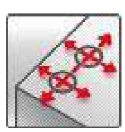
Hammer drilled holes



Diamond drilled holes

SAFESET

Hilti SafeSet technology



Small edge distance and spacing

Other information

European Technical Assessment

CE conformity

PROFIS 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 / 2017-12-14
European Technical Assessment b)	DIBt, Berlin	ETA-18/0185 / 2018-05-14
European Technical Assessment c)	DIBt, Berlin	ETA-18/0184 / 2018-08-17
Fire test assessment	ING.Thiele, Pirmasens	21735 / 2017-08-01

a) applies to M8 to M20 under static loading b) applies to M24 to M30 under static loading c) applies to M10 to M30 under seismic loading

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 C20/25, $f_{ck,cube}$ = 25 N/mm²
- Temperature range I: -40 °C to +40 °C (max. long term temperature +24 °C and max. short term temperature +40 °C)
- All data given in this section according ETA-16/0515, issue 2017-12-14 (M8 to M20) and ETA 18/0185, issue 2018-05-14 (M24 to M30)

Embedment depth and base material thickness

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
HAS										
Eff. Anchorage depth	h_{ef}	[mm]	80	90	110	125	170	210	240	270
Base material thickness	h_{min}	[mm]	110	120	140	160	220	270	300	340
HIS-N										
Eff. Anchorage depth	h_{ef}	[mm]	90	110	125	170	205	-	-	-
Base material thickness	h_{min}	[mm]	120	150	170	230	270	-	-	-

Hammer drilled holes and hammer drilled holes with hollow drill bit[1]:

Characteristic resistance

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concrete										
Tension N_{Rk}	HAS-(E) 5.8	[kN]	*18,9*	*30,1*	*43,4*	70,6	111,9	153,7	-	-
	HAS-(E) 8.8		24,1	*42,2*	58,3	70,6	111,9	153,7	187,8	224,0
	HAS-(E-)R		*23,2*	*37,0*	*53,3*	70,6	111,9	153,7	187,8	224,0
	HAS-(E-)HCR		24,1	*42,2*	58,3	70,6	111,9	153,7	-	-
	HIS-N 8.8		*25,0*	*46,0*	*67,0*	111,9	*116,0*	-	-	-
	HIS-RN 70		*26,0*	*41,0*	*59,0*	*110,0*	148,2	-	-	-
Shear V_{Rk}	HAS-(E) 5.8	[kN]	*9,5*	*15,1*	*21,7*	*41,1*	*56,1*	*80,1*	-	-
	HAS-(E) 8.8		*13,3*	*21,1*	*30,5*	*57,7*	*89,7*	*128,2*	*173,5*	*210,7*
	HAS-(E-)R		*11,6*	*18,5*	*26,7*	*50,5*	*78,5*	*112,2*	*108,4*	*131,7*
	HAS-(E-)HCR		*13,3*	*21,1*	*30,5*	*57,7*	*89,7*	*112,2*	-	-
	HIS-N 8.8		*13,0*	*23,0*	*34,0*	*63,0*	*58,0*	-	-	-
	HIS-RN 70		*13,0*	*20,0*	*30,0*	*55,0*	*83,0*	-	-	-
Cracked concrete										
Tension N_{Rk}	HAS-(E) 5.8	[kN]	10,1	24,0	35,2	50,3	79,8	109,6	-	-
	HAS-(E) 8.8		10,1	24,0	35,2	50,3	79,8	109,6	133,9	159,7
	HAS-(E-)R		10,1	24,0	35,2	50,3	79,8	109,6	133,9	159,7
	HAS-(E-)HCR		10,1	24,0	35,2	50,3	79,8	109,6	-	-
	HIS-N 8.8		23,0	37,1	50,3	79,8	105,7	-	-	-
	HIS-RN 70		23,0	37,1	50,3	79,8	105,7	-	-	-
Shear V_{Rk}	HAS-(E) 5.8	[kN]	*9,5*	*15,1*	*21,7*	*41,1*	*56,1*	*80,1*	-	-
	HAS-(E) 8.8		*13,3*	*21,1*	*30,5*	*57,7*	*89,7*	*128,2*	*173,5*	*210,7*
	HAS-(E-)R		*11,6*	*18,5*	*26,7*	*50,5*	*78,5*	*112,2*	*108,4*	*131,7*
	HAS-(E-)HCR		*13,3*	*21,1*	*30,5*	*57,7*	*89,7*	*112,2*	-	-
	HIS-N 8.8		*13,0*	*23,0*	*34,0*	*63,0*	*58,0*	-	-	-
	HIS-RN 70		*13,0*	*20,0*	*30,0*	*55,0*	*83,0*	-	-	-

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

Design resistance

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concrete										
Tension N_{Rd}	HAS-(E) 5.8	[kN]	12,6	20,1	28,9	47,1	74,6	102,5	-	-
	HAS-(E) 8.8		16,1	28,1	38,8	47,1	74,6	102,5	125,2	149,4
	HAS-(E-)R		13,8	22,0	31,7	47,1	74,6	102,5	75,8	92,1
	HAS-(E-)HCR		16,1	28,1	38,8	47,1	74,6	102,5	-	-
	HIS-N 8.8		16,7	30,7	44,7	74,6	77,3	-	-	-
	HIS-RN 70		13,9	21,9	31,6	58,8	69,2	-	-	-
Shear V_{Rd}	HAS-(E) 5.8	[kN]	7,6	12,1	17,4	32,9	44,9	64,1	-	-
	HAS-(E) 8.8		10,6	16,9	24,4	46,2	71,8	102,6	138,8	168,6
	HAS-(E-)R		8,3	13,2	19,1	36,1	50,3	71,9	45,5	55,3
	HAS-(E-)HCR		10,6	16,9	24,4	46,2	71,8	64,1	-	-
	HIS-N 8.8		10,4	18,4	27,2	50,4	46,4	-	-	-
	HIS-RN 70		8,3	12,8	19,2	35,3	41,5	-	-	-
Cracked concrete										
Tension N_{Rd}	HAS-(E) 5.8	[kN]	6,7	16,0	23,5	33,5	53,2	73,0	-	-
	HAS-(E) 8.8		6,7	16,0	23,5	33,5	53,2	73,0	89,2	106,5
	HAS-(E-)R		6,7	16,0	23,5	33,5	53,2	73,0	75,8	92,1
	HAS-(E-)HCR		6,7	16,0	23,5	33,5	53,2	73,0	-	-
	HIS-N 8.8		15,3	24,7	33,5	53,2	70,4	-	-	-
	HIS-RN 70		13,9	21,9	31,6	53,2	70,4	-	-	-
Shear V_{Rd}	HAS-(E) 5.8	[kN]	7,6	12,1	17,4	32,9	44,9	64,1	-	-
	HAS-(E) 8.8		10,6	16,9	24,4	46,2	71,8	102,6	138,8	168,6
	HAS-(E-)R		8,3	13,2	19,1	36,1	50,3	71,9	45,5	55,3
	HAS-(E-)HCR		10,6	16,9	24,4	46,2	71,8	64,1	-	-
	HIS-N 8.8		10,4	18,4	27,2	50,4	46,4	-	-	-
	HIS-RN 70		8,3	12,8	19,2	35,3	41,5	-	-	-

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

Recommended loads[2)]

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concrete										
Tension N_{Rec}	HAS-(E) 5.8	[kN]	9,0	14,3	20,7	33,6	53,3	73,2	-	-
	HAS-(E) 8.8		11,5	20,1	27,7	33,6	53,3	73,2	89,4	106,7
	HAS-(E-)R		9,9	15,7	22,7	33,6	53,3	73,2	54,2	65,8
	HAS-(E-)HCR		11,5	20,1	27,7	33,6	53,3	73,2	-	-
	HIS-N 8.8		11,9	21,9	31,9	53,3	55,2	-	-	-
	HIS-RN 70		9,9	15,7	22,5	42,0	49,4	-	-	-
Shear V_{Rec}	HAS-(E) 5.8	[kN]	5,4	8,6	12,4	23,5	32,1	45,8	-	-
	HAS-(E) 8.8		7,6	12,1	17,4	33,0	51,3	73,3	99,1	120,4
	HAS-(E-)R		5,9	9,4	13,6	25,8	35,9	51,4	32,5	39,5
	HAS-(E-)HCR		7,6	12,1	17,4	33,0	51,3	45,8	-	-
	HIS-N 8.8		7,4	13,1	19,4	36,0	33,1	-	-	-
	HIS-RN 70		6,0	9,2	13,7	25,2	29,6	-	-	-
Cracked concrete										
Tension N_{Rec}	HAS-(E) 5.8	[kN]	4,8	11,4	16,8	24,0	38,0	52,2	-	-
	HAS-(E) 8.8		4,8	11,4	16,8	24,0	38,0	52,2	63,7	76,1
	HAS-(E-)R		4,8	11,4	16,8	24,0	38,0	52,2	54,2	65,8
	HAS-(E-)HCR		4,8	11,4	16,8	24,0	38,0	52,2	-	-
	HIS-N 8.8		10,9	17,6	24,0	38,0	50,3	-	-	-
	HIS-RN 70		9,9	15,7	22,5	38,0	49,4	-	-	-
Shear V_{Rec}	HAS-(E) 5.8	[kN]	5,4	8,6	12,4	23,5	32,1	45,8	-	-
	HAS-(E) 8.8		7,6	12,1	17,4	33,0	51,3	73,3	99,1	120,4
	HAS-(E-)R		5,9	9,4	13,6	25,8	35,9	51,4	32,5	39,5
	HAS-(E-)HCR		7,6	12,1	17,4	33,0	51,3	45,8	-	-
	HIS-N 8.8		7,4	13,1	19,4	36,0	33,1	-	-	-
	HIS-RN 70		6,0	9,2	13,7	25,2	29,6	-	-	-

1) Hlti hollow drill bit is available for the element sizes M12-M20.
2) 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.

Diamond cored holes:

Characteristic resistance

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concrete										
Tension N_{Rk}	HAS-(E) 5.8	[kN]	-	30,1	43,4	70,6	111,9	153,7	-	-
	HAS-(E) 8.8		-	39,6	58,1	70,6	111,9	153,7	187,8	224,0
	HAS-(E-) R		-	37,0	53,3	70,6	111,9	153,7	187,8	224,0
	HAS-(E-) HCR		-	39,6	58,1	70,6	111,9	153,7	-	-
	HIS-N 8.8		25,0	46,0	67,0	111,9	116,0	-	-	-
	HIS-RN 70		26,0	41,0	59,0	110,0	148,2	-	-	-
Shear V_{Rk}	HAS-(E) 5.8	[kN]	-	15,1	21,7	41,1	56,1	80,1	-	-
	HAS-(E) 8.8		-	21,1	30,5	57,7	89,7	128,2	173,5	210,7
	HAS-(E-) R		-	18,5	26,7	50,5	78,5	112,2	108,4	131,7
	HAS-(E-) HCR		-	21,1	30,5	57,7	89,7	112,2	-	-
	HIS-N 8.8		13,0	23,0	34,0	63,0	58,0	-	-	-
	HIS-RN 70		13,0	20,0	30,0	55,0	83,0	-	-	-
Cracked concrete										
Tension N_{Rk}	HAS-(E) 5.8	[kN]	-	19,8	29,0	44,0	74,8	109,6	-	-
	HAS-(E) 8.8		-	19,8	29,0	44,0	74,8	109,6	133,9	159,7
	HAS-(E-) R		-	19,8	29,0	44,0	74,8	109,6	133,9	159,7
	HAS-(E-) HCR		-	19,8	29,0	44,0	74,8	109,6	-	-
	HIS-N 8.8		15,9	25,7	36,2	61,0	80,0	-	-	-
	HIS-RN 70		15,9	25,7	36,2	61,0	80,0	-	-	-
Shear V_{Rk}	HAS-(E) 5.8	[kN]	-	15,1	21,7	41,1	56,1	80,1	-	-
	HAS-(E) 8.8		-	21,1	30,5	57,7	89,7	128,2	173,5	210,7
	HAS-(E-) R		-	18,5	26,7	50,5	78,5	112,2	108,4	131,7
	HAS-(E-) HCR		-	21,1	30,5	57,7	89,7	112,2	-	-
	HIS-N 8.8		13,0	23,0	34,0	63,0	58,0	-	-	-
	HIS-RN 70		13,0	20,0	30,0	55,0	83,0	-	-	-

Design resistance

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concrete										
Tension N_{Rd}	HAS-(E) 5.8	[kN]	-	20,1	28,9	47,1	74,6	102,5	-	-
	HAS-(E) 8.8		-	26,4	38,7	47,1	74,6	102,5	125,2	149,4
	HAS-(E-) R		-	22,0	31,7	47,1	74,6	102,5	75,8	92,1
	HAS-(E-) HCR		-	26,4	38,7	47,1	74,6	102,5	-	-
	HIS-N 8.8		16,7	30,7	44,7	74,6	77,3	-	-	-
	HIS-RN 70		13,9	21,9	31,6	58,8	69,2	-	-	-
Shear V_{Rd}	HAS-(E) 5.8	[kN]	-	12,1	17,4	32,9	44,9	64,1	-	-
	HAS-(E) 8.8		-	16,9	24,4	46,2	71,8	102,6	138,8	168,6
	HAS-(E-) R		-	13,2	19,1	36,1	50,3	71,9	45,5	55,3
	HAS-(E-) HCR		-	16,9	24,4	46,2	71,8	64,1	-	-
	HIS-N 8.8		10,4	18,4	27,2	50,4	46,4	-	-	-
	HIS-RN 70		8,3	12,8	19,2	35,3	41,5	-	-	-
Cracked concrete										
Tension N_{Rd}	HAS-(E) 5.8	[kN]	-	13,2	19,4	29,3	49,8	73,0	-	-
	HAS-(E) 8.8		-	13,2	19,4	29,3	49,8	73,0	89,2	106,5
	HAS-(E-) R		-	13,2	19,4	29,3	49,8	73,0	75,8	92,1
	HAS-(E-) HCR		-	13,2	19,4	29,3	49,8	73,0	-	-
	HIS-N 8.8		10,6	17,1	24,2	40,7	53,3	-	-	-
	HIS-RN 70		10,6	17,1	24,2	40,7	53,3	-	-	-
Shear V_{Rd}	HAS-(E) 5.8	[kN]	-	12,1	17,4	32,9	44,9	64,1	-	-
	HAS-(E) 8.8		-	16,9	24,4	46,2	71,8	102,6	138,8	168,6
	HAS-(E-)-R		-	13,2	19,1	36,1	50,3	71,9	45,5	55,3
	HAS-(E-) HCR		-	16,9	24,4	46,2	71,8	64,1	-	-
	HIS-N 8.8		10,4	18,4	27,2	50,4	46,4	-	-	-
	HIS-RN 70		8,3	12,8	19,2	35,3	41,5	-	-	-

Concrete

Chemical anchors

Mechanical anchors

Plastic/Light duty metal anchors

Insulation anchors

Recommended loads [a)]

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concrete										
Tension N_{Rec}	HAS-(E) 5.8	[kN]	-	14,3	20,7	33,6	53,3	73,2	-	-
	HAS-(E) 8.8		-	18,8	27,6	33,6	53,3	73,2	89,4	106,7
	HAS-(E-) R		-	15,7	22,7	33,6	53,3	73,2	54,2	65,8
	HAS-(E-) HCR		-	18,8	27,6	33,6	53,3	73,2	-	-
	HIS-N 8.8		11,9	21,9	31,9	53,3	55,2	-	-	-
	HIS-RN 70		9,9	15,7	22,5	42,0	49,4	-	-	-
Shear V_{Rec}	HAS-(E) 5.8	[kN]	-	8,6	12,4	23,5	32,1	45,8	-	-
	HAS-(E) 8.8		-	12,1	17,4	33,0	51,3	73,3	99,1	120,4
	HAS-(E-) R		-	9,4	13,6	25,8	35,9	51,4	32,5	39,5
	HAS-(E-) HCR		-	12,1	17,4	33,0	51,3	45,8	-	-
	HIS-N 8.8		7,4	13,1	19,4	36,0	33,1	-	-	-
	HIS-RN 70		6,0	9,2	13,7	25,2	29,6	-	-	-
Cracked concrete										
Tension N_{Rec}	HAS-(E) 5.8	[kN]	-	9,4	13,8	20,9	35,6	52,2	-	-
	HAS-(E) 8.8		-	9,4	13,8	20,9	35,6	52,2	63,7	76,1
	HAS-(E-) R		-	9,4	13,8	20,9	35,6	52,2	54,2	65,8
	HAS-(E-) HCR		-	9,4	13,8	20,9	35,6	52,2	-	-
	HIS-N 8.8		7,6	12,2	17,3	29,1	38,1	-	-	-
	HIS-RN 70		7,6	12,2	17,3	29,1	38,1	-	-	-
Shear V_{Rec}	HAS-(E) 5.8	[kN]	-	8,6	12,4	23,5	32,1	45,8	-	-
	HAS-(E) 8.8		-	12,1	17,4	33,0	51,3	73,3	99,1	120,4
	HAS-(E-) R		-	9,4	13,6	25,8	35,9	51,4	32,5	39,5
	HAS-(E-) HCR		-	12,1	17,4	33,0	51,3	45,8	-	-
	HIS-N 8.8		7,4	13,1	19,4	36,0	33,1	-	-	-
	HIS-RN 70		6,0	9,2	13,7	25,2	29,6	-	-	-

a) With overall partial safety 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.

Seismic resistance

All data in this section applies to:
- Hammer drilled holes and hammer drilled holes with hollow drill bit (HAS M10 to M30)
- Correct setting (See setting instruction)
- No edge distance and spacing influence
- *Steel* failure
- Minimum base material thickness
- Concrete C20/25, $f_{ck,cube}$ = 25 N/mm²
- α_{gap} = 0,5
- Temperature range I: -40 °C to +40 °C
  (max. long term temperature +24 °C and max. short term temperature +40 °C)
- All data given in this section according ETA-18/0184, issue 2018-08-17

Embedment depth and base material thickness

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
HAS										
Eff. Anchorage depth	h_{ef}	[mm]	80	90	110	125	170	210	240	270
Base material thickness	h_{min}	[mm]	110	120	140	160	220	270	300	340

Characteristic resistance

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Seismic performance C1										
Tension $N_{Rk,seis}$	HAS-(E) 5.8	[kN]	-	24,0	35,2	42,8	67,8	93,1	-	-
	HAS-(E) 8.8		-	24,0	35,2	42,8	67,8	93,1	113,8	135,8
	HAS-(E-)-R		-	24,0	35,2	42,8	67,8	93,1	113,8	135,8
	HAS-(E-)-HCR		-	24,0	35,2	42,8	67,8	93,1	-	-
Shear $V_{Rk,seis}$	HAS-(E) 5.8	[kN]	-	*11,0*	*15,0*	*27,0*	*43,0*	*62,0*	-	-
	HAS-(E) 8.8		-	*16,0*	*24,0*	*44,0*	*69,0*	*99,0*	*129,0*	*157,0*
	HAS-(E-)-R		-	*14,0*	*21,0*	*39,0*	*60,0*	*87,0*	*81,0*	*98,0*
	HAS-(E-)-HCR		-	*16,0*	*24,0*	*44,0*	*69,0*	*87,0*	-	-
Seismic performance C2										
Tension $N_{Rd,seis}$	HAS-(E) 8.8		-	-	-	18,2	27,8	-	-	-
Shear $V_{Rd,seis}$	HAS-(E) 8.8		-	-	-	40,0	71,0	-	-	-

Design resistance

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Seismic performance C1										
Tension $N_{Rd,seis}$	HAS-(E) 5.8	[kN]	-	16,0	23,5	28,5	45,2	62,1	-	-
	HAS-(E) 8.8		-	16,0	23,5	28,5	45,2	62,1	75,8	90,5
	HAS-(E-)-R		-	16,0	23,5	28,5	45,2	62,1	75,8	90,5
	HAS-(E-)-HCR		-	16,0	23,5	28,5	45,2	62,1	-	-
Shear $V_{Rd,seis}$	HAS-(E) 5.8	[kN]	-	8,8	12,0	21,6	34,4	49,6	-	-
	HAS-(E) 8.8		-	12,8	19,2	35,2	55,2	79,2	103,2	125,6
	HAS-(E-)-R		-	10,0	15,0	27,9	38,5	55,8	34,0	41,2
	HAS-(E-)-HCR		-	12,8	19,2	35,2	55,2	49,7	-	-
Seismic performance C2										
Tension $N_{Rd,seis}$	HAS-(E) 8.8		-	-	-	12,1	18,5	-	-	-
Shear $V_{Rd,seis}$	HAS-(E) 8.8		-	-	-	32,0	56,8	-	-	-

Concrete | Chemical anchors | Mechanical anchors | Plastic/Light duty metal anchors | Insulation anchors

Fire resistance

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 C20/25, $f_{ck,cube}$ = 25 N/mm²
- All data given in this section according to Fire test assessment from Ing. Thiele, Pirmasens 21735 / 2017-08-01

Embedment depth and base material thickness

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
HAS										
Eff. Anchorage depth	h_{ef}	[mm]	80	90	110	125	170	210	240	270
Base material thickness	h_{min}	[mm]	110	120	140	160	220	270	300	340
HIS-N										
Eff. Anchorage depth	h_{ef}	[mm]	90	110	125	170	205	-	-	-
Base material thickness	h_{min}	[mm]	120	150	170	230	270	-	-	-

Characteristic/design[1] resistance in uncracked concrete

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Fire Exposure R30										
Tension $N_{Rk,fi}$	HAS-(E) 8.8	[kN]	*1,83*	*2,90*	*4,22*	*7,85*	12,2	*17,6*	23,0	28,0
	HAS-(E-)-R		*4,19*	*6,64*	*9,65*	*17,1*	*28,0*	*40,4*	*52,5*	*64,2*
	HIS-N 8.8		*1,83*	*2,90*	*4,22*	*7,85*	*12,2*	-	-	-
	HIS-RN 70		*4,19*	*6,64*	*9,65*	*18,0*	*28,0*	-	-	-
Shear $V_{Rk,fi}$	HAS-(E) 8.8	[kN]	*1,83*	*2,90*	*4,22*	*7,85*	12,2	*17,6*	23,0	28,0
	HAS-(E-)-R		*4,19*	*6,64*	*9,65*	*17,1*	*28,0*	*40,4*	*52,5*	*64,2*
	HIS-N 8.8		*1,83*	*2,90*	*4,22*	*7,85*	*12,2*	-	-	-
	HIS-RN 70		*4,19*	*6,64*	*9,65*	*18,0*	*28,0*	-	-	-
Fire Exposure R120										
Tension $N_{Rk,fi}$	HAS-(E) 8.8	[kN]	0,28	0,47	1,31	2,22	*4,41*	*6,35*	*8,26*	*10,1*
	HAS-(E-)-R		0,28	0,47	1,31	2,22	*7,11*	*10,2*	*13,3*	*16,3*
	HIS-N 8.8		0,43	1,02	1,52	2,83	*4,41*	-	-	-
	HIS-RN 70		0,43	1,02	1,75	*4,55*	*7,11*	-	-	-
Shear $V_{Rk,fi}$	HAS-(E) 8.8	[kN]	0,28	0,47	1,31	2,22	*4,41*	*6,35*	*8,26*	*10,1*
	HAS-(E-)-R		0,28	0,47	1,31	2,22	*7,11*	*10,2*	*13,3*	*16,3*
	HIS-N 8.8		0,43	1,02	1,52	2,83	*4,41*	-	-	-
	HIS-RN 70		0,43	1,02	1,75	*4,55*	*7,11*	-	-	-

1) The safety factor is γ=1.0 for all load cases

Characteristic/design[1] resistance in cracked concrete

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Fire Exposure R30										
Tension $N_{Rk,fi}$	HAS-(E) 8.8	[kN]	-	2,90	4,22	7,85	12,2	16,6	23,0	28,0
	HAS-(E-)R		-	5,00	9,00	12,8	28,0	40,4	52,5	64,2
	HIS-N 8.8		1,83	2,90	4,22	7,85	12,2	-	-	-
	HIS-RN 70		4,19	6,64	9,65	18,00	28,0	-	-	-
Shear $V_{Rk,fi}$	HAS-(E) 8.8	[kN]	-	2,90	4,22	7,85	12,2	16,6	23,0	28,0
	HAS-(E-)R		-	5,00	9,00	12,8	28,0	40,4	52,5	64,2
	HIS-N 8.8		1,83	2,90	4,22	7,85	12,2	-	-	-
	HIS-RN 70		4,19	6,64	9,65	18,00	28,0	-	-	-
Fire Exposure R120										
Tension $N_{Rk,fi}$	HAS-(E) 8.8	[kN]	-	0,35	0,99	1,66	4,40	6,35	8,26	10,1
	HAS-(E-)R		-	0,35	1,00	1,66	6,90	10,2	13,3	16,3
	HIS-N 8.8		0,33	0,76	1,30	2,80	4,40	-	-	-
	HIS-RN 70		0,33	0,76	1,31	4,55	7,11	-	-	-
Shear $V_{Rk,fi}$	HAS-(E) 8.8	[kN]	-	0,35	0,99	1,66	4,40	6,35	8,26	10,1
	HAS-(E-)R		-	0,35	1,00	1,66	6,90	10,2	13,3	16,3
	HIS-N 8.8		0,33	0,76	1,30	2,80	4,40	-	-	-
	HIS-RN 70		0,33	0,76	1,31	4,55	7,11	-	-	-

1) The safety factor is γ=1.0 for all load cases

Materials

Mechanical properties for HAS

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Nominal tensile strength f_{uk}	HAS-(E) 5.8	[N/mm²]	570	570	570	570	500	500	-	-
	HAS-(E) 8.8		800	800	800	800	800	800	800	800
	HAS-(E-)R		700	700	700	700	700	700	500	500
	HAS-(E-)HCR		800	800	800	800	800	700	-	-
Yield strength f_{yk}	HAS-(E) 5.8	[N/mm²]	456	456	456	456	400	400	-	-
	HAS-(E) 8.8		640	640	640	640	640	640	640	640
	HAS-(E-)R		450	450	450	450	450	450	210	210
	HAS-(E-)HCR		640	640	640	640	640	400	-	-
Stressed cross-section A_s	HAS	[mm²]	33,2	52,8	76,2	144,2	224,3	320,5	433,7	526,9
Moment of resistance W	HAS	[mm³]	27,0	54,1	93,8	244,0	474,0	809,0	1274,0	1706,0

Mechanical properties for HIS-N

Anchor size			M8	M10	M12	M16	M20
Nominal tensile strength f_{uk}	HIS-N	[N/mm²]	490	490	460	460	460
	Screw 8.8		800	800	800	800	800
	HIS-RN		700	700	700	700	700
	Screw 70		700	700	700	700	700
Yield strength f_{yk}	HIS-N	[N/mm²]	390	390	390	390	390
	Screw 8.8		640	640	640	640	640
	HIS-RN		350	350	350	350	350
	Screw 70		450	450	450	450	450
Stressed cross-section A_s	HIS-(R)N	[mm²]	51,5	108,0	169,1	256,1	237,6
	Screw		36,6	58,0	84,3	157,0	245,0
Moment of resistance W	HIS-(R)N	[mm³]	145	430	840	1595	1543
	Screw		31,2	62,3	109,0	277,0	541,0

Material quality for HAS

Part	Material
Metal parts made of zinc coated steel	
HAS HAS-E	M10 to M24 Strength class 5.8: - Elongation after fracture A_f > 022 (equal to A (l_0 = 5d) > 8% ductile) M10 to M30: Strength class 8.8: - Rupture elongation A (l_0 = 5d) > 12% ductile - Electroplated zinc coated (≥5 µm); (F) hot dip galvanized ≥45 µm
Washer	Electroplated zinc coated (≥5 µm); (F) hot dip galvanized ≥45 µm
Nut	Strength class adapted to strength class of threaded rod. Electroplated zinc coated (≥5 µm); hot dip galvanized ≥45 µm
Metal parts made of stainless steel	
HAS-R HAS-(E-)-R	M10 to M30 Strength class 70: - Rupture elongation (l_0=5d) > 12% ductile - Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4438,1.43362 EN 10088-1:2014
Washer	Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1:2014
Nut	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
Metal parts made of high corrosion resistant steel	
HAS-HCR HAS-E-HCR	Rupture elongation A (l_0 = 5d) > 12% ductile High corrosion resistance steel 1.4529, 1.1.4565 EN 10088-1:2014
Washer	High corrosion resistance steel 1.4529, 1.1.4565 EN 10088-1:2014
Nut	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
Metal parts made of zinc coated steel		
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
Metal parts made of stainless steel		
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 for M8 to M20 under static loading according to ETA-16-0515
0°C to +40°C for M24 to M30 under static loading according to ETA-18-0185
0°C to +40°C for M10 to M30 under seismic loading according to ETA-18/0184

In service temperature range

Hilti HVU2 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	Maximum long term base material temperature	Maximum 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

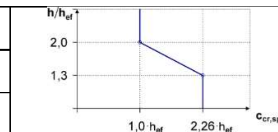
Max short term base material temperature
Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.
Max long term base material temperature
Long-term elevated base material temperatures are roughly constant over significant periods of time.

Curing time

Temperature of the base material	Minimum curing time t_{cure}
-10 °C to -6 °C 1)	5 hours 1)
-5 °C to -1 °C 1)	3 hours 1)
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

1) The utiisation of HAS sizes M24, M27 and M30 and HIS size M20 is only allowed for temperatures above 0 °C.

Setting details for HAS

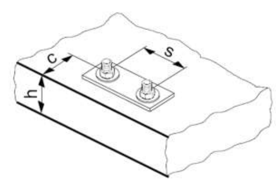
Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Foil capsule HVU2			**8x80**	**10x90**	**12x110**	**16x125**	**20x170**	**24x210**	**27x240**	**30x270**
Diameter of element	$d_1=d_{nom}$	[mm]	8	10	12	16	20	24	27	30
Nom. diameter of drill	d_0	[mm]	10	12	14	18	22	28	30	35
Eff. Embedment depth and drill hole in the fixture	$h_{ef}=h_0$	[mm]	80	90	110	125	170	210	240	270
Max. diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22	26	30	33
Min. thickness of concrete member	h_{min}	[mm]	110	120	140	160	220	270	300	340
Max. torque moment a)	T_{max}	[Nm]	10	20	40	80	150	200	270	300
Min. spacing	s_{min}	[mm]	40	50	60	75	90	115	120	140
Min. edge distance	c_{min}	[mm]	40	45	45	50	55	60	75	80
Critical spacing for splitting failure	$s_{cr,sp}$		$2\ c_{cr,sp}$							
Critical edge distance for splitting failure b)	$c_{cr,sp}$	[mm]	**$1{,}0 \cdot h_{ef}$**		for $h / h_{ef} \geq 2{,}0$					
			$4{,}6\ h_{ef} - 1{,}8\ h$		for $2{,}0 > h/h_{ef} > 1{,}3$					
			$2{,}26\ h_{ef}$		for $h / h_{ef} \leq 1{,}3$					
Critical spacing for concrete cone failure	$s_{cr,N}$	[mm]	$2\ c_{cr,N}$					$3\ h_{ef}$		
Critical edge distance for concrete cone	$c_{cr,N}$	[mm]	$1{,}5\ h_{ef}$							

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

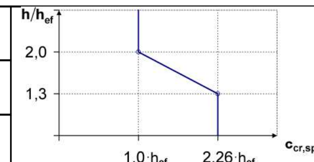
a) Max. recommended torque moment to avoid splitting failure during installation with min. spacing and/or edge distance

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

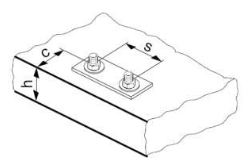
Anchor size			**M8**	**M10**	**M12**	**M16**	**M20**
Foil capsule HVU2			**10x90**	**12x110**	**16x125**	**20x170**	**24x210**
Diameter of element	$d_1=d_{nom}$	[mm]	12,5	16,5	20,5	25,4	27,8
Nominal diameter of drill bit	d_0	[mm]	14	18	22	28	32
Eff. Embedment depth and drill hole in fixture	$h_{ef}=h_0$	[mm]	90	110	125	170	205
Max. diameter of clearance hole in the	d_f	[mm]	9	12	14	18	22
Min. thickness of concrete member	h_{min}	[mm]	120	150	170	230	270
Max. torque moment[a)]	T_{max}	[Nm]	10	20	40	80	150
Thread engagement	h_s		8-20	10-25	12-30	16-40	20-50
Min. spacing	s_{min}	[mm]	60	75	90	115	130
Min. edge distance	c_{min}	[mm]	40	45	55	65	90
Critical spacing for	$s_{cr,sp}$		$2\ c_{cr,sp}$				
Critical edge distance for splitting failure [b)]	$c_{cr,sp}$	[mm]	$\mathbf{1{,}0 \cdot h_{ef}}$	for $h / h_{ef} \geq 2{,}0$			
			$\mathbf{4{,}6\ h_{ef} - 1{,}8\ h}$	for $2{,}0 > h/h_{ef} > 1{,}3$			
			$\mathbf{2{,}26\ h_{ef}}$	for $h / h_{ef} \leq 1{,}3$			
Critical spacing for concrete cone failure	$s_{cr,N}$	[mm]	$2\ c_{cr,N}$				$1{,}5\ h_{ef}$
Critical edge distance for concrete cone	$c_{cr,N}$	[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 ($h \geq h_{min}$)

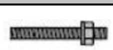
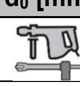
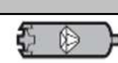
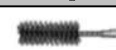
c) The critical edge distance for concrete cone failure depends on the embedment depth h_{ef} and the design bond resistance. The simplified formula given in this table is on the save side.



Installation equipment

Anchor size		**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Rotary hammer		TE 1- TE 7		TE 1- TE 40		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

HAS	**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
M24	**M16**	28	28	28	28
M27	-	30	-	30	30
-	**M20**	32	32	32	32
M30	-	35	35	35	35

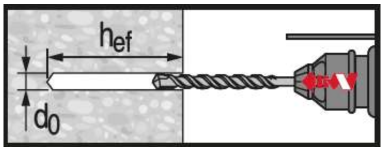
Setting instructions

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

Safety regulations.

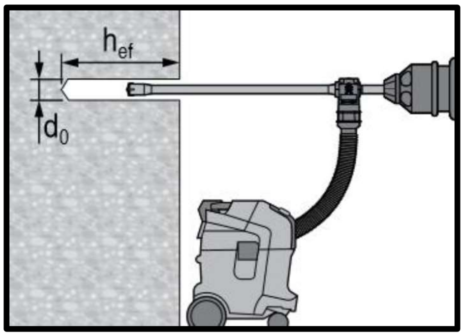
Review the Material Safety Data Sheet (MSDS) before use for proper and safe handling! Wear well-fitting protective goggles and protective gloves when working with Hilti HVU2.

Hole drilling



Hammer drilled hole

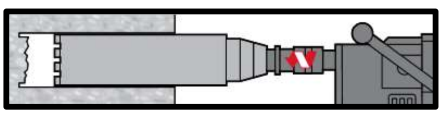
For dry or wet concrete and installation in flooded holes (no sea water).



Hammer drilled hole with Hollow drill bit

For dry and wet concrete, only.

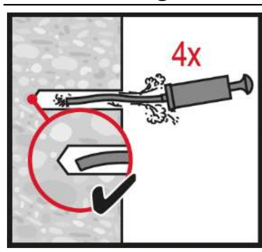
No cleaning required.



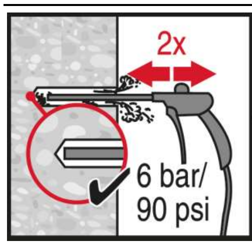
Diamond Coring

For dry and wet concrete only.

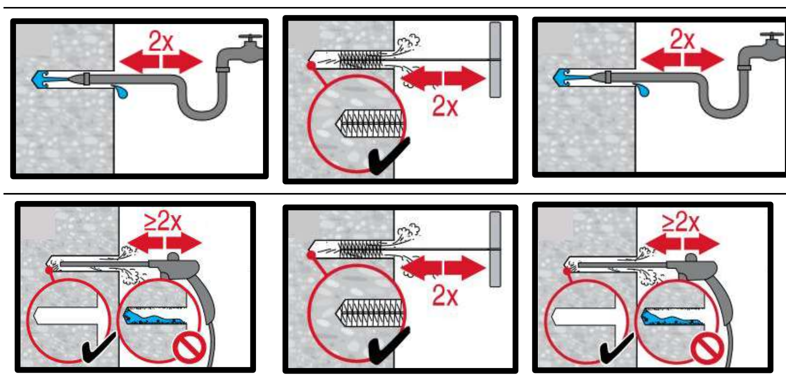
Hole cleaning



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

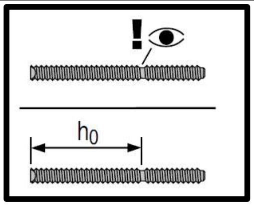


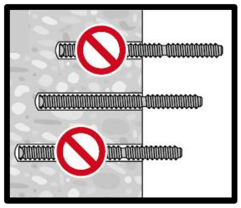
Compressed air cleaning (CAC) for hammer drilled hole
for all drill hole diameters d_0 and drill hole depths h_0.



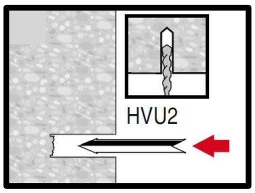
Hammer drilled flooded holes and diamond cored holes:
for all drill hole diameters d_0 and drill hole depths h_0.

Setting the element

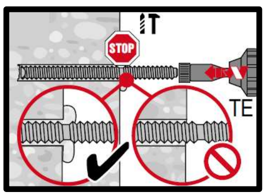


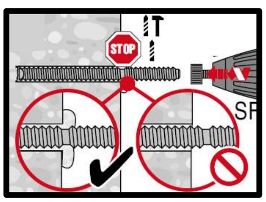


Check the setting depth.

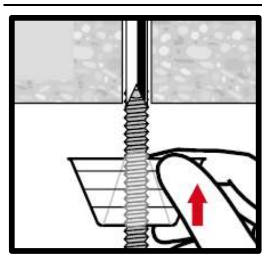


Insert the foil capsule with the peak ahead to the back of the hole.

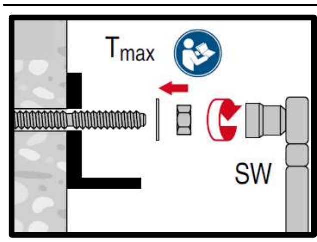




Drive the anchor rod with the plugged tool into the hole.



Overhead installation.



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