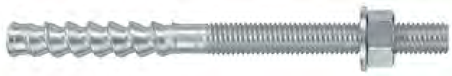
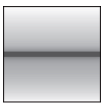
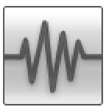
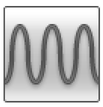
HIT-HY 200-A V3
HIT-HY 200-R V3
INJECTION MORTAR

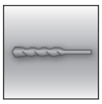
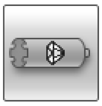
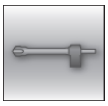
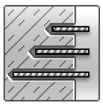
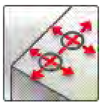
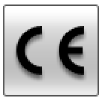
Technical Datasheet
Update: Sep-23

HIT-HY 200-A V3 and HIT-HY 200-R V3 injection mortars

Anchor design (EN 1992-4, EOTA TR 082) / Rods and Sleeves / Concrete

Injection mortar system		Benefits
	Hilti HIT-HY 200-A V3	- safe set technology: Makes installation steps faster, simpler and safer. Automatic borehole cleaning with hollow drill bits, accurate dosing with HDE and fast and safe torquing with the adaptive torque (AT) system.
	Hilti HIT-HY 200-R V3 500 ml foil pack (also available as 330 ml foil pack)	- Suitable for uncracked and cracked concrete C20/25 to C50/60
 	Anchor rod: HAS, HAS HDG, HAS A4, HAS-U, HAS-U HDG, HAS-U A4, HAS-U HCR (M8-M30)	- ETA Approved for seismic performance category C1, C2 [a)] - Maximum load performance in cracked concrete and uncracked concrete - High corrosion / corrosion resistance [b)]
	Internally threaded sleeve: HIS-N HIS-RN (M8-M20)	- Small edge distance and anchor spacing possible - Manual cleaning for borehole diameter up to 20mm and $h_{ef} \leq$ 10d for uncracked concrete only
	Anchor rod: HIT-Z(-D TP) HIT-Z-F HIT-Z-R(-D TP) (M8-M20) [f)]	- ETA data for 50 and 100 Years Working Life [c)] - Suitable for dry and water saturated concrete
	Anchor rod : HAS-D (M12-M20) [f)]	- Data under fire exposure in accordance with TR082 for threaded rod size M8 to M30

Base material					Load conditions				
									
Concrete (uncracked)	Concrete (cracked)	Dry concrete	Wet concrete	Water-filled borehole in concrete [d)]	Static/ quasi-static	Seismic, ETA-C1, C2 [a)]	Fatigue ETA [f)]	Fire resistance [g)]	100 Years Working Life [c)]

Installation conditions					Other information				
									
Hammer drilled holes	Diamond drilled holes [e)]	Hollow Drill Bit drilled holes / Hilti **SafeSet**	Variable embedment depth	Small edge distance and spacing	European Technical Assessment	CE conformity	Corrosion resistance [b)]	High corrosion resistance [b)]	PROFIS Engineering Software

a) HIS-N internally threaded sleeves and HAS-D not approved for Seismic.
b) High Corrosion resistant rods available only for HAS-U. Corrosion resistant rods available for HAS, HAS-U, HIS-N, and HIT-Z(-D TP).
c) HIS-N, HIT-Z-D TP and HAS-D rods only approved for 50 Years Working Life, not 100 Years.
d) Only threaded rods are approved for installation in water-filled boreholes in concrete.
e) Diamond drilling with Roughening Tool (RT) for HAS-U and HIS-N. No roughening tool needed with HIT-Z(-D TP) and HAS-D.
f) Fatigue data available for HAS-D and HIT-Z-D TP rods. Only M16 is available for HIT-Z-D TP. See the Approvals listed below for more information.
g) HIS, HIT-Z(-D TP) and HAS-D rods are not assessed under fire exposure.

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment a)	DIBt, Berlin	ETA-19/0601 / 2023-06-02
European Technical Assessment b)	DIBt, Berlin	ETA-19/0632 / 2023-06-08
European Technical Assessment c)	DIBt, Berlin	ETA-18/0972 / 2023-07-18
European Technical Assessment d)	DIBt, Berlin	ETA-15/0296 / 2023-07-20
European Technical Assessment e)	DIBt, Berlin	ETA-18/0978 / 2023-06-22
European Technical Assessment f)	DIBt, Berlin	ETA-19/0802 / 2023-07-18

a) All data given in this section according to the ETA-19/0601, issued 2023-06-02.
b) All data given in this section according to the ETA-19/0632, issued 2023-06-08.
c) All data given in this section according to the ETA-18/0972, issued 2023-07-18.
d) All data given in this section according to the ETA-15/0296, issued 2023-07-20.
e) All data given in this section according to the ETA-18/0978, issued 2023-06-22.
f) All data given in this section according to the ETA-19/0802, issued 2023-07-18.

Static and quasi-static design according to EN 1992-4 (for a single anchor)

All data in this section applies to:

- Correct setting (see setting instruction)
- No edge distance and spacing influence
- *Steel* failure (only indicated for Characteristic resistances)
- Minimum base material thickness
- Embedment depth, as specified in the table
- Anchor material, as specified in the tables
- Concrete C20/25
- Data given below are for 50 Years Working Life, for 100 Years Working Life see the respective ETAs
- In-service temperature range I
  (min. base material temp. -40°C, max. long/short term base material temp.: +24°C/40°C)
- The following data are valid for a ψ_{sus} = 1,0. For specific design cases involving smaller percentages of permanent loads refer to PROFIS Engineering.

For hammer drilled holes, hammer drilled holes with Hilti hollow drill bit:

Embedment depth [1)] and base material thickness

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
HAS, HAS-U										
Embedment depth	h_{ef}	[mm]	80	90	110	125	170	210	240	270
Base material thickness	h	[mm]	110	120	140	160	220	270	300	340
HIS-N										
Embedment depth	h_{ef}	[mm]	90	110	125	170	205	-	-	-
Base material thickness	h	[mm]	120	150	170	230	270	-	-	-
HIT-Z(-D TP)										
Embedment depth	h_{ef}	[mm]	70	90	110	145	180	-	-	-
Base material thickness	h	[mm]	130	150	170	245	280	-	-	-
HAS-D										
Embedment depth	h_{ef}	[mm]	-	-	100	125	170	-	-	-
Base material thickness	h	[mm]	-	-	130	160	220	-	-	-

1) The allowed range of embedment depth is shown in the setting details.

Characteristic resistance

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Uncracked concrete										
Tension	HAS 5.8, HAS-U 5.8	N_{Rk} [kN]	*18,3*	*29,0*	*42,2*	68,8	109,0	149,7	182,9	218,2
	HAS 8.8, HAS-U 8.8		*29,3*	42,0	56,8	68,8	109,0	149,7	182,9	218,2
	HAS A4, HAS-U A4		*25,6*	*40,6*	56,8	68,8	109,0	149,7	182,9	218,2
	HAS-U HCR		*29,3*	42,0	56,8	68,8	109,0	149,7	182,9	218,2
	HIS-N 8.8		*25,0*	*46,0*	*67,0*	109,0	*116,0*	-	-	-
	HIT-Z(-D TP) [a)]		*24,0*	*38,0*	50,0	85,9	118,8	-	-	-
	HAS-D		-	-	49,2	68,8	109,0	-	-	-
Shear	HAS 5.8, HAS-U 5.8	V_{Rk} [kN]	*11,0*	*17,4*	*25,3*	*47,1*	*73,5*	*105,9*	*137,7*	*168,3*
	HAS 8.8, HAS-U 8.8		*14,6*	*23,2*	*33,7*	*62,8*	*98,0*	*141,2*	*183,6*	*224,4*
	HAS A4, HAS-U A4		*12,8*	*20,3*	*29,5*	*55,0*	*85,8*	*123,6*	*114,8*	*140,3*
	HAS-U HCR		*14,6*	*23,2*	*33,7*	*62,8*	*98,0*	*123,6*	*160,7*	*196,4*
	HIS-N 8.8		*13,0*	*23,0*	*34,0*	*63,0*	*58,0*	-	-	-
	HIT-Z(-D TP) [a)]		*12,0*	*19,0*	*27,0*	*48,0*	*73,0*	-	-	-
	HAS-D		-	-	*34,0*	*63,0*	*149,0*	-	-	-
Cracked concrete										
Tension	HAS 5.8, HAS-U 5.8	N_{Rk} [kN]	15,1	26,6	39,4	48,1	76,3	104,8	128,0	152,8
	HAS 8.8, HAS-U 8.8		15,1	26,6	39,4	48,1	76,3	104,8	128,0	152,8
	HAS A4, HAS-U A4		15,1	26,6	39,4	48,1	76,3	104,8	128,0	152,8
	HAS-U HCR		15,1	26,6	39,4	48,1	76,3	104,8	128,0	152,8
	HIS-N 8.8		24,7	39,7	48,1	76,3	101,1	-	-	-
	HIT-Z(-D TP) [a)]		20,2	29,4	39,7	60,1	83,2	-	-	-
	HAS-D		-	-	34,4	48,1	76,3	-	-	-
Shear	HAS 5.8, HAS-U 5.8	V_{Rk} [kN]	*11,0*	*17,4*	*25,3*	*47,1*	*73,5*	*105,9*	*137,7*	*168,3*
	HAS 8.8, HAS-U 8.8		*14,6*	*23,2*	*33,7*	*62,8*	*98,0*	*141,2*	*183,6*	*224,4*
	HAS A4, HAS-U A4		*12,8*	*20,3*	*29,5*	*55,0*	*85,8*	*123,6*	*114,8*	*140,3*
	HAS-U HCR		*14,6*	*23,2*	*33,7*	*62,8*	*98,0*	*123,6*	*160,7*	*196,4*
	HIS-N 8.8		*13,0*	*23,0*	*34,0*	*63,0*	*58,0*	-	-	-
	HIT-Z(-D TP) [a)]		*12,0*	*19,0*	*27,0*	*48,0*	*73,0*	-	-	-
	HAS-D		-	-	*34,0*	*63,0*	*149,0*	-	-	-

a) Hilti anchor rod HIT-Z-F: M16 and M20.

Design resistance

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Uncracked concrete											
Tension	HAS 5.8, HAS-U 5.8	N_{Rd}	[kN]	12,2	19,3	28,1	45,8	72,7	99,8	121,9	145,5
	HAS 8.8, HAS-U 8.8			19,5	28,0	37,8	45,8	72,7	99,8	121,9	145,5
	HAS A4, HAS-U A4			13,7	21,7	31,6	45,8	72,7	99,8	80,2	98,1
	HAS-U HCR			19,5	28,0	37,8	45,8	72,7	99,8	121,9	145,5
	HIS-N 8.8			16,7	30,7	44,7	72,7	77,3	-	-	-
	HIT-Z(-D TP) [a)]			16,0	25,3	33,3	57,3	79,2	-	-	-
	HAS-D			-	-	32,8	45,8	72,7	-	-	-
Shear	HAS 5.8, HAS-U 5.8	V_{Rd}	[kN]	8,8	13,9	20,2	37,7	58,8	84,7	110,2	134,6
	HAS 8.8, HAS-U 8.8			11,7	18,6	27,0	50,2	78,4	113,0	146,9	179,5
	HAS A4, HAS-U A4			8,2	13,0	18,9	35,2	55,0	79,2	48,2	58,9
	HAS-U HCR			11,7	18,6	27,0	50,2	78,4	70,6	91,8	112,2
	HIS-N 8.8			10,4	18,4	27,2	50,4	46,4	-	-	-
	HIT-Z(-D TP) [a)]			9,6	15,2	21,6	38,4	58,4	-	-	-
	HAS-D			-	-	27,2	50,4	119,2	-	-	-
Cracked concrete											
Tension	HAS 5.8, HAS-U 5.8	N_{Rd}	[kN]	10,0	17,7	26,3	32,1	50,9	69,9	85,4	101,8
	HAS 8.8, HAS-U 8.8			10,0	17,7	26,3	32,1	50,9	69,9	85,4	101,8
	HAS A4, HAS-U A4			10,0	17,7	26,3	32,1	50,9	69,9	80,2	98,1
	HAS-U HCR			10,0	17,7	26,3	32,1	50,9	69,9	85,4	101,8
	HIS-N 8.8			16,5	26,5	32,1	50,9	67,4	-	-	-
	HIT-Z(-D TP) [a)]			13,4	19,6	26,5	40,1	55,4	-	-	-
	HAS-D			-	-	22,9	32,1	50,9	-	-	-
Shear	HAS 5.8, HAS-U 5.8	V_{Rd}	[kN]	8,8	13,9	20,2	37,7	58,8	84,7	110,2	134,6
	HAS 8.8, HAS-U 8.8			11,7	18,6	27,0	50,2	78,4	113,0	146,9	179,5
	HAS A4, HAS-U A4			8,2	13,0	18,9	35,2	55,0	79,2	48,2	58,9
	HAS-U HCR			11,7	18,6	27,0	50,2	78,4	70,6	91,8	112,2
	HIS-N 8.8			10,4	18,4	27,2	50,4	46,4	-	-	-
	HIT-Z(-D TP) [a)]			9,6	15,2	21,6	38,4	58,4	-	-	-
	HAS-D			-	-	27,2	50,4	101,8	-	-	-

a) Hilti anchor rod HIT-Z-F: M16 and M20.

Recommended load [b)]

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Uncracked concrete											
Tension	HAS 5.8, HAS-U 5.8	N_{rec}	[kN]	8,7	13,8	20,1	32,7	51,9	71,3	87,1	103,9
	HAS 8.8, HAS-U 8.8			13,9	20,0	27,0	32,7	51,9	71,3	87,1	103,9
	HAS A4, HAS-U A4			9,8	15,5	22,5	32,7	51,9	71,3	57,3	70,1
	HAS-U HCR			13,9	20,0	27,0	32,7	51,9	71,3	87,1	103,9
	HIS-N 8.8			11,9	21,9	31,9	51,9	55,2	-	-	-
	HIT-Z(-D TP) [a)]			11,4	18,1	23,8	40,9	56,6	-	-	-
	HAS-D			-	-	23,4	32,7	51,9	-	-	-
Shear	HAS 5.8, HAS-U 5.8	V_{rec}	[kN]	6,3	9,9	14,5	26,9	42,0	60,5	78,7	96,2
	HAS 8.8, HAS-U 8.8			8,4	13,3	19,3	35,9	56,0	80,7	104,9	128,2
	HAS A4, HAS-U A4			5,9	9,3	13,5	25,2	39,3	56,6	34,4	42,1
	HAS-U HCR			8,4	13,3	19,3	35,9	56,0	50,4	65,6	80,1
	HIS-N 8.8			7,4	13,1	19,4	36,0	33,1	-	-	-
	HIT-Z(-D TP) [a)]			6,9	10,9	15,4	27,4	41,7	-	-	-
	HAS-D			-	-	19,4	36,0	85,1	-	-	-
Cracked concrete											
Tension	HAS 5.8, HAS-U 5.8	N_{rec}	[kN]	7,2	12,6	18,8	22,9	36,3	49,9	61,0	72,7
	HAS 8.8, HAS-U 8.8			7,2	12,6	18,8	22,9	36,3	49,9	61,0	72,7
	HAS A4, HAS-U A4			7,2	12,6	18,8	22,9	36,3	49,9	57,3	70,1
	HAS-U HCR			7,2	12,6	18,8	22,9	36,3	49,9	61,0	72,7
	HIS-N 8.8			11,8	18,9	22,9	36,3	48,1	-	-	-
	HIT-Z(-D TP) [a)]			9,6	14,0	18,9	28,6	39,6	-	-	-
	HAS-D			-	-	16,4	22,9	36,3	-	-	-
Shear	HAS 5.8, HAS-U 5.8	V_{rec}	[kN]	6,3	9,9	14,5	26,9	42,0	60,5	78,7	96,2
	HAS 8.8, HAS-U 8.8			8,4	13,3	19,3	35,9	56,0	80,7	104,9	128,2
	HAS A4, HAS-U A4			5,9	9,3	13,5	25,2	39,3	56,6	34,4	42,1
	HAS-U HCR			8,4	13,3	19,3	35,9	56,0	50,4	65,6	80,1
	HIS-N 8.8			7,4	13,1	19,4	36,0	33,1	-	-	-
	HIT-Z(-D TP) [a)]			6,9	10,9	15,4	27,4	41,7	-	-	-
	HAS-D			-	-	19,4	36,0	72,7	-	-	-

a) Hilti anchor rod HIT-Z-F: M16 and M20;
b) 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 design according to EN 1992-4 (for a single anchor)

All data in this section applies to:
- Correct setting (see setting instruction with hammer drilling)
- No edge distance and spacing influence
- *Steel* failure (only indicated for Characteristic resistances)
- Minimum base material thickness
- Concrete C20/25
- Temperature range I (min. base material temp. -40°C, max. long/short term base material temp.: +24°C/40°C)
- Installation temperature range -10°C to +40°C (for HAS-U) or +5°C to +40°C (for HIT-Z)
- α_{gap} = 1,0 (using Hilti seismic filling set) or α_{gap} = 0,5 (without using Hilti seismic filling set) accordingly

For hammer drilled holes and hammer drilled holes with Hilti hollow drill bit:

Anchorage depth for seismic C2

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
HAS, HAS-U										
Embedment depth	h_{ef}	[mm]	-	-	110	125	170	210	-	-
Base material thickness	h	[mm]	-	-	140	160	220	270	-	-
HIT-Z										
Embedment depth	h_{ef}	[mm]	-	-	110	145	180	-	-	-
Base material thickness	h	[mm]	-	-	170	245	280	-	-	-

Characteristic resistance in case of seismic performance category C2

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Tension	HAS 8.8, HAS-U 8.8	$N_{Rk,C2}$	[kN]	-	-	11,2	28,9	49,1	55,4	-	-
	HIT-Z a)			-	-	22,0	51,1	70,7	-	-	-
with Hilti filling set (α_{gap} = 1,0)											
Shear	HAS 8.8, HAS-U 8.8	$V_{Rk,C2}$	[kN]	-	-	*28,0*	*46,0*	*77,0*	*103,0*	-	-
	HIT-Z a)			-	-	*23,0*	*41,0*	*61,0*	-	-	-
without Hilti filling set (α_{gap} = 0,5)											
Shear	HAS 8.8, HAS-U 8.8	$V_{Rk,C2}$	[kN]	-	-	*12,0*	*20,0*	*35,5*	*45,0*	-	-
	HIT-Z a)			-	-	*10,5*	*18,0*	*27,5*	-	-	-

a) Hilti anchor rod HIT-Z-F: M16 and M20.

Design resistance in case of seismic performance category C2

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Tension	HAS 8.8, HAS-U 8.8	$N_{Rd,C2}$	[kN]	-	-	7,5	19,3	32,8	36,9	-	-
	HIT-Z a)			-	-	14,7	34,1	47,1	-	-	-
with Hilti filling set (α_{gap} = 1,0)											
Shear	HAS 8.8, HAS-U 8.8	$V_{Rd,C2}$	[kN]	-	-	22,4	36,8	61,6	82,4	-	-
	HIT-Z a)			-	-	18,4	32,8	48,8	-	-	-
without Hilti filling set (α_{gap} = 0,5)											
Shear	HAS 8.8, HAS-U 8.8	$V_{Rd,C2}$	[kN]	-	-	9,6	16,0	28,4	36,0	-	-
	HIT-Z a)			-	-	8,4	14,4	22,0	-	-	-

a) Hilti anchor rod HIT-Z-F: M16 and M20.

Anchorage depth for seismic C1

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
HAS, HAS-U										
Embedment depth	h_{ef}	[mm]	-	90	110	125	170	210	240	270
Base material thickness	h	[mm]	-	120	140	160	220	270	300	340
HIT-Z										
Embedment depth	h_{ef}	[mm]	70	90	110	145	180	-	-	-
Base material thickness	h	[mm]	130	150	170	245	280	-	-	-

Characteristic resistance in case of seismic performance category C1

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Tension	HAS 8.8, HAS-U 8.8	$N_{Rk,C1}$	[kN]	-	14,7	29,0	40,9	64,9	89,1	108,8	129,9
	HIT-Z a); HIT-Z-R			17,1	25,0	33,8	51,1	70,7	-	-	-
with Hilti filling set (α_{gap} = 1,0)											
Shear	HAS 8.8, HAS-U 8.8	$V_{Rk,C1}$	[kN]	-	*23,2*	*33,7*	*62,8*	*98,0*	*141,2*	*183,6*	*224,4*
	HIT-Z a)			*8,5*	*12,0*	*16,0*	*28,0*	*45,0*	-	-	-
	HIT-Z-R			*9,8*	*15,0*	*22,0*	*31,0*	*48,0*	-	-	-
without Hilti filling set (α_{gap} = 0,5)											
Shear	HAS 8.8, HAS-U 8.8	$V_{Rk,C1}$	[kN]	-	*11,6*	*16,9*	*31,4*	*49,0*	*70,6*	*91,8*	*112,2*
	HIT-Z a)			*4,3*	*6,0*	*8,0*	*14,0*	*22,5*	-	-	-
	HIT-Z-R			*4,9*	*7,5*	*11,0*	*15,5*	*24,0*	-	-	-

a) Hilti anchor rod HIT-Z-F: M16 and M20.

Design resistance in case of seismic performance category C1

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Tension	HAS 8.8, HAS-U 8.8	$N_{Rd,C1}$	[kN]	-	9,8	19,4	27,3	43,3	59,4	72,6	86,6
	HIT-Z a); HIT-Z-R			11,4	16,7	22,5	34,1	47,1	-	-	-
with Hilti filling set (α_{gap} = 1,0)											
Shear	HAS 8.8, HAS-U 8.8	$V_{Rd,C1}$	[kN]	-	18,6	27,0	50,2	78,4	113,0	145,1	173,1
	HIT-Z a)			6,8	9,6	12,8	22,4	36,0	-	-	-
	HIT-Z-R			7,8	12,0	17,6	24,8	38,4	-	-	-
without Hilti filling set (α_{gap} = 0,5)											
Shear	HAS 8.8, HAS-U 8.8	$V_{Rd,C1}$	[kN]	-	9,3	13,5	25,1	39,2	56,5	73,4	89,8
	HIT-Z a)			3,4	4,8	6,4	11,2	18,0	-	-	-
	HIT-Z-R			3,9	6,0	8,8	12,4	19,2	-	-	-

a) Hilti anchor rod HIT-Z-F: M16 and M20.

Fatigue design according to EN 1992-4 (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
- FOR HAS-D: In-service temperature range I
  (min. base material temp. -40°C, max. long/short term base material temp.: +50°C/80°C)
- FOR HIT-Z(-R)-D TP: In-service temperature range I
  (min. base material temp. -40°C, max. long/short term base material temp.: +24°C/40°C)

Anchorage depth

Anchor size			M12	M16	M20
HAS-D					
Embedment depth	h_{ef}	[mm]	100	125	170
Base material thickness	h	[mm]	130	160	220
HIT-Z-D TP, HIT-Z-R-D TP					
Embedment depth	h_{ef}	[mm]	-	125	-
Base material thickness [a)]	h	[mm]	-	160/225 [a)]	-

a) Values show for Drill hole condition (1) and (2) respectively. See setting details

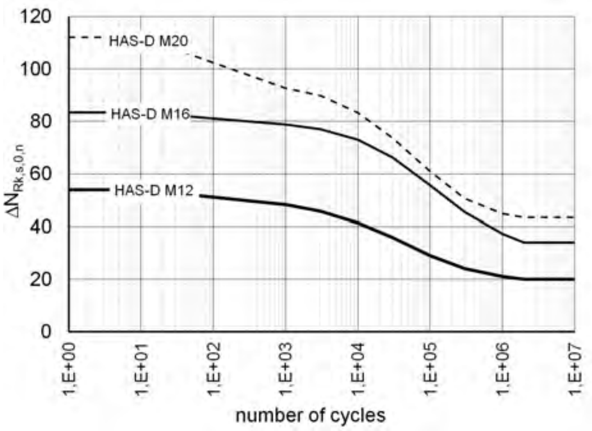
Characteristic resistance

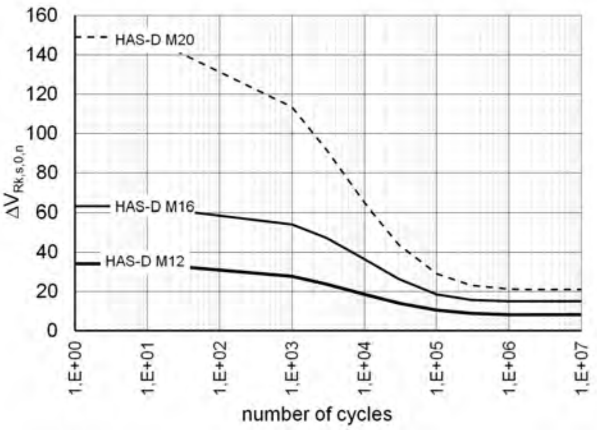
Anchor size				M12	M16	M20
Non-cracked concrete						
Tension	HAS-D	$\Delta N_{Rk,0,\infty}$	[kN]	*20,1*	*34,0*	*43,5*
	HIT-Z-D TP			-	*18,8*	-
	HIT-Z-R-D TP			-	*12,4*	-
Shear	HAS-D	$\Delta V_{Rk,0,\infty}$	[kN]	*8,2*	*15,0*	*21,1*
	HIT-Z-D TP			-	*8,0*	-
	HIT-Z-R-D TP			-	*8,0*	-
Cracked concrete						
Tension	HAS-D	$\Delta N_{Rk,0,\infty}$	[kN]	*20,1*	34,0	*43,5*
	HIT-Z-D TP			-	18,8	-
	HIT-Z-R-D TP			-	12,4	-
Shear	HAS-D	$\Delta V_{Rk,0,\infty}$	[kN]	*8,2*	15,0	*21,1*
	HIT-Z-D TP			-	8,0	-
	HIT-Z-R-D TP			-	8,0	-

Design resistance

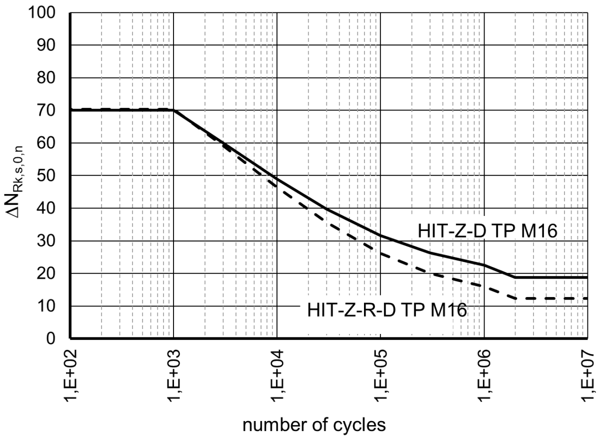
Anchor size				M12	M16	M20
Non-cracked concrete						
Tension	HAS-D	$\Delta N_{Rd,0,\infty}$	[kN]	14,9	25,2	32,2
	HIT-Z-D TP			-	13,9	-
	HIT-Z-R-D TP			-	9,2	-
Shear	HAS-D	$\Delta V_{Rd,0,\infty}$	[kN]	6,1	11,1	15,6
	HIT-Z-D TP			-	5,9	-
	HIT-Z-R-D TP			-	5,9	-
Cracked concrete						
Tension	HAS-D	$\Delta N_{Rd,0,\infty}$	[kN]	14,9	25,2	32,2
	HIT-Z-D TP			-	13,9	-
	HIT-Z-R-D TP			-	9,2	-
Shear	HAS-D	$\Delta V_{Rd,0,\infty}$	[kN]	6,1	11,1	15,6
	HIT-Z-D TP			-	5,9	-
	HIT-Z-R-D TP			-	5,9	-

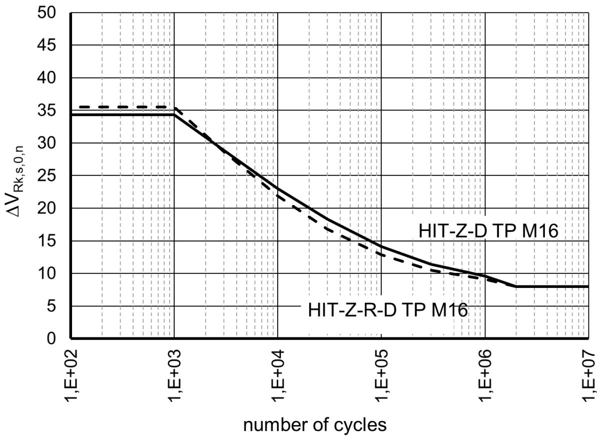
Characteristic Wöhler curve under tension and shear fatigue load





Characteristic Wöhler curve under tension and shear fatigue load





Fire design according to EOTA TR 082 (for a single anchor)

All data in this section applies to:

- EOTA TR 082, Design of bonded fasteners under fire conditions (June 2023)
- In case of fire a partial safety factor γ_m = 1,0 is taken (in absence of other national recomendations)
- Correct setting (see setting instructions with hammer drilling)
- No edge distance and spacing influence (fire attack from side only)
- *Steel* failure
- Minimum base material thickness
- Concrete C20/25
- No fire assessment available for HIT-Z-(R), rebar or HIS-(R)N.

For hammer drilled holes and hammer drilled holes with Hilti hollow drill bit:

Anchorage depth in case of fire

Anchor size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
HAS 5.8, HAS-U 5.8, HAS A4, HAS-U A4										
Embedment depth (minimum)	$h_{ef,min}$	[mm]	60	60	72	80	90	96	108	120
Embedment depth (intermediate)	$h_{ef,med}$	[mm]	80	90	96	112	120	120	135	150
Embedment depth (maximum)	$h_{ef,max}$	[mm]	160	200	240	320	400	480	540	600

Characteristic and design resistance in case of fire [1)]

Anchor size					**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
HAS 5.8, HAS-U 5.8												
Tension	30 min	$h_{ef,min}$	$N_{Rk,fi(30)}$ $N_{Rd,fi(30)}$	[kN]	0,17	0,14	0,45	0,62	1,00	1,23	2,25	3,79
		$h_{ef,med}$			0,85	1,68	2,10	3,61	4,47	4,12	6,71	10,37
		$h_{ef,max}$			*1,04*	*1,80*	*2,80*	*5,22*	*8,15*	*11,74*	*15,27*	*18,67*
	60 min	$h_{ef,min}$	$N_{Rk,fi(60)}$ $N_{Rd,fi(60)}$	[kN]	-	-	-	-	-	-	-	-
		$h_{ef,med}$			0,15	0,36	0,47	0,92	1,04	0,67	1,46	2,56
		$h_{ef,max}$			*0,81*	*1,36*	*2,05*	*3,83*	*5,98*	*8,62*	*11,21*	*13,70*
	90 min	$h_{ef,min}$	$N_{Rk,fi(90)}$ $N_{Rd,fi(90)}$	[kN]	-	-	-	-	-	-	-	-
		$h_{ef,med}$			-	-	-	0,14	-	-	-	0,50
		$h_{ef,max}$			*0,59*	*0,91*	*1,31*	*2,44*	*3,81*	*5,49*	*7,14*	*8,73*
	120 min	$h_{ef,min}$	$N_{Rk,fi(120)}$ $N_{Rd,fi(120)}$	[kN]	-	-	-	-	-	-	-	-
		$h_{ef,med}$			-	-	-	-	-	-	-	-
		$h_{ef,max}$			*0,47*	*0,69*	*0,93*	*1,74*	*2,72*	*3,92*	*5,10*	*6,24*
Shear	30 min	$h_{ef,min}$	$N_{Rk,fi(30)}$ $N_{Rd,fi(30)}$	[kN]	0,35	0,29	0,90	1,24	2,01	2,46	4,51	7,57
		$h_{ef,med}$			*1,04*	*1,80*	*2,80*	*5,22*	*8,15*	8,24	13,42	*18,67*
		$h_{ef,max}$			*1,04*	*1,80*	*2,80*	*5,22*	*8,15*	*11,74*	*15,27*	*18,67*
	60 min	$h_{ef,min}$	$N_{Rk,fi(60)}$ $N_{Rd,fi(60)}$	[kN]	-	-	-	-	-	-	-	-
		$h_{ef,med}$			0,30	0,73	0,93	1,83	2,07	1,35	2,92	5,13
		$h_{ef,max}$			*0,81*	*1,36*	*2,05*	*3,83*	*5,98*	*8,62*	*11,21*	*13,70*
	90 min	$h_{ef,min}$	$N_{Rk,fi(90)}$ $N_{Rd,fi(90)}$	[kN]	-	-	-	-	-	-	-	-
		$h_{ef,med}$			-	-	-	0,27	-	-	-	1,01
		$h_{ef,max}$			*0,59*	*0,91*	*1,31*	*2,44*	*3,81*	*5,49*	*7,14*	*8,73*
	120 min	$h_{ef,min}$	$N_{Rk,fi(120)}$ $N_{Rd,fi(120)}$	[kN]	-	-	-	-	-	-	-	-
		$h_{ef,med}$			-	-	-	-	-	-	-	-
		$h_{ef,max}$			*0,47*	*0,69*	*0,93*	*1,74*	*2,72*	*3,92*	*5,10*	*6,24*

Characteristic and design resistance in case of fire 1)

Anchor size					M8	M10	M12	M16	M20	M24	M27	M30
HAS A4, HAS-U A4												
Tension	30 min	$h_{ef,min}$	$N_{Rk,fi(30)}$ $N_{Rd,fi(30)}$	[kN]	0,41	0,47	1,20	1,87	3,12	4,15	6,87	10,57
		$h_{ef,med}$			1,43	2,93	3,95	7,25	9,60	10,07	15,37	21,82
		$h_{ef,max}$			*2,70*	*4,93*	*7,93*	*14,77*	*23,06*	*33,23*	*43,20*	*52,81*
	60 min	$h_{ef,min}$	$N_{Rk,fi(60)}$ $N_{Rd,fi(60)}$	[kN]	-	-	0,09	0,15	0,35	0,43	1,10	2,13
		$h_{ef,med}$			0,33	0,80	1,14	2,41	3,14	2,75	4,94	7,98
		$h_{ef,max}$			*1,93*	*3,49*	*5,56*	*10,37*	*16,18*	*23,31*	*30,31*	*37,05*
	90 min	$h_{ef,min}$	$N_{Rk,fi(90)}$ $N_{Rd,fi(90)}$	[kN]	-	-	-	-	-	-	-	0,23
		$h_{ef,med}$			0,06	0,22	0,33	0,86	1,09	0,77	1,76	3,28
		$h_{ef,max}$			*1,17*	*2,04*	*3,20*	*5,96*	*9,30*	*13,40*	*17,42*	*21,29*
	120 min	$h_{ef,min}$	$N_{Rk,fi(120)}$ $N_{Rd,fi(120)}$	[kN]	-	-	-	-	-	-	-	-
		$h_{ef,med}$			-	-	-	0,24	0,29	-	0,51	1,30
		$h_{ef,max}$			*0,79*	*1,32*	*2,01*	*3,75*	*5,86*	*8,44*	*10,98*	*13,42*
Shear	30 min	$h_{ef,min}$	$N_{Rk,fi(30)}$ $N_{Rd,fi(30)}$	[kN]	0,81	0,94	2,40	3,74	6,24	8,29	13,74	21,14
		$h_{ef,med}$			*2,70*	4,93	7,90	14,51	19,21	20,15	30,73	43,64
		$h_{ef,max}$			*2,70*	*4,93*	*7,93*	*14,77*	*23,06*	*33,23*	*43,20*	*52,81*
	60 min	$h_{ef,min}$	$N_{Rk,fi(60)}$ $N_{Rd,fi(60)}$	[kN]	-	-	0,18	0,30	0,69	0,87	2,20	4,26
		$h_{ef,med}$			*0,66*	1,61	2,27	4,83	6,28	5,49	9,88	15,97
		$h_{ef,max}$			*1,93*	*3,49*	*5,56*	*10,37*	*16,18*	*23,31*	*30,31*	*37,05*
	90 min	$h_{ef,min}$	$N_{Rk,fi(90)}$ $N_{Rd,fi(90)}$	[kN]	-	-	-	-	-	-	-	0,46
		$h_{ef,med}$			0,12	0,43	0,65	1,72	2,18	1,54	3,51	6,56
		$h_{ef,max}$			*1,17*	*2,04*	*3,20*	*5,96*	*9,30*	*13,40*	*17,42*	*21,29*
	120 min	$h_{ef,min}$	$N_{Rk,fi(120)}$ $N_{Rd,fi(120)}$	[kN]	-	-	-	-	-	-	-	-
		$h_{ef,med}$			-	-	-	0,48	0,59	-	1,02	2,60
		$h_{ef,max}$			*0,79*	*1,32*	*2,01*	*3,75*	*5,86*	*8,44*	*10,98*	*13,42*

1) Interpolation between the resistance values with PROFIS Engineering possible.

Materials

Mechanical properties for HAS and HAS-U

Anchor size				M8	M10	M12	M16	M20	M24	M27	M30
Nominal tensile strength	HAS 5.8 (HDG), HAS-U 5.8 (HDG)	f_{uk}	[N/mm²]	500	500	500	500	500	500	500	500
	HAS 8.8 (HDG), HAS-U 8.8 (HDG) AM 8.8 (HDG)			800	800	800	800	800	800	800	800
	HAS A4, HAS-U			700	700	700	700	700	700	500	500
	HAS-U HCR			800	800	800	800	800	700	-	-
Yield strength	HAS 5.8 (HDG), HAS-U 5.8 (HDG)	f_{yk}	[N/mm²]	440	440	440	440	400	400	400	400
	HAS 8.8 (HDG), HAS-U 8.8 (HDG) AM 8.8 (HDG)			640	640	640	640	640	640	640	640
	HAS A4, HAS-U			450	450	450	450	450	450	210	210
	HAS-U HCR			640	640	640	640	640	400	-	-
Stressed cross-section	HAS, HAS-U	A_s	[mm²]	36,6	58,0	84,3	157	245	353	459	561
Moment of resistance	HAS, HAS-U	W	[mm³]	31,2	62,3	109	277	541	935	1387	1874

Mechanical properties for HIS-N

Anchor size				M8	M10	M12	M16	M20
Nominal tensile strength	HIS-N	f_{uk}	[N/mm²]	490	490	490	490	490
	Screw 8.8			800	800	800	800	800
	HIS-RN			700	700	700	700	700
	Screw A4-70			700	700	700	700	700
Yield strength	HIS-N	f_{yk}	[N/mm²]	390	390	390	390	390
	Screw 8.8			640	640	640	640	640
	HIS-RN			350	350	350	350	350
	Screw A4-70			450	450	450	450	450
Stressed cross-section	HIS-(R)N	A_s	[mm²]	51,5	108	169	256	238
	Screw			36,6	58,0	84,3	157	245
Moment of resistance	HIS-(R)N	W	[mm³]	145	430	840	1595	1543
	Screw			31,2	62,3	109	277	541

Mechanical properties for HIT-Z

Anchor size				M8	M10	M12	M16	M20
Nominal tensile strength	HIT-Z(-F) [a)]	f_{uk}	[N/mm²]	650	650	650	610	595
	HIT-Z-R			650	650	650	610	595
Yield strength	HIT-Z(-F) [a)]	f_{yk}	[N/mm²]	520	520	520	490	480
	HIT-Z-R			520	520	520	490	480
Stressed cross-section of thread	HIT-Z(-F) [a)] HIT-Z-R	A_s	[mm²]	36,6	58,0	84,3	157	245
Moment of resistance	HIT-Z(-F) [a)] HIT-Z-R	W	[mm³]	31,9	62,5	109,7	278	542

a) Hilti anchor rod HIT-Z-F: M16 and M20.

Mechanical properties for HAS-D

Refer to the material quality for HAS-D Table for more information.

Material quality for HAS and HAS-U

Part	Material
Zinc coated steel	
Threaded rod, HAS 5.8 (HDG), HAS-U 5.8 (HDG)	Strength class 5.8; Elongation at fracture A5 > 8% ductile Electroplated zinc coated ≥ 5µm; (HDG) hot dip galvanized ≥ 50 µm
Threaded rod, HAS 8.8 (HDG), HAS-U 8.8 (HDG)	Strength class 8.8; Elongation at fracture A5 > 12% ductile Electroplated zinc coated ≥ 5µm; (HDG) hot dip galvanized ≥ 50 µm
Hilti Meter rod, AM 8.8 (HDG)	Strength class 8.8; Elongation at fracture A5 > 12% ductile Electroplated zinc coated ≥ 5µm, (HDG) hot dip galvanized ≥ 50 µm
Washer	Electroplated zinc coated ≥ 5 µm, hot dip galvanized ≥ 50 µm
Nut	Strength class of nut adapted to strength class of threaded rod. Electroplated zinc coated ≥ 5µm, (HDG) hot dip galvanized ≥ 50 µm
Hilti Filling set (F)	Filling washer: Electroplated zinc coated ≥ 5 µm / (HDG) Hot dip galvanized ≥ 50 µm Spherical washer: Electroplated zinc coated ≥ 5 µm / (HDG) Hot dip galvanized ≥ 50 µm Lock nut: Electroplated zinc coated ≥ 5 µm / (HDG) Electroplated zinc-nickel coated ≥ 6 µm
Stainless Steel	
Threaded rod, HAS A4 HAS-U A4	Strength class 70 for ≤ M24 and strength class 50 for > M24; Elongation at fracture A5 > 12% ductile Stainless steel 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362 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 70 for ≤ M24 and strength class 50 for > M24; Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1:2014
High corrosion resistant steel	
Threaded rod, HAS-U HCR	Strength class 80 for ≤ M20 and class 70 for > M20, Elongation at fracture A5 > 12% ductile High corrosion resistant steel 1.4529, 1.4565 EN 10088-1:2014
Washer	High corrosion resistant steel 1.4529, 1.4565 EN 10088-1:2014
Nut	Strength class 80 for ≤ M20 and class 70 for > M20, High corrosion resistant steel 1.4529, 1.4565 EN 10088-1:2014

Material quality for HIS-N

Part		Material
HIS-N	Int. threaded sleeve	Electroplated zinc coated ≥ 5 µm
HIS-RN	Int. threaded sleeve	Stainless steel 1.4401,1.4571 EN 10088-1:2014

Material quality for HIT-Z

Part	Material
Threaded rod HIT-Z	Elongation at fracture > 8% ductile; Electroplated zinc coated ≥ 5 µm
Washer	Electroplated zinc coated ≥ 5 µm
Nut	Strength class of nut adapted to strength class of anchor rod. Electroplated zinc coated ≥ 5 µm
HIT-Z-F	Elongation at fracture > 8% ductile Multilayer coating, ZnNi-galvanized according to EN ISO 19598:2016
Washer	Multilayer coating, ZnNi-galvanized according to EN ISO 19598:2016
Nut	Multilayer coating, ZnNi-galvanized according to EN ISO 19598:2016
HIT-Z-R	Elongation at fracture > 8% ductile; Stainless steel 1.4401, 1.4404 EN 10088-1:2014
Washer	Stainless steel A4 according to EN 10088-1:2014
Nut	Strength class of nut adapted to strength class of anchor rod. Stainless steel 1.4401, 1.4404 EN 10088-1:2014

Material quality for HAS-D

Part	Material
Fastener	Steel according to EN ISO 683-4:2018, galvanized and coated
Sealing washer	Steel, electroplated zinc coated ≥ 5 μm
Calotte nut	Steel, electroplated zinc coated ≥ 5 μm
Lock nut	Steel, electroplated zinc coated ≥ 5 μm

Setting information

Installation temperature:

- -10 °C to +40 °C (for HAS, HAS-U, HAS-D, HIS-N)
- +5 °C to +40 °C (for HIT-Z)

In service temperature range

Hilti HIT-HY 200-A and HIT-HY 200-R V3 injection mortars with anchor rod HAS / HAS-U / HIS-(R)N may be applied in the temperature ranges given below. For the intended temperature range specified in the design, the respective bond strength values shall be taken from the ETA.

Temperature in the base material

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

Maximum 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.

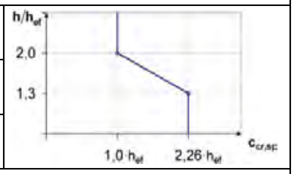
Maximum long term base material temperature
Long-term elevated base material temperatures are roughly constant over significant periods of time.

Curing and working time

Temperature of the base material	HIT-HY 200-A V3		HIT-HY 200-R V3	
	Maximum working time	Minimum curing time	Maximum working time	Minimum curing time
T_{BM}	t_{work}	t_{cure}	t_{work}	t_{cure}
- 10°C < T_{BM} ≤ - 5°C [a)]	1,5 h	7 h	3 h	20 h
- 4°C < T_{BM} ≤ 0°C [a)]	50 min	4 h	1,5 h	8 h
1°C < T_{BM} ≤ 5°C [a)]	25 min	2 h	45 min	4 h
6°C < T_{BM} ≤ 10°C	15 min	75 min	30 min	2,5 h
11°C < T_{BM} ≤ 20°C	7 min	45 min	15 min	1,5 h
21°C < T_{BM} ≤ 30°C	4 min	30 min	9 min	1 h
31°C < T_{BM} ≤ 40°C	3 min	30 min	6 min	1 h

a) Installation of HIT-Z, HIT-Z-D TP only in range +5 °C to +40 °C

Setting details for HAS and HAS-U

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18	22	28	30	35
Effective embedment depth (= drill hole depth) [a]	$h_{ef,min} = h_0$	[mm]	60	60	70	80	90	96	108	120
	$h_{ef,max} = h_0$	[mm]	160	200	240	320	400	480	540	600
Minimum base material thickness	h_{min}	[mm]	h_{ef} + 30 mm ≥100 mm			$h_{ef} + 2\ d_0$				
Maximum diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22	26	30	33
Thickness of Hilti filling set	h_{fs}	[mm]	-	-	-	11	13	15	-	-
Effective fixture thickness with Hilti filling set	$t_{fix,eff}$	[mm]	$t_{fix} - h_{fs}$							
Maximum torque moment [b]	T_{max}	[Nm]	10	20	40	80	150	200	270	300
Minimum spacing	s_{min}	[mm]	40	50	60	75	90	115	120	140
Minimum edge distance	c_{min}	[mm]	40	45	45	50	55	60	75	80
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]	$2\ c_{cr,sp}$							
Critical edge distance for splitting failure [c]	$c_{cr,sp}$	[mm]	$1{,}0 \cdot h_{ef}$		for $h / h_{ef} \geq 2{,}00$					
			$4{,}6\ h_{ef} - 1{,}8\ h$		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]	$2\ c_{cr,N}$							
Critical edge distance for concrete cone failure	$c_{cr,N}$	[mm]	$1{,}5\ h_{ef}$							

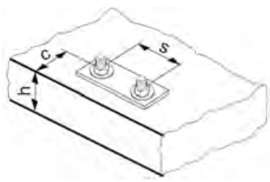
For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced.

a) $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ (h_{ef}: embedment depth)

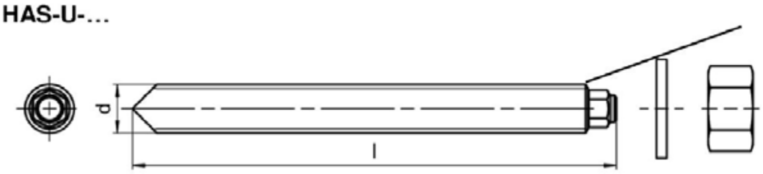
b) Maximum recommended torque moment to avoid splitting failure during instalation with minimum spacing and edge distance

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

d) 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.



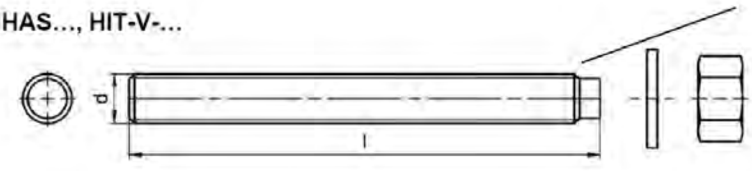
HAS-U-...



Marking:

Steel grade number and length identification letter: e.g. 8L

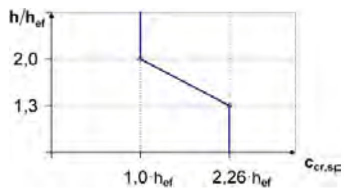
HAS..., HIT-V-...



HAS Color code marking:

5.8 = RAL 5010 (blue)
8.8 = RAL 1023 (yellow)
A4 = RAL 3000 (red)

Setting details for HIS-N

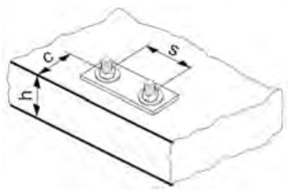
Anchor size			M8	M10	M12	M16	M20
Nominal diameter of drill bit	d_0	[mm]	14	18	22	28	32
Diameter of element	d	[mm]	12,5	16,5	20,5	25,4	27,6
Effective embedment depth (=drill hole depth)	$h_{ef} = h_0$	[mm]	90	110	125	170	205
Minimum base material thickness	h_{min}	[mm]	120	150	170	230	270
Diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22
Thread engagement length; min - max	h_s	[mm]	8-20	10-25	12-30	16-40	20-50
Maximum torque moment [b)]	T_{max}	[Nm]	10	20	40	80	150
Minimum spacing	s_{min}	[mm]	60	75	90	115	130
Minimum edge distance	c_{min}	[mm]	40	45	55	65	90
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]	$2\ c_{cr,sp}$				
Critical edge distance for splitting failure [a)]	$c_{cr,sp}$	[mm]	$1{,}0 \cdot h_{ef}$	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]	$2\ c_{cr,N}$				
Critical edge distance for concrete cone failure	$c_{cr,N}$	[mm]	$1{,}5\ h_{ef}$				

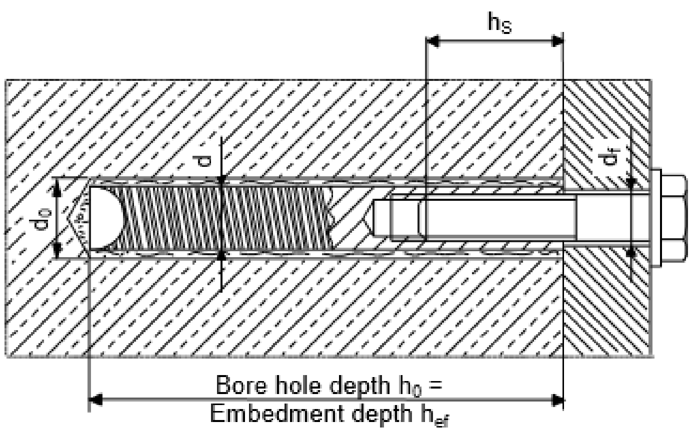
For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced.

a) Max. recommended torque moment to avoid splitting failure during Instalation with minimum spacing and edge distance

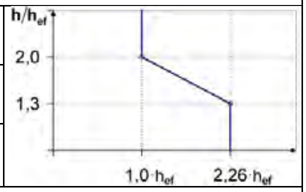
b) h: base material thickness ($h \geq h_{min}$)

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 for HIT-Z, HIT-Z-F and HIT-Z-R

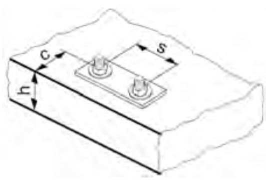
Anchor size			M8	M10	M12	M16	M20
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18	22
Length of anchor	min l	[mm]	80	95	105	155	215
	max l	[mm]	120	160	196	420	450
Nominal embedment depth a)	$h_{ef,min}$	[mm]	60	60	60	96	100
	$h_{ef,max}$	[mm]	100	120	144	192	220
Borehole condition 1 Min. base material thickness	h_{min}	[mm]	h_{ef} + 60 mm			h_{ef} + 100 mm	
Borehole condition 2 Min. base material thickness	h_{min}	[mm]	h_{ef} + 30 mm ≥100 mm			h_{ef} + 45 mm ≥45 mm	
Maximum depth of drill hole	h_0	[mm]	h – 30 mm			h – 2 d_0	
Pre-setting: Diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22
Through-setting: Diameter of clearance hole in the fixture	d_f	[mm]	11	14	16	20	24
Maximum fixture thickness	t_{fix}	[mm]	48	87	120	303	326
Maximum fixture thickness with seismic filling set	t_{fix}	[mm]	41	79	111	292	314
Installation torque moment b) HIT-Z, HIT-Z-F	T_{inst}	[Nm]	10	25	40	80	150
Installation torque moment b) HIT-Z-R	T_{inst}	[Nm]	30	55	75	155	215
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]	2 $c_{cr,sp}$				
Critical edge distance for splitting failure c)	$c_{cr,sp}$	[mm]	1,5 · h_{ef}	for h / h_{ef} ≥ 2,35			
			6,2 h_{nom} - 2,0 h	for 2,35 > h / h_{ef} > 1,35			
			3,5 h_{ef}	for h / h_{ef} ≤ 1,35			
Critical spacing for concrete cone failure	$s_{cr,N}$	[mm]	2 $c_{cr,N}$				
Critical edge distance concrete cone failure	$c_{cr,N}$	[mm]	1,5 h_{ef}				

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

a) $h_{ef,min} \le h_{ef} \le h_{ef,max}$ (h_{ef}: effective embedment depth).

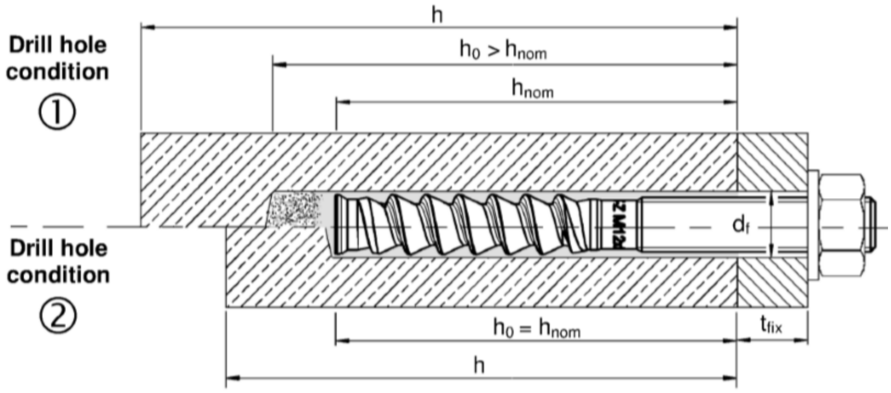
b) Recommended torque moment to avoid splitting failure during instalation with minimum spacing and edge distance.

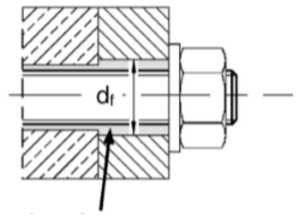
c) h: base material thickness (h ≥ h_{min}).



Pre-setting:
Install anchor before positioning fixture

Through-setting: Install anchor through positioned fixture





Drill hole condition 1 → non-cleaned borehole
Drill hole condition 2 → drilling dust is completely removed

Annular gap filled with Hilti HIT-HY 200-A

Anchor dimension for HIT-Z a)

Anchor size			**M8**	**M10**	**M12**	**M16**	**M20**
Length of anchor	min ℓ	[mm]	80	95	105	155	215
	max ℓ		120	160	196	420	450
Helix length	ℓ_{Helix}	[mm]	30 or 50	50 or 60	60	96	100

Minimum edge distance and spacing for HIT-Z

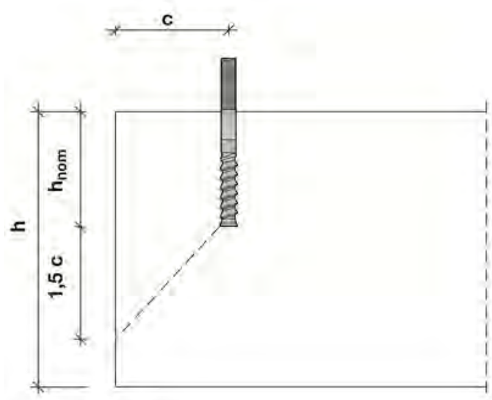
For the calculation of minimum spacing and minimum edge distance of anchors in combination with different embedment depth and thickness of concrete member the following equation shall be fulfilled: $\mathbf{A_{i,req} < A_{i,cal}}$

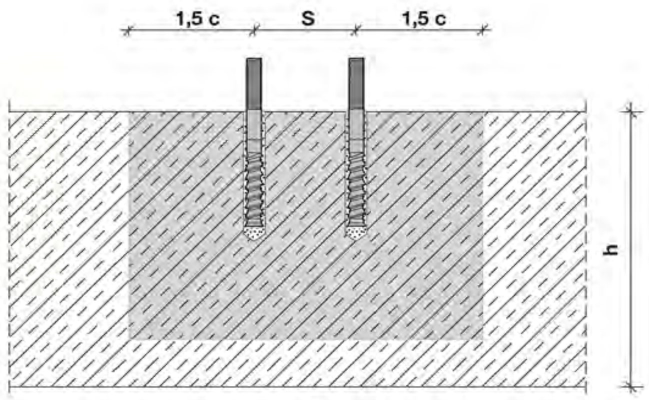
Required interaction area $A_{i,cal}$ for HIT-Z

Anchor size		**M8**	**M10**	**M12**	**M16**	**M20**
Cracked concrete	[mm²]	19200	40800	58800	94700	148000
Non-cracked concrete	[mm²]	22200	57400	80800	128000	198000

Effective area $A_{i,ef}$ of HIT-Z

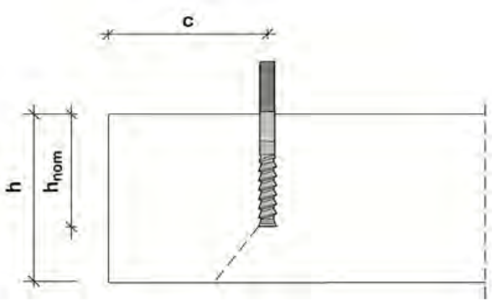
Member thickness $h \geq h_{nom} + 1{,}5 \cdot c$

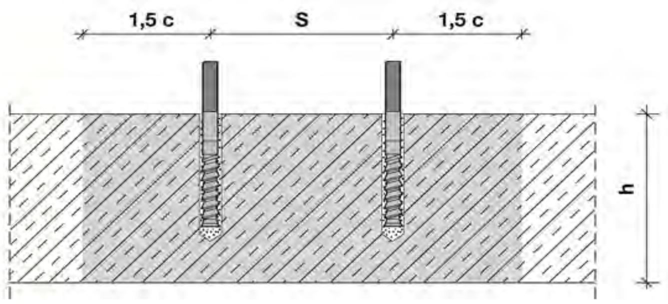




Single anchor and group of anchors with s > 3·c	[mm²]	**$A_{i,cal} = (6 \cdot c) \cdot (h_{nom} + 1{,}5 \cdot c)$**	with $c \geq 5 \cdot d$
Group of anchors with s ≤ 3·c	[mm²]	**$A_{i,cal} = (3 \cdot c + s) \cdot (h_{nom} + 1{,}5 \cdot c)$**	with $c \geq 5 \cdot d$ and $s \geq 5 \cdot d$

Member thickness $h \leq h_{nom} + 1{,}5 \cdot c$





Single anchor and group of anchors with s >	[mm²]	**$A_{i,cal} = (6 \cdot c) \cdot h$**	with $c \geq 5 \cdot d$
Group of anchors with s ≤ 3·c	[mm²]	**$A_{i,cal} = (3 \cdot c + s) \cdot h$**	with $c \geq 5 \cdot d$ and $s \geq 5 \cdot d$

Best case minimum edge distance and spacing with required member thickness and embedment depth

Anchor size			**M8**	**M10**	**M12**	**M16**	**M20**
Cracked concrete							
Member thickness	$h \geq$	[mm]	140	200	240	300	370
Embedment depth	$h_{nom} \geq$	[mm]	80	120	150	200	220
Minimum spacing	s_{min}	[mm]	40	50	60	80	100
Corresponding edge distance	$c \geq$	[mm]	40	55	65	80	100
Minimum edge distance	$c_{min} =$	[mm]	40	50	60	80	100
Corresponding spacing	$s \geq$	[mm]	40	60	65	80	100
Non-cracked concrete							
Member thickness	$h \geq$	[mm]	140	230	270	340	410
Embedment depth	$h_{nom} \geq$	[mm]	80	120	150	200	220
Minimum spacing	s_{min}	[mm]	40	50	60	80	100
Corresponding edge distance	$c \geq$	[mm]	40	70	80	100	130
Minimum edge distance	c_{min}	[mm]	40	50	60	80	100
Corresponding spacing	$s \geq$	[mm]	40	145	160	160	235

Best case minimum member thickness and embedment depth with required minimum edge distance and spacing (borehole condition 1)

Anchor size			**M8**	**M10**	**M12**	**M16**	**M20**
Cracked concrete							
Member thickness	h ≥	[mm]	120	120	120	196	200
Embedment depth	h_{nom} ≥	[mm]	60	60	60	96	100
Minimum spacing	s_{min}	[mm]	40	50	60	80	100
Corresponding edge distance	c ≥	[mm]	40	100	140	135	215
Minimum edge distance	c_{min} =	[mm]	40	60	90	80	125
Corresponding spacing	s ≥	[mm]	40	160	220	235	365
Non cracked concrete							
Member thickness	h ≥	[mm]	120	120	120	196	200
Embedment depth	h_{nom} ≥	[mm]	60	60	60	96	100
Minimum spacing	s_{min}	[mm]	40	50	60	80	100
Corresponding edge distance	c ≥	[mm]	50	145	200	190	300
Minimum edge distance	c_{min}	[mm]	40	80	115	110	165
Corresponding spacing	s ≥	[mm]	65	240	330	310	495

Minimum edge distance and spacing – Explanation

Minimum edge and spacing geometrical requirements are determined by testing the installation conditions in which two anchors with a given spacing can be set close to an edge without forming a crack in the concrete due to tightening torque.

The HIT-Z boundary conditions for edge and spacing geometry can be found in the tables to the left. If the embedment depth and slab thickness are equal to or greater than the values in the table, then the edge and spacing values may be utilized.

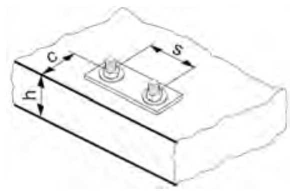
PROFIS Engineering software is programmed to calculate the referenced equations in order to determine the optimized related minimum edge and spacing based on the following variables:

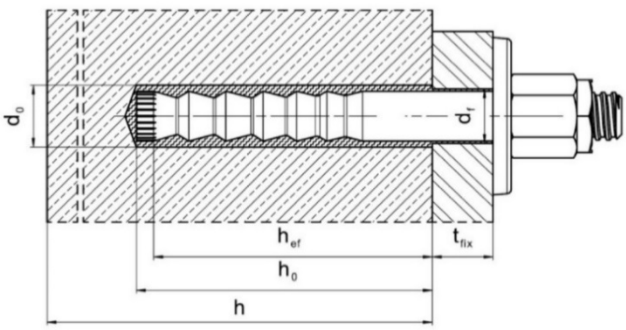
Cracked or non-cracked concrete	For cracked concrete it is assumed that a reinforcement is present which limits the crack width to 0,3 mm, allowing smaller values for minimum edge distance and minimum spacing
Anchor diameter	For smaller anchor diameter a smaller installation torque is required, allowing smaller values for minimum edge distance and minimum spacing
Slab thickness and embedment depth	Increasing these values allows smaller values for minimum edge distance and minimum spacing

Setting details for HAS-D

Anchor size				M12	M16	M20
Nominal diameter of drill bit		d_0	[mm]	14	18	24
Diameter of element		$d = d_{nom}$	[mm]	12	16	20
Effective anchorage depth (=drill hole depth)		$h_{ef} = h_0$	[mm]	100	125	170
Minimum drill hole depth		h_0	[mm]	105	133	180
Minimum base material thickness		h_{min}	[mm]	130	160[1] / 170	220[1] / 230
Pre-setting: Maximum diameter of clearance hole in the fixture		d_f	[mm]	14	18	24
Through-setting: Maximum diameter of clearance hole in the fixture		d_f	[mm]	16	20	26
Fixture thickness		$t_{fix,min}$	[mm]	12	16	20
		$t_{fix,max}$	[mm]	200		
Installation torque moment		T_{inst}	[Nm]	30	50	80
Uncracked concrete	Minimum spacing	s_{min}	[mm]	80[2]	60	80
	Minimum edge distance	c_{min}	[mm]	55[2]	60	80
Cracked concrete	Minimum spacing	s_{min}	[mm]	50	60	80
	Minimum edge distance	c_{min}	[mm]	50	60	80

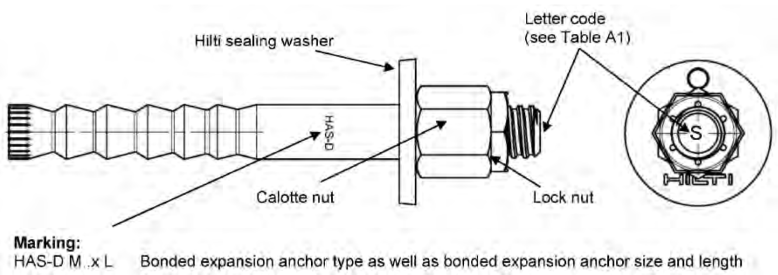
1) The reverse side of the concrete member shall have no break-through after drilling.
2) For min. edge distance $c_{min} \geq 80$ mm, min. spacing $s_{min} = 55$ mm.





Anchor dimension for HAS-D

Anchor size			M12	M16	M20
Shaft diameter	d_k	[mm]	12,5	16,5	22,0
Fastener length l	≥	[mm]	143	180	242
	≤		531	565	623
Calotte nut	SW	[mm]	18/19	24	30
Lock nut	SW	[mm]	19	24	30

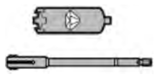


Installation equipment

Anchor size		M8	M10	M12	M16	M20	M24	M27	M30
Rotary hammer	HAS, HAS-U, HAS-D	TE 2 – TE 16				TE 40 - TE 80			
	HIT-Z	TE 2 – TE 40			TE 40 – TE 80		-		
	HIS-N	TE (-A) – TE 16(-A)	TE 40 – TE 80				-		
Other tools		blow out pump ($h_{ef} \leq 10 \cdot d$, $d_0 \leq 20$ mm), compressed air gun, set of cleaning brushes, dispenser Hollow Drill Bit							
		roughening tools TE-YRT							
Additional Hilti recommended tools		DD EC-1, DD 100 … DD 160 a)							

a) Diamond cored holes without roughening is only approved for HIT-Z anchors.

Cleaning, drilling and installation parameters

HAS, HAS-U	HIT-Z, HIT-Z-D TP b)	HAS-D	HIS-N	Drilling				Cleaning and installation	
				Hammer drill (HD)	Hollow Drill Bit (HDB)	Diamond coring		Brush HIT-RB	Piston plug HIT-SZ
						Diamond coring (DD) c)	With roughening tool (RT)		
				d_0 [mm]				size [mm]	
									
M8	**M8**	**-**	**-**	10	-	10	-	10	-
M10	**M10**	**-**	**-**	12	12	12	-	12	12
M12	**M12**	**M12**	**M8**	14	14	14	-	14	14
M16	**M16**	**M16**	**M10**	18	18	18	18	18	18
M20	**M20**	**M20**	**M12**	22 / 24a)	22 / 24a)	22 / 24a)	22	22 / 24a)	22 / 24a)
M24	**-**	**-**	**M16**	28	28	28	28	28	28
M27	**-**	**-**	**-**	30	-	30	30	30	30
-	**-**	**-**	**M20**	32	32	32	32	32	32
M30	**-**	**-**	**-**	35	35	35	35	35	35

a) Only for HAS-D.
b) HIT-Z-D TP only available for M16.
c) Diamond cored holes without roughening is only approved for HIT-Z anchors.

Associated components for the use of Hilti Roughening tool TE-YRT

Diamond coring		Roughening tool TE-YRT	Wear gauge RTG…
			
d_0 [mm]		d_0 [mm]	size
Nominal	measured		
18	17,9 to 18,2	18	18
20	19,9 to 20,2	20	20
22	21,9 to 22,2	22	22
25	24,9 to 25,2	25	25
28	27,9 to 28,2	28	28
30	29,9 to 30,2	30	30
32	31,9 to 32,2	32	32
35	34,9 to 35,2	35	35

Installation parameters for use of the Hilti Roughening tool TE-YRT

h_{ef} [mm]	Minimum roughening time $t_{roughen}$ [sec] ($t_{roughen}$ [sec] = h_{ef} [mm] /10)	Minimum blowing time $t_{blowing}$ [sec] ($t_{blowing}$ [sec] = $t_{roughen}$ [sec] + 20)
0 to 100	10	30
101 to 200	20	40
201 to 300	30	50
301 to 400	40	60
401 to 500	50	70
501 to 600	60	80

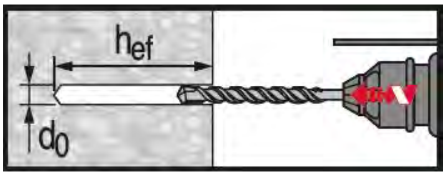
Setting instructions for HAS rods, HAS-U rods and HIS-N internally threaded sleeves

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

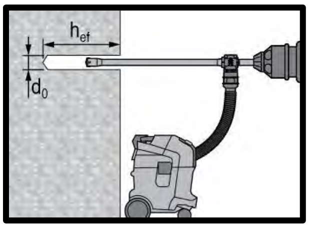
Safety regulations.

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 HIT-HY 200-A V3 and HIT-HY 200-R V3.

Drilling

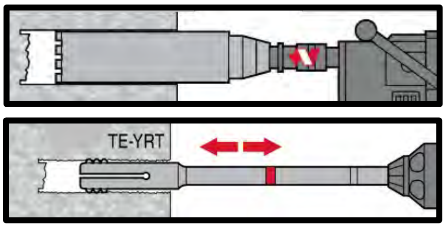


Hammer drilled hole (HD)



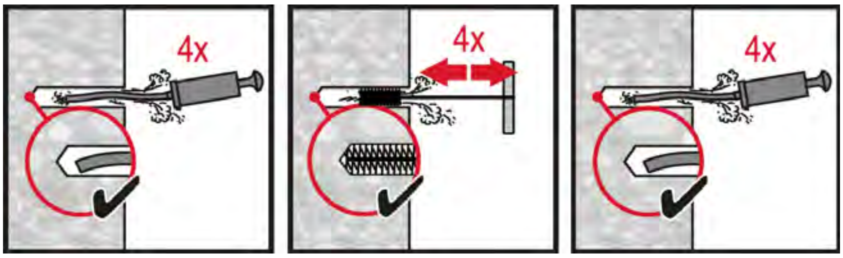
Hammer drilled hole with Hollow Drilled Bit (HDB)

No cleaning required



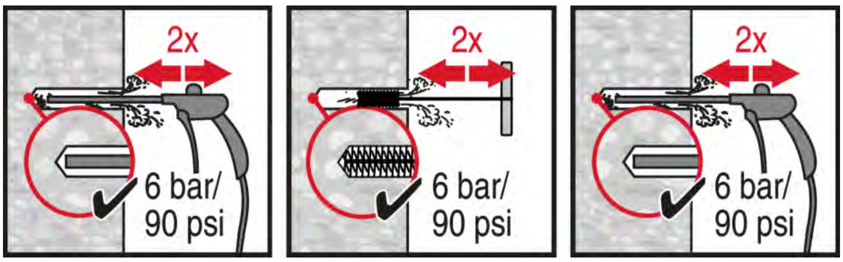
Diamond Drilling + Roughening Tool (DD+RT)

Cleaning



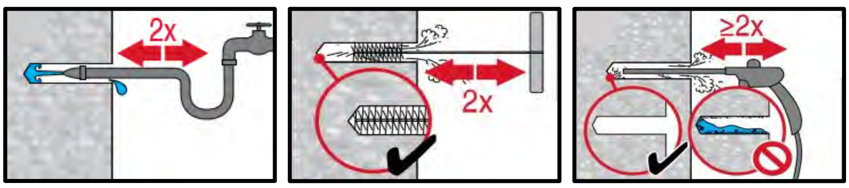
Hammer drilling:

Manual cleaning (MC)
for drill diameters $d_0 \leq 20$ mm and drill hole depth $h_0 \leq 10 \cdot d$.



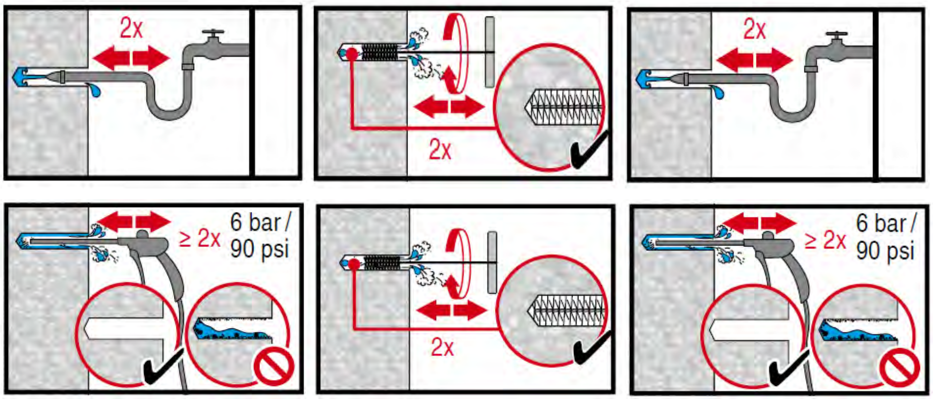
Hammer drilling:

Compressed air cleaning (CAC)
for all drill hole diameters d_0 and drill hole depths $h_0 \leq 20 \cdot d$.



Diamond cored holes with Hilti roughening tool:

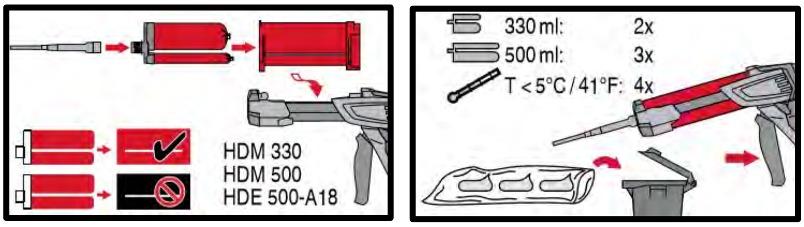
For all drill hole diameters d_0 and drill hole depths h_0.



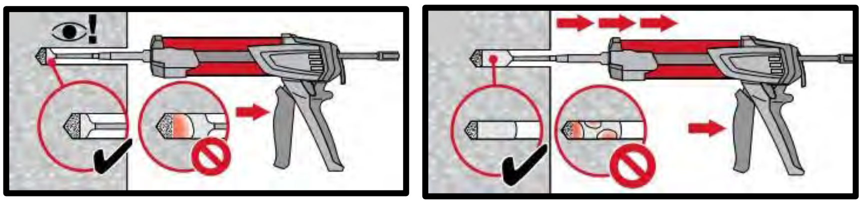
Hammer drilling or Hammer drilling with Hilti hollow drill bit for waterfilled holes:

For all drill hole diameters d_0 and drill hole depths h_0.

Injection

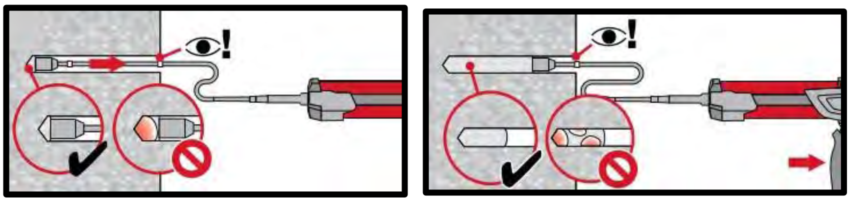


Injection system preparation.



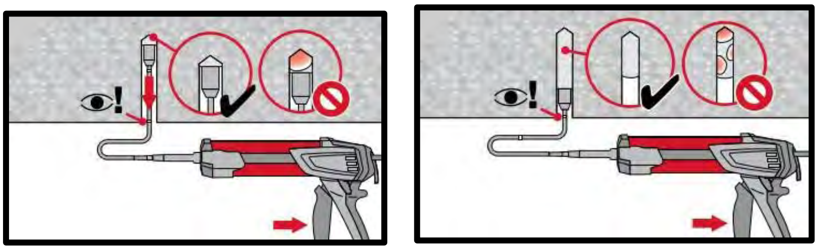
Injection method for drill hole depth

$h_{ef} \leq 250$ mm.



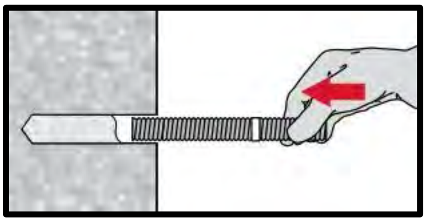
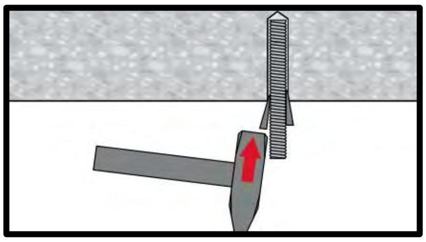
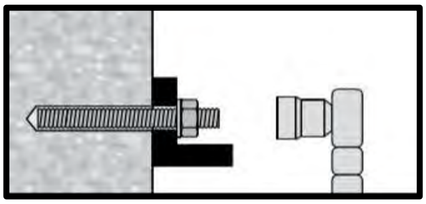
Injection method for drill hole depth

$h_{ef} > 250$mm.



Injection method for overhead application and/or installation with embedment depth > 250 mm.

Setting the element

	**Setting element**, observe working time "t_{work}".
	**Setting element** for overhead applications, observe working time "t_{work}".
	**Loading the anchor** after required curing time t_{cure}

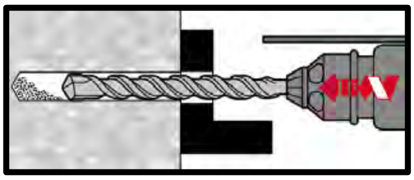
Setting instructions for HIT-Z & HIT-Z(-D) rods

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

Safety regulations.

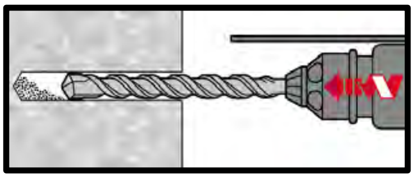
Review the Material Safety Data Sheet (MSDS) before use for proper and safe handling! Wear well-fitting protective goggles and protective gloves when working with Hilti HIT-HY 200-A V3 and HIT-HY 200-R V3.

Drilling



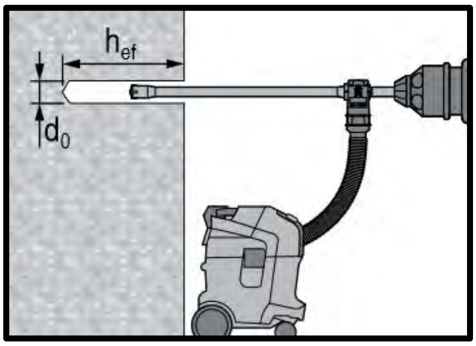
Hammer drilling: Through-setting

No cleaning required



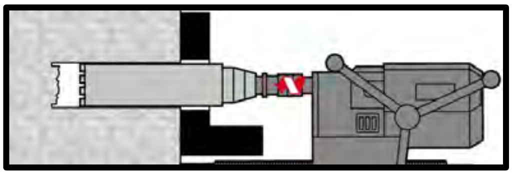
Hammer drilling: Pre-setting

No cleaning required

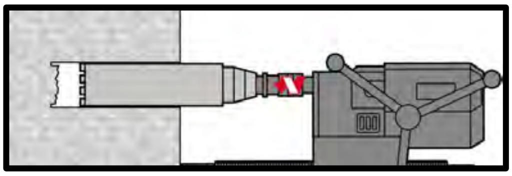


Hammer drilling with hollow drill bit: Through / pre-setting

No cleaning required

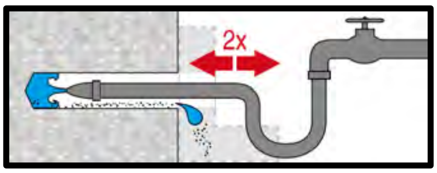


Diamond coring: Through-setting

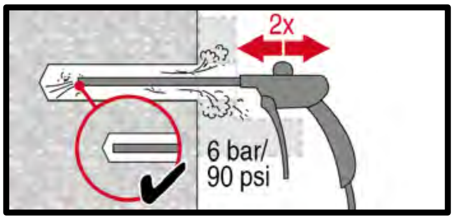


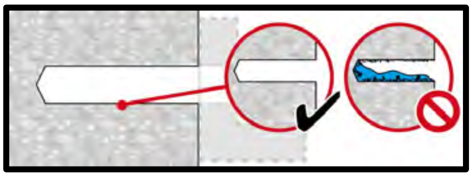
Diamond coring: Pre-setting

Cleaning



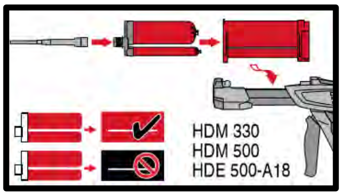
Hole flushing required for wet-drilled diamond cored holes.

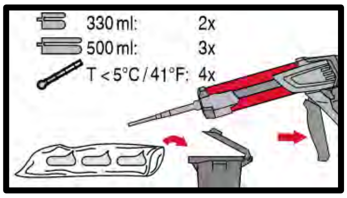




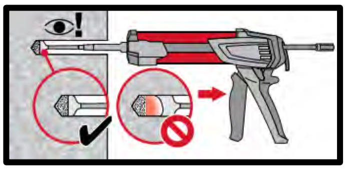
Evacuation required for wet-drilled diamond cored holes.

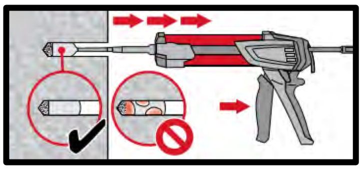
Injection



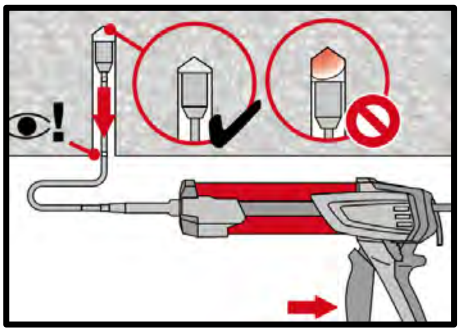


Injection system preparation.

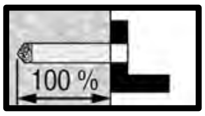




Injection of adhesive from the back of the drill hole without forming air voids.

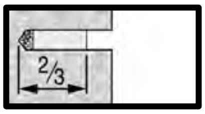


Overhead installation only with the aid of extensions and piston plugs.



Through-setting:

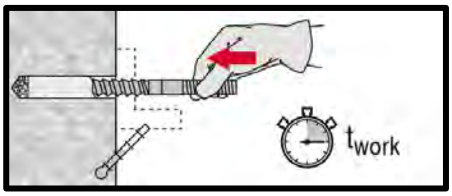
Fill 100% of the drill hole.



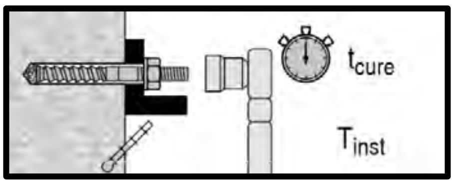
Pre-setting:

Fill approx. 2/3 of the drill hole.

Setting the element



Setting element to the required embedment depth before working time "t_{work}" has elapsed.



Loading the anchor: After required curing time t_{cure}.

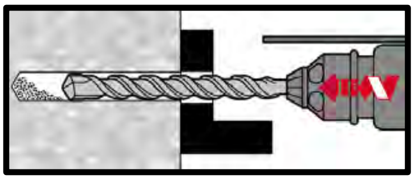
Setting instructions for HAS-D rods

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

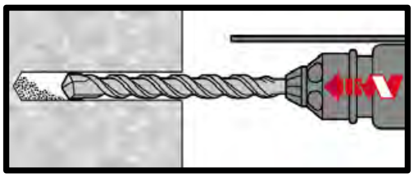
Safety regulations.

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 HIT-HY 200-A V3 and HIT-HY 200-R V3.

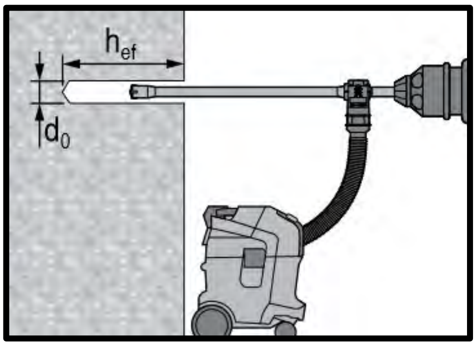
Drilling



Hammer drilling: Through-setting

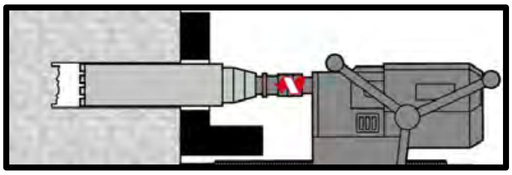


Hammer drilling: Pre-setting

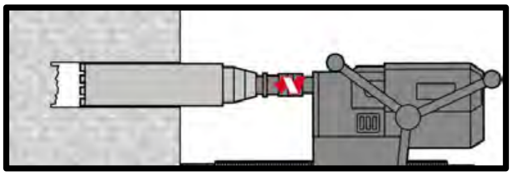


Hammer drilling with hollow drill bit: Through / pre-setting

No cleaning required

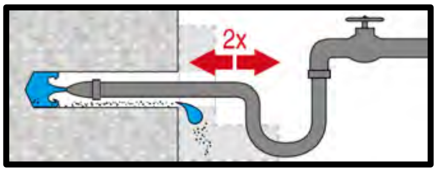


Diamond coring: Through-setting

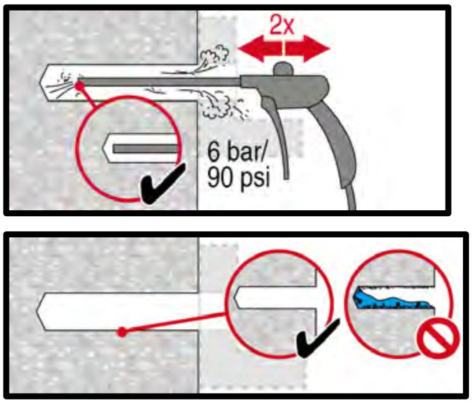


Diamond coring: Pre-setting

Cleaning

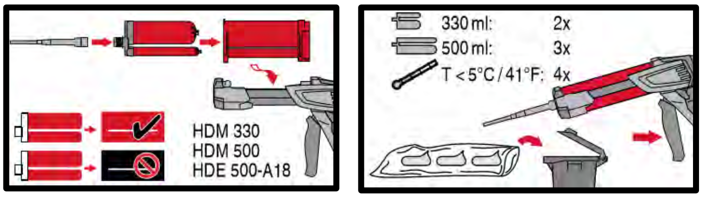


Hole flushing required for wet-drilled diamond cored holes.

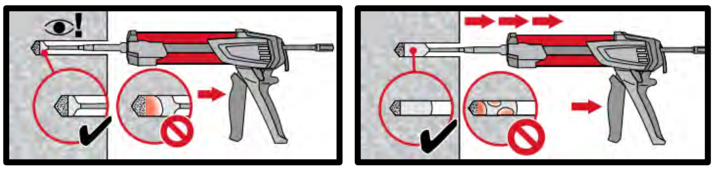


Evacuation required for wet-drilled diamond cored holes.

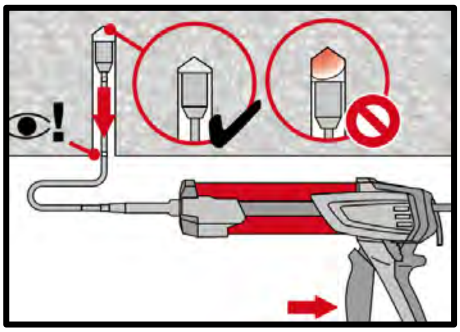
Injection



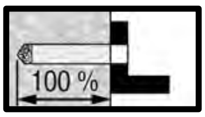
Injection system preparation.



Injection of adhesive from the back of the drill hole without forming air voids.

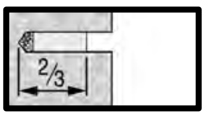


Overhead installation only with the aid of extensions and piston plugs.



Through-setting:

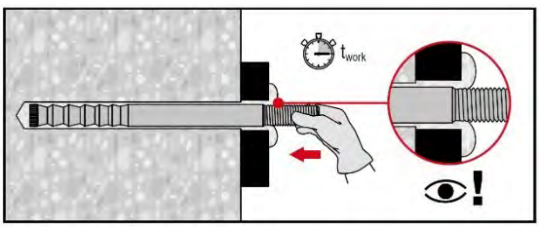
Fill 100% of the drill hole.



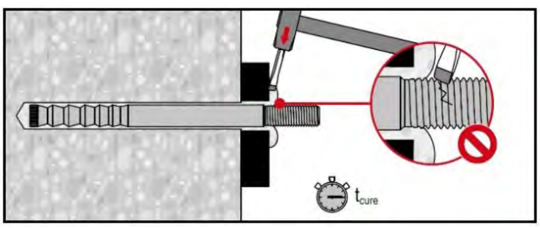
Pre-setting:

Fill approx. 2/3 of the drill hole.

Setting the element

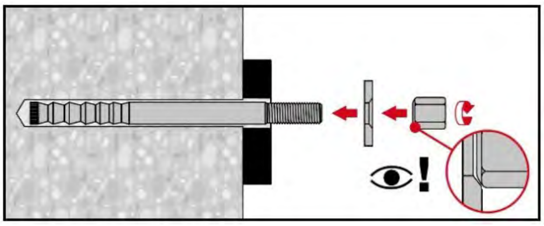


Setting element to the required embedment depth before working time “t_{work}” has elapsed.

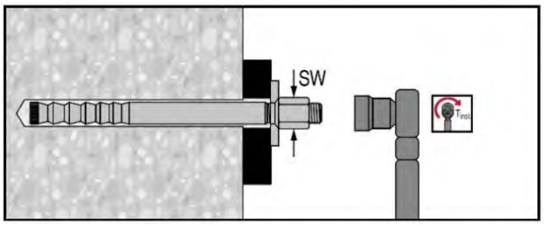


Removing excess mortar: After required curing time t_{cure}.

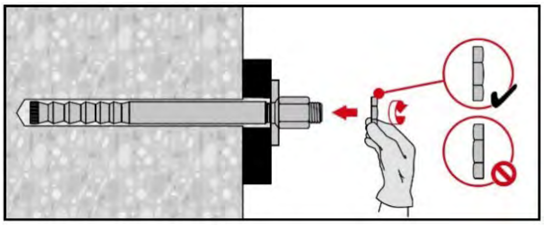
Final assembly with sealing washer

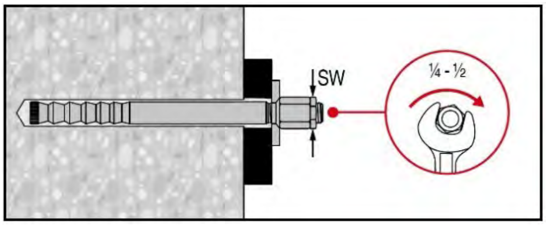


Installation: Orient the round part of the calotte nut to the sealing washer and install.



Installation torque moment





Applying the lock nut: Tighten with a ¼ to ½ turn.

HIT-HY 200-A V3 and HIT-HY 200-R V3 injection mortars

Anchor design (EN 1992-4) / Rebar elements / Concrete

Injection mortar system		Benefits
	Hilti HIT-HY 200-A V3	- safe set technology: Makes installation steps faster, simpler, and safer. Automatic borehole cleaning with hollow drill bits and accurate dosing with HDE. - HY 200-R V3 version is formulated for best handling and cure time, specifically for rebar applications. - Assessed following EAD 330499-02-0601. - ETA approved for seismic performance category C1 - Suitable for cracked and uncracked concrete C20/25 to C50/60 - Suitable for dry and wet concrete - ETA data for 50 and 100 Years Working Life - In service temperature range up to 120°C short term / 72°C long term
	Hilti HIT-HY 200-R V3 330 ml foil pack (also available as 500 ml foil pack)	
	Rebar B500 B (ϕ8 - ϕ32)	

Base material


Concrete (uncracked)


Concrete (cracked)

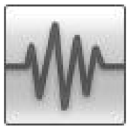

Dry concrete


Wet concrete


Water-filled borehole in concrete

Load conditions

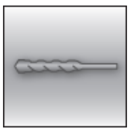

Static/ quasi-static

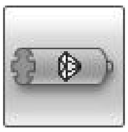

Seismic, ETA - C1

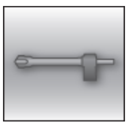
100 YEARS

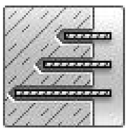
100 Years Working Life

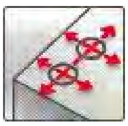
Installation conditions


Hammer drilling


Diamond drilled holes[a)]


Hollow Drill Bit drilled holes / Hilti **SafeSet**


Variable embedment depth


Small edge distance and spacing

Other information

European Technical Assessment

CE conformity

PROFIS Engineering design Software

a) Diamond drilling only with Roughening Tool (RT).

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical assessment [a)]	DIBt, Berlin	ETA-19/0601 / 2023-06-02

a) All data given in this section according to the ETA-19/0601, issued 2023-06-02.

Static and quasi-static design according to EN 1992-4 (for a single anchor)

All data in this section applies to
- Correct setting (see setting instruction)
- Only valid for 50 years working life
- No edge distance and spacing influence
- *Steel* failure (only indicated for Characteristic resistances)
- 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
- In-service temperate range I
  (min. base material temperature -40°C, max. long term/short term base material temperature: +24°C/40°C)

Embedment depth [a)] and base material thickness

Anchor- size			ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Embedment depth	h_{ef}	[mm]	80	90	110	125	125	170	210	240	270	270	300
Base material thickness	h	[mm]	110	120	145	165	165	220	275	305	340	345	380

a) The allowed range of embedment depth is shown in the setting details.

Characteristic resistance

Anchor- size				ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Uncracked concrete														
Tensile	Rebar B500B	N_{Rk}	[kN]	24,1	33,9	49,8	66,0	68,7	109,0	149,7	182,9	218,2	218,2	255,6
Shear	Rebar B500B	V_{Rk}	[kN]	*14,0*	*22,0*	*31,0*	*42,0*	*55,0*	*86,0*	*135,0*	*146,0*	*169,0*	*194,0*	*221,0*
Cracked concrete														
Tensile	Rebar B500B	N_{Rk}	[kN]	-	14,1	29,0	38,5	44,0	74,8	104,8	128,0	152,8	152,8	178,9
Shear	Rebar B500B	V_{Rk}	[kN]	-	*22,0*	*31,0*	*42,0*	*55,0*	*86,0*	*135,0*	*146,0*	*169,0*	*194,0*	*221,0*

Design resistance

Anchor- size				ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Uncracked concrete														
Tensile	Rebar B500B	N_{Rd}	[kN]	16,1	22,6	33,2	44,0	45,8	72,7	99,8	121,9	145,5	145,5	170,4
Shear	Rebar B500B	V_{Rd}	[kN]	9,3	14,7	20,7	28,0	36,7	57,3	90,0	97,3	112,7	129,3	147,3
Cracked concrete														
Tensile	Rebar B500B	N_{Rd}	[kN]	-	9,4	19,4	25,7	29,3	49,8	69,9	85,4	101,8	101,8	119,3
Shear	Rebar B500B	V_{Rd}	[kN]	-	14,7	20,7	28,0	36,7	57,3	90,0	97,3	112,7	129,3	147,3

Recommended load [a)]

Anchor- size				ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Uncracked concrete														
Tensile	Rebar B500B	N_{Rec}	[kN]	11,5	16,2	23,7	31,4	32,7	51,9	71,3	87,1	103,9	103,9	121,7
Shear	Rebar B500B	V_{Rec}	[kN]	6,7	10,5	14,8	20,0	26,2	41,0	64,3	69,5	80,5	92,4	105,2
Cracked concrete														
Tensile	Rebar B500B	N_{Rec}	[kN]	-	6,7	13,8	18,3	20,9	35,6	49,9	61,0	72,7	72,7	85,2
Shear	Rebar B500B	V_{Rec}	[kN]	-	10,5	14,8	20,0	26,2	41,0	64,3	69,5	80,5	92,4	105,2

a) With overall partial safety factor for action $\gamma = 1{,}4$. The partial safety factors for action depend on the type of resista and shall be taken from national regulations.

Seismic design according to EN 1992-4 (for a single anchor)

All data in this section applies to:

- Correct setting (see setting instruction)
- No edge distance and spacing influence
- *Steel* failure (only indicated for Characteristic resistances)
- Minimum base material thickness
- Concrete C20/25
- In-service temperate range I

(min. base material temperature -40°C, max. long term/short term base material temperature: +24°C/40°C)

- α_{gap} = 1,0

Embedment depth and base material thickness in case of seismic performance category C1

Anchor- size			ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Typical embedment depth	h_{ef}	[mm]	-	90	110	125	125	170	210	240	270	270	300
Base material thickness	h	[mm]	-	120	145	165	165	220	275	305	340	345	380

Characteristic resistance in case of seismic performance category C1

Anchor- size				ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Tensile	Rebar B500B	$N_{Rk,C1}$	[kN]	-	12,4	25,3	33,5	38,3	64,9	89,1	108,8	129,9	129,9	152,1
Shear	Rebar B500B	$V_{Rk,C1}$	[kN]	-	*15,0*	*22,0*	*29,0*	*39,0*	*60,0*	*95,0*	*102,0*	*118,0*	*136,0*	*155,0*

Design resistance in case of seismic performance category C1

Anchor- size				ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Tensile	Rebar B500B	$N_{Rd,C1}$	[kN]	-	8,3	16,9	22,4	25,6	43,4	59,4	72,6	86,6	86,6	101,4
Shear	Rebar B500B	$V_{Rd,C1}$	[kN]	-	10,0	14,7	19,3	26,0	40,0	63,3	68,0	78,7	90,7	103,3

Materials

Mechanical properties

Anchor size			ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Nominal tensile strength	f_{uk}	[N/mm²]	550	550	550	550	550	550	550	550	550	550	550
Yield strength	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	550	500	550	500
Stressed cross-section	A_s	[mm²]	50,3	78,5	113	154	201	314	491	531	616	707	804
Moment of resistance	W	[mm³]	50,3	98,2	170	269	402	785	1534	1726	2155	2651	3217

Material quality

Part	Material
Rebar EN 1992-1-1:2004 and AC:2010	Bars and de-coiled rods class B or C according to NDP or NCL of EN 1992-1-1/NA

Setting information

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

Service temperature range

Hilti HIT-HY 200-R V3 injection mortar may be applied in the temperature ranges given below, An elevated base material temperature may lead to a reduction of the design bond resistance.

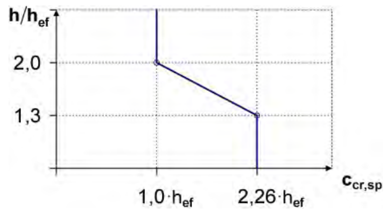
Temperature range	Base material temperature	Maximum long term base material temperature	Maximum short term base material temperature
Temperature range I	-40 °C to + 40 °C	+ 24 °C	+ 40 °C
Temperature range II	-40 °C to + 80 °C	+ 50 °C	+ 80 °C
Temperature range III	-40 °C to + 120 °C	+ 72 °C	+ 120 °C

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

Curing and working time

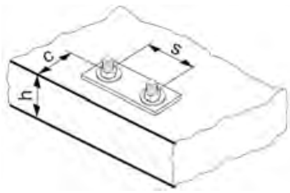
Temperature of the base material	HIT-HY 200-A V3		HIT-HY 200-R V3	
	Maximum working time	Minimum curing time	Maximum working time	Minimum curing time
T_{BM}	t_{work}	t_{cure}	t_{work}	t_{cure}
- 10°C < T_{BM} ≤ - 5°C	1,5 h	7 h	3 h	20 h
- 4°C < T_{BM} ≤ 0°C	50 min	4 h	1,5 h	8 h
1°C < T_{BM} ≤ 5°C	25 min	2 h	45 min	4 h
6°C < T_{BM} ≤ 10°C	15 min	75 min	30 min	2,5 h
11°C < T_{BM} ≤ 20°C	7 min	45 min	15 min	1,5 h
21°C < T_{BM} ≤ 30°C	4 min	30 min	9 min	1 h
31°C < T_{BM} ≤ 40°C	3 min	30 min	6 min	1 h

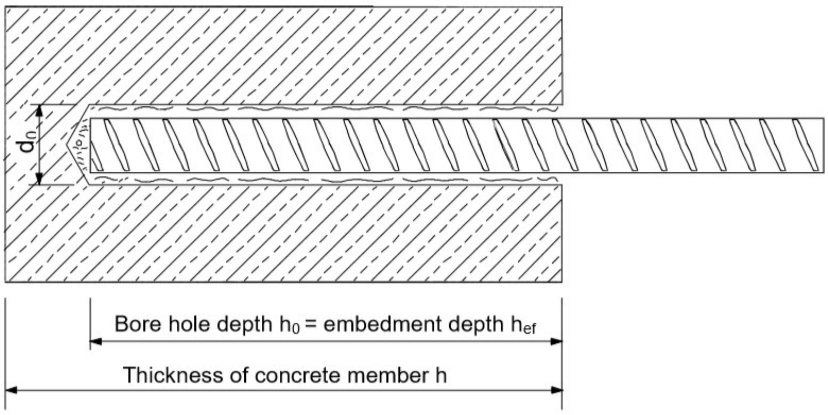
Setting details

Anchor size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø26	Ø28	Ø30	Ø32
Nominal diameter of drill bit	d_0	[mm]	10 / 12 [a]	12 / 14 [a]	14 / 16 [a]	18	20	25	32	32	35	37	40
Effective anchorage and drill hole depth range [b]	$h_{ef,min}$	[mm]	60	60	70	75	80	90	100	104	112	120	128
	$h_{ef,max}$	[mm]	160	200	240	280	320	400	500	520	560	600	640
Minimum base material thickness	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm			$h_{ef} + 2 d_0$							
Minimum spacing	s_{min}	[mm]	40	50	60	70	80	100	125	130	140	150	160
Minimum edge distance	c_{min}	[mm]	40	45	45	50	50	65	70	75	75	80	80
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]	$2\ c_{cr,sp}$										
Critical edge distance for splitting failure [c]	$c_{cr,sp}$	[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]	$2\ c_{cr,N}$										
Critical edge distance for concrete cone failure [d]	$c_{cr,N}$	[mm]	$1{,}5\ h_{ef}$										

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

a) Both given values for drill bit diameter can be used
b) $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ (h_{ef}: embedment depth)
c) h: base material thickness ($h \geq h_{min}$)
d) 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	ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Rotary hammer	TE 2 (-A) – TE 16 (-A)					TE 40 – TE 80					
Other tools	blow out pump (h_{ef} ≤ 10 · d, d_0 ≤ 20 mm), Compressed air gun, Set of cleaning brushes, dispenser										

Drilling and cleaning diameters

Rebar	Hammer drill (HD)	Hollow Drill Bit (HDB)	Diamond coring with Roughening Tool (RT)[b]	Brush HIT-RB
d_0 [mm]				size [mm]
				
ϕ8	12 / 10 [a)]	12	-	12 / 10 [a)]
ϕ10	14 / 12 [a)]	14 / 12 [a)]	-	14 / 12 [a)]
ϕ12	16 / 14 [a)]	16 / 14 [a)]	-	16 / 14 [a)]
ϕ14	18	18	18	18
ϕ16	20	20	20	20
ϕ20	25	25	25	25
ϕ25	32	32	32	32
ϕ26	32	32	32	32
ϕ28	35	35	35	35
ϕ30	37	-	-	37
ϕ32	40	-	-	40

a) Both given values can be used

Associated components for the use of Hilti Roughening tool TE-YRT

Diamond coring		Roughening tool TE-YRT	Wear gauge RTG…
			
d_0 [mm]		d_0 [mm]	size
Nominal	measured		
18	17,9 to 18,2	18	18
20	19,9 to 20,2	20	20
22	21,9 to 22,2	22	22
25	24,9 to 25,2	25	25
28	27,9 to 28,2	28	28
30	29,9 to 30,2	30	30
32	31,9 to 32,2	32	32
35	34,9 to 35,2	35	35

Installation parameters for use of the Hilti Roughening tool TE-YRT

h_{ef} [mm]	Minimum roughening time $t_{roughen}$ [sec] ($t_{roughen}$ [sec] = h_{ef} [mm] /10)	Minimum blowing time $t_{blowing}$ [sec] ($t_{blowing}$ [sec] = $t_{roughen}$ [sec] + 20)
0 to 100	10	30
101 to 200	20	40
201 to 300	30	50
301 to 400	40	60
401 to 500	50	70
501 to 600	60	80

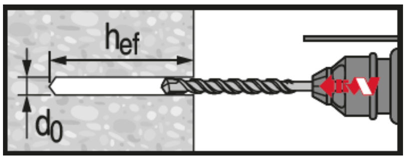
Setting instructions

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

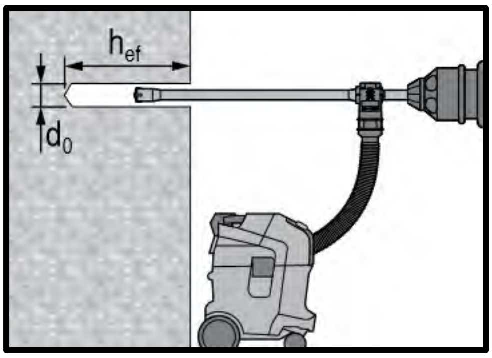
Safety regulations.

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 HIT-HY 200-A V3 and Hilti HIT-HY 200-R V3.

Drilling

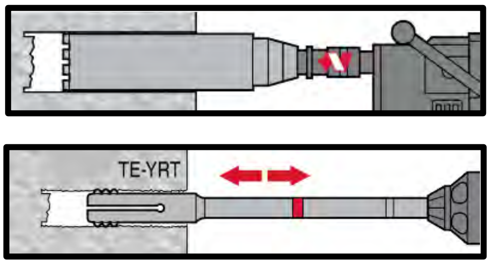


Hammer drilled hole (HD)



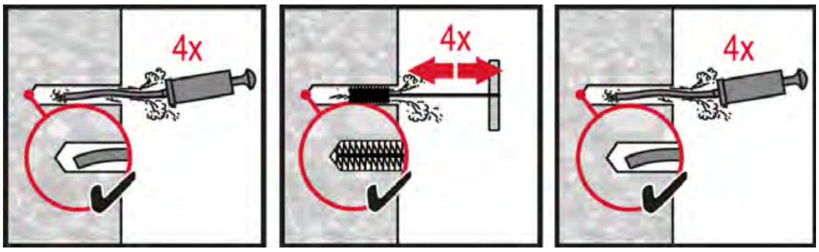
Hammer drilled hole with Hollow Drilled Bit (HDB)

No cleaning required



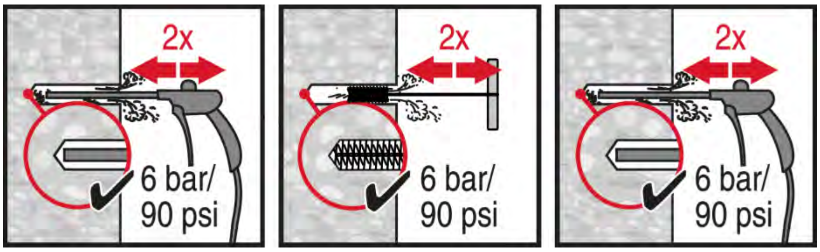
Diamond Drilling + Roughening Tool (DD+RT)

Cleaning (Inadequate hole cleaning = poor load values.)



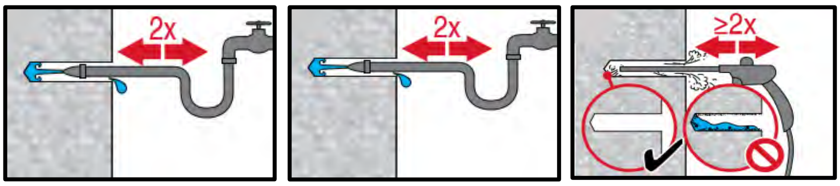
Hammer drilling:

Manual cleaning (MC)
for drill diameters $d_0 \leq 20$ mm and drill hole depth $h_0 \leq 10 \cdot d$.



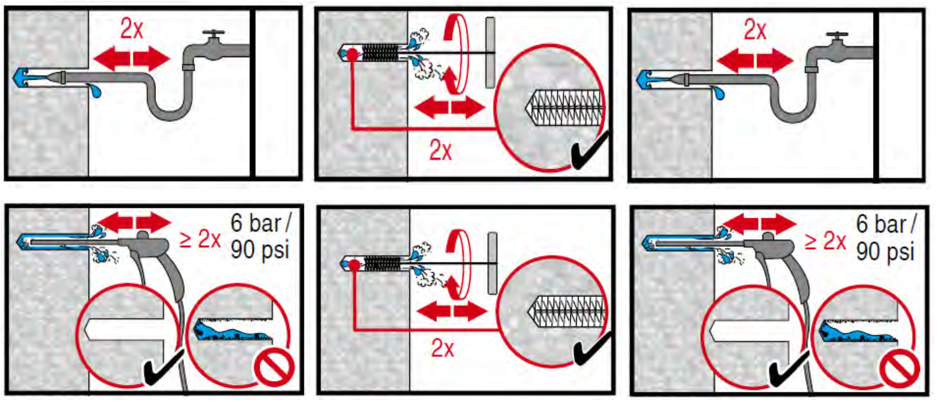
Hammer drilling:

Compressed air cleaning (CAC)
for all drill hole diameters d_0 and drill hole depths $h_0 \leq 20 \cdot d$.



Diamond cored holes with Hilti roughening tool:

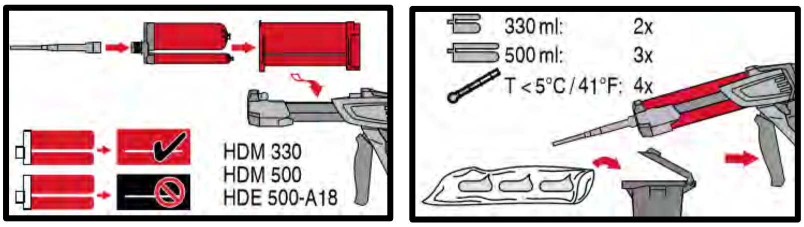
For all drill hole diameters d_0 and drill hole depths h_0.



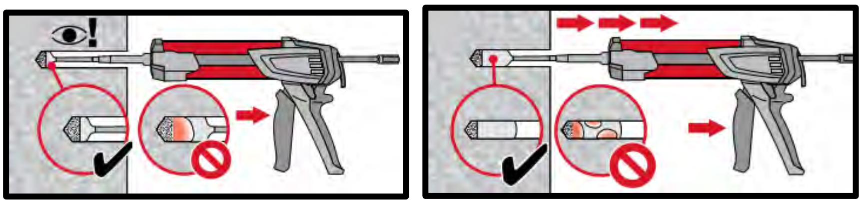
Hammer drilling or Hammer drilling with Hilti hollow drill bit for waterfilled holes:

For all drill hole diameters d_0 and drill hole depths h_0.

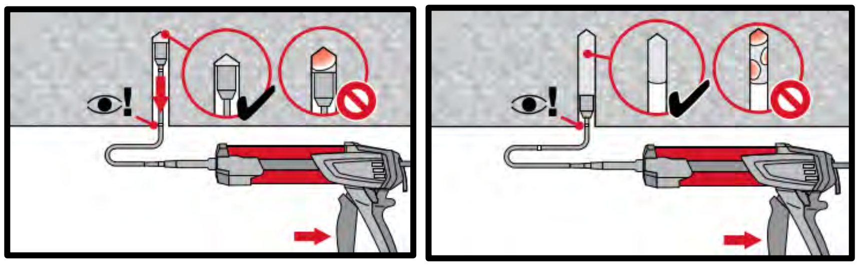
Injection system preparation



Injection system preparation.

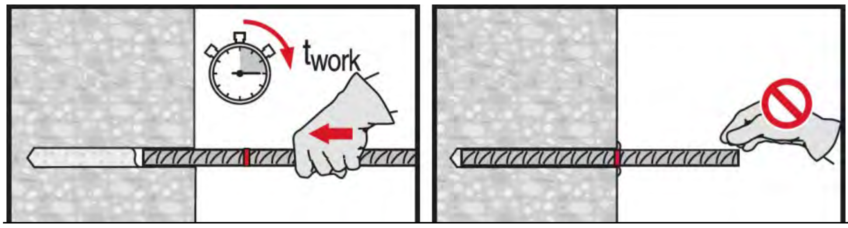


Injection method for drill hole depth h_{ef} ≤ 250 mm.

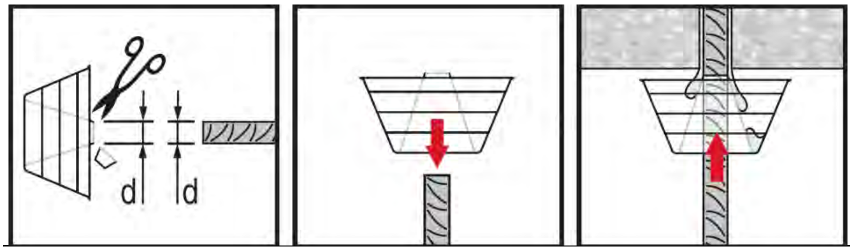


Injection method for overhead application and/or installations with embedment depth h_{ef} ≥ 250 mm.

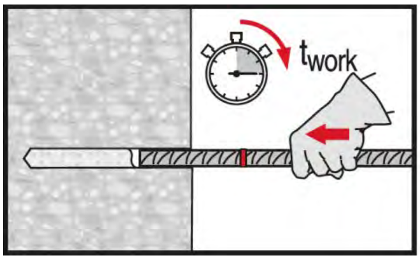
Setting the element

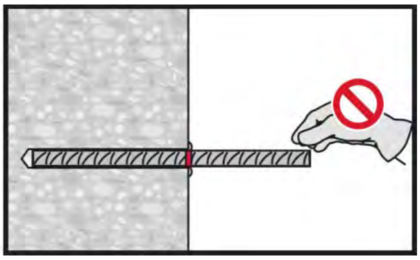


Setting element, observe working time "t_{work}".



Setting element for overhead applications, observe working time "t_{work}".



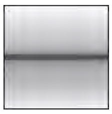
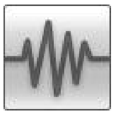


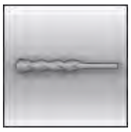
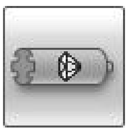
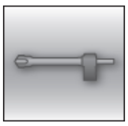
Setting element, observe working time "t_{work}".

HIT-HY 200-A V3 and HIT-HY 200-R V3 injection mortars

Rebar design (EN 1992-1, EOTA TR 069, EN 1998-1) / Rebar elements / Concrete

Injection mortar system		Benefits
	Hilti HIT-HY 200-A V3	- SafeSet technology: Makes installation steps faster, simpler, and safer. Automatic borehole cleaning with hollow drill bits and accurate dosing with HDE. - HY 200-R V3 version is formulated for best handling and cure time specifically for rebar applications - Suitable for concrete C12/15 to C50/60 - Suitable for dry and water saturated concrete - For rebar diameters up to 40 mm for static design according to EN 1992-1-1 - Non-corrosive to rebar elements - Good load capacity at elevated temperatures - Suitable for embedment lengths up to 1000 mm, and for HIT-HY 200-R V3 suitable up to 1300 mm for ϕ34 - ϕ40 - Suitable for applications down to -10 °C
	Hilti HIT-HY 200-R V3 330 ml foil pack (also available as 500 ml foil pack)	
	Rebar (ϕ8 - ϕ40, for rebar ϕ34 - ϕ40 only suitable with HIT-HY 200-R V3 due to working time)	

Base material				Load conditions		
						
Concrete (uncracked)	Concrete (cracked)	Dry concrete	Wet concrete	Static/ quasi-static	Seismic, ETA	Fire resistance

Installation conditions			Other information		
					
Hammer drilling	Diamond drilled holes [c)]	Hollow Drill Bit drilled holes / Hilti **SafeSet**	European Technical Assessment	CE conformity	PROFIS Engineering design Software

a) Diamond drilling only with Roughening Tool (RT)

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical Assessment [a)]	DIBt, Berlin	ETA-19/0600 / 2023-05-25
European technical Assessment [b)]	DIBt, Berlin	ETA-19/0665 / 2023-06-29

a) All data given in this section according to ETA-19/0600, issued 2023-05-23.
b) All data given in this section according to ETA-19/0665, issued 2023-06-29.

Static and quasi-static resistance according to EN 1992-1-1

Note the following for the data in this section:

- The data for rebar ϕ34 - ϕ40 is only suitable with HIT-HY 200-R V3; it is not valid for HIT-HY 200-A V3 due to the shorter working time.

Design bond strength in N/mm² for good bond conditions

All allowed drilling methods									
Rebar - size	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
ϕ8 - ϕ32	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
ϕ34	1,6	2,0	2,3	2,7	2,9	3,3	3,6	3,9	4,2
ϕ36	1,6	1,9	2,2	2,6	2,9	3,3	3,6	3,8	3,8
ϕ40	1,5	1,8	2,1	2,5	2,8	3,1	3,4	3,4	3,4

For poor bond conditions multiply the values by 0,7. Values valid for uncracked and cracked concrete.

Minimum anchorage length and minimum lap length

The minimum anchorage length $\ell_{b,min}$ and the minimum lap length $\ell_{0,min}$ according to EN 1992-1-1 shall be multiplied by relevant **Amplification factor α_{lb}** in the table below.

Amplification factor α_{lb} for the min. anchorage length and min. lap length for

All allowed hammer drilling methods									
Rebar - size	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
ϕ8 - ϕ40	1,0								

Anchorage length for characteristic steel strength f_{yk}=500 N/mm^2 for good conditions

All allowed drilling methods								
Rebar-size	**Concrete class**	**Yielding load [kN]**	**$l_{b,min}$ 1) [mm]**	**$l_{0,min}$ 1) [mm]**	**$l_{bd,y}$ (α2=1) 2) [mm]**	**$l_{bd,y}$ (α2=0.7) 3) [mm]**	**l_{max} -10°C ≤ Ct4) ≤ 0°C [mm]**	**l_{max} Ct4) > 0°C [mm]**
ϕ8	**C20/25**	21,9	113	200	378	265	700	1000
ϕ8	**C50/60**	21,9	100	200	202	142	700	1000
ϕ10	**C20/25**	34,1	142	200	473	331	700	1000
ϕ10	**C50/60**	34,1	100	200	253	177	700	1000
ϕ12	**C20/25**	49,2	170	200	567	397	700	1000
ϕ12	**C50/60**	49,2	120	200	303	212	700	1000
ϕ14	**C20/25**	66,9	198	210	662	463	700	1000
ϕ14	**C50/60**	66,9	140	210	354	248	700	1000
ϕ16	**C20/25**	87,4	227	240	756	529	700	1000
ϕ16	**C50/60**	87,4	160	240	404	283	700	1000
ϕ18	**C20/25**	110,6	255	270	851	595	700	1000
ϕ18	**C50/60**	110,6	180	270	455	319	700	1000
ϕ20	**C20/25**	136,6	284	300	945	662	700	1000
ϕ20	**C50/60**	136,6	200	300	506	354	700	1000
ϕ22	**C20/25**	165,3	312	330	1040	728	700	1000
ϕ22	**C50/60**	165,3	220	330	556	389	700	1000
ϕ24	**C20/25**	196,7	340	360	1134	794	700	1000
ϕ24	**C50/60**	196,7	240	360	607	425	700	1000
ϕ25	**C20/25**	213,4	354	375	1181	827	700	1000
ϕ25	**C50/60**	213,4	250	375	632	442	700	1000
ϕ26	**C20/25**	230,8	369	390	1229	860	700	1000
ϕ26	**C50/60**	230,8	260	390	657	460	700	1000
ϕ28	**C20/25**	267,7	397	420	1323	926	700	1000
ϕ28	**C50/60**	267,7	280	420	708	495	700	1000
ϕ30	**C20/25**	307,3	425	450	1418	992	700	1000
ϕ30	**C50/60**	307,3	300	450	758	531	700	1000
ϕ32	**C20/25**	349,7	454	480	1512	1059	700	1000
ϕ32	**C50/60**	349,7	320	480	809	566	700	1000
ϕ34	**C20/25**	394.7	482	510	1607	1125	700	1300
ϕ34	**C50/60**	394.7	340	510	880	616	700	1300
ϕ36	**C20/25**	442.6	534	540	1779	1245	700	1300
ϕ36	**C50/60**	442.6	360	540	1030	721	700	1300
ϕ40	**C20/25**	546.4	621	621	2070	1449	700	1300
ϕ40	**C50/60**	546.4	400	600	1279	895	700	1300

1) According to EC2: EN 1992-1-1:2004 $l_{b,min}$ (8.6) and $l_{0,min}$ (8.11) are calculated for good bond conditions with characteristic yield strength f_{yk} = 500 N/mm², γ_M=1,15 and α_6 = 1,0
2) Embedment depth for yield of the rebar and for c_d/ϕ = 1 (characteristic yield strength f_{yk} = 500 N/mm²)
3) Embedment depth for yield of the rebar and for c_d/ϕ = 3 (characteristic yield strength f_{yk} = 500 N/mm²)
4) c_t=concrete temperature at installation

Static and quasi-static resistance according to EOTA TR 069

Essential characteristics for rebar under tension load in concrete – 50 and 100 years working life

Rebar			**ϕ8**	**ϕ10**	**ϕ12**	**ϕ14**	**ϕ16**	**ϕ20**	**ϕ25**	**ϕ26**	**ϕ28**	**ϕ30**	**ϕ32**
Diameter of rebar	ϕ	[mm]	8	10	12	14	16	20	25	26	28	30	32
Pull-out resistance													
Characteristic bond resistance in uncracked concrete C20/25 – 50 years working life													
Temperature range I: 40°C/24°C	$\tau_{Rk,ucr,50}$	[N/mm²]	12										
Temperature range II: 80°C/50°C	$\tau_{Rk,ucr,50}$	[N/mm²]	10										
Temperature range II: 80°C/50°C	$\tau_{Rk,ucr,50}$	[N/mm²]	8,5										
Characteristic bond resistance in uncracked concrete C20/25 – 100 years working life													
Temperature range I: 40°C/24°C	$\tau_{Rk,ucr,100}$	[N/mm²]	11										
Temperature range II: 80°C/50°C	$\tau_{Rk,ucr,100}$	[N/mm²]	9,5										
Temperature range II: 80°C/50°C	$\tau_{Rk,ucr,100}$	[N/mm²]	8										
Influence of cracked concrete	Ω_{cr}	[-]	0,53		0,58			0,61	0,64				0,73
Installation safety factor													
Hammer drilling	γ_{inst}	[-]	1,0										
Hammer drilling with Hilti hollow drill bit TE-CD or TE-YD	γ_{inst}	[-]	1,0							-			
Diamond coring with roughening with Hilti roughening tool TE-YRT	γ_{inst}	[-]	-			1,0						-	
Bond-splitting resistance													
Product basic factor	A_k	[-]	4,1										
Exponent for influence of concrete compressive strength	sp1	[-]	0,31										
Exponent for influence of rebar diameter ϕ	sp2	[-]	0,32										
Exponent for influence of concrete cover c_d	sp3	[-]	0,67										
Exponent for influence of side concrete cover (c_{max} / c_d)	sp4	[-]	0,25										
Exponent for influence of anchorage length l_b	lb1	[-]	0,45										
Influence factors Ψ on bond resistance τ_{Rk}													
Cracked and uncracked concrete: Factor for concrete strength	Ψ_c	C30/37	1,04										
		C40/45	1,07										
		C50/60	1,10										
Cracked and uncracked concrete: Sustained load factor – 50 years	$\Psi^0_{sus,50}$	40ºC/24ºC	0,74										
		80ºC/50ºC	0,89										
		120ºC/72ºC	0,72										
Cracked and uncracked concrete: Sustained load factor – 100 years	$\Psi^0_{sus,100}$	40ºC/24ºC	0,71										
		80ºC/50ºC	0,86										
		120ºC/72ºC	0,80										

Concrete cone failure			
Factor for uncracked concrete	$k_{ucr,N}$	[-]	11,0
Factor for cracked concrete	$k_{cr,N}$	[-]	7,7
Edge distance	$c_{cr,N}$	[mm]	$1,5 \cdot l_b$
Spacing	$s_{cr,N}$	[mm]	$3,0 \cdot l_b$

Seismic resistance according to EN 1998-1

Seismic reduction factor $k_{b,seis}$ for hammer drilling (HD) and (HDB) and compressed air drilling (CA)

Rebar - size	Reduction factor $k_{b,seis}$							
	Concrete class							
	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
ϕ10 - ϕ18	1,0				0,90	0,82	0,76	0,71
ϕ20 - ϕ30	1,0						0,92	0,86
ϕ32	1,0							

For poor bond conditions multiply the values 0,7.

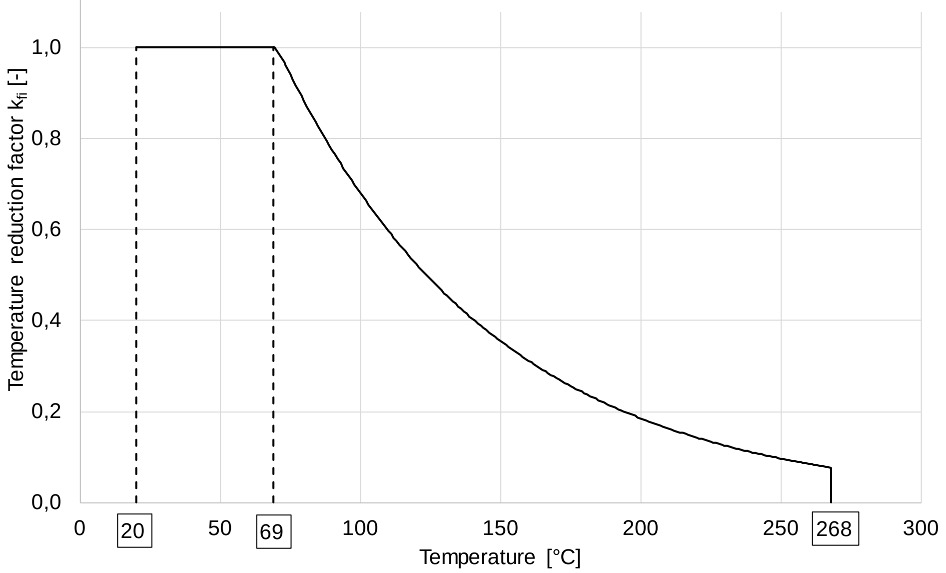
Design values for the ultimate bond resistance $f_{bd,seis}$ [1)] in N/mm² for seismic resistance for hammer drilling (HD) and (HDB) and compressed air drilling (CA)

Rebar - size		Bond resistance $f_{bd,seis}$						
		Concrete class						
	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
ϕ10 - ϕ18	2,0	2,3	2,7	3,0				
ϕ20 - ϕ30	2,0	2,3	2,7	3,0	3,4	3,7		
ϕ32	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3

1) According to EN 1992-1-1:2004 for good bond conditions. For all other bond conditions multiply the values by 0.7.

Fire resistance according to EN 1992-1-2

Example graph of temperature reduction factor $k_{fi}(\theta)$ for concrete class C20/25 for good bond conditions according to ETA-21/0624 for working life of 50 and 100 years[1)]



The design value of the bond resistance $f_{bd,fi}$ under fire exposure has to be calculated by the following equation:

$$f_{bd,fi} = k_{b,fi}(\theta) \cdot f_{bd,PIR} \cdot \frac{\gamma_c}{\gamma_{M,fi}}$$ for a working life of 50 years

$$f_{bd,fi,100y} = k_{b,fi,100y}(\theta) \cdot f_{bd,PIR,100y} \cdot \frac{\gamma_c}{\gamma_{M,fi}}$$ for a working life of 100 years

with $\theta \leq 268$ °C:

$$k_{b,fi}(\theta) = \frac{24{,}661 \cdot e^{(-0{,}013 \cdot \theta)}}{f_{bd,PIR} \cdot 4{,}3} \leq 1{,}0$$ for a working life of 50 years

$$k_{b,fi,100y}(\theta) = \frac{24{,}661 \cdot e^{(-0{,}013 \cdot \theta)}}{f_{bd,PIR,100y} \cdot 4{,}3} \leq 1{,}0$$ for a working life of 100 years

$\theta > 268$°C: $$k_{b,fi}(\theta) = k_{b,fi,100y}(\theta) = 0{,}0$$

$f_{bd,fi}$	Design value of the bond strength in case of fire in N/mm² for a working life of 50 years.
$f_{bd,fi,100y}$	Design value of the bond strength in case of fire in N/mm² for a working life of 100 years.
(θ)	Temperature in °C in the mortar layer.
θ_{max}	Temperature in °C at which the mortar can no longer transfer bond stresses
$k_{b,fi}(\theta)$	Reduction factor under fire exposure for a working life of 50 years.
$k_{b,fi,100y}(\theta)$	Reduction factor under fire exposure for a working life of 100 years.
$f_{bd,PIR}$	Design value of the bond strength in N/mm² in cold condition according to Table C3 or Table C6 considering the concrete classes, the rebar diameter, the drilling method and the bond conditions according to EN 1992-1-1 for a working life of 50 years.
$f_{bd,PIR,100y}$	Design value of the bond strength in N/mm² in cold condition according to Table C3 or Table C6 considering the concrete classes, the rebar diameter, the drilling method and the bond conditions according to EN 1992-1-1 for a working life of 100 years.
γ_c	Partial factor according to EN 1992-1-1.
$\gamma_{M,fi}$	Partial factor according to EN 1992-1-2.

For evidence under fire exposure the anchorage length shall be calculated according to
EN 1992-1- 1:2004+AC:2010 Equation 8.3 using the temperature-dependent bond resistance $f_{bd,fi}$.

Materials

Material quality

Part	Material
Rebar EN 1992-1-1	Bars and de-coiled rods class B or C with f_{yk} and k according to NDP or NCL of EN 1992-1-1 $f_{uk} = f_{tk} = k \cdot f_{yk}$

Fitness for use

Some creep tests have been conducted in accordance with ETAG guideline 001 part 5 and TR 023 in the following conditions: **in dry environment at 50 °C during 90 days**.
These tests show an excellent behaviour of the post-installed connection made with HIT-HY 200: low displacements with long term stability, failure load after exposure above reference load.

Resistance to chemical substances

Chemical	Resistance	Chemical	Resistance
Air	**+**	Gasoline	**+**
Acetic acid 10%	**+**	Glycole	**o**
Acetone	**o**	Hydrogen peroxide 10%	**o**
Ammonia 5%	**+**	Lactic acid 10%	**+**
Benzyl alcohol	**-**	Maschinery oil	**+**
Chloric acid 10%	**o**	Methylethylketon	**o**
Chlorinated lime 10%	**+**	Nitric acid 10%	**o**
Citric acid 10%	**+**	Phosphoric acid 10%	**+**
Concrete plasticizer	**+**	Potassium Hydroxide pH 13,2	**+**
De-icing salt (Calcium chloride)	**+**	Sea water	**+**
Demineralized water	**+**	Sewage sludge	**+**
Diesel fuel	**+**	Sodium carbonate 10%	**+**
Drilling dust suspension pH 13,2	**+**	Sodium hypochlorite 2%	**+**
Ethanol 96%	**-**	Sulfuric acid 10%	**+**
Ethylacetate	**-**	Sulfuric acid 30%	**+**
Formic acid 10%	**+**	Toluene	**o**
Formwork oil	**+**	Xylene	**o**

+ resistant
o resistant in short term (max. 48h) contact
- not resistant

Electrical Conductivity
HIT-HY 200-A V3 and HIT-HY 200-R V3 in the hardened state **are not conductive electrically**. Its electric resistivity is $15{,}5 \cdot 10^9\ \Omega \cdot cm$ (DIN IEC 93 – 12.93). It is adapted well to realize electrically insulating anchoring (ex: railway applications, subway)

Setting information

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

Service temperature range
Hilti HIT-HY 200 injection mortar 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

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

Curing and working time

Temperature of the base material	HIT-HY 200-A V3		HIT-HY 200-R V3	
	Maximum working time	Minimum curing time	Maximum working time	Minimum curing time
T_{BM}	t_{work}	t_{cure}	t_{work}	t_{cure}
- 10°C < T_{BM} ≤ - 5°C	1,5 h	7 h	3 h	20 h
- 4°C < T_{BM} ≤ 0°C	50 min	4 h	1,5 h	8 h
1°C < T_{BM} ≤ 5°C	25 min	2 h	45 min	4 h
6°C < T_{BM} ≤ 10°C	15 min	75 min	30 min	2,5 h
11°C < T_{BM} ≤ 20°C	7 min	45 min	15 min	1,5 h
21°C < T_{BM} ≤ 30°C	4 min	30 min	9 min	1 h
31°C < T_{BM} ≤ 40°C	3 min	30 min	6 min	1 h

Setting information

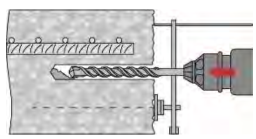
Installation equipment

Rebar – size	ϕ8 - ϕ16	ϕ18 - ϕ40
Rotary hammer	TE 2 (-A)– TE 40(-A)	TE40 – TE80
Other tools	Blow out pump (h_{ef} ≤ 10·d)	-
	Compressed air gun[a)] Set of cleaning brushes[b)], dispenser, piston plug Roughening tools	

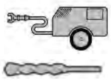
a) Compressed air gun with extension hose for all drill holes deeper than 250 mm (for ϕ 8 to ϕ 12) or deeper than 20·ϕ (for ϕ > 12 mm).
b) Automatic brushing with round brush for all drill holes deeper than 250 mm (for ϕ 8 to ϕ 12) or deeper than 20·ϕ (for ϕ > 12 mm

Minimum concrete cover c_{min} of the post-installed rebar

Drilling method	Bar diameter [mm]	Minimum concrete cover c_{min} [mm]	
		Without drilling aid	With drilling aid
Hammer drilling **(HD)** and **(HDB)**	ϕ < 25	30 + 0,06 · l_v ≥ 2 · ϕ	30 + 0,02 · l_v ≥ 2 · ϕ
	ϕ ≥ 25	40 + 0,06 · l_v ≥ 2 · ϕ	40 + 0,02 · l_v ≥ 2 · ϕ
Compressed air drilling **(CA)**	ϕ < 25	50 + 0,08 · l_v	50 + 0,02 · l_v
	ϕ ≥ 25	60 + 0,08 · l_v ≥ 2 · ϕ	60 + 0,02 · l_v ≥ 2 · ϕ
Diamond coring with roughening with Hilti Roughening tool TE-YRT **(RT)**	ϕ < 25	30 + 0,06 · l_v ≥ 2 · ϕ	30 + 0,02 · l_v ≥ 2 · ϕ
	ϕ ≥ 25	40 + 0,06 · l_v ≥ 2 · ϕ	40 + 0,02 · l_v ≥ 2 · ϕ



Drilling and cleaning diameters

Rebar [mm]	Drilling				Cleaning	
	Hammer drill (HD)	Hollow Drill Bit (HDB) [b)]	Compressed air drill (CA)	Diamond coring with roughening tool (RT)[b)]	Brush HIT-RB	Air nozzle HIT-RB
	d₀ [mm]				size [mm]	
						
ϕ8	12 / 10 [a)]	12	-	-	12 / 10 [a)]	12 / 10 [a)]
ϕ10	14 / 12 [a)]	14 / 12 [a)]	-	-	14 / 12 [a)]	14 / 12 [a)]
ϕ12	16 / 14 [a)]	16 / 14 [a)]	-	-	16 / 14 [a)]	16 / 14 [a)]
	-	-	17	-	18	16
ϕ14	18	18	17	18	18	18
ϕ16	20	20	-	-	20	20
	-	-	20	20	22	20
ϕ18	22	22	22	22	22	22
ϕ20	25	25	-	-	25	25
	-	-	26	25	28	25
ϕ22	28	28	28	28	28	28
ϕ24	32	32	32	32	32	
ϕ25	32	32	32	32	32	
ϕ26	35	-	35	35	35	
ϕ28	35	-	35	35	35	32
ϕ30	-	-	35	-	35	
	37	-	-	-	37	
ϕ32	40	-	40	-	40	
ϕ34[b)]	-	-	42	-	42	32
	45	-	-	-	45	32
ϕ36[b)]	45	-	45	-	45	32
ϕ40[b)]	55	-	-	-	55	32
	-	-	57	-	57	32

a) Both given values can be used / Maximum installation length l=250 mm.
b) Only for EN 1992-1-1 design, not available for TR 069 design.

Associated components for the use of Hilti Roughening tool TE-YRT

Diamond coring		Roughening tool TE-YRT	Wear gauge RTG…
			
d₀ [mm]		d₀ [mm]	size
Nominal	measured		
18	17,9 to 18,2	18	18
20	19,9 to 20,2	20	20
22	21,9 to 22,2	22	22
25	24,9 to 25,2	25	25
28	27,9 to 28,2	28	28
30	29,9 to 30,2	30	30
32	31,9 to 32,2	32	32
35	34,9 to 35,2	35	35

Installation parameters for use of the Hilti Roughening tool TE-YRT

h_{ef} [mm]	Minimum roughening time $t_{roughen}$ [sec] ($t_{roughen}$ [sec] = h_{ef} [mm] /10)	Minimum blowing time $t_{blowing}$ [sec] ($t_{blowing}$ [sec] = $t_{roughen}$ [sec] + 20)
0 to 100	10	30
101 to 200	20	40
201 to 300	30	50
301 to 400	40	60
401 to 500	50	70
501 to 600	60	80

Dispensers and corresponding maximum embedment depth $\ell_{v,max}$

Rebar	Dispenser	
	HDM 330, HDM 500	HDE 500
	Concrete temp. ≥ -10°C	Concrete temp. ≥ 0°C
	$\ell_{v,max}$ [mm]	$\ell_{v,max}$ [mm]
ϕ8 - ϕ32	700	1000
ϕ34 - ϕ40	-	1300

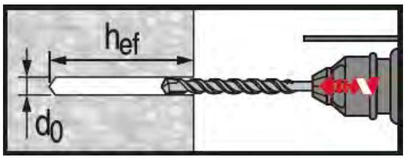
Setting instructions

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

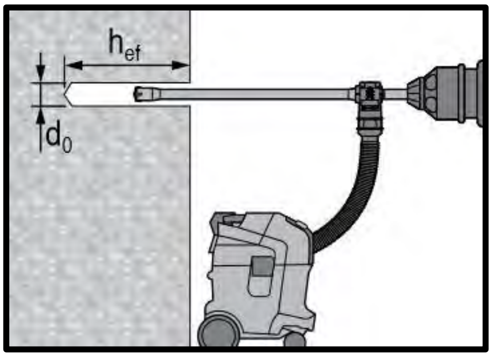
Safety regulations.

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 HIT-HY 200-A V3 and HIT-HY 200-R V3.

Drilling

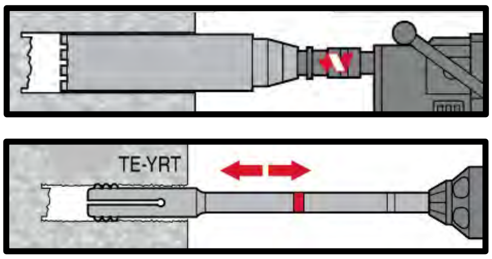


Hammer drilled hole (HD)



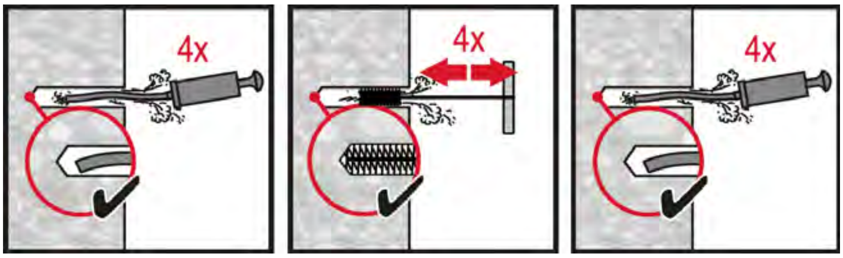
Hammer drilled hole with Hollow Drilled Bit (HDB)

No cleaning required



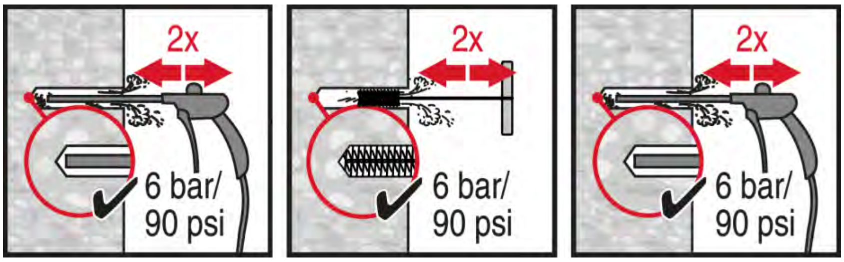
Diamond Drilling + Roughening Tool (DD+RT)

Cleaning



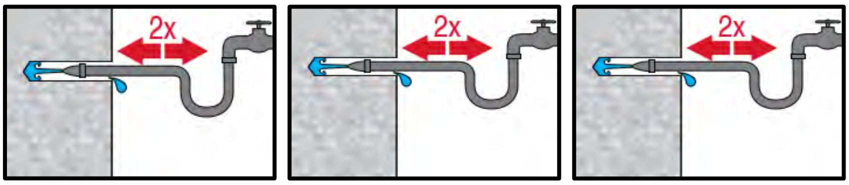
Hammer drilling:

Manual cleaning (MC)
for drill diameters $d_0 \leq 20$ mm and drill hole depth $h_0 \leq 10 \cdot d$.



Hammer drilling:

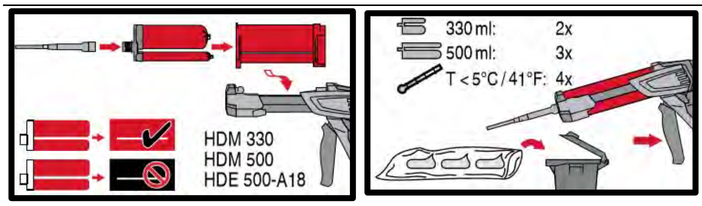
Compressed air cleaning (CAC)
for all drill hole diameters d_0 and drill hole depths $h_0 \leq 20 \cdot d$.



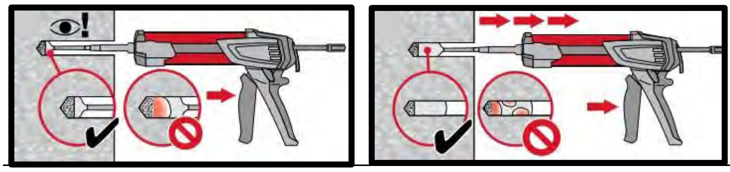
Diamond cored holes with Hilti roughening tool:

For all drill hole diameters d_0 and drill hole depths h_0.

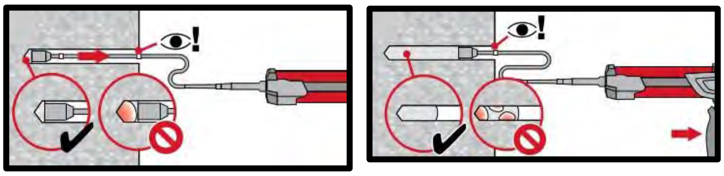
Injection system preparation



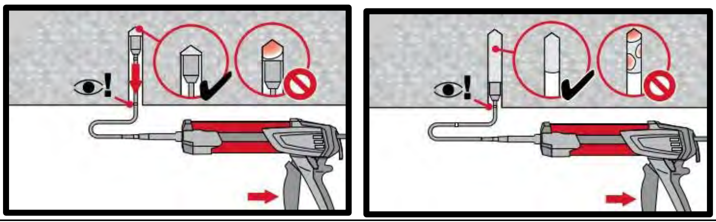
Injection system preparation.



Injection method for drill hole depth $h_{ef} \leq 250$ mm.

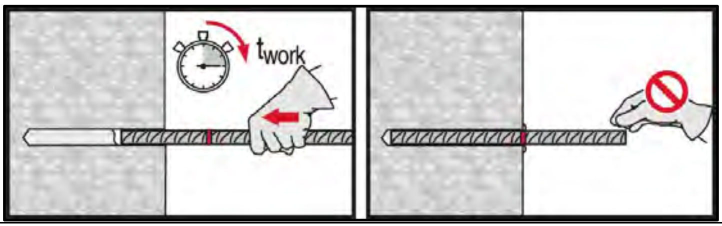


Injection method for drill hole depth $h_{ef} > 250$mm.

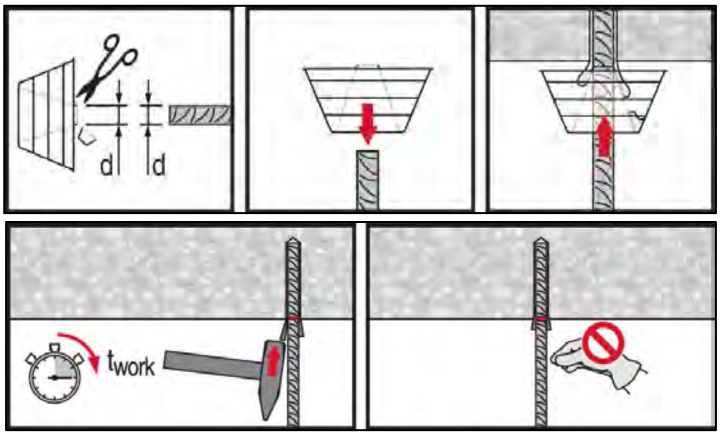


Injection method for overhead application.

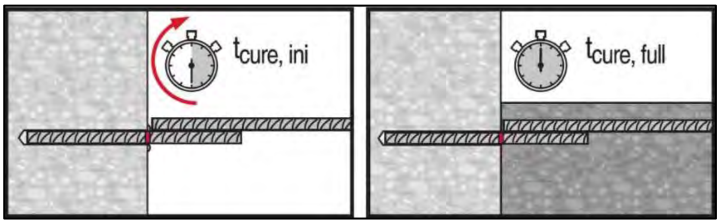
Setting the element



Setting element, observe working time “t_{work}”.



Setting element for overhead applications, observe working time “t_{work}”.



Apply full load only after curing time “t_{cure}“.