HIT-HY 200 R V3
INJECTION MORTAR

Technical Datasheet

Update: September-21

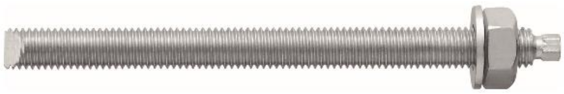
HIT-HY 200-R V3 injection mortar

Anchor design (EN 1992-4) / Rods&Sleeves / Concrete

Injection mortar system

Hilti HIT-HY 200-R V3

500 ml foil pack (also available as 330 ml foil pack)



Anchor rod:
HAS-U
HAS-U HDG
HAS-U A4
HAS-U HCR
(M8-M30)

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

Benefits

- **SafeSet** technology: Simplified method of borehole preparation using either Hilti hollow drill bit for hammer drilling or Roughening tool for diamond cored applications
- Suitable for uncracked and cracked concrete C 20/25 to C 50/60
- ETA Approved for seismic performance category C1, C2[a)]
- Maximum load performance in cracked concrete and uncracked concrete
- High corrosion / corrosion resistance[b)]
- Small edge distance and anchor spacing possible
- Manual cleaning for borehole diameter up to 20mm and $h_{ef} \leq 10d$ for uncracked concrete only

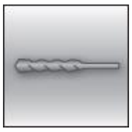
a) HIS-N internally threaded sleeves not approved for Seismic.
b) High Corrosion resistant rods available only for HAS-U. Corrosion resistant rods available for HAS-U and HIS-N.

Base material

Concrete (uncracked)

Concrete (cracked)

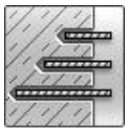
Installation conditions



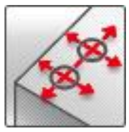
Hammer drilled holes

Diamond drilled holes [c)]

Hilti **SafeSet** technology

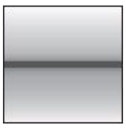


Variable embedment depth



Small edge distance and spacing

Load conditions



Static/ quasi-static

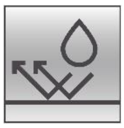
Seismic, ETA-C1, C2[a)]

Fire resistance

Other information

European Technical Assessment

CE conformity



Corrosion resistance[b)]

High corrosion resistance[b)]

PROFIS Anchor design Software

a) HIS-N internally threaded sleeves not approved for Seismic.
b) High Corrosion resistant rods available only for HAS-U. Corrosion resistant rods available for HAS-U and HIS-N.
c) Diamond drilling only with Roughening Tool (RT) for HAS-U and HIS-N.

Approvals / certificates

Description	Product	Authority /	No. / date of issue
European Technical Assessment [a)]	HY 200-R V3	DIBt, Berlin	ETA-19/0601 / 2019-12-10

a) All data given in this section according to the ETA-19/0601, issue 2019-12-10.

Static and quasi-static resistance (for a single anchor)

All data in this section applies to:

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- *Steel* failure
- Minimum base material thickness
- One typical embedment depth, as specified in the table
- One anchor material, as specified in the tables
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²
- Temperature range I (min. base material temp. -40°C, max. long/short term base material temp.: +24°C/40°C)
- Short term loading. For long term loading please apply ψ_{sus} = 0.74.

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

Anchorage depth [1)]

Anchor size		M8	M10	M12	M16	M20	M24	M27	M30
HAS-U									
Embedment depth	[mm]	80	90	110	125	170	210	240	270
Base material thickness	[mm]	110	120	140	160	220	270	300	340
HIS-N									
Embedment depth	[mm]	90	110	125	170	205	-	-	-
Base material thickness	[mm]	120	150	170	230	270	-	-	-

1) The allowed range of embedment depth is shown in the setting details.
2) For combined pull-out and concrete cone failure
3) For concrete cone failure

Characteristic resistance

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Uncracked concrete										
Tension N_{Rk}	HAS-U 5.8	[kN]	*18,0*	*29,0*	*42,0*	68,7	109	150	183	218
	HAS-U 8.8		*29,0*	42,0	56,8	68,7	109	150	183	218
	HAS-U A4		*26,0*	*41,0*	56,8	68,7	109	150	183	218
	HAS-U HCR		*29,0*	42,0	56,8	68,7	109	150	183	218
	HIS-N 8.8		*25,0*	*46,0*	*67,0*	109	*116*	-	-	-
Shear V_{Rk}	HAS-U 5.8	[kN]	*9,0*	*15,0*	*21,0*	*39,0*	*61,0*	*88,0*	*115*	*140*
	HAS-U 8.8		*15,0*	*23,0*	*34,0*	*63,0*	*98,0*	*141*	*184*	*224*
	HAS-U A4		*13,0*	*20,0*	*30,0*	*55,0*	*86,0*	*124*	*115*	*140*
	HAS-U HCR		*15,0*	*23,0*	*34,0*	*63,0*	*98,0*	*124*	*161*	*196*
	HIS-N 8.8		*13,0*	*23,0*	*34,0*	*63,0*	*58,0*	-	-	-
Cracked concrete										
Tension N_{Rk}	HAS-U 5.8	[kN]	15,1	21,2	35,2	48,1	76,3	105	128	153
	HAS-U 8.8		15,1	21,2	35,2	48,1	76,3	105	128	153
	HAS-U A4		15,1	21,2	35,2	48,1	76,3	105	128	153
	HAS-U HCR		15,1	21,2	35,2	48,1	76,3	105	128	153
	HIS-N 8.8		24,7	39,7	48,1	76,3	101	-	-	-
Shear V_{Rk}	HAS-U 5.8	[kN]	*9,0*	*15,0*	*21,0*	*39,0*	*61,0*	*88,0*	*115*	*140*
	HAS-U 8.8		*15,0*	*23,0*	*34,0*	*63,0*	*98,0*	*141*	*184*	*224*
	HAS-U A4		*13,0*	*20,0*	*30,0*	*55,0*	*86,0*	*124*	*115*	*140*
	HAS-U HCR		*15,0*	*23,0*	*34,0*	*63,0*	*98,0*	*124*	*161*	*196*
	HIS-N 8.8		*13,0*	*23,0*	*34,0*	*63,0*	*58,0*	-	-	-

Design resistance

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Uncracked concrete										
Tension N_{Rd}	HAS-U 5.8	[kN]	*12,0*	*19,3*	*28,0*	45,8	72,7	99,8	122	146
	HAS-U 8.8		*19,3*	28,0	37,8	45,8	72,7	99,8	122	146
	HAS-U A4		*13,9*	*21,9*	*31,6*	45,8	72,7	99,8	*80,4*	*98,3*
	HAS-U HCR		*19,3*	28,0	37,8	45,8	72,7	99,8	122	146
	HIS-N 8.8		16,7	30,7	44,7	72,7	77,3	-	-	-
Shear V_{Rd}	HAS-U 5.8	[kN]	*7,2*	*12,0*	*16,8*	*31,2*	*48,8*	*70,4*	*92,0*	*112*
	HAS-U 8.8		*12,0*	*18,4*	*27,2*	*50,4*	*78,4*	*113*	*147*	*179*
	HAS-U A4		*8,3*	*12,8*	*19,2*	*35,3*	*55,1*	*79,5*	*48,3*	*58,8*
	HAS-U HCR		*12,0*	*18,4*	*27,2*	*50,4*	*78,4*	*70,9*	*92,0*	*112*
	HIS-N 8.8		10,4	18,4	27,2	50,4	46,4	-	-	-
Cracked concrete										
Tension N_{Rd}	HAS-U 5.8	[kN]	10,1	14,1	23,5	32,1	50,9	69,9	85,4	102
	HAS-U 8.8		10,1	14,1	23,5	32,1	50,9	69,9	85,4	102
	HAS-U A4		10,1	14,1	23,5	32,1	50,9	69,9	*80,4*	*98,3*
	HAS-U HCR		10,1	14,1	23,5	32,1	50,9	69,9	85,4	102
	HIS-N 8.8		16,5	26,5	32,1	50,9	67,4	-	-	-
Shear V_{Rd}	HAS-U 5.8	[kN]	*7,2*	*12,0*	*16,8*	*31,2*	*48,8*	*70,4*	*92,0*	*112*
	HAS-U 8.8		*12,0*	*18,4*	*27,2*	*50,4*	*78,4*	*113*	*147*	*179*
	HAS-U A4		*8,3*	*12,8*	*19,2*	*35,3*	*55,1*	*79,5*	*48,3*	*58,8*
	HAS-U HCR		*12,0*	*18,4*	*27,2*	*50,4*	*78,4*	*70,9*	*92,0*	*112*
	HIS-N 8.8		10,4	18,4	27,2	50,4	46,4	-	-	-

Recommended loads

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Uncracked concrete										
Tension N_{Rd}	HAS-U 5.8	[kN]	*8,6*	*13,8*	*20,0*	32,7	51,9	71,3	87,1	104
	HAS-U 8.8		*13,8*	20,0	27,0	32,7	51,9	71,3	87,1	104
	HAS-U A4		*9,9*	*15,7*	*22,5*	32,7	51,9	71,3	*57,4*	*70,2*
	HAS-U HCR		*13,8*	20,0	27,0	32,7	51,9	71,3	87,1	104
	HIS-N 8.8		11,9	21,9	31,9	51,9	55,2	-	-	-
Shear V_{Rd}	HAS-U 5.8	[kN]	*5,1*	*8,6*	*12,0*	*22,3*	*34,9*	*50,3*	*65,7*	*80,0*
	HAS-U 8.8		*8,6*	*13,1*	*19,4*	*36,0*	*56,0*	*80,6*	*105*	*128*
	HAS-U A4		*6,0*	*9,2*	*13,7*	*25,2*	*39,4*	*56,8*	*34,5*	*42,0*
	HAS-U HCR		*8,6*	*13,1*	*19,4*	*36,0*	*56,0*	*50,6*	*65,7*	*80,0*
	HIS-N 8.8		*7,4*	*13,1*	*19,4*	*36,0*	*33,1*	-	-	-
Cracked concrete										
Tension N_{Rd}	HAS-U 5.8	[kN]	7,2	10,1	16,8	22,9	36,3	49,9	61,0	72,7
	HAS-U 8.8		7,2	10,1	16,8	22,9	36,3	49,9	61,0	72,7
	HAS-U A4		7,2	10,1	16,8	22,9	36,3	49,9	*57,4*	*70,2*
	HAS-U HCR		7,2	10,1	16,8	22,9	36,3	49,9	61,0	72,7
	HIS-N 8.8		11,8	18,9	22,9	36,3	48,1	-	-	-
Shear V_{Rd}	HAS-U 5.8	[kN]	*5,1*	*8,6*	*12,0*	*22,3*	*34,9*	*50,3*	*65,7*	*80,0*
	HAS-U 8.8		*8,6*	*13,1*	*19,4*	*36,0*	*56,0*	*80,6*	*105*	*128*
	HAS-U A4		*6,0*	*9,2*	*13,7*	*25,2*	*39,4*	*56,8*	*34,5*	*42,0*
	HAS-U HCR		*8,6*	*13,1*	*19,4*	*36,0*	*56,0*	*50,6*	*65,7*	*80,0*
	HIS-N 8.8		*7,4*	*13,1*	*19,4*	*36,0*	*48,1*	-	-	-

Seismic resistance (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
- Minimum base material thickness
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²
- 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
- α_{gap} = 1,0 (using Hilti seismic filling set)

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-U										
Embedment depth	h_{ef}	[mm]	-	-	-	125	170	210	-	-

Characteristic resistance in case of seismic performance category C2

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Tension $N_{Rk,seis}$	HAS-U 8.8	[kN]	-	-	-	24,5	45,9	55,4	-	-
Shear $V_{Rk,seis}$	HAS-U 8.8 w/ filling set	[kN]	-	-	-	*46,0*	*77,0*	*103*	-	-
	HAS-U 8.8 w/o filling set		-	-	-	*40,0*	*71,0*	*90,0*	-	-

Design resistance in case of seismic performance category C2

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Tension $N_{Rd,seis}$	HAS-U 8.8	[kN]	-	-	-	16,3	30,6	36,9	-	-
Shear $V_{Rd,seis}$	HAS-U 8.8 w/ filling set	[kN]	-	-	-	36,8	61,6	82,4	-	-
	HAS-U 8.8 w/o filling set		-	-	-	32,0	56,8	72,0	-	-

Anchorage depth for seismic C1

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
HAS-U										
Embedment depth	h_{ef}	[mm]	-	90	110	125	170	210	240	270

Characteristic resistance in case of seismic performance category C1

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Tension $N_{Rk,seis}$	HAS-U 8.8	[kN]	-	14,7	29,0	44,0	72,5	99,6	122	145
Shear $V_{Rk,seis}$	HAS-U 8.8	[kN]	-	*23,0*	*34,0*	*63,0*	*98,0*	*141*	*184*	*224*

Design resistance in case of seismic performance category C1

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Tension $N_{Rd,seis}$	HAS-U 8.8	[kN]	-	9,8	19,4	29,3	48,4	66,4	81,1	96,8
Shear $V_{Rd,seis}$	HAS-U 8.8	[kN]	-	18,4	27,2	50,4	78,4	113	145	173

Materials

Mechanical properties for HAS-U

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Nominal tensile strength f_{uk}	HAS-U 5.8 (HDG)	[N/mm²]	500	500	500	500	500	500	-	-
	HAS-U 8.8 (HDG) AM 8.8 (HDG)		800	800	800	800	800	800	800	800
	HAS-U A4		700	700	700	700	700	700	500	500
	HAS-U HCR		800	800	800	800	800	700	-	-
Yield strength f_{yk}	HAS-U 5.8 (HDG)	[N/mm²]	440	440	440	440	400	400	-	-
	HAS-U 8.8 (HDG) AM 8.8 (HDG)		640	640	640	640	640	640	640	640
	HAS-U A4		450	450	450	450	450	450	210	210
	HAS-U HCR		640	640	640	640	640	400	-	-
Stressed cross-section A_s	HAS-U	[mm²]	36,6	58,0	84,3	157	245	353	459	561
Moment of resistance W	HAS-U	[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 f_{uk}	HIS-N	[N/mm²]	490	490	490	490	490
	Screw 8.8		800	800	800	800	800
	HIS-RN		700	700	700	700	700
	Screw 70		700	700	700	700	700
Yield strength f_{yk}	HIS-N	[N/mm²]	390	390	390	390	390
	Screw 8.8		640	640	640	640	640
	HIS-RN		350	350	350	350	350
	Screw A4-70		450	450	450	450	450
Stressed cross-section A_s	HIS-(R)N	[mm²]	51,5	108	169	256	238
	Screw		36,6	58,0	84,3	157	245
Moment of resistance W	HIS-(R)N	[mm³]	145	430	840	1595	1543
	Screw		31,2	62,3	109	277	541

Material quality for HAS-U

Part	Material
Zinc coated steel	
Threaded rod, HAS-U 5.8 (HDG)	Strength class 5.8; Elongation at fracture A5 > 8% ductile Electroplated zinc coated ≥ 5µm; (HDG) hot dip galvanized ≥ 45 µm
Threaded rod, HAS-U 8.8 (HDG)	Strength class 8.8; Elongation at fracture A5 > 12% ductile Electroplated zinc coated ≥ 5µm; (HDG) hot dip galvanized ≥ 45 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 ≥ 45 µm
Washer	Electroplated zinc coated ≥ 5 µm, hot dip galvanized ≥ 45 µm
Nut	Strength class of nut adapted to strength class of threaded rod. Electroplated zinc coated ≥ 5µm, (HDG) hot dip galvanized ≥ 45 µm
Hilti Filling set (F)	Filling washer: Electroplated zinc coated ≥ 5 µm / (HDG) Hot dip galvanized ≥ 45 µm Spherical washer: Electroplated zinc coated ≥ 5 µm / (HDG) Hot dip galvanized ≥ 45 µm Lock nut: Electroplated zinc coated ≥ 5 µm / (HDG) Hot dip galvanized ≥ 45 µm
Stainless Steel	
Threaded rod, HAS-U A4	Strength class 70 for ≤ M24 and strength class 50 for > M24; Elongation at fracture A5 > 8% 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 > 8% 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

Setting information

In service temperature range

Hilti HIT-HY 200-R V3 injection mortar with anchor rod HAS-U / HIS-(R)N may be applied in the temperature ranges given below. An elevated base material temperature leads to a reduction of the design bond resistance.

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

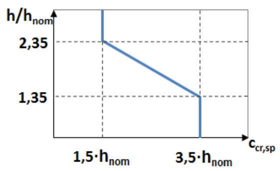
Max short term base material temperature
Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

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

Curing and working time

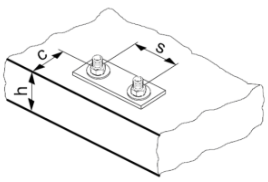
Temperature of the base material	HIT-HY 200-R V3	
	Maximum working time t_{work}	Minimum curing time t_{cure}
$-10°C < T_{BM} \leq -5°C$	3 h	20 h
$-5°C < T_{BM} \leq 0°C$	1,5 h	8 h
$0°C < T_{BM} \leq 5°C$	45 min	4 h
$5°C < T_{BM} \leq 10°C$	30 min	2,5 h
$10°C < T_{BM} \leq 20°C$	15 min	1,5 h
$20°C < T_{BM} \leq 30°C$	9 min	1 h
$30°C < T_{BM} \leq 40°C$	6 min	1 h

Setting details for HAS-U

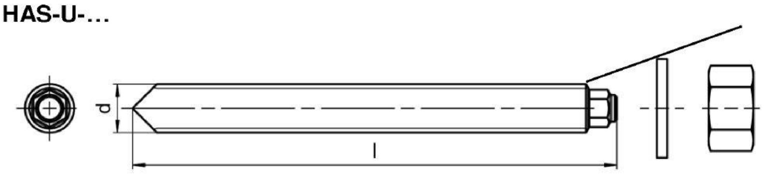
Anchor size			M8	M10	M12	M16	M20	M24	M27	M30
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18	22	28	30	35
Eff. embedment depth and drill hole depth a)	$h_{ef,min}$	[mm]	60	60	70	80	90	96	108	120
	$h_{ef,max}$	[mm]	160	200	240	320	400	480	540	600
Minimum base material thickness	h_{min}	[mm]	h_{ef} + 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]	$t_{fix} - h_{fs}$							
Max. 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 $2{,}00 > h / h_{ef} > 1{,}3$						
			$2{,}26\ h_{ef}$	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) $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ (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-…

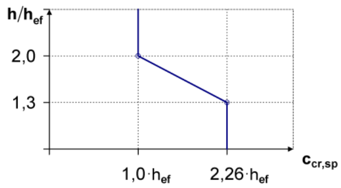


Marking:

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

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 anchorage and drill hole depth	h_{ef}	[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
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 [b)]	$c_{cr,sp}$	[mm]	**$1{,}0 \cdot h_{ef}$**	for $h / h_{ef} \geq 2{,}0$			
			$4{,}6\ h_{ef} - 1{,}8\ h$	for $2{,}0 > h / h_{ef} > 1{,}3$			
			$2{,}26\ h_{ef}$	for $h / h_{ef} \leq 1{,}3$			
Critical spacing for concrete cone failure	$s_{cr,N}$	[mm]	2 $c_{cr,N}$				
Critical edge distance for concrete cone failure [c)]	$c_{cr,N}$	[mm]	1,5 h_{ef}				
Max. torque moment [a)]	T_{max}	[Nm]	10	20	40	80	150

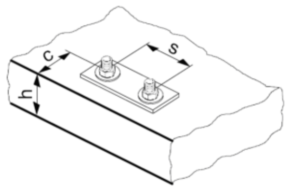


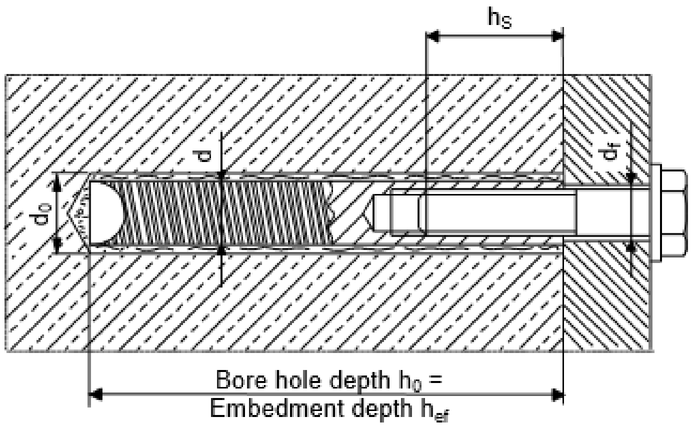
For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced.

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.



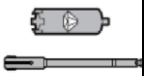


Installation equipment

Anchor size		M8	M10	M12	M16	M20	M24	M27	M30
Rotary hammer	HAS-U	TE 2 – TE 16				TE 40 - TE 80			
	HIS-N	TE (-A) – TE 16(-A)		TE 40 – TE 80			-		
Other tools		compressed air gun and blow out pump, 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) For anchors in diamond drilled holes load values for combined pull-out and concrete cone resistance have to be reduced

Cleaning, drilling and installation parameters

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

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

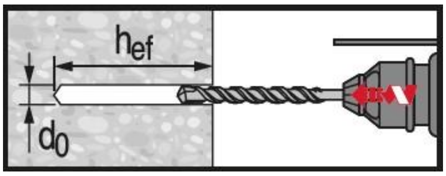
Setting instructions for HAS-U rods and HIS-N internally threaded sleeves

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

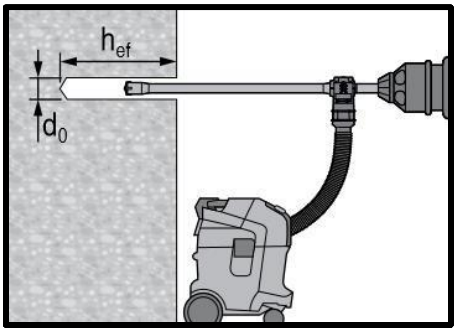
Safety regulations.

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-R V3.

Drilling

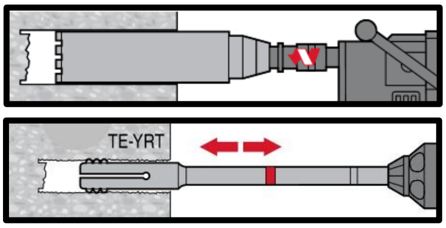


Hammer drilled hole (HD)



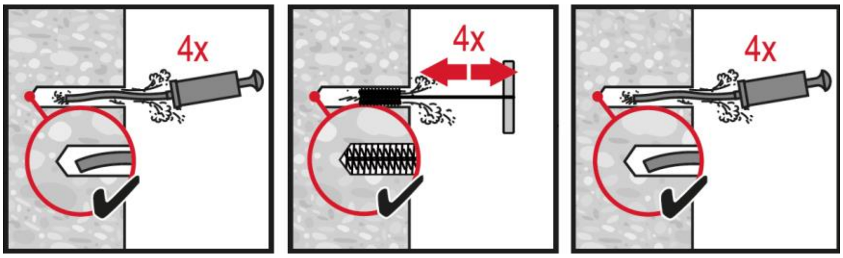
Hammer drilled hole with Hollow Drilled Bit (HDB)

No cleaning required



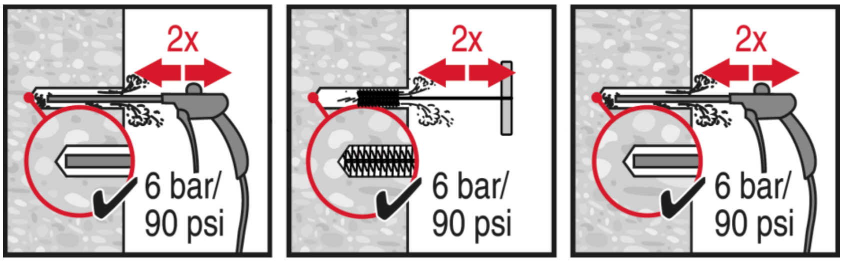
Diamond Drilling + Roughening Tool (DD+RT)

Cleaning



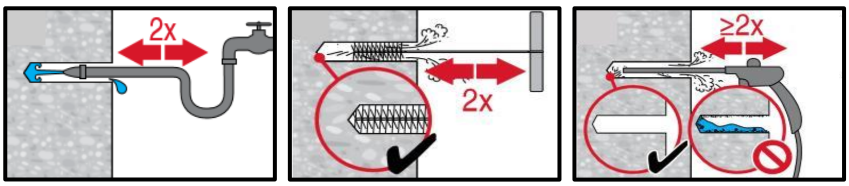
Hammer drilling:

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



Hammer drilling:

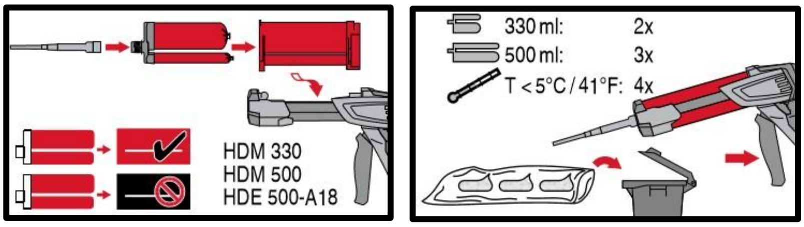
Compressed air cleaning (CAC)
for all drill hole diameters d_0 and drill hole depths $h_0 \leq 20 \cdot d$.



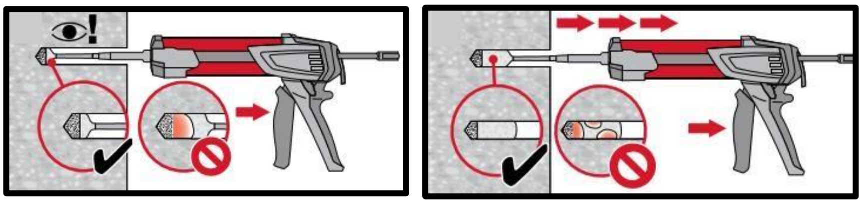
Diamond cored holes with Hilti roughening tool:

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

Injection

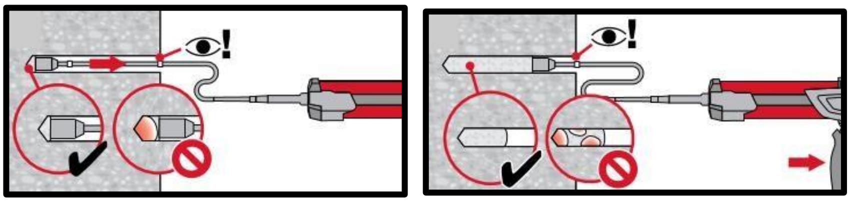


Injection system preparation.



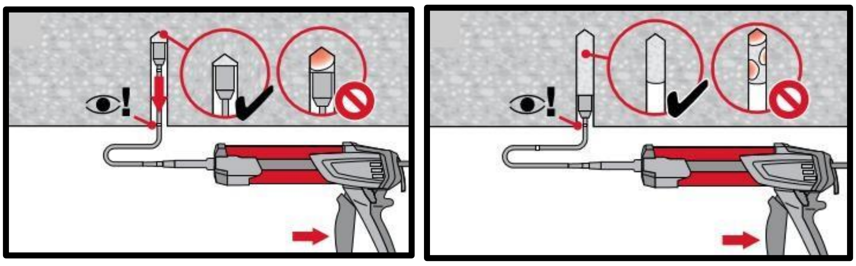
Injection method for drill hole depth

h_{ef} ≤ 250 mm.



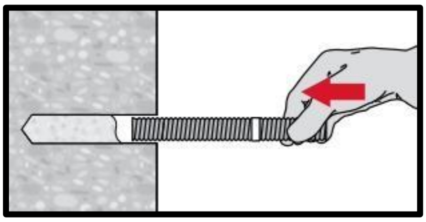
Injection method for drill hole depth

h_{ef} > 250mm.

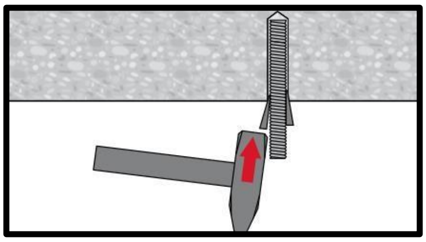


Injection method for overhead application and/or installation with embedment depth > 250 mm.

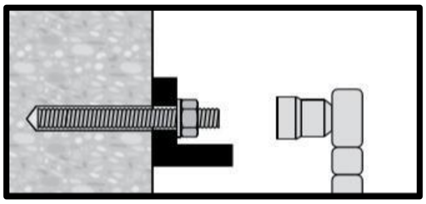
Setting the element



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



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



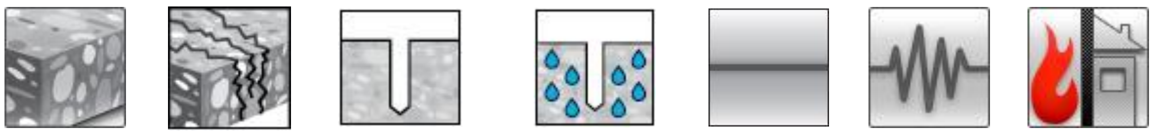
Loading the anchor after required curing time t_{cure}

HIT-HY 200-R V3 injection mortar

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

Injection mortar system		Benefits
	Hilti HIT-HY 200-R V3 330 ml foil pack (also available as 500 ml foil pack)	- **SafeSet** technology: Simplified method of borehole preparation using either Hilti hollow drill bit for hammer drilling or Roughening tool for diamond cored applications - Assessed following the EAD 332402-00-0601 “Post-Installed Reinforcing Bar (Rebar) Connections with Improved Bond-Splitting Behavior Under Static Loading”. - Allows the design of post-installed, moment-resisting reinforced concrete connections under static loading conditions without using a splice configuration according to TR 069
	Rebar B500 B (ϕ8 - ϕ32)	- ETA seismic approval C1 - Suitable for cracked and uncracked concrete C 12/15 to C 50/60 - Suitable for dry and water saturated concrete - In service temperature range up to 120°C short term / 72°C long term - Large diameter applications

Base material / **Load conditions**



Concrete (uncracked)	Concrete (cracked)	Dry concrete	Wet concrete	Static/ quasi-static	Seismic, ETA-C1	Fire resistance

Installation conditions / **Other informations**

Hammer drilling	Diamond drilled holes[a)]	Variable embedment depth	Hilti **SafeSet** technology	Small edge distance and spacing	European Technical Assessment	CE conformity	PROFIS Rebar 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 / 2019-12-10

a) All data given in this section according to ETA-19/0601 issue 2019-12-10.

Static and quasi-static loading (for a single anchor)

All data in this section applies to
-Correct setting (See setting instruction)
-No edge distance and spacing influence
-*Steel* failure
-Base material thickness, as specified in the table
-One typical embedment depth, as specified in the table
-One anchor material, as specified in the tables
-Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²
-Temperate range I
(min. base material temperature -40°C, max. long term/short term base material temperature: +24°C/40°C)

Embedment depth and base material thickness for static and quasi-static loading data

Anchor size		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Typical embedment depth	[mm]	80	90	110	125	125	170	210	240	270	270	300
Base material thickness	[mm]	110	120	140	160	170	220	280	310	340	350	380

Characteristic resistance

Anchor size		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Uncracked concrete												
Tensile N_{Rk}	[kN]	24,1	33,9	49,8	66,0	68,7	109	150	183	218	218	256
Shear V_{Rk}	[kN]	*14,0*	*22,0*	*31,0*	*42,0*	*55,0*	*86,0*	*135*	*146*	*169*	*194*	*221*
Cracked concrete												
Tensile N_{Rk}	[kN]	-	14,1	29,0	38,5	44,0	74,8	105	128	153	153	179
Shear V_{Rk}	[kN]	-	*22,0*	*31,0*	*42,0*	*55,0*	*86,0*	*135*	*146*	*169*	*194*	*221*

Design resistance

Anchor size		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Uncracked concrete												
Tensile N_{Rd}	[kN]	16,1	22,6	33,2	44,0	45,8	72,7	99,8	122	146	146	170
Shear V_{Rd}	[kN]	9,3	14,7	20,7	28,0	36,7	57,3	90,0	97,3	113	129	147
Cracked concrete												
Tensile N_{Rd}	[kN]	-	9,4	19,4	25,7	29,3	49,8	69,9	85,4	102	102	119
Shear V_{Rd}	[kN]	-	14,7	20,7	28,0	36,7	57,3	90,0	97,3	113	129	147

Seismic loading (for a single anchor)

All data in this section applies to:
- Correct setting (See setting)
- No edge distance and spacing influence
- *Steel* failure
- Minimum base material thickness
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²

-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	[mm]	-	90	110	125	125	170	210	240	270	270	300
Base material thickness	[mm]	-	120	140	160	170	220	280	310	340	350	380

Characteristic resistance in case of seismic performance category C1

Anchor size		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Tensile $N_{Rk, seis}$	[kN]	-	12,4	25,3	33,5	38,3	65,2	99,6	120	145	145	170
Shear $V_{Rk, seis}$	[kN]	-	*15,0*	*22,0*	*29,0*	*39,0*	*60,0*	*95,0*	*102*	*118*	*136*	*155*

Design resistance in case of seismic performance category C1

Anchor size		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ26	ϕ28	ϕ30	ϕ32
Tensile $N_{Rd, seis}$	[kN]	-	8,3	16,9	22,4	25,6	43,4	66,4	79,7	96,6	96,8	113
Shear $V_{Rd, seis}$	[kN]	-	10,0	14,7	19,3	26,0	40,0	63,3	68,0	78,7	90,7	103

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

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

Curing and working time

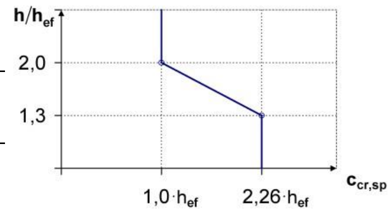
Temperature of the base material	HIT-HY 200-R	
	Maximum working time t_{work}	minimum curing time t_{cure}
- 10°C < T_{BM} ≤ - 5°C	3 h	20 h
- 5°C < T_{BM} ≤ 0°C	1,5 h	8 h
0°C < T_{BM} ≤ 5°C	45 min	4 h
5°C < T_{BM} ≤ 10°C	30 min	2,5 h
10°C < T_{BM} ≤ 20°C	15 min	1,5 h
20°C < T_{BM} ≤ 30°C	9 min	1 h
30°C < T_{BM} ≤ 40°C	6 min	1 h

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	Compressed air gun, blow out pump Set of cleaning brushes, dispenser										

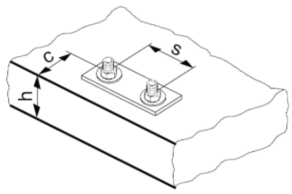
Setting details

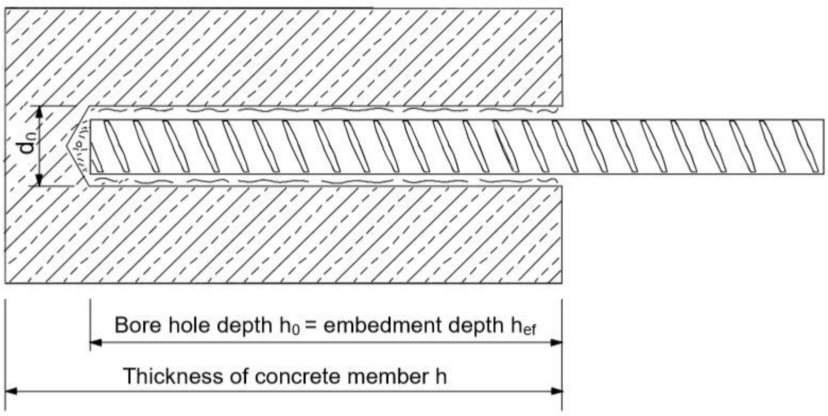
Anchor size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø26	Ø28	Ø30	Ø32
Nominal diameter of drill bit	d_0	[mm]	10 / 12 [a)]	12 / 14 [a)]	14 / 16 [a)]	18	20	25	32	32	35	37	40
Effective anchorage and drill hole depth range [b)]	$h_{ef,min}$	[mm]	60	60	70	75	80	90	100	104	112	120	128
	$h_{ef,max}$	[mm]	160	200	240	280	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]	$1{,}5\ h_{ef}$										



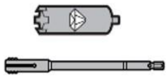
For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced,

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.





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

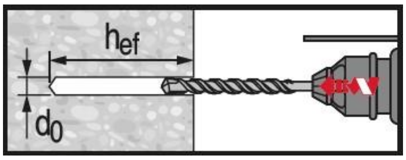
h_{ef} [mm]	Minimum roughening time $t_{roughen}$ [sec] ($t_{roughen}$ [sec] = h_{ef} [mm] /10)	Minimum blowing time $t_{blowing}$ [sec] ($t_{blowing}$ [sec] = $t_{roughen}$ [sec] + 20)
0 to 100	10	30
101 to 200	20	40
201 to 300	30	50
301 to 400	40	60
401 to 500	50	70
501 to 600	60	80

Setting instructions

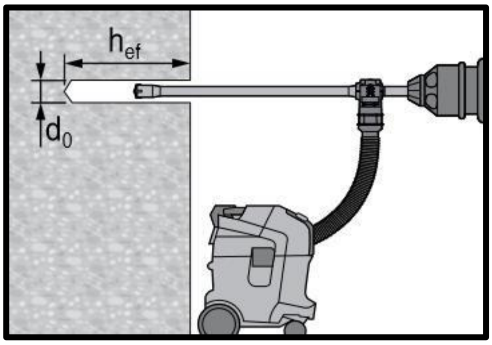
***For detailed information on installation see instruction for use given with the package of the product,**

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-R V3.

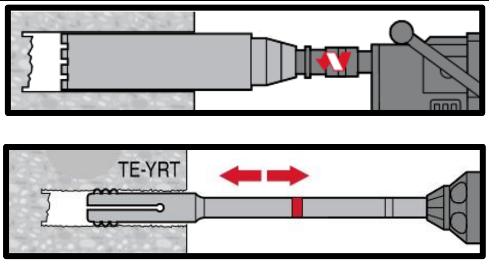


Hammer drilled hole (HD)

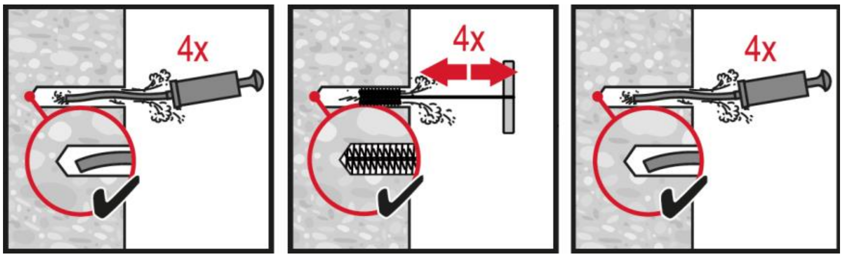


Hammer drilled hole with Hollow Drilled Bit (HDB)

No cleaning required

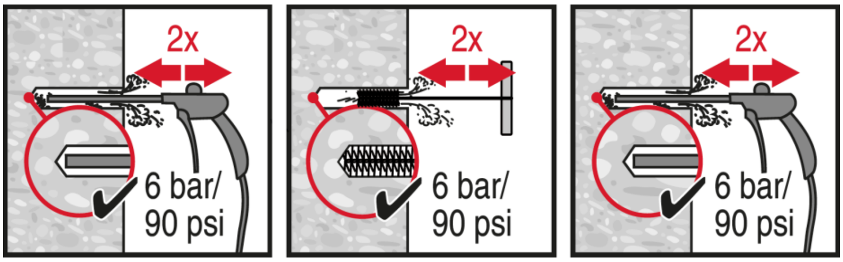


Diamond Drilling + Roughening Tool (DD+RT)



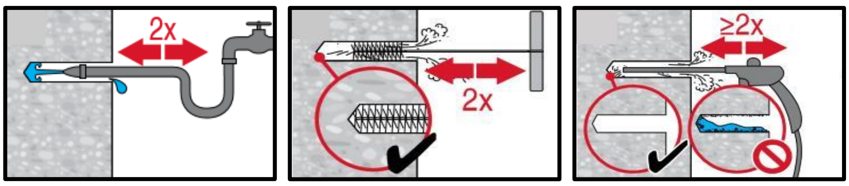
Hammer drilling:

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



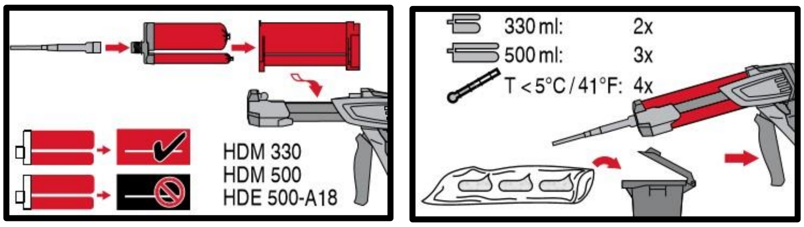
Hammer drilling:

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

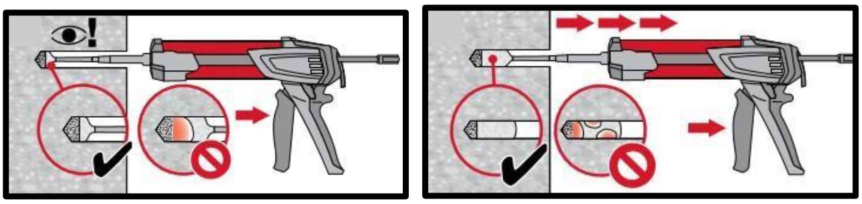


Diamond cored holes with Hilti roughening tool:

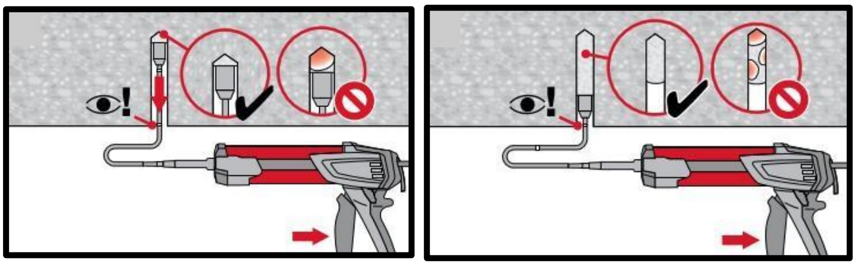
For all drill hole diameters d_0 and drill hole depths h_0.



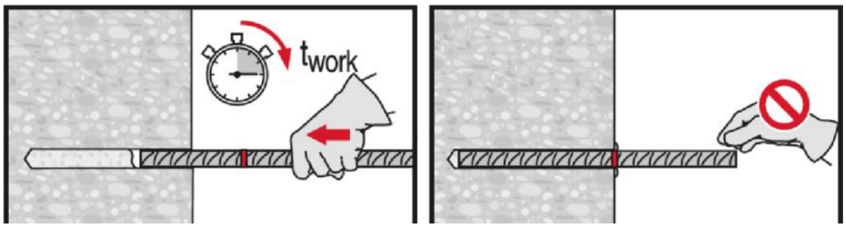
Injection system preparation.



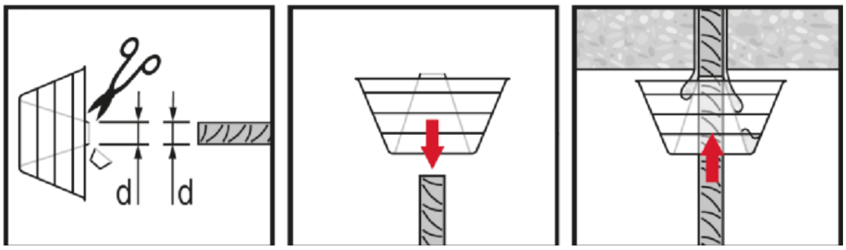
Injection method for drill hole depth h_{ef} ≤ 250 mm.



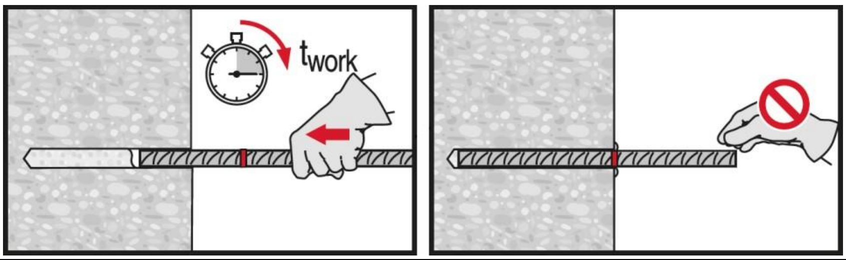
Injection method for overhead application and/or installations with embedment depth h_{ef} ≥ 250 mm.



Setting 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-R V3 injection mortar

Rebar design (EOTA TR023 & EOTA TR069) / Rebar elements / Concrete

Injection mortar system		Benefits
	Hilti HIT-HY 200-R V3 330 ml foil pack (also available as 500 ml foil pack)	- **SafeSet** technology: Simplified method of borehole preparation using either Hilti hollow drill bit for hammer drilling or Roughening tool for diamond cored applications - HY 200-R version is formulated for best handling and cure time specifically for rebar applications - Approved for ETA seismic C1 approval for post-installed-rebar - Suitable for concrete C 12/15 to C 50/60 - Suitable for dry and water saturated concrete - For rebar diameters up to 32 mm - Non corrosive to rebar elements - Good load capacity at elevated temperatures - Suitable for embedment length up to 1000 mm - Suitable for applications down to -10 °C
	Rebar (ϕ8 - ϕ32)	

Base material

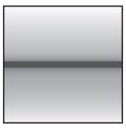

Concrete (uncracked)


Concrete (cracked)


Dry concrete


Wet concrete

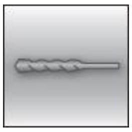
Load conditions


Static/ quasi-static


Seismic, ETA-C1


Fire resistance

Installation conditions


Hammer drilling


Diamond drilled holes[c)]

SAFESET
Hilti SafeSet technology

Other informations

European Technical Assessment

CE conformity

PROFIS Rebar design Software

[c)]Diamond drilling only with Roughening Tool (RT)

Approvals / certificates

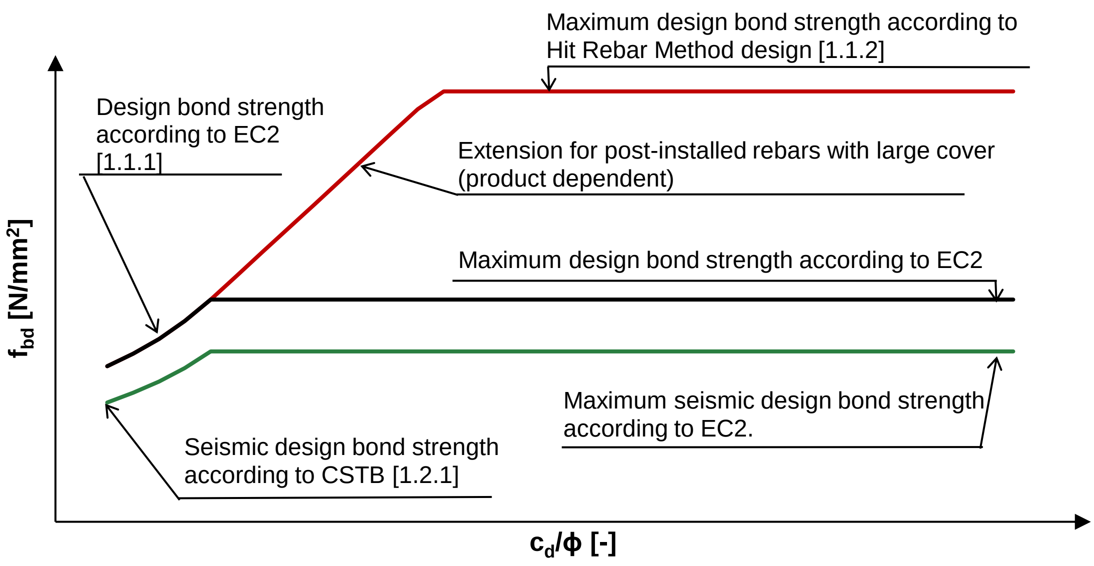
Description	Authority / Laboratory	No. / date of issue
European technical Assessment [a)]	DIBt, Berlin	ETA-19/0600 / 2019-12-10 (HY200-R V3)

[a)] All data given in this section according to ETA-19/0600, issue 2019-12-10.

Essential characteristics for rebar under tension load in concrete

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													
Temperature range I: 40°C/24°C	$\tau_{Rk,ucr}$	[N/mm²]	12										
Temperature range II: 80°C/50°C	$\tau_{Rk,ucr}$	[N/mm²]	10										
Temperature range II: 80°C/50°C	$\tau_{Rk,ucr}$	[N/mm²]	8,5										
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	Ψ^0_{sus}	40ºC/24ºC	0,74										
		80ºC/50ºC	0,89										
		120ºC/72ºC	0,72										
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]	$3,0 \cdot l_b$										

Static and quasi-static loading



Effective limit on bond stress for post-installed rebar using Hilti mortar systems and design bond strength values as provided by the EC2.

Static EC2 design (small concrete cover)

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

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

Static Hit Rebar Method design (large concrete cover)

Maximum design bond strength in N/mm² for good bond conditions

Non-cracked concrete, all allowed drilling methods								
Temperature range	Rebar - size	Concrete class						
		C20/25	C25/30	C30/37	C35/45	C40/45	C45/55	C50/60
I: 40°C/24°C	ϕ8 - ϕ32	8	8,2	8,3	8,4	8,6	8,7	8,8
II: 58°C/35°C		6,7	6,8	6,9	7,0	7,1	7,2	7,3
III: 70°C/43°C		5,7	5,8	5,9	6,0	6,1	6,1	6,2
Cracked concrete, all allowed drilling methods								
I: 40°C/24°C	ϕ12 - ϕ32	4,7	4,8	4,8	4,9	5,0	5,1	5,1
II: 58°C/35°C		3,7	3,7	3,8	3,9	3,9	4,0	4,0
III: 70°C/43°C		3,3	3,4	3,5	3,5	3,6	3,6	3,7

For poor bond conditions multiply the values by 0,7. *The reduction factor for rebar diameter equal to 10 mm is 0,72

Additional Hilti Technical Data:

Reduction factor for splitting with large concrete cover: δ = 0,306 (Hilti additional data)

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 - ϕ32	1,0								

Anchorage length for characteristic steel strength f_{yk}=500 N/mm² 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]**	**$l_{bd,y,HRM}$ (α2<0.7) 4) [mm]**	**l_{max} -10°C ≤ Ct 5) ≤ 0°C [mm]**	**l_{max} Ct 5) > 0°C [mm]**
ϕ8	**C20/25**	21,9	113	200	378	265	109	700	1000
ϕ8	**C50/60**	21,9	100	200	202	142	99	700	1000
ϕ10	**C20/25**	34,1	142	200	473	331	136	700	1000
ϕ10	**C50/60**	34,1	100	200	253	177	124	700	1000
ϕ12	**C20/25**	49,2	170	200	567	397	163	700	1000
ϕ12	**C50/60**	49,2	120	200	303	212	148	700	1000
ϕ14	**C20/25**	66,9	198	210	662	463	190	700	1000
ϕ14	**C50/60**	66,9	140	210	354	248	173	700	1000
ϕ16	**C20/25**	87,4	227	240	756	529	217	700	1000
ϕ16	**C50/60**	87,4	160	240	404	283	198	700	1000
ϕ18	**C20/25**	110,6	255	270	851	595	245	700	1000
ϕ18	**C50/60**	110,6	180	270	455	319	222	700	1000
ϕ20	**C20/25**	136,6	284	300	945	662	272	700	1000
ϕ20	**C50/60**	136,6	200	300	506	354	247	700	1000
ϕ22	**C20/25**	165,3	312	330	1040	728	299	700	1000
ϕ22	**C50/60**	165,3	220	330	556	389	272	700	1000
ϕ24	**C20/25**	196,7	340	360	1134	794	326	700	1000
ϕ24	**C50/60**	196,7	240	360	607	425	296	700	1000
ϕ25	**C20/25**	213,4	354	375	1181	827	340	700	1000
ϕ25	**C50/60**	213,4	250	375	632	442	309	700	1000
ϕ26	**C20/25**	230,8	369	390	1229	860	353	700	1000
ϕ26	**C50/60**	230,8	260	390	657	460	321	700	1000
ϕ28	**C20/25**	267,7	397	420	1323	926	380	700	1000
ϕ28	**C50/60**	267,7	280	420	708	495	346	700	1000
ϕ30	**C20/25**	307,3	425	450	1418	992	408	700	1000
ϕ30	**C50/60**	307,3	300	450	758	531	371	700	1000
ϕ32	**C20/25**	349,7	454	480	1512	1059	435	700	1000
ϕ32	**C50/60**	349,7	320	480	809	566	395	700	1000

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) Embedment depth according to Hit Rebar design for yield of the rebar and for c_d/ϕ > 8 (Temperature range I,
5) characteristic yield strength f_{yk} = 500 N/mm²)
6) c_t=concrete temperature

Seismic data

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 loading for hammer drilling (HD) and (HDB) and compressed air drilling (CA)

		Bond resistance $f_{bd,seis}$						
Rebar - size		**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.

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 in the hardened state **is 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

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

Curing and working time

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

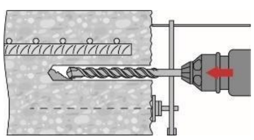
Setting information

Installation equipment

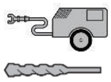
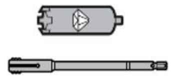
Rebar – size	ϕ8 - ϕ16	ϕ18 - ϕ32
Rotary hammer	TE 2 (-A)– TE 40(-A)	TE40 – TE80
Other tools	Blow out pump ($h_{ef} \leq 10 \cdot d$)	-
	Compressed air gun[a)] Set of cleaning brushes[b)], dispenser, piston plug	

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	$30 + 0{,}06 \cdot l_v \geq 2 \cdot \phi$	$30 + 0{,}02 \cdot l_v \geq 2 \cdot \phi$	
	ϕ ≥ 25	$40 + 0{,}06 \cdot l_v \geq 2 \cdot \phi$	$40 + 0{,}02 \cdot l_v \geq 2 \cdot \phi$	
Compressed air drilling **(CA)**	ϕ < 25	$50 + 0{,}08 \cdot l_v$	$50 + 0{,}02 \cdot l_v$	
	ϕ ≥ 25	$60 + 0{,}08 \cdot l_v \geq 2 \cdot \phi$	$60 + 0{,}02 \cdot l_v \geq 2 \cdot \phi$	
Diamond coring with roughening with Hilti Roughening tool TE-YRT **(RT)**	ϕ < 25	$30 + 0{,}06 \cdot l_v \geq 2 \cdot \phi$	$30 + 0{,}02 \cdot l_v \geq 2 \cdot \phi$	
	ϕ ≥ 25	$40 + 0{,}06 \cdot l_v \geq 2 \cdot \phi$	$40 + 0{,}02 \cdot l_v \geq 2 \cdot \phi$	

Drilling and cleaning diameters

Rebar [mm]	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
	d_0 [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	32
ϕ25	32	32	32	32	32	
ϕ26	35	-	35	35	35	
ϕ28	35	-	35	35	35	
ϕ30	-	-	35	-	35	
	37	-	-	-	37	
ϕ32	40	-	40	-	40	

a) Both given values can be used / Maximum installation length l=250 mm.

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

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

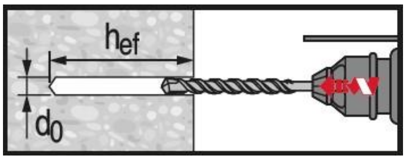
Rebar	Dispenser	
	HDM 330, HDM 500	HDE 500
	Concrete temp. ≥ -10°C	Concrete temp. ≥ 0°C
	$\ell_{v,max}$ [mm]	$\ell_{v,max}$ [mm]
ϕ8 - ϕ32	700	1000

Setting instructions

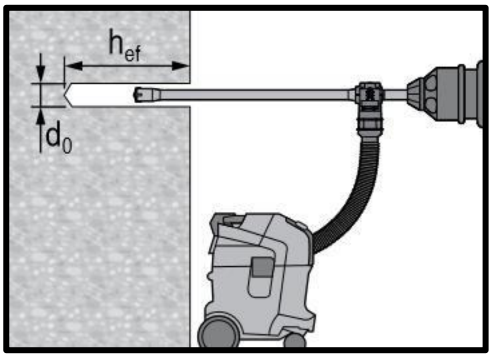
***For detailed information on installation see instruction for use given with the package of the product.**

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-R V3.

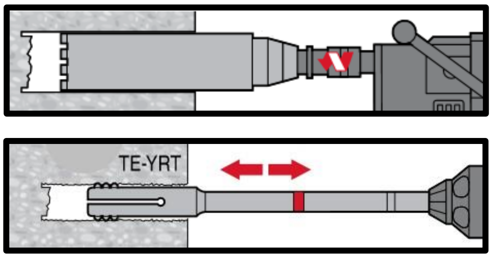


Hammer drilled hole (HD)

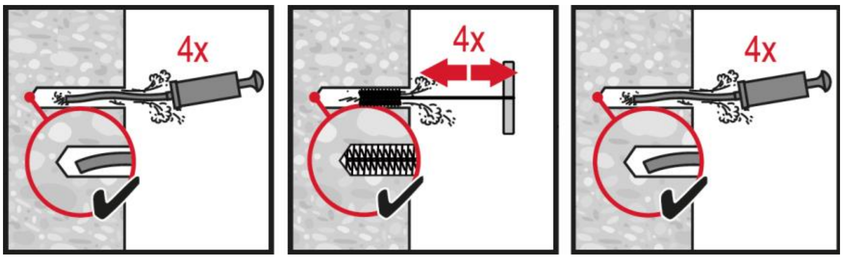


Hammer drilled hole with Hollow Drilled Bit (HDB)

No cleaning required

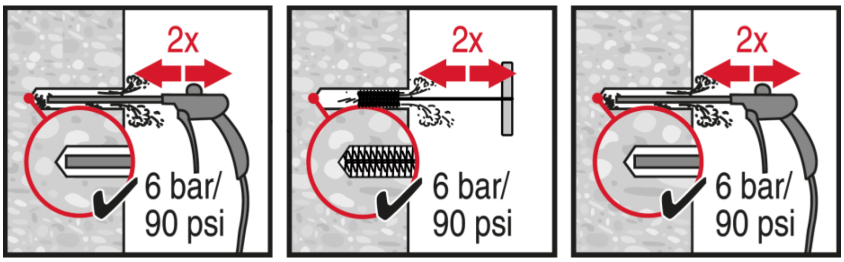


Diamond Drilling + Roughening Tool (DD+RT)



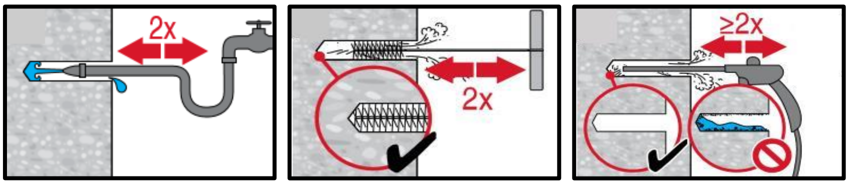
Hammer drilling:

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



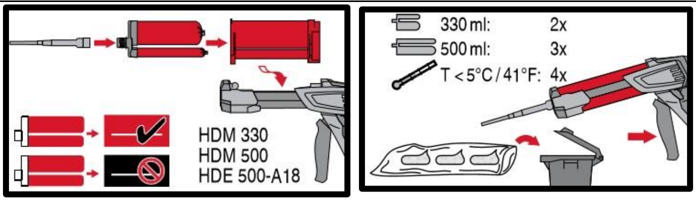
Hammer drilling:

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

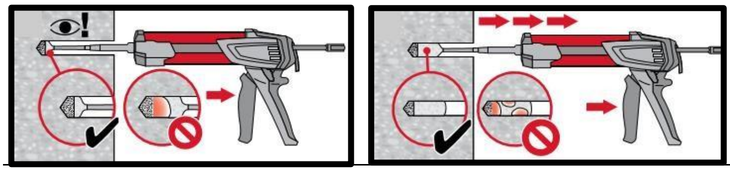


Diamond cored holes with Hilti roughening tool:

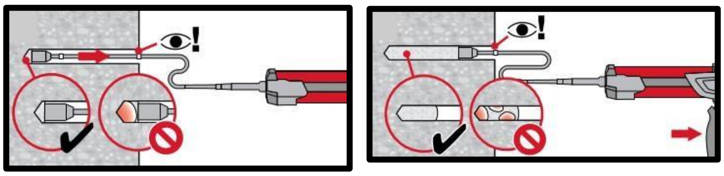
For all drill hole diameters d_0 and drill hole depths h_0.



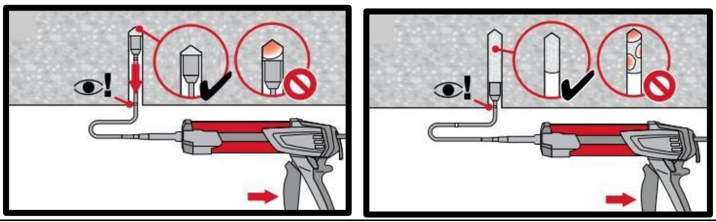
Injection system preparation.



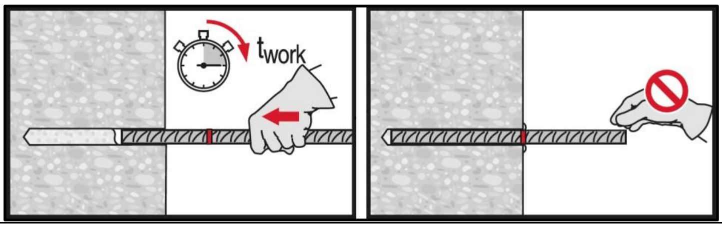
Injection method for drill hole depth h_{ef} ≤ 250 mm.



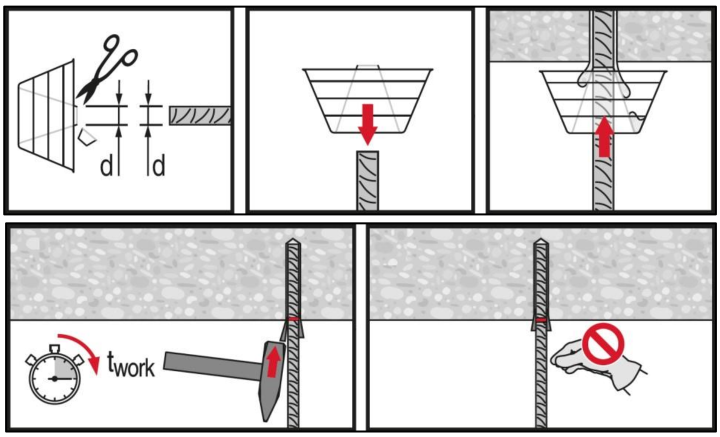
Injection method for drill hole depth h_{ef} > 250mm.



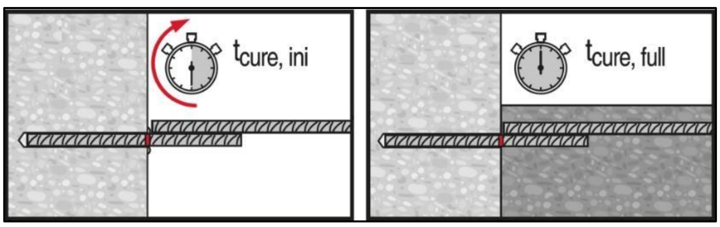
Injection method for overhead application.



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}".