HIT-RE 500 V4
INJECTION MORTAR

Technical Data Sheet

Update: August-21

HIT-RE 500 V4 injection mortar

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

Injection mortar system

Foil pack: HIT-RE 500 V4

(available in 330, 500 and 1400 ml cartridges)

Rebar B500

(ϕ8 - ϕ40)

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 non-cracked and cracked concrete C 20/25 to C 50/60
- ETA approval for seismic performance category C1
- Hilti Technical Data for service life of 100 years
- High loading capacity
- Suitable for dry and water saturated concrete
- Hilti Technical Data for under water application
- Long working time to allow installation of big diameters and/or deep embedment depths even at higher temperature
- Cures down to -5 °C

Base material

Concrete (non-cracked)

Concrete (cracked)

Dry concrete

Wet concrete

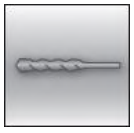
Load conditions

Static/ quasi-static

Seismic, ETA-C1

Service life 100y, Hilti Tech Data

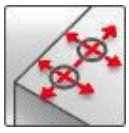
Installation conditions



Hammer drilling

Diamond coring

Hilti **SafeSet** technology



Small edge distance and spacing

Other informations

European Technical Assessment

CE conformity

PROFIS design Software

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical Assessment[a)]	CSTB, Marne la Vallée	ETA-20/0541 / 2020-11-21

a) All data given in this section according to ETA-20/0541 issue 2020-11-21 (if not stated otherwise).

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
- Rebar B500
- Base material thickness and one typical embedment depth, as specified in the table
- Concrete C 20/25
- Service life: 50 years
- Temperature range I: -40 °C to +40 °C
  (min. base material temperature -40°C, max. long/short term base material temperature: +24°C/40°C)
- Short term loading. For long term loading apply ψ_{sus} acc. to EN 1992-4
  Hammer drilled holes, hammer drilled holes with hollow drill bit and diamond cored holes with Hilti roughening tool: ψ^0_{sus} = 0,88; diamond cored holes: ψ^0_{sus} = 0,89

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

Rebar size		ETA-20/0541, issued 2020-11-21										Hilti tech. data	
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32	ϕ36	ϕ40
Typ. embed. depth	[mm]	80	90	110	125	125	170	210	270	270	300	330	360
Base m. thickness	[mm]	110	120	142	161	165	220	274	340	344	380	420	470

For hammer drilled holes, hammer drilled holes with hollow drill bit[1)] and diamond cored with Hilti roughening tool TE-YRT [2)]:

Characteristic resistance

Rebar size		ETA-20/0541, issued 2020-11-21										Hilti tech. data	
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32	ϕ36	ϕ40
Non-cracked concrete													
Tension N_{Rk}	[kN]	20,1	42,4	*62,0*	76,9	76,9	122	167	244	244	286	330	376
Shear V_{Rk}		*14,0*	*22,0*	*31,0*	*42,0*	*55,0*	*86,0*	*135*	*169*	*194*	*221*	*280*	*346*
Cracked concrete													
Tension N_{Rk}	[kN]	11,1	28,3	44,4	53,8	53,8	85,3	117	171	171	200	-	-
Shear V_{Rk}		*14,0*	*22,0*	*31,0*	*42,0*	*55,0*	*86,0*	*135*	*169*	*194*	*221*	-	-

1) Hilti hollow drill bit available for element size ϕ10-ϕ28.
2) Hilti Roughening tools are available for element size ϕ14-ϕ28.

Design resistance

Rebar size		ETA-20/0541, issued 2020-11-21										Hilti tech. data	
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32	ϕ36	ϕ40
Non-cracked concrete													
Tension N_{Rd}	[kN]	13,4	28,0	37,8	45,8	45,8	72,7	99,8	146	146	170	164	187
Shear V_{Rd}		*9,3*	*14,7*	*20,7*	*28,0*	*36,7*	*57,3*	*90,0*	*113*	*129*	*147*	*187*	*231*
Cracked concrete													
Tension N_{Rd}	[kN]	7,4	18,8	26,5	32,1	32,1	50,9	69,9	102	102	119	-	-
Shear V_{Rd}		*9,3*	*14,7*	*20,7*	*28,0*	*36,7*	*57,3*	*90,0*	*113*	*129*	*147*	-	-

Recommended loads[a)]

Rebar size		ETA-20/0541, issued 2020-11-21										Hilti tech. data	
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32	ϕ36	ϕ40
Non-cracked concrete													
Tension N_{rec}	[kN]	9,6	20,0	27,0	32,7	32,7	51,9	71,3	104	104	122	117	133
Shear V_{rec}		*6,7*	*10,5*	*14,8*	*20,0*	*26,2*	*41*	*64,3*	*80,5*	*92,4*	*105*	*133*	*165*
Cracked concrete													
Tension N_{rec}	[kN]	5,3	13,5	18,9	22,9	22,9	36,3	49,9	72,7	72,7	85,2	-	-
Shear V_{rec}		*6,7*	*10,5*	*14,8*	*20,0*	*26,2*	*41*	*64,3*	*80,5*	*92,4*	*105*	-	-

a) With overall partial safety factor for action γ=1,4. The partial safety factors for action depend on the type of loading and shall be taken from national regulations.

For diamond cored holes:

Characteristic resistance

Rebar size		ETA-20/0541, issued 2020-11-21									
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32
Non-cracked concrete											
Tension N_{Rk}	[kN]	19,1	26,9	39,4	52,2	59,7	102	157	238	244	286
Shear V_{Rk}	[kN]	*14,0*	*22,0*	*31,0*	*42,0*	*55,0*	*86,0*	*135*	*169*	*194*	*221*

Design resistance

Rebar size		ETA-20/0541, issued 2020-11-21									
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32
Non-cracked concrete											
Tension N_{Rd}	[kN]	10,6	14,9	21,9	29,0	28,4	48,3	71,3	104	104	128
Shear V_{Rd}	[kN]	*9,3*	*14,7*	*20,7*	*28,0*	*36,7*	*57,3*	*90,0*	*113*	*129*	*147*

Recommended loads[a)]

Rebar size		ETA-20/0541, issued 2020-11-21									
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32
Non-cracked concrete											
Tension N_{krec}	[kN]	7,6	10,7	15,6	20,7	20,3	34,5	50,9	74,2	74,2	86,9
Shear $_{krec}$	[kN]	*6,7*	*10,5*	*14,8*	*20,0*	*26,2*	*41*	*64,3*	*80,5*	*92,4*	*105*

a) With overall partial safety factor for action γ=1,4. The partial safety factors for action depend on the type of loading and shall be taken from national regulations.

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
- Rebar B500
- Base material thickness and one typical embedment depth, as specified in the table
- Concrete C 20/25
- Service life: 100 years
- Temperature range I: -40 °C to +40 °C
  (min. base material temperature -40 °C, max. long/short term base material temperature: +24 °C/40 °C)
- Short term loading. For long term loading apply ψ_{sus} acc. to EN 1992-4.

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

Rebar size		Hilti technical data									
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32
Typ. embed. depth	[mm]	80	90	110	125	125	170	210	270	270	300
Base m. thickness	[mm]	110	120	142	161	165	220	274	340	344	380

For hammer drilled holes, hammer drilled holes with hollow drill bit[1)] and diamond cored with Hilti roughening tool TE-YRT[2)]:

Characteristic resistance

Rebar size		Hilti technical data									
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32
Non-cracked concrete											
Tension N_{Rk}	[kN]	20,1	42,4	*62,0*	76,9	76,9	122	167	244	244	286
Shear V_{Rk}	[kN]	*14,0*	*22,0*	*31,0*	*42,0*	*55,0*	*86,0*	*135*	*169*	*194*	*221*
Cracked concrete											
Tension N_{Rk}	[kN]	5,0	21,1	33,2	44,0	50,3	80,1	117	171	171	200
Shear V_{Rk}	[kN]	10,1	*22,0*	*31,0*	*42,0*	*55,0*	*86,0*	*135*	*169*	*194*	*221*

1) Hilti hollow drill bit available for element size ϕ10-ϕ28.

2) Hilti Roughening tools are available for element size ϕ14-ϕ28.

Design resistance

Rebar size		Hilti technical data									
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32
Non-cracked concrete											
Tension N_{Rd}	[kN]	13,4	28,0	37,8	45,8	45,8	72,7	99,8	146	146	170
Shear V_{Rd}		*9,3*	*14,7*	*20,7*	*28,0*	*36,7*	*57,3*	*90,0*	*113*	*129*	*147*
Cracked concrete											
Tension N_{Rd}	[kN]	3,4	14,1	22,1	29,3	32,1	50,9	69,9	102	102	119
Shear V_{Rd}		6,7	*14,7*	*20,7*	*28,0*	*36,7*	*57,3*	*90,0*	*113*	*129*	*147*

Recommended load[a)]

Rebar size		Hilti technical data									
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32
Non-cracked concrete											
Tension N_{rec}	[kN]	9,6	20,0	27,0	32,7	32,7	51,9	71,3	104	104	122
Shear V_{rec}		*6,7*	*10,5*	*14,8*	*20,0*	*26,2*	*41*	*64,3*	*80,5*	*92,4*	*105*
Cracked concrete											
Tension N_{rec}	[kN]	2,4	10,1	15,8	20,9	22,9	36,3	49,9	72,7	72,7	85,2
Shear V_{rec}		4,8	*10,5*	*14,8*	*20,0*	*26,2*	*41*	*64,3*	*80,5*	*92,4*	*105*

a) With overall partial safety factor for action γ=1,4. The partial safety factors for action depend on the type of loading and shall be taken from national regulations.

For diamond cored holes:

Characteristic resistance

Rebar size		Hilti technical data									
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32
Non-cracked concrete											
Tension N_{Rk}	[kN]	18,1	25,4	37,3	49,5	56,5	96,1	148	226	242	286
Shear V_{Rk}		*14,0*	*22,0*	*31,0*	*42,0*	*55,0*	*86,0*	*135*	*169*	*194*	*221*

Design resistance

Rebar size		Hilti technical data									
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32
Non-cracked concrete											
Tension N_{Rd}	[kN]	10,1	14,1	20,7	27,5	26,9	45,8	70,7	104	104	122
Shear V_{Rd}		*9,3*	*14,7*	*20,7*	*28,0*	*36,7*	*57,3*	*90,0*	*113*	*129*	*147*

Recommended load[a)]

Rebar size		Hilti technical data									
		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32
Non-cracked concrete											
Tension N_{rec}	[kN]	7,2	10,1	14,8	19,6	19,2	32,7	50,5	74,2	74,2	86,9
Shear V_{rec}		*6,7*	*10,5*	*14,8*	*20,0*	*26,2*	*41*	*64,3*	*80,5*	*92,4*	*105*

a) With overall partial safety factor for action γ=1,4. The partial safety factors for action depend on the type of loading and shall be taken from national regulations.

Seismic loading (for a single anchor)

All data in this section applies to:

- Correct setting (see setting)
- No edge distance and spacing influence
- *Steel* failure
- Rebar B500
- Base material thickness and one typical embedment depth, as specified in the table
- Concrete C 20/25
- 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

		ETA-20/0541, issued 2020-11-21									
Rebar size		**ϕ8**	**ϕ10**	**ϕ12**	**ϕ14**	**ϕ16**	**ϕ20**	**ϕ25**	**ϕ28**	**ϕ30**	**ϕ32**
Typical embedment depth	[mm]	-	90	110	125	125	170	210	270	270	300
Base material thickness	[mm]	-	120	142	161	165	220	274	340	344	380

For hammer drilled holes, hammer drilled holes with hollow drill bit[1] and diamond cored with Hilti roughening tool TE-YRT[2]:

Characteristic resistance in case of seismic performance category C1

		ETA-20/0541, issued 2020-11-21									
Rebar size		**ϕ8**	**ϕ10**	**ϕ12**	**ϕ14**	**ϕ16**	**ϕ20**	**ϕ25**	**ϕ28**	**ϕ30**	**ϕ32**
Tension $N_{Rk,seis}$	[kN]	-	25,7	37,8	45,7	45,7	72,5	99,6	145	145	170
Shear $V_{Rk,seis}$		-	*15,0*	*22,0*	*29,0*	*39,0*	*60,0*	*95,0*	*118*	*136*	*155*

1) Hilti hollow drill bit available for element size ϕ10-ϕ28.
2) Roughening tools are available for element size ϕ14-ϕ28.

Design resistance in case of seismic performance category C1

		ETA-20/0541, issued 2020-11-21									
Rebar size		**ϕ8**	**ϕ10**	**ϕ12**	**ϕ14**	**ϕ16**	**ϕ20**	**ϕ25**	**ϕ28**	**ϕ30**	**ϕ32**
Tension $N_{Rd,seis}$	[kN]	-	17,2	25,2	30,5	30,5	48,4	66,4	96,8	96,8	113
Shear $V_{Rd,seis}$		-	*10,0*	*14,7*	*19,3*	*26,0*	*40,0*	*63,3*	*78,7*	*90,7*	*103*

Materials

Mechanical properties

Rebar size		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ20	ϕ25	ϕ28	ϕ30	ϕ32	ϕ36	ϕ40
Nominal tensile strength f_{uk}	[N/mm²]	550	550	550	550	550	550	550	550	550	550	550	550
Yield strength f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500	500	500	500	500
Stressed cross-section A_s	[mm²]	50,3	78,5	113	154	201	314	491	616	707	804	1018	1257
Moment of resistance W	[mm³]	50,3	98,2	170	269	402	785	1534	2155	2650	3217	4580	6283

Material quality

Part	Material
Rebar EN 1992-1-1:2004 and AC:2010	Bars and de-coiled rods class B or C with f_{yk} and k according to NDP or NCL of EN 1992-1-1/ NA:2013 $f_{uk} = f_{tk} = k \cdot f_{yk}$

Setting information

Installation temperature range:
-5 °C to +40 °C

Service temperature range
Hilti HIT-RE 500 V4 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 +55 °C	+43 °C	+55 °C
Temperature range III	-40 °C to +75 °C	+55 °C	+75 °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.

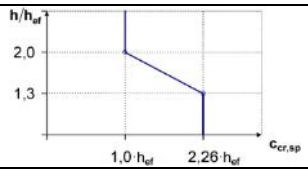
Working time and curing time

Temperature of the base material T[2)]	Max. working time in which rebar can be inserted and adjusted t_{gel}	Min. curing time before rebar can be fully loaded t_{cure}[1)]
-5 °C ≤ T_{BM} < -1 °C	2 h	168 h
0 °C ≤ T_{BM} < 4 °C	2 h	48 h
5 °C ≤ T_{BM} < 9 °C	2 h	24 h
10 °C ≤ T_{BM} < 14 °C	1,5 h	16 h
15 °C ≤ T_{BM} < 19 °C	1 h	12 h
20 °C ≤ T_{BM} < 24 °C	30 min	7 h
25 °C ≤ T_{BM} < 29 °C	20 min	6 h
30 °C ≤ T_{BM} < 34 °C	15 min	5 h
35 °C ≤ T_{BM} < 39 °C	12 min	4,5 h
T_{BM} = 40 °C	10 min	4 h

1) The curing time data are valid for dry base material only. In wet base material, the curing times must be doubled.
2) The minimum temperature of the foil pack is +5° C.

Setting details

			ETA-20/0541, issued 2020-11-21										Hilti tech. data	
Rebar size			**ϕ8**	**ϕ10**	**ϕ12**		**ϕ14**	**ϕ16**	**ϕ20**	**ϕ25**	**ϕ28**	**ϕ30**	**ϕ32**	**ϕ36**	**ϕ40**
Nominal diameter of drill bit	d_0	[mm]	10 12 [a)]	12 14[a)]	14[a)]	16[a)]	18	20	25	30 32[a)]	35	37	40	45	55
Effective anchorage and drill hole depth range [b)]	$h_{ef,min}$	[mm]	60	60	70	70	75	80	90	100	112	120	128	144	160
	$h_{ef,max}$	[mm]	160	200	240	240	280	320	400	500	560	600	640	720	800
Min. base material thickness	h_{min}	[mm]	hef +30mm ≥ 100 mm			h_{ef} + 2 d_0									
Min. spacing	s_{min}	[mm]	40	50	60	60	70	80	100	125	140	150	160	180	200
Min. edge distance	c_{min}	[mm]	40	45	45	45	50	50	65	70	75	80	80	180	200
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 h_{ef} for h / h_{ef} ≥ 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} ≤ 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}												

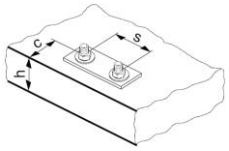


For spacing (edge distance) smaller than critical spacing (critical edge distance) the design loads have to be reduced.

a) both given values for drill bit diameter can be used

b) $h_{ef,min} \le h_{ef} \le h_{ef,max}$ (h_{ef}: embedment depth)

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



Installation equipment

Rebar size	**ϕ8**	**ϕ10**	**ϕ12**	**ϕ14**	**ϕ16**	**ϕ20**	**ϕ25**	**ϕ28**	**ϕ30**	**ϕ32**	**ϕ36**	**ϕ40**
Rotary hammer	TE 2 (-A) – TE 40(-A)						TE40 – TE80					
Diamond coring tools	DD EC-1, DD 100 … DD 160										-	
Other tools	Compressed air gun, brush, hollow drill bit, roughening tool, dispenser, piston plug											