PRODUCT TECHNICAL DATASHEET

HIT-RE 500 V4 INJECTION MORTAR

Concrete-to-concrete
Update: Dec-25

HIT-RE 500 V4 injection mortar

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

Injection mortar system		Benefits
	HIT-RE 500 V4 (Available in 330-, 500- and 1400-ml Foil pack)	- SPEC2SITE faster, simpler and safer borehole drilling method using either Hilti hollow drill bit for hammer drilling or Roughening tool for diamond coring. - Allows the design of post-installed, moment-resisting reinforced concrete connections under static loading conditions without using a splice configuration according to TR 069 - Suitable for concrete C 12/15 to C 50/60 - ETA Data for 100 and/or 120 years working life - High loading capacity - Suitable for dry and water saturated concrete - Non-corrosive to rebar elements - Long working time at elevated temperatures - Cures down to -5 °C concrete temperature. - Odourless epoxy - Higher bond-splitting performance (EOTA TR 069) makes more optimized embedment depths. - Fire loading requirements up to 240 min as per EOTA TR 069
	Rebar (ϕ8 - ϕ40)	

Application condition

Base material / Load conditions

Base material		Load conditions			
Concrete (uncracked)	Concrete (cracked)	Static/ quasi-static	Seismic	Fatigue	Fire resistance

Installation conditions / Other information

Installation conditions							Other information		
Hammer drilling	Hollow drill bit drilling	Diamond cored	Diamond coring with roughening	Dry	Water saturated	Water-filled boreholes	ETA Working life 100/120 years	PROFIS Engineering design Software	Concrete-to-concrete Handbook

Linked Approvals/Certificates and Instructions for use.

Approvals / Certificates

Approval no.	Application / Loading condition	Working life / Design method	Authority / Laboratory	Date of issue	Date of expiry
ETA-20/0540	Static and quasi-static / Seismic / Fire	50 and/or 100 years Eurocode	CSTB, Marne la Vallée	18-08-2025	-
ETA-20/0539	Static and quasi-static / Seismic	50 and/or 100 years EOTA TR 069	CSTB, Marne la Vallée	18-08-2025	-
ETA-25/0448	Static and quasi-static / Seismic / Fire	120 years Eurocode	CSTB, Marne la Vallée	17-07-2025	-
ETA-25/0344	Fire	50 and/or 100 years EOTA TR 069	CSTB, Marne la Vallée	22-08-2025	
Z-21.8-2123	Fatigue loading	German National Approval	DIBt, Berlin	28-01-2021	28-01-2026

Instructions for use(IFU)

Material				
Injection mortar	IFU Hilti HIT-RE 500 V4 (330/500 ml)			IFU Hilti HIT-RE 500 V4 (1400 ml)
Dispenser	IFU HDM	IFU HDE 500-22	IFU HDE 500-A12	IFU HIT-P8000D

Link to Hilti Webpage

Injection mortars / Dispenser				
Hilti HIT-RE 500 V4	HDE 500-22	HDE 500-A12	HDM 500	P8000D

Mechanical properties and dimensions rebar

Mechanical properties and dimensions of the rebars are standardized and can be taken from the ETA.

Material quality

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

Static and quasi-static loading as per ETA 20/0540 / ETA-25/0448 . Design according to EN 1992-1-1

All data in this section applies to:

- According to EN 1992-1-1 for good bond conditions. For all other bond conditions multiply the values by 0,7
- Hammer drilling, Hammer drilling with Hilti hollow drill bit (TE-CD, TE-YD), Compressed air drilling
- Diamond coring (dry) ,Diamond coring with roughening with Hilti Roughening tool TE-YRT
- Design values of the bond strength for a working life of 50 /100 / 120 years.

For specific design cases refer to PROFIS Engineering

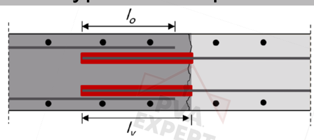
Design bond strength in N/mm² for above methods of drilling techniques according to mortar IFU & ETA-20/0540 / ETA-25/0448

Rebar size	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
[mm]	$f_{bd,PIR}$ [N/mm²]								
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	2,6	2,9	3,3	3,6	3,9	4,2
ϕ36	1,6	1,9	2,2	2,6	2,9	3,2	3,5	3,8	4,1
ϕ40	1,5	1,8	2,1	2,5	2,8	3,1	3,4	3,7	3,9

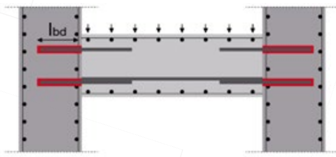
Minimum anchorage length and minimum lap length

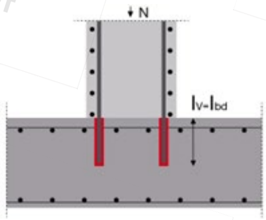
Post-installed rebar applications as per EN 1992-1-1	Typical examples

Lap splice applications



End anchorage applications –
simply supported / compression load-only connections

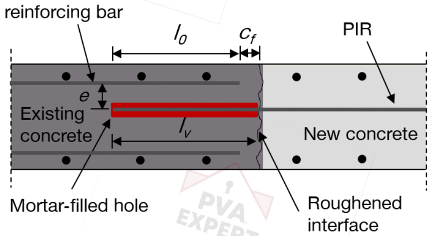


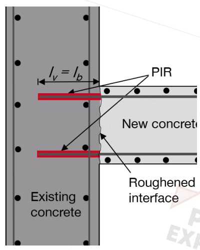


The minimum anchorage length $\ell_{b,min}$ and the minimum lap length $\ell_{0,min}$ according for applications designed as per EN 1992-1-1 shall be multiplied by relevant **Amplification factor α_{lb}** in the table below.

Amplification factor α_{lb} for the min. anchorage length and min. lap length according to mortar IFU & ETA-20/0540 / ETA-25/0448.

Rebar size	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
[mm]	α_{lb} [-]								
ϕ8 - ϕ40	1,0								





Refer to the table for data on dispensers and corresponding maximum embedment depth $\ell_{v,max}$ due to mortar installation limitations

HILTI

Anchorage length and lap length for characteristic steel strength f_{yk} = 500 N/mm² for good bond conditions

$l_{b,min}$	Minimum anchorage length for simply supported connections under tension loading assuming $\sigma_{sd} = f_{yd}$
$l_{0,min}$	Minimum anchorage length for overlap splice joint, assuming $\sigma_{sd} = f_{yd}$
$l_{bd,y}$	Anchorage length for simply supported connections (design for yielding)
$l_{0,PIR,y}$	Anchorage length for overlap joint (design for yielding)
α_2	Coefficient of Concrete Cover

For specific design cases refer to PROFIS Engineering

For detailed technical contents, refer to Concrete-to-Concrete connections Handbook

Rebar-size [mm]	Concrete class	Design Resistance (Yielding) [kN]	$l_{b,min}$ [mm]	$l_{0,min}$ [mm]	$l_{bd,y}$ (α_2=1) [mm]	$l_{bd,y}$ (α_2=0,7) [mm]	$l_{0,PIR,y}$ (α_2=1) [mm]	$l_{0,PIR,y}$ (α_2=0,7) [mm]
ϕ8	C20/25	21,9	113	200	378	265	567	398
	C50/60		100	200	202	142	303	213
ϕ10	C20/25	34,1	142	213	473	331	710	497
	C50/60		100	200	253	177	380	266
ϕ12	C20/25	49,2	170	255	567	397	851	596
	C50/60		120	200	303	212	455	318
ϕ13	C20/25	57,2	184	277	615	430	922	645
	C50/60		130	200	329	230	493	345
ϕ14	C20/25	66,9	198	298	662	463	993	695
	C50/60		140	210	354	248	531	372
ϕ16	C20/25	87,4	227	340	756	529	1134	794
	C50/60		160	240	404	283	606	425
ϕ18	C20/25	110,6	255	383	851	596	1277	894
	C50/60		180	270	455	319	683	478
ϕ19	C20/25	123,3	270	404	898	629	1348	943
	C50/60		190	285	481	336	721	505
ϕ20	C20/25	136,6	284	426	945	662	1418	993
	C50/60		200	300	506	354	759	531
ϕ22	C20/25	165,3	312	468	1040	728	1560	1092
	C50/60		220	330	556	389	835	584
ϕ24	C20/25	196,7	340	511	1135	794	1702	1192
	C50/60		240	360	607	425	910	637
ϕ25	C20/25	213,4	355	532	1182	827	1773	1241
	C50/60		250	375	632	443	948	664
ϕ26	C20/25	230,8	369	553	1229	861	1844	1291
	C50/60		260	390	658	460	986	690
ϕ28	C20/25	267,7	397	596	1323	926	1985	1389
	C50/60		280	420	708	495	1062	743
ϕ29	C20/25	287,2	411	617	1371	960	2057	1440
	C50/60		290	435	733	513	1100	770
ϕ30	C20/25	307,3	425	638	1418	992	2127	1488
	C50/60		300	450	758	531	1137	797
ϕ32	C20/25	349,7	454	681	1512	1059	2268	1589
	C50/60		320	480	809	566	1214	849

ϕ34	C20/25	394,7	482	723	1608	1125	2411	1688
	C50/60		340	510	880	616	1321	924
ϕ36	C20/25	442,6	534	801	1779	1245	2669	1868
	C50/60		360	540	954	668	1431	1002
ϕ40	C20/25	546,4	621	932	2070	1449	3105	2174
	C50/60		400	600	1115	780	1673	1170

Seismic loading based on ETA-20/0540 / ETA-25/0448. Seismic design according to EN 1998-1

All data in this section applies to:

- According to EN 1992-1-1 for good bond conditions. For all other bond conditions multiply the values by 0,7
- Hammer drilling, Hammer drilling with Hilti hollow drill bit (TE-CD, TE-YD),Compressed air drilling
- Diamond coring (dry),Diamond coring with roughening with Hilti Roughening tool TE-YRT
- Design values of the bond strength for a working life of 50 /100 / 120 years.

For specific design cases refer to PROFIS Engineering

For detailed technical contents, refer to Concrete-to-Concrete connections Handbook

Design bond strength in N/mm² for good bond conditions for above methods of drilling techniques according to mortar IFU & ETA-20/0540 / ETA-25/0448

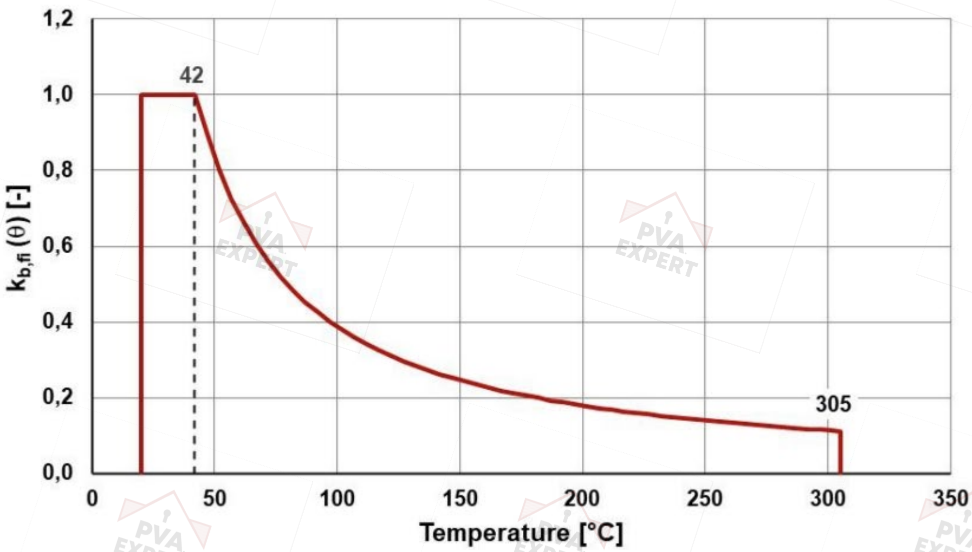
Rebar Size	Concrete class							
	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
[mm]	$f_{bd,PIR,seis}$ [N/mm²]							
ϕ8 - ϕ32	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
ϕ34	2,0	2,3	2,6	2,9	3,3	3,6	3,9	4,2
ϕ36	1,9	2,2	2,6	2,9	3,2	3,5	3,8	4,1
ϕ40	1,8	2,1	2,5	2,8	3,1	3,4	3,7	3,9

Fire resistance based on ETA-20/0540 / ETA-25/0448. Design 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 $f_{bd,fi}$.
design working life of 50 /100 / 120 years

For specific design cases refer to PROFIS Engineering

Temperature reduction factor $k_{b,fi}(\theta)$ for concrete class C20/25 for good bond conditions



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

$$f_{bd,fi} = k_{b,fi}(\theta) \cdot f_{bd,PIR} \cdot \frac{\gamma_c}{\gamma_{M,fi}}$$

With θ ≤305°C: $k_{bfi}(\theta) = \frac{651{,}24 \cdot \theta^{-1{,}115}}{f_{bd,PIR} \cdot 4{,}3} \leq 1{,}0$

$\theta > 305°C$ $k_{fi}(\theta) = 0{,}0$

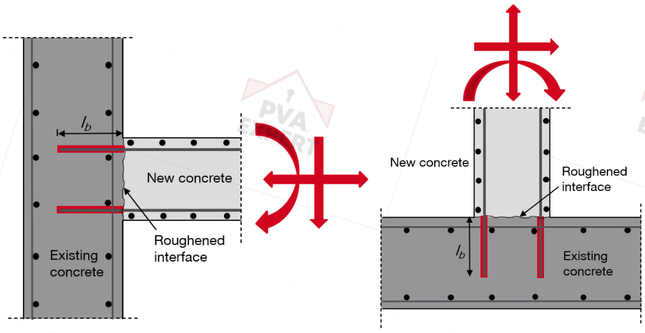
$f_{bd,fi}$	=	Design value of the bond resistance in case of fire in N/mm²
θ	=	Temperature in °C in the mortar layer
$k_{b,fi}(\theta)$	=	Reduction factor under fire exposure
$f_{bd,PIR}$	=	Design value of the bond resistance in N/mm² in cold condition considering the concrete classes, rebar diameter, the drilling method, and the bond conditions according to EN 1992-1-1
γ_c	=	Partial safety factor according to EN 1992-1-1
$\gamma_{M,fi}$	=	Partial safety factor according to EN 1992-1-2

Bond strength $f_{bd,fi}$ in N/mm² for fire design for concrete classes C20/25 to C50/60

Rebar Temperature	50°C	100°C	150°C	200°C	250°C	305°C (θ_{max})
$f_{bd,fi}$ [N/mm²]	2,90	1,34	0,85	0,62	0,48	0,39

Static and quasi-static loading as per ETA 20/0539. Design according to EOTA TR 069

For post-installed rebar solutions beyond provisions of EN 1992-1-1, such as end-anchorage applications with bi-axial and uni-axial bending and shear loads with compression or tension forces without the limitation of using strut-and-tie design approach can be designed using EOTA TR 069



Anchorage length $l_{bd,y}$ as per EOTA TR 069 design provisions (Improved bond-splitting failure mode) for characteristic steel strength f_{yk}=500 N/mm^2 for good bond conditions

All data in this section applies to

- Hammer drilling,
- Effect of transverse reinforcement is not considered
- Effect of sustained loads are not considered
- Minimum spacing between rebars considered as 100 mm
- Minimum anchorage length $\mathbf{l_{b,min}}$ shall apply as per EN 1992-1-1
- The maximum recommended installation length shall be applicable
- Concrete breakout resistance is not considered (it shall be calculated depending on the boundary conditions of the actual concrete application)
- In-service temperature range I (min. base material temperature -40°C, max. long/short term base material temperature: +24°C/+40°C)
- Material and installation factors: γ_{Ms}=1,15 , γ_{Mc}=1,5 , γ_{inst}=1,0
- Minimum concrete cover shall apply as per EOTA TR 069 and EN 1992-1-1
- Working life of 50 years

For specific design cases refer to PROFIS Engineering

Rebar-size	Concrete class	Design Resistance (Yielding)	Cracked concrete bond resistance as per ETA			Uncracked concrete bond resistance as per ETA		
mm		[kN]	$l_{bd,y}$ (c_d=3ϕ)) [mm]	$l_{bd,y}$ (c_d=5ϕ) [mm]	$l_{bd,y}$ (c_d=8ϕ) [mm]	$l_{bd,y}$ (c_d=3ϕ) [mm]	$l_{bd,y}$ (c_d=5ϕ) [mm]	$l_{bd,y}$ (c_d=8ϕ) [mm]
ϕ8	**C20/25**	21,9	-	149	131	-	149	131
	C50/60		-	119	119	-	119	119
ϕ10	**C20/25**	34,1	-	209	113	-	209	109
	C50/60		-	108	103	-	108	100
ϕ12	**C20/25**	49,2	-	252	145	-	252	131
	C50/60		-	132	132	-	132	120
ϕ13	**C20/25**	57,7	-	288	146	-	288	130
	C50/60		-	148	146	-	148	130
ϕ14	**C20/25**	66,9	759	325	179	759	325	152
	C50/60		390	168	163	390	168	140
ϕ16	**C20/25**	87,4	970	407	212	970	407	183
	C50/60		500	210	193	500	210	160

ϕ18	**C20/25**	110,6	1180	495	244	1180	495	223
	C50/60		608	255	244	608	255	191
ϕ19	**C20/25**	123,3	1295	543	265	1295	543	245
	C50/60		666	280	265	666	280	202
ϕ20	**C20/25**	136,6	1410	592	307	1410	592	266
	C50/60		726	305	279	726	305	212
ϕ22	**C20/25**	165,3	1655	695	320	1655	695	313
	C50/60		852	358	320	852	358	233
ϕ24	**C20/25**	196,7	1765	712	358	1765	712	310
	C50/60		907	367	358	907	367	255
ϕ25	**C20/25**	213,4	1940	794	416	1940	794	349
	C50/60		998	408	378	998	408	265
ϕ28	**C20/25**	267,7	2480	1040	480	2480	1040	468
	C50/60		1275	535	436	1275	535	297
ϕ29	**C20/25**	287.2	2627	1103	551	2627	1103	496
	C50/60		1352	568	501	1352	568	331
ϕ30	**C20/25**	307,3	2780	1167	570	2780	1167	525
	C50/60		1432	601	519	1432	601	342
ϕ32	**C20/25**	349,7	3100	1300	618	3100	1300	585
	C50/60		1595	670	561	1595	670	365
ϕ36	**C20/25**	442,6	3780	1585	718	3780	1585	713
	C50/60		1945	816	718	1945	816	445
ϕ40	**C20/25**	546,4	4505	1890	1070	4505	1890	850
	C50/60		2320	1070	1070	2320	973	539

The highlighted values exceed the maximum length given in ETA-20/0539 and IFU.

Seismic loading based on ETA-20/0539. Seismic design according EOTA TR 069

All data in this section applies to:

- Hammer drilling, Hammer drilling with Hilti hollow drill bit
- working life of 50 years

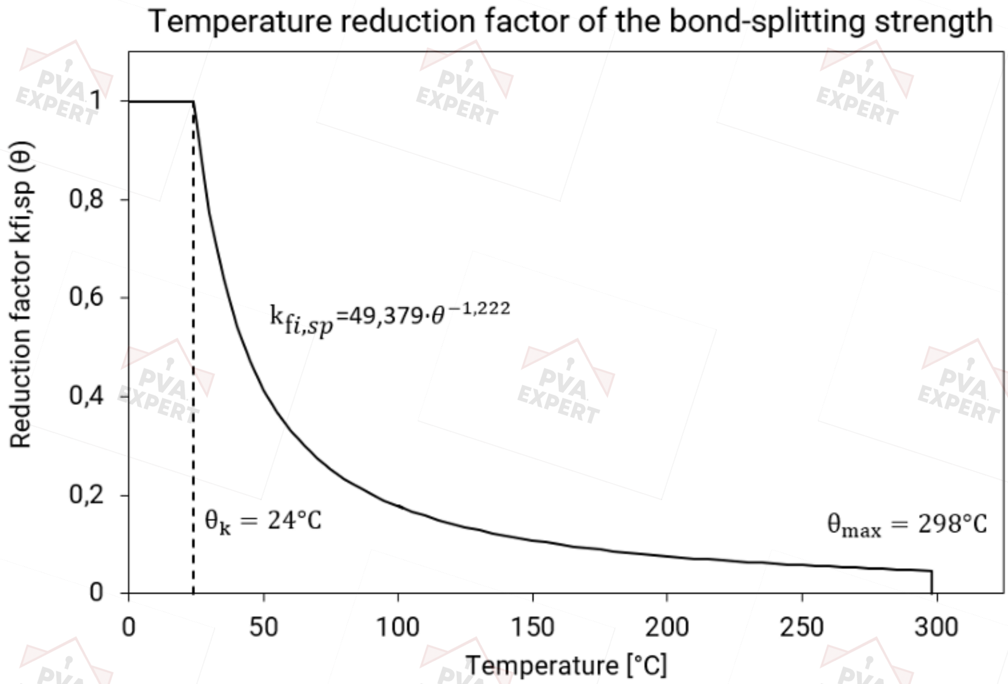
For specific design cases refer to PROFIS Engineering

Rebar Size		ϕ8	ϕ10	ϕ12	ϕ13	ϕ14	ϕ16	ϕ18	ϕ20	ϕ22	ϕ24	ϕ25	ϕ28	ϕ30	ϕ32	ϕ36	ϕ40
Pull-out failure																	
Reduction factor for pull-out resistance under seismic action $\alpha_{eq,p}$	[-]	0,61	0,83													0,65	
Influence of cracked concrete on bond resistance τ_{Rd}																	
Factor for influence of cracked concrete $\Omega_{cr,03}$	[-]	1,00	0,96	0,90	0,88	0,85	0,82	0,78	0,76	0,73	0,71	0,70	0,68	0,66	0,65	0,62	0,60
Factor for influence of cracked concrete $\Omega_{cr,05}$	[-]	0,79	0,81	0,82	0,83	0,84	0,82	0,78	0,76	0,73	0,71	0,70	0,68	0,66	0,65	0,62	0,60
Factor for influence of cracked concrete $\Omega_{cr,08}$	[-]	0,59	0,61	0,63	0,64	0,65	0,67	0,69	0,71	0,72	0,71	0,70	0,68	0,66	0,65	0,62	0,60
Bond-splitting failure																	
Reduction factor for bond-splitting resistance under seismic action $\alpha_{eq,sp}$	[-]	0,95															

Fire resistance based on ETA-25/0344. Design according to EOTA TR 069

Reduction factors under fire exposure for a working life of 50 and/or 100 years for concrete classes C20/25 to C50/60 for hammer drilling with compressed air cleaning.

For specific design cases refer to PROFIS Engineering



$\theta \leq 24$ °C: $k_{fi\,sp(\theta)} = 1{,}0$

With $24°C < \theta \leq 298$ °C: $k_{fi,sp(\theta)} = 49{,}379 \cdot \theta^{-1{,}222} \leq 1{,}0$

$\theta > 298$ °C $k_{fi,sp(\theta)} = 0{,}0$

θ = Temperature in °C in the mortar layer

$k_{fi,Sp\,(\theta)}$ = Reduction factor under fire exposure for bond-splitting resistance

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.

ETA-20/0540, ETA-25/0488

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

ETA-20/0539, ETA-25/0344

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 +55 °C	+43 °C	+55 °C
Temperature range III	-40 °C to +75 °C	+55 °C	+75 °C

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

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

Working time and curing time[1) 2)]

Temperature of the base material	Maximum working time	Initial curing time	Minimum curing time
T [2)]	t_{work}	$t_{cure,ini}$	t_{cure}
-5 °C to -1 °C	2 h	48 h	168 h
> -1 °C to 4 °C	2 h	24 h	48 h
> 5 °C to 9 °C	2 h	16 h	24 h
> 9 °C to 14 °C	1,5 h	12 h	16 h
> 14 °C to 19 °C	1 h	8 h	16 h
> 19 °C to 24 °C	30 min	4 h	7 h
> 24 °C to 29 °C	20 min	3,5 h	6 h
> 29 °C to 34 °C	15 min	3 h	5 h
> 34 °C to 39 °C	12 min	2 h	4,5 h
> 39 °C to 40 °C	10 min	2 h	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.

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

<table>
<tr><th rowspan="2">Rebar size</th><th>HDM 330, HDM 500</th><th>HDE 500</th><th>HIT-P8000D</th></tr>
<tr><th colspan="3">$\ell_{v,max}$ [mm]</th></tr>
<tr><td>ϕ8</td><td rowspan="6">1000</td><td>1000</td><td>-</td></tr>
<tr><td>ϕ10</td><td>1000</td><td>-</td></tr>
<tr><td>ϕ12</td><td>1200</td><td>1200</td></tr>
<tr><td>ϕ13</td><td>1300</td><td>1300</td></tr>
<tr><td>ϕ14</td><td>1400</td><td>1400</td></tr>
<tr><td>ϕ16</td><td>1600</td><td>1600</td></tr>
<tr><td>ϕ18</td><td>700</td><td>1800</td><td>1800</td></tr>
<tr><td>ϕ19</td><td>600</td><td>1900</td><td>1900</td></tr>
<tr><td>ϕ20</td><td>600</td><td>2000</td><td>2000</td></tr>
<tr><td>ϕ22</td><td>500</td><td>1800</td><td>2200</td></tr>
<tr><td>ϕ24</td><td>300</td><td>1300</td><td>2400</td></tr>
<tr><td>ϕ25</td><td>300</td><td>1500</td><td>2500</td></tr>
<tr><td>ϕ26</td><td>300</td><td>1000</td><td>2600</td></tr>
<tr><td>ϕ28</td><td>300</td><td>1000</td><td>2800</td></tr>
<tr><td>ϕ29</td><td rowspan="6">-</td><td>1000</td><td>2900</td></tr>
<tr><td>ϕ30</td><td>1000</td><td>3000</td></tr>
<tr><td>ϕ32</td><td>700</td><td rowspan="4">3200</td></tr>
<tr><td>ϕ34</td><td>600</td></tr>
<tr><td>ϕ36</td><td>600</td></tr>
<tr><td>ϕ40</td><td>400</td></tr>
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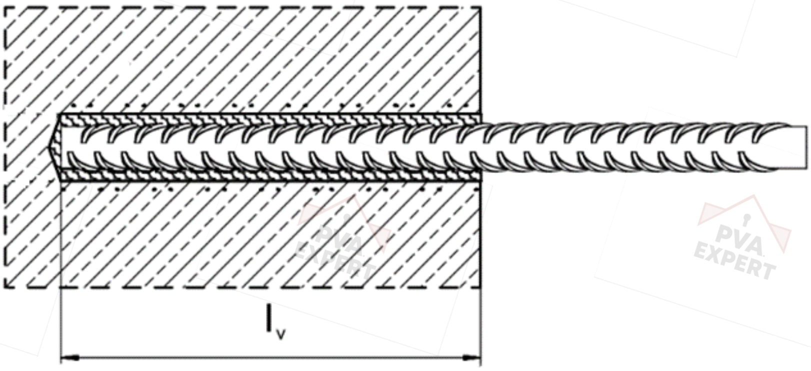


For detailed setting information on installation see instructions for use given with the product.

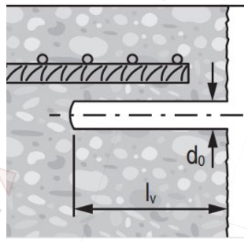
Approved installation methods can be found in the specific ETA/Certificate definitions.

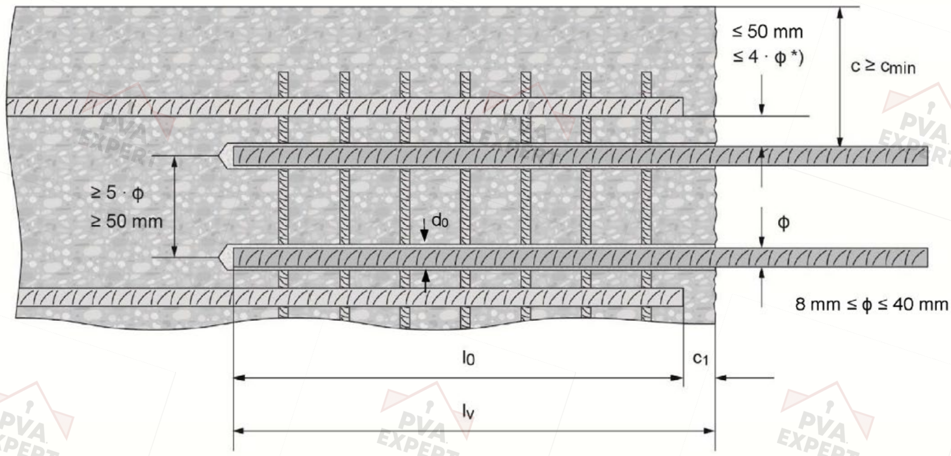
Drilling and Installation equipment

Rotary Hammers (Corded and Cordless)		TE 2 - TE 70
Diamond Coring Machines		DD EC-1, DD 100 … DD 160
Dispenser		HDE HDM PE-8000D
Other tools		Compressed air gun Set of cleaning brushes
		Hammer drill bit TE-CX, TE-YX, TE-C, TE-Y
		Hollow drill bit TE-CD, TE-YD
		Diamond core bit SP-L, SP-HX, SP-H, P-U
		Roughening tools TE-YRT
		Piston plug

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





*) If the clear distance between lapped bars exceeds $4 \cdot \phi$ or 50 mm, then the lap length shall be increased by the difference between the clear bar distance and the smaller of $4 \cdot \phi$ or 50 mm.

Where, c is concrete cover of post-installed rebar

$c_1 = c_f$ is the end-cover of existing rebar

d_o is the nominal drill bit diameter

ϕ diameter of reinforcement bar

l_0 is the lap length

l_v is the installation length