



PRODUCT TECHNICAL DATASHEET

Shear connector HCC-U with HIT-HY 200-A/R V3 Injection mortar

Concrete-to-concrete
Update: July-26



Shear connector HCC-U and HIT-HY 200-A/R V3 injection mortar

for Shear-friction applications and concrete overlay design (EOTA TR 066:2020)

Injection mortar system

Benefits

Hilti HIT-HY 200-A V3
(330 / 500 ml foil pack)

Hilti HIT-HY 200-R V3
(330 / 500 ml foil pack)

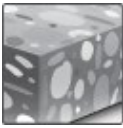
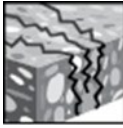
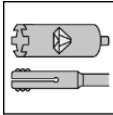
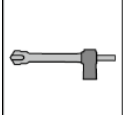
HAS 5.8
(M8 to M30)

HAS-U 5.8
(M8 to M30)

- Hilti Injection Technology: Faster, simpler and safer installation. Automatic borehole cleaning with hollow drill bits, accurate mortar dosing with HDE.
- Simpler: Shear connection done with standard Hilti anchor rods.
- Safer: HAS and HAS-U Hilti anchor rods have ETA assessment and CE marking.

Application

- Renovation: reinforcement and repair of bridges, tunnels and high-rise buildings
- Concrete-concrete composite
- Repair of bridges, concrete roadways and underground car parks
- Increasing the payloads of bridges

Base material		Load conditions	
			
Concrete (uncracked)	Concrete (cracked)	Static/ quasi-static	
Drilling, cleaning, setting		Other information	
			
Hammer drilled holes	Diamond coring with roughening	Hollow Drill Bit drilled holes	Shear-friction applications and concrete overlays Handbook
			PROFIS Engineering software

Linked Approvals/Certificates and Instructions for use.

Approval no	Application / loading condition	Authority / Laboratory	Date of issue
ETA-20/0697	Static and quasi-static	DIBt, Berlin	28-08-2023

The instructions for use can be viewed using the link in the instructions for use table or the QR code/link in the Hilti webpage table.

Instructions for use(IFU)

Material			
Injection mortar / Shear connector	IFU Hilti HIT-HY 200 A V3	IFU Hilti HIT-HY 200-R V3	
Dispenser	IFU HDM	IFU HDE-500 22	IFU HDE 500-A12

Link to Hilti Webpage

Injection mortars / Shear connector				
HIT-HY 200-A V3	HIT-HY 200-R V3	HAS-U	HAS	
				
Dispenser				
HDE 500-22	HDE 500-A12	HDM 500		
				

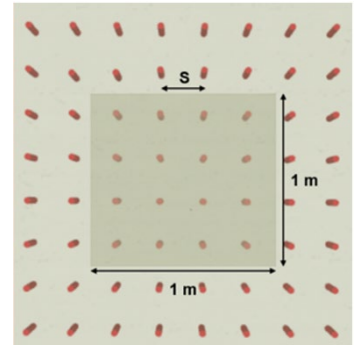
Fastener special dimensions

Mechanical properties and dimensions HAS and HAS-U

Mechanical properties and dimensions of the threaded rods are standardized and can be taken from the ETA listed in the table Approvals / Certificates.

All data in this section applies to:

- Correct setting (see Instructions for use (IFU))
- Hammer drilled holes, hammer drilled holes with Hilti hollow drill bit (TE-CD, TE-YD)
- Below calculated values based on 1 m² grid pattern of connectors given in the table below, No edge influence is consider in design
- Minimum base material thickness (see setting details)
- Cracked concrete
- Design values of the bond strength for a working life of 50 Years
- The following data are valid for a $\psi_{\text{sus}} = 1,0$
- The new concrete / overlay must exhibit a higher strength
- Roughness levels as defined in EOTA TR 066:2020.
- The design with shear connectors follows equation (2.11) of EOTA TR 066: 2020
- No design shear stress given in cases where minimum reinforcement ratio is not met
- The concrete strength class given in the following tables refer to the existing concrete member.
- In-service temperature range I (min. base mat. temp. -40°C, max. long/short term base mat. temp.: +24°C/40°C)
- Reinforcement ratio: Calculated based on number of connectors on 1 m²



For specific design cases refer to [PROFIS Engineering](#).

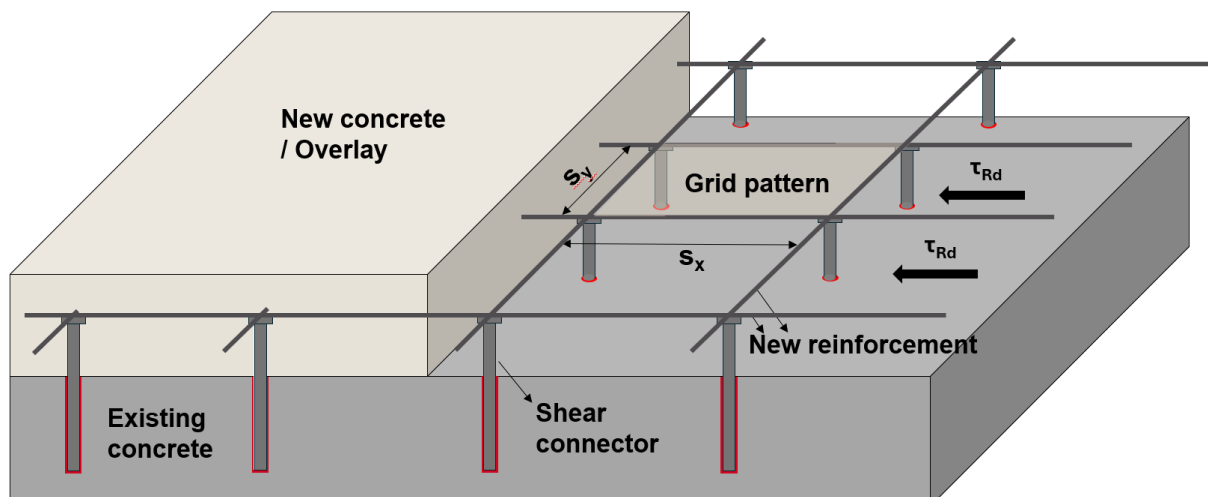


Figure showing grid pattern and shear stress in overlay application with HCC-U

Connector HCC-U M10

Effective embedment depth in existing concrete, $h_{ef,ex} = 60$ mm

Effective embedment depth in overlay concrete $h_{ef,ov} = 40$ mm

Grid pattern of connectors, $s_x \times s_y$ [mm]	350 x 350	300 x 300	200 x 200	100 x 100
No. of connectors per 1 m ²	9	16	25	100
Reinforcement ratio	0,05%	0,09%	0,15%	0,58%
Design resistance for very rough interface ($R_t \geq 3,0$ mm)				
Existing concrete: C20/25 New concrete: C25/30	-	0,64	0,70	1,00
Existing concrete: C30/37 New concrete: C40/50	-	-	0,82	1,18
Existing concrete: C45/55 New concrete: C50/60	-	-	0,97	1,45
Design resistance for rough interface ($R_t \geq 1,5$ mm)				
Existing concrete: C20/25 New concrete: C25/30	-	0,37	0,42	0,71
Existing concrete: C30/37 New concrete: C40/50	-	-	0,49	0,85
Existing concrete: C45/55 New concrete: C50/60	-	-	0,57	1,02
Design resistance for smooth interface ($R_t < 1,5$ mm)				
Existing concrete: C20/25 New concrete: C25/30	-	0,10	0,16	0,50
Existing concrete: C30/37 New concrete: C40/50	-	-	0,19	0,61
Existing concrete: C45/55 New concrete: C50/60	-	-	0,23	0,75

Connector HCC-U M12

Effective embedment depth in existing concrete, $h_{ef,ex} = 70$ mm

Effective embedment depth in overlay concrete $h_{ef,ov} = 40$ mm

Grid pattern of connectors, $s_x \times s_y$ [mm]	350 x 350	300 x 300	200 x 200	100 x 100
No. of connectors per 1 m ²	9	16	25	100
Reinforcement ratio	0,08%	0,13%	0,21%	0,84%
Design resistance for very rough interface ($R_t \geq 3,0$ mm)				
Existing concrete: C20/25 New concrete: C25/30	-	0,67	0,74	1,14
Existing concrete: C30/37 New concrete: C40/50	-	0,78	0,86	1,35
Existing concrete: C45/55 New concrete: C50/60	-	0,91	1,02	1,65
Design resistance for rough interface ($R_t \geq 1,5$ mm)				
Existing concrete: C20/25 New concrete: C25/30	-	0,39	0,46	0,85
Existing concrete: C30/37 New concrete: C40/50	-	0,46	0,54	1,02
Existing concrete: C45/55 New concrete: C50/60	-	0,53	0,63	1,23
Design resistance for smooth interface ($R_t < 1,5$ mm)				
Existing concrete: C20/25 New concrete: C25/30	-	0,13	0,20	0,67
Existing concrete: C30/37 New concrete: C40/50	-	0,16	0,25	0,83
Existing concrete: C45/55 New concrete: C50/60	-	0,19	0,30	1,01

Connector HCC-U M16

Effective embedment depth in existing concrete, $h_{ef,ex} = 80 \text{ mm}$

Effective embedment depth in overlay concrete $h_{ef,ov} = 40 \text{ mm}$

Grid pattern of connectors, $s_x \times s_y \text{ [mm]}$	350 x 350	300 x 300	200 x 200	100 x 100
No. of connectors per 1 m^2	9	16	25	100
Reinforcement ratio	0,14%	0,25%	0,39%	1,57%
Design resistance for very rough interface ($R_t \geq 3,0 \text{ mm}$)				
Existing concrete: C20/25 New concrete: C25/30	0,65	0,73	0,84	1,54
Existing concrete: C30/37 New concrete: C40/50	0,75	0,86	0,99	1,85
Existing concrete: C45/55 New concrete: C50/60	0,88	1,01	1,18	2,26
Design resistance for rough interface ($R_t \geq 1,5 \text{ mm}$)				
Existing concrete: C20/25 New concrete: C25/30	0,37	0,46	0,56	1,26
Existing concrete: C30/37 New concrete: C40/50	0,44	0,54	0,67	1,52
Existing concrete: C45/55 New concrete: C50/60	0,51	0,63	0,78	1,84
Design resistance for smooth interface ($R_t < 1,5 \text{ mm}$)				
Existing concrete: C20/25 New concrete: C25/30	0,12	0,21	0,33	1,17
Existing concrete: C30/37 New concrete: C40/50	0,15	0,26	0,40	1,43
Existing concrete: C45/55 New concrete: C50/60	0,18	0,31	0,49	1,75

Connector HCC-U M20

Effective embedment depth in existing concrete, $h_{ef,ex} = 90 \text{ mm}$

Effective embedment depth in overlay concrete $h_{ef,ov} = 40 \text{ mm}$

Grid pattern of connectors, $s_x \times s_y \text{ [mm]}$	350 x 350	300 x 300	200 x 200	100 x 100
No. of connectors per 1 m^2	9	16	25	100
Reinforcement ratio	0,22%	0,39%	0,61%	2,45%
Design resistance for very rough interface ($R_t \geq 3,0 \text{ mm}$)				
Existing concrete: C20/25 New concrete: C25/30	0,69	0,81	0,96	2,03
Existing concrete: C30/37 New concrete: C40/50	0,81	0,95	1,14	2,45
Existing concrete: C45/55 New concrete: C50/60	0,95	1,13	1,36	2,99
Design resistance for rough interface ($R_t \geq 1,5 \text{ mm}$)				
Existing concrete: C20/25 New concrete: C25/30	0,42	0,53	0,68	1,75
Existing concrete: C30/37 New concrete: C40/50	0,49	0,64	0,82	2,12
Existing concrete: C45/55 New concrete: C50/60	0,58	0,75	0,97	2,57
Design resistance for smooth interface ($R_t < 1,5 \text{ mm}$)				
Existing concrete: C20/25 New concrete: C25/30	0,17	0,31	0,48	1,77
Existing concrete: C30/37 New concrete: C40/50	0,21	0,38	0,59	2,17
Existing concrete: C45/55 New concrete: C50/60	0,26	0,46	0,71	2,66



Setting information

Installation temperature range

-5°C to +40°C

Service temperature range

HY 200 A/R V3 injection mortar with HCC-U may be applied in the temperature ranges given below. An elevated base material temperature may lead to a reduction of the design bond resistance.

For use with HIT-HY A/R 200 V3

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

Maximum short term base material temperature

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

Maximum long term base material temperature

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

Working time and curing time

Temperature of the base material ^{a)}	HIT-HY 200-A V3		HIT-HY 200-R V3	
	Maximum working time	Minimum curing time	Maximum working time	Minimum curing time
T	t _{work}	t _{cure}	t _{work}	t _{cure}
- 10°C to - 5°C	1,5 h	7 h	3 h	20 h
> -5°C to 0°C	50 min	4 h	1,5 h	8 h
> 0°C to 5°C	25 min	2 h	45 min	4 h
> 5°C to 10°C	15 min	75 min	30 min	2,5 h
> 10°C to 20°C	7 min	45 min	15 min	1,5 h
> 20°C to 30°C	4 min	30 min	9 min	1 h
> 30°C to 40°C	3 min	30 min	6 min	1 h

^{a)} The Minimum Foil pack temperature is 0°C

Setting details for Hilti HCC-U in existing concrete

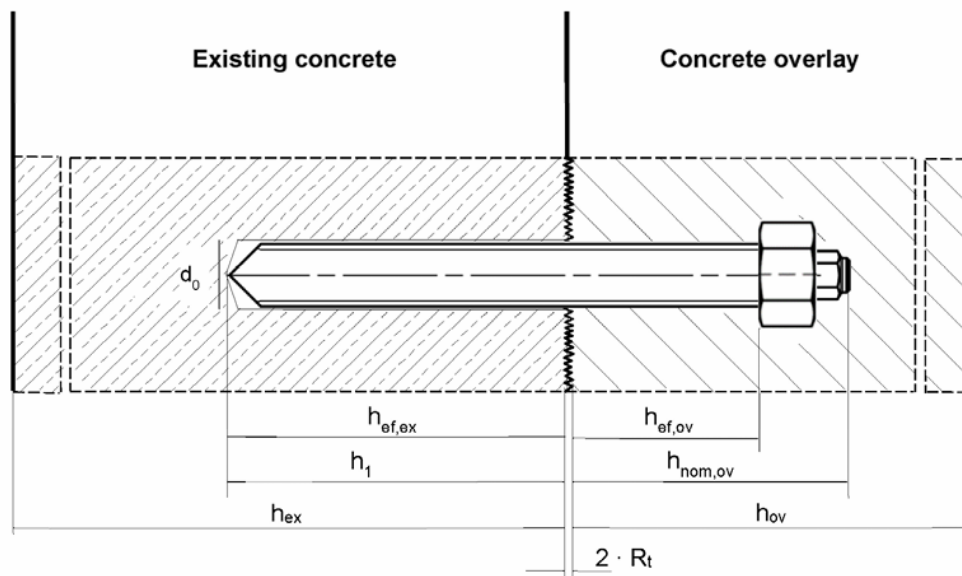
Connector Hilti HCC-U	M8	M10	M12	M16	M20	M24	M27	M30
Effective embedment depth And drill hole depth $h_{ef,ex} = h_1$ [mm]	60	60	70	80	90	96	108	120
	160	200	240	320	400	480	540	600
Nominal diameter of drill d_0 [mm]	10	12	14	18	22	28	30	35
Minimum thickness of existing concrete $h_{min,ex} \geq$ [mm]	$\max(100; h_{ef} + 30, h_{ef} + 2 \cdot d_0)$							
Minimum spacing $s_{min,ex} \geq$ [mm]	40	50	60	75	90	115	120	140
Minimum edge distance $c_{min,ex} \geq$ [mm]	40	45	45	50	55	60	75	80

Setting details for Hilti HCC-U in new concrete / overlay

Connector Hilti HCC-U	M8	M10	M12	M16	M20	M24	M27	M30
Effective embedment depth $h_{ef,ov}$ [mm]	≥ 40							
Overall embedment depth $h_{nom,ov}$ [mm]	$L - h_{ef,ex} - 2 \cdot R_t^{1)}$							
Minimum thickness of concrete overlay $h_{min,ov} \geq$ [mm]	$h_{nom,ov} + c_{nom}^{2)}$							
Minimum spacing $s_{min,ov} \geq$ [mm]	35	40	45	55	70	80	95	105
Minimum edge distance $c_{min,ov} \geq$ [mm]	$10 + c_{nom}^{2)}$	$10 + c_{nom}^{2)}$	$15 + c_{nom}^{2)}$	$15 + c_{nom}^{2)}$	$20 + c_{nom}^{2)}$	$20 + c_{nom}^{2)}$	$25 + c_{nom}^{2)}$	$30 + c_{nom}^{2)}$

1) R_t : Roughness according to EOTA TR 066:2020

2) c_{nom} : Minimum concrete cover according to EN 1992-1-1:2004



$h_{ef,ex}$ Effective embedment depth in existing concrete
 h_1 Drill hole depth
 h_{ex} Thickness of existing concrete
 R_t Roughness according to EOTA Technical Report TR 066

$h_{ef,ov}$ Effective embedment depth in concrete overlay
 $h_{nom,ov}$ Overall embedment depth in the concrete overlay
 h_{ov} Thickness of concrete overlay

Drilling and Installation equipment

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

Rotary Hammers (Corded and Cordless)		TE 2 - TE 70
Diamond Coring Machines		DD EC-1, DD 100 ... DD 160
Dispenser		HDE HDM
Other tools		Blow out pump, Compressed air gun Set of cleaning brushes
		Hammer drill bit TE-CX, TE-C, TE Y, TE YX
		Hollow drill bit TE-CD, TE-YD
		Diamond core bits Roughening tool