Shear connector HCC-B with HIT-RE 500 V4 Injection mortar

Product Technical Datasheet
Concrete-to-concrete
Update: Feb 25

Shear connector HCC-B with HIT-RE 500 V4 injection mortar

for shear-friction applications and overlay design (EOTA TR 066)

Injection mortar system	Benefits

Foil pack:

HIT-RE 500 V4

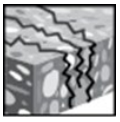
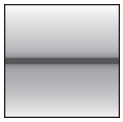
(available in 330, 500 and 1400 ml Foils)

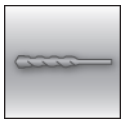
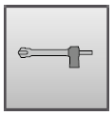
- safe set technology: Makes installation steps faster, simpler and safer. Automatic borehole cleaning with hollow drill bits, accurate dosing with HDE
- Easy to use: No need to prepare the anchor rod before setting
- Fast work progress: Setting and height levelling are carried out in a single work step
- Shear connector can be loaded immediately
- Reliable design: Structure appears monolithic after use of HCC-B

Shear connector HCC-B (d=14mm)

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	Fatigue

Drilling, cleaning, setting			Other information	
				
Hammer drilled holes	Diamond drilled holes	Hollow Drill Bit drilled holes	PROFIS Engineering Software	Concrete to concrete Handbook

Linked Approvals/Certificates and Instructions for use

Approvals / Certificates

Approval no.	Application / loading condition	Authority / Laboratory	Date of issue
ETA-18/1022	Static and quasi-static / Fatigue	DIBt, Berlin	05-05-2023

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	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
Shear Connector	IFU HCC-B			

Link to Hilti Webpage

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

Fastener: Shear connector
HCC-B

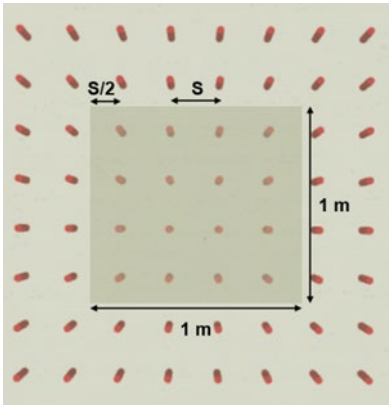
Fastener special dimensions

Mechanical properties and dimensions HCC-B

Mechanical properties and dimensions of the HCC-B are standardized and can be taken from the ETA listed in the table Approvals / Certificates or Instructions for use (IFU) section.

Static and quasi-static loading based on ETA-18/1022 and design according to TR-066

All data in this section applies to:



- Correct setting (see setting instruction)
- Hammer drilled holes, hammer drilled holes with Hilti hollow drill bit (TE-CD, TE-YD)
- Below calculated values based on 1 m^2 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
- Embedment depth in existing concrete, $h_{nom,ex}$ = 90 mm
- Embedment depth in new concrete, $h_{nom,ov}$ = 85 mm
- Design values of the bond strength for a working life of 50 Years
- The following data are valid for a ψ_{sus} = 1,0
- The new concrete / overlay must exhibit a higher strength
- Roughness levels as defined in EOTA TR 066
- The design with shear connectors follows equation (2.11) of EOTA TR 066
- 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)
- The design with “no connectors” follows equation (2.9) of EOTA TR 066 (Note: Provide minimum reinforcement)

For specific design cases refer to PROFIS Engineering.

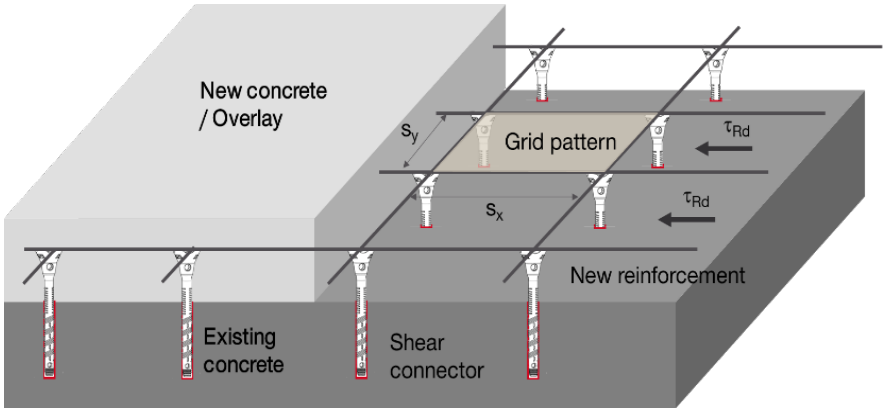


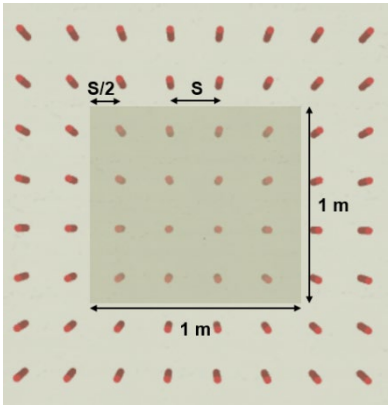
Figure showing grid pattern and shear stress in overlay application with HCC-B

Design resistance for very rough interface ($R_t \geq 3,0$ mm)						
Grid pattern of connectors, s_x x s_y [mm x mm]		**No connectors**	**350 x 350**	**300 x 300**	**200 x 200**	**100 x 100**
No. of connectors per sq.m² Reinforcement ratio		**0 0,0%**	**9 0,09%**	**16 0,12%**	**25 0,27%**	**100 1,10%**
Existing concrete: C20/25 New concrete: C25/30	τ_{Rd} [N/mm²]	0,43	0,67	0,77	0,83	1,43
Existing concrete: C30/37 New concrete: C40/50		0,57	-	0,90	0,97	1,71
Existing concrete: C45/55 New concrete: C50/60		0,77	-	1,06	1,16	2,08

Design resistance for rough interface (1,5 mm ≤ R_t < 3,0 mm)						
Grid pattern of connectors, s_x x s_y [mm x mm]		**no connectors**	**350 x 350**	**300 x 300**	**200 x 200**	**100 x 100**
No. of connectors per sq.m² Reinforcement ratio		**0 0,0%**	**9 0,09%**	**16 0,12%**	**25 0,27%**	**100 1,10%**
Existing concrete: C20/25 New concrete: C25/30	τ_{Rd} [N/mm²]	0,34	0,39	0,49	0,55	1,15
Existing concrete: C30/37 New concrete: C40/50		0,45	-	0,57	0,65	1,39
Existing concrete: C45/55 New concrete: C50/60		0,61	-	0,66	0,76	1,68

Design resistance for smooth interface (Rt < 1,5 mm)						
Grid pattern of connectors, s_x x s_y [mm x mm]		**no connectors**	**350 x 350**	**300 x 300**	**200 x 200**	**100 x 100**
No. of connectors per sq.m² Reinforcement ratio		**0 0,0%**	**9 0,09%**	**16 0,12%**	**25 0,27%**	**100 1,10%**
Existing concrete: C20/25 New concrete: C25/30	τ_{Rd} [N/mm²]	0,17	0,13	0,23	0,31	1,05
Existing concrete: C30/37 New concrete: C40/50		0,23	-	0,28	0,38	1,28
Existing concrete: C45/55 New concrete: C50/60		0,31	-	0,33	0,46	1.57

Fatigue loading based on ETA-18/1022. Design according to TR 066



All data in this section applies to:

- Correct setting (see setting instruction)
- Hammer drilled holes, hammer drilled holes with Hilti hollow drill bit (TE-CD, TE-YD)
- Below calculated values based on 1 m^2 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
- Embedment depth in existing concrete, $h_{nom,ex}$ = 90 mm
- Embedment depth in new concrete, $h_{nom,ov}$ = 85 mm
- Design values of the bond strength for a working life of 50 Years
- The following data are valid for a ψ_{sus} = 1,0
- The new concrete / overlay must exhibit a higher strength
- Roughness levels as defined in EOTA TR 066
- The design with shear connectors follows equation (2.11) of EOTA TR 066
- The design with “no connectors” follows equation (2.9) of EOTA TR 066 (Note: Provide minimum reinforcement)
- No design shear stress given in cases where minimum reinforcement ratio is not met
- In-service temperature range I (min. base mat. temp. -40°C, max. long/short term base mat. temp.: +24°C/40°C)
- The concrete strength class given in the following tables refer to the existing concrete member.
- Given data below are valid for pulsating fatigue action, without considering static loads.

For specific design cases refer to PROFIS Engineering.

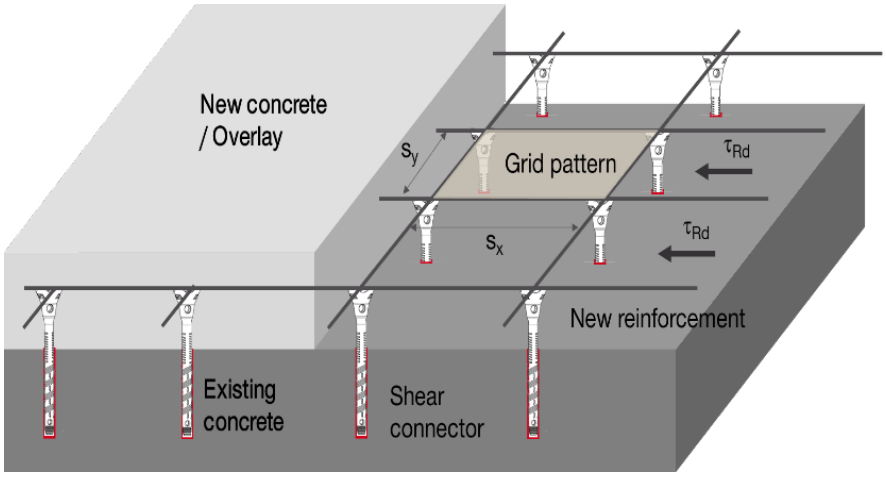


Figure showing grid pattern and shear stress in overlay application with HCC-B

Design resistance for very rough interface ($R_t \geq 3{,}0$ mm)						
Grid pattern of connectors, s_x x s_y [mm x mm]		**no connectors**	**350 x 350**	**300 x 300**	**200 x 200**	**100 x 100**
No. of connectors per sq.m² Reinforcement ratio		**0 0,0%**	**9 0,09%**	**16 0,12%**	**25 0,27%**	**100 1,10%**
Existing concrete: C20/25 New concrete: C25/30	τ_{Rd} [N/mm²]	0,17	0,27	0,31	0,33	0,57
Existing concrete: C30/37 New concrete: C40/50		0,23	-	0,36	0,39	0,68
Existing concrete: C45/55 New concrete: C50/60		0,31	-	0,42	0,47	0,83

Setting information

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

Service temperature range
Hilti HIT-RE 500 V4 injection mortar with HCC-B 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-RE 500 V4

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 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[1)]

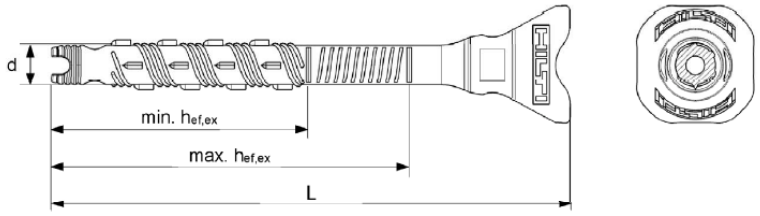
Temperature of the base material at installation	Maximum working time	Minimum curing time
T [1)]	t_{work}	t_{cure} [2)]
0 °C to 4 °C	2 h	48 h
> 4 °C to 9 °C	2 h	24 h
> 9 °C to 14 °C	1,5 h	16 h
> 14 °C to 19 °C	1 h	16 h
> 19 °C to 24 °C	30 min	7 h
> 24 °C to 29 °C	20 min	6 h
> 29 °C to 34 °C	15 min	5 h
> 34 °C to 39 °C	12 min	4,5 h
> 39 °C to 40 °C	`10 min	4 h

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

Setting details for Hilti HCC-B in existing concrete

Connector Hilti HCC-B			
Outer diameter of shaft	d	[mm]	14
Overall length	L	[mm]	180
Effective embedment length	min $h_{ef,ex}$	[mm]	90
	max $h_{ef,ex}$		125 – 2·R_t [1]
Drill hole depth	h_1	[mm]	$h_{ef,ex}$ + 5 mm
Nominal diameter of drill bit	d_0	[mm]	16
Minimum thickness of existing concrete	$h_{min,ex}$ ≥	[mm]	h_1 + 2·d_0
Minimum spacing	$s_{min,ex}$ ≥	[mm]	75
Minimum edge distance	$c_{min,ex}$ ≥	[mm]	50

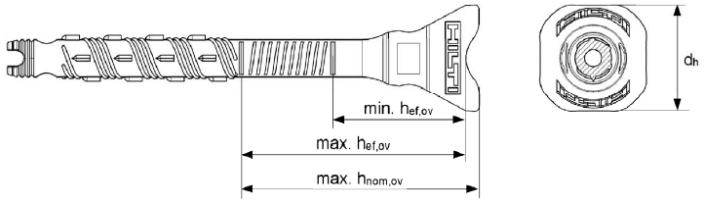
[1] R_t: Roughness according to EOTA TR 066:2019-10.

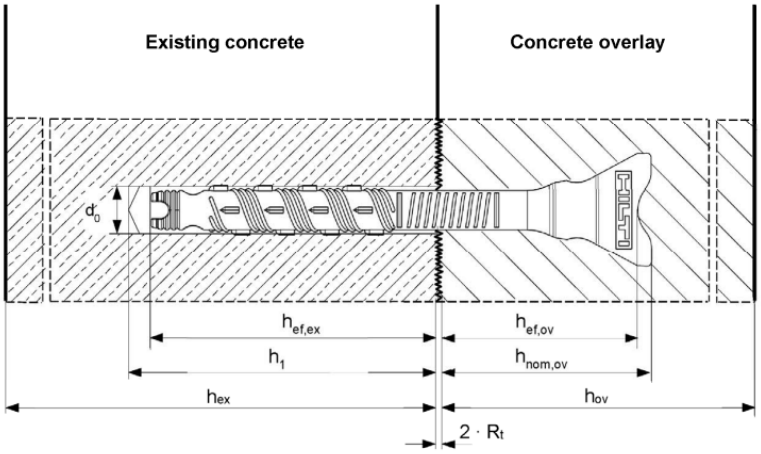


Setting details for Hilti HCC-B in new concrete / overlay

Connector Hilti HCC-B			
Diameter of the head	d_h	[mm]	40,6
Effective embedment length	min $h_{ef,ov}$	[mm]	50
	max $h_{ef,ov}$		85 – 2·R_t [1]
Overall embedment depth	h_1	[mm]	$h_{ef,ov}$ + 5 mm
Minimum thickness of overlay	$h_{min,ov}$ ≥	[mm]	$h_{nom,ov}$ + 2·c_{nom} [2]
Minimum spacing	$s_{min,ov}$ ≥	[mm]	85
Minimum edge distance	$c_{min,ov}$ ≥	[mm]	25 + c_{nom} [2]

[1] R_t: Roughness according to EOTA TR 066.
[2] c_{nom}: Minimum concrete cover according to EN 1992-1-1:2004+AC:2010.





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 30
Diamond Coring Machines		DD EC-1, DD 100 … DD 160
Dispenser		HDE HDM PE-8000D
Other tools		Blow out pump, Compressed air gun Set of cleaning brushes
		Hammer drill bit TE-CX, TE-C,
		Hollow drill bit TE-CD
		Diamond core bits
Setting		Machine setting HCC-M , HSD-M
		Hand setting HSD-G