HCC-B
SHEAR CONNECTOR INJECTION SYSTEM

Technical Datasheet

Update: Nov-23

Shear connector HCC-B with HIT-RE 500 V4 and HIT-RE 500 V3 injection mortar

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

Shear connector HCC-B system

Hilti HIT-RE 500 V4 or
Hilti HIT-RE 500 V3
(in 330 / 500 ml foil pack)

Shear connector HCC-B

Machine setting tool
HCC-M

Hand setting tool
HSD-G

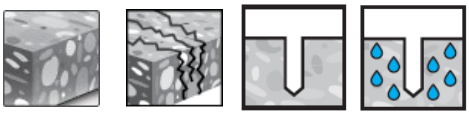
Benefits

- 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

Application

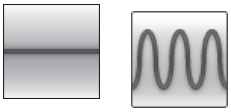
- Renovation: reinforcement and repair of bridges, tunnels and high-rise buildings
- Concrete-concrete composite
- Repair of bridges, concrete roadways and underground car parks
- Increasing the payloads of bridges

Base material



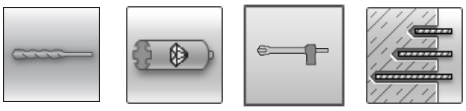
Concrete (uncracked) | Concrete (cracked) | Dry concrete | Wet concrete

Load conditions



Static/ quasi-static | Fatigue

Installation conditions



Hammer drilled holes | Diamond drilled holes | Hollow Drill Bit drilled holes / Hilti **SafeSet** | Variable embedment depth

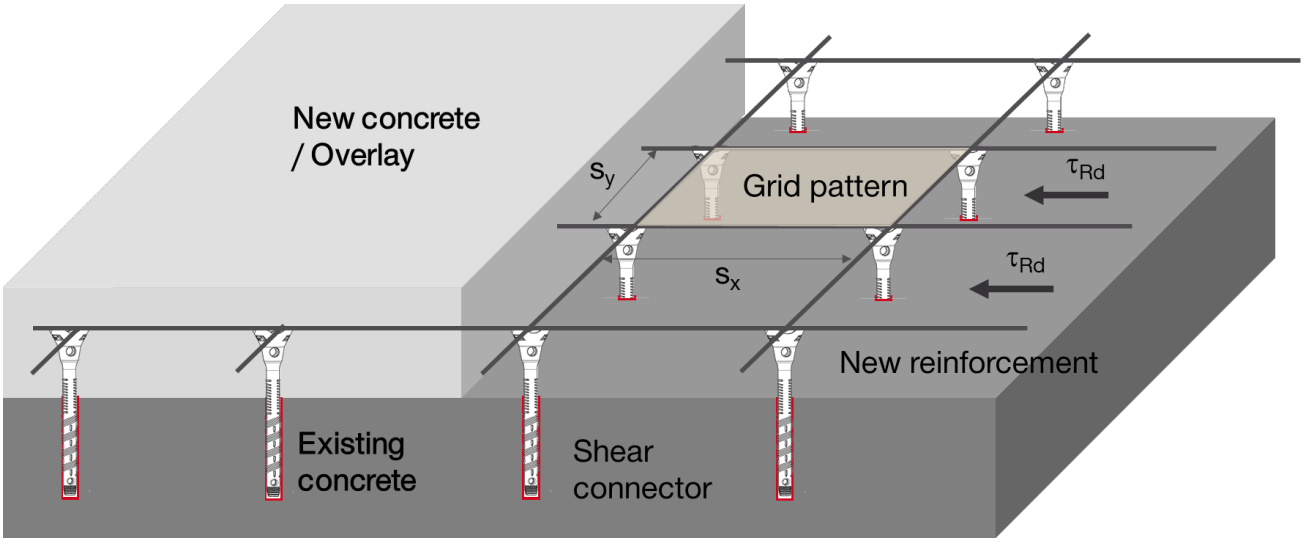
Other information

European Technical Assessment | CE conformity | PROFIS Engineering Software

Approvals / Certificates

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment	DIBt, Berlin	ETA-18/1022 / 2023-05-23

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



Hilti HIT-RE 500 V4 with HCC-B: Static and quasi-static design according to EOTA TR 066

All data in this section applies to:

- Hammer drilled holes, hammer drilled holes with Hilti hollow drill bit
- Correct setting (see setting instruction)
- No edge distance influence
- Minimum base material thickness
- Cracked concrete
- Embedment depth in existing concrete, $h_{nom,ex}$ = 90 mm
- Embedment depth in new concrete, $h_{nom,ov}$ = 85 mm
- Data given below are for 50 years working Life,
- In-service temperature range I (min. base mat. temp. -40°C, max. long/short term base mat. temp.: +24°C/40°C)
- The following data are valid for a ψ_{sus} = 1,0.
  For specific design cases involving permanent actions refer to PROFIS Engineering.
- The concrete strength class given in the following tables refer to the existing concrete member.
  The new concrete / overlay must exhibit a higher strength
- Roughness levels as defined in EOTA TR 066
- The design with “no connectors” follows equation (2.9) of EOTA TR 066.
  The design with shear connectors follows equation (2.11) of EOTA TR 066.

Design resistance for very rough interface ($R_t \geq 3,0$ mm)						
Grid pattern, s_x x s_y [mm x mm] **Reinforcement ratio**			**no connectors** **0,0%**	**350 x 350** **0,09%**	**300 x 300** **0,12%**	**200 x 200** **0,27%**	**100 x 100** **1,1%**
Existing concrete: C20/25 New concrete: C25/30	τ_{Rd}	[N/mm²]	0,43	0,64	0,67	0,79	1,32
Existing concrete: C30/37 New concrete: C40/50	τ_{Rd}	[N/mm²]	0,63	NA ρ_{min} not met	NA ρ_{min} not met	1,01	1,72
Existing concrete: C45/55 New concrete: C50/60	τ_{Rd}	[N/mm²]	0,75	NA ρ_{min} not met	NA ρ_{min} not met	1,12	1,92

Design resistance for rough interface (1,5 mm ≤ R_t < 3,0 mm)						
Grid pattern, s_x x s_y [mm x mm] **Reinforcement ratio**			**no connectors** **0,0%**	**350 x 350** **0,09%**	**300 x 300** **0,12%**	**200 x 200** **0,27%**	**100 x 100** **1,1%**
Existing concrete: C20/25 New concrete: C25/30	τ_{Rd}	[N/mm²]	0,35	0,36	0,39	0,51	1,04
Existing concrete: C30/37 New concrete: C40/50	τ_{Rd}	[N/mm²]	0,50	NA ρ_{min} not met	NA ρ_{min} not met	0,64	1,35
Existing concrete: C45/55 New concrete: C50/60	τ_{Rd}	[N/mm²]	0,60	NA ρ_{min} not met	NA ρ_{min} not met	0,72	1,51

Design resistance for smooth interface (0 mm ≤ R_t < 1,5 mm)						
Grid pattern, s_x x s_y [mm x mm] **Reinforcement ratio**			**no connectors** **0,0%**	**350 x 350** **0,09%**	**300 x 300** **0,12%**	**200 x 200** **0,27%**	**100 x 100** **1,1%**
Existing concrete: C20/25 New concrete: C25/30	τ_{Rd}	[N/mm²]	0,17	0,10	0,13	0,27	0,91
Existing concrete: C30/37 New concrete: C40/50	τ_{Rd}	[N/mm²]	0,25	NA ρ_{min} not met	NA ρ_{min} not met	0,36	1,21
Existing concrete: C45/55 New concrete: C50/60	τ_{Rd}	[N/mm²]	0,30	NA ρ_{min} not met	NA ρ_{min} not met	0,40	1,37

Hilti HIT-RE 500 V4 with HCC-B: Fatigue design according to EOTA TR 066

All data in this section applies to:

- Same installation and design parameter as for the static design
- Given data below are valid for pulsating fatigue action, without considering static loads. For different loading schemes refer to PROFIS Engineering

Design resistance for very rough interface (R_t ≥ 3,0 mm)						
Grid pattern, s_x x s_y [mm x mm] **Reinforcement ratio**			**no connectors** **0,0%**	**350 x 350** **0,09%**	**300 x 300** **0,12%**	**200 x 200** **0,27%**	**100 x 100** **1,1%**
Existing concrete: C20/25 New concrete: C25/30	τ_{Rd}	[N/mm²]	0,17	0,25	0,26	0,31	0,53
Existing concrete: C30/37 New concrete: C40/50	τ_{Rd}	[N/mm²]	0,25	NA ρ_{min} not met	NA ρ_{min} not met	0,40	0,68
Existing concrete: C45/55 New concrete: C50/60	τ_{Rd}	[N/mm²]	0,30	NA ρ_{min} not met	NA ρ_{min} not met	0,44	0,76

Material quality	**HCC-B**
Material	Malleable cast iron, Material EN-GJMB-550-4 acc. EN 1562:2006 Strength: f_{uk} ≥ 500 N/mm², f_{yk} ≥ 400 N/mm² Rupture elongation $A_{3,4}$ ≥ 6% Brinell hardness ≤ 250 HBW

Setting information

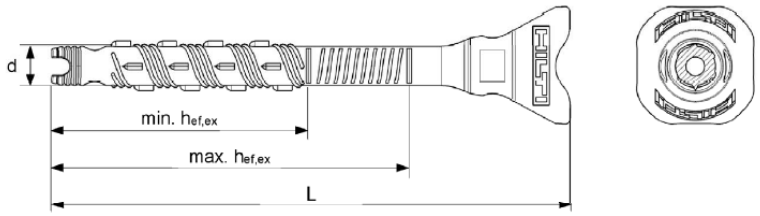
Working time and curing time

Temperature of the base material at installation	Maximum working time	Minimum curing time
T_{BM} [2)]	t_{work}	t_{cure} [1)]
0 °C to 4 °C	2 h	48 h
5 °C to 9 °C	2 h	24 h
10 °C to 14 °C	1,5 h	16 h
15 °C to 19 °C	1 h	12 h
20 °C to 24 °C	30 min	7 h
25 °C to 29 °C	20 min	6 h
30 °C to 34 °C	15 min	5 h
35 °C to 39 °C	12 min	4,5 h
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 for Hilti HCC-B in existing concrete

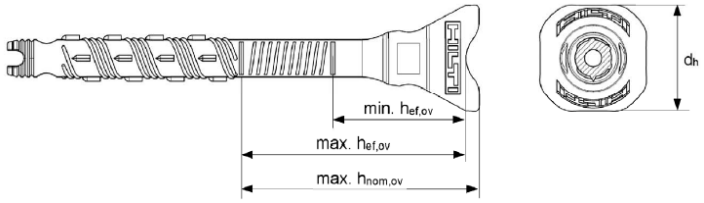
Connector Hilti HCC-B			
Outer diameter of shaft	d	[mm]	14
Overall length	L	[mm]	180
Effective embedment length	min $h_{ef,ex}$	[mm]	90
	max $h_{ef,ex}$		125 – 2 · R_t [1)]
Drill hole depth	h_1	[mm]	$h_{ef,ex}$ + 5 mm
Nominal diameter of drill bit	d_0	[mm]	16
Minimum thickness of existing concrete	$h_{min,ex}$ ≥	[mm]	h_1 + 2 * d0
Minimum spacing	$s_{min,ex}$ ≥	[mm]	75
Minimum edge distance	$c_{min,ex}$ ≥	[mm]	50



1) R_t: Roughness according to EOTA TR 066.

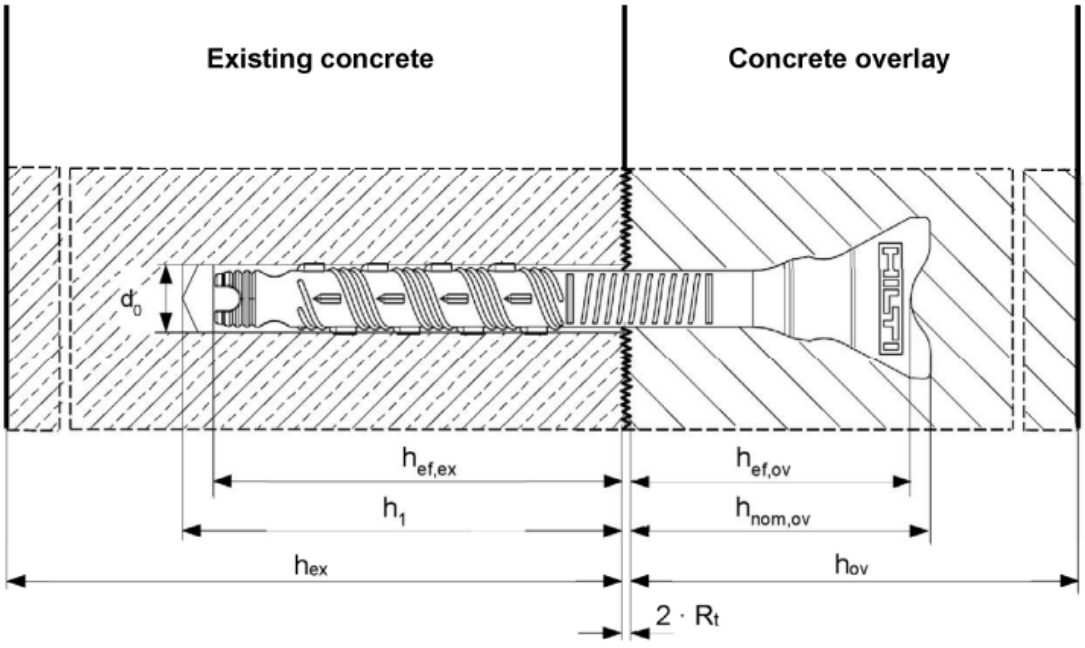
Setting details for Hilti HCC-B in new concrete / overlay

Connector Hilti HCC-B			
Diameter of the head	d_h	[mm]	40,6
Effective embedment length	min $h_{ef,ov}$	[mm]	50
	max $h_{ef,ov}$		$85 - 2 \cdot R_t$ [1]
Overall embedment depth	h_1	[mm]	$h_{ef,ov} + 5$ mm
Minimum thickness of overlay	$h_{min,ov} \geq$	[mm]	$h_{nom,ov} + 2 \cdot c_{nom}$ [2]
Minimum spacing	$s_{min,ov} \geq$	[mm]	85
Minimum edge distance	$c_{min,ov} \geq$	[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, cleaning and setting accessories for Hilti HCC-B

Element	Drilling and cleaning				Setting	
	Hammer drilling					
HCC-B	Hammer drill (HD) TE-CX, TE-Y	Hollow Drill Bit (HDB) TE-CD, TE-YD	Diamond coring	Brush HIT-RB	Machine setting	Hand setting
						
Size	**d0 [mm]**				**Item**	**Item**
16 x 180	16	16	16	16	HCC-M DM 14 HSD-M12x25	HSD-G M12x25

Setting instructions for HCC-B