Hybrid GEN 2

B+BTec DesignFiX®

TRO29

ETA - 19/0131

Hybrid Injection Adhesive
ETA Option 1 Assessed
for Cracked & Non-Cracked
Concrete

Rebar Dowels
Ø8 - Ø32 mm

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

Features

- NEW! ETA Assessed for the Installation in Flooded Holes
- NEW! No Cleaning required for Hollow Drilling
- NEW! Extended Seismic C2 Range: M12 - M24
- For Extreme Loads
- Fast Curing
- Styrene Free
- Low VOC: A+ Rating
- Fire Rated
- Leed Tested
- Potable Water Approved
- B+BTec DesignFix® support

Use Conditions

- Installation in Cracked & Non-Cracked Concrete C20/25 to C50/60
- For Anchor Rods M8-M30, Rebar Ø8-32 mm and Threaded Sleeves M6-M20
- Seismic Action C1: M8-M30, Ø8-32 mm
- Seismic Action C2: M12 - M24
- For Hammer/Air drilled Holes
- Installation in Dry and Wet Holes
- Installation in Flooded Holes
- Overhead Installation allowed.

Approvals & Test Reports

ETA - 19/0130
ETA - 19/0131
SEISMIC C1
SEISMIC C2
FIRE F120
A+ VOC
LEED
POTABLE WATER

Temperature Range

B+BTec BIS-HY GEN2 injection mortar may be applied in the temperature ranges given below. An elevated base material temperature leads to a reduction of the bond resistance.

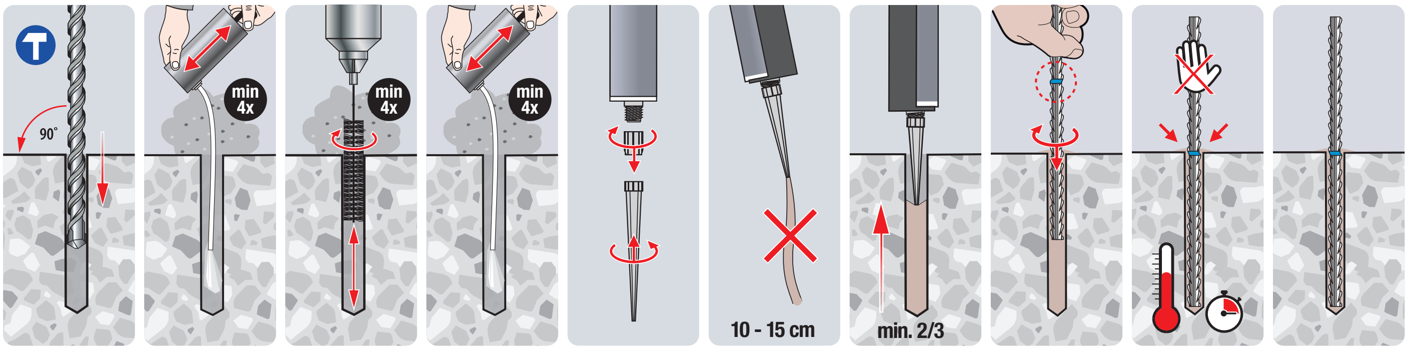
Max. long term base material temperature: Long term elevated base material temperatures are roughly constant over significant periods of time.

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.

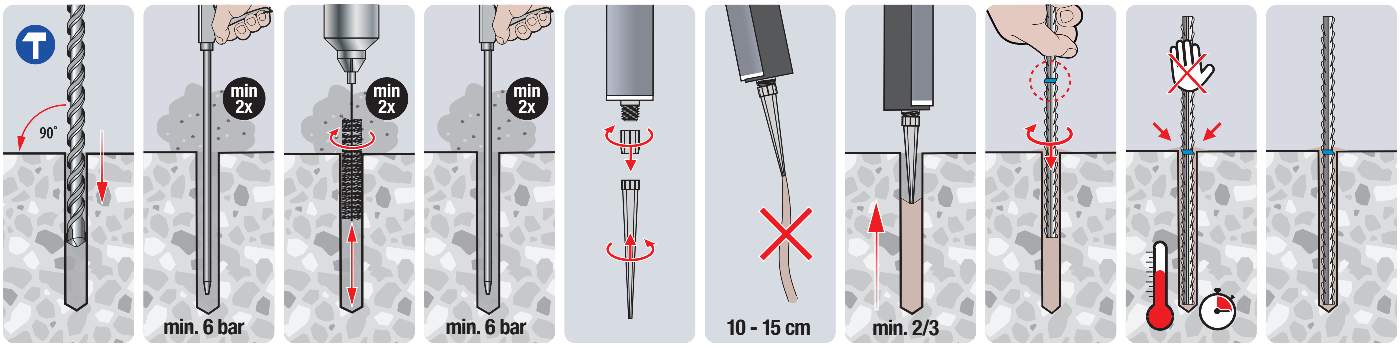
Temperature Range	Temperature Base Material	Max. Long Term Base Material Temperature	Max. Short Term Base Material Temperature
Temp. Range I	-40°C to +80°C	+ 50°C	+80°C
Temp. Range II	-40°C to +120°C	+72°C	+120°C
Temp. Range III	-40°C to +160°C	+100°C	+160°C

Installation Procedures (Hand Pump Cleaning)

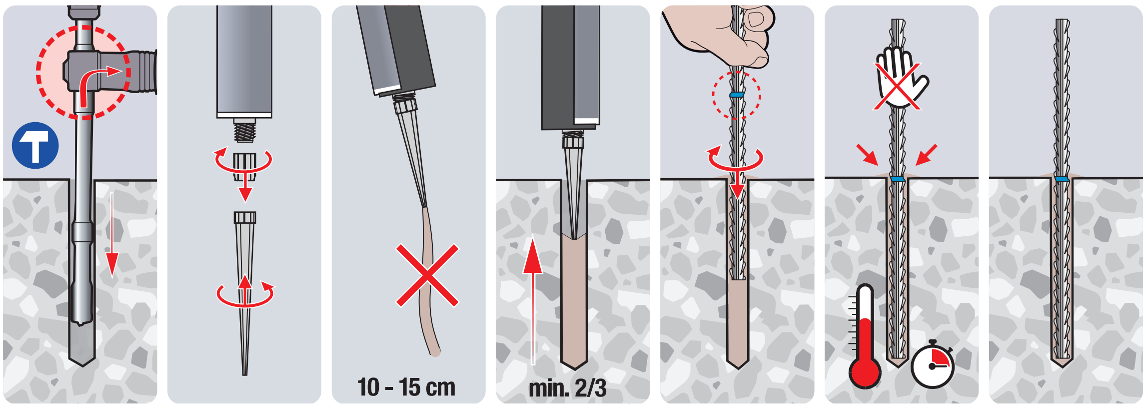
Hand Pump Cleaning for bore hole diameter $d_0 \leq$ 20mm, bore hole depth $h_0 \leq 10d_{nom}$ and Non-Cracked Concrete only.



Installation Procedures (Compressed Air Cleaning)



Installation Procedures (Hollow Drilling)



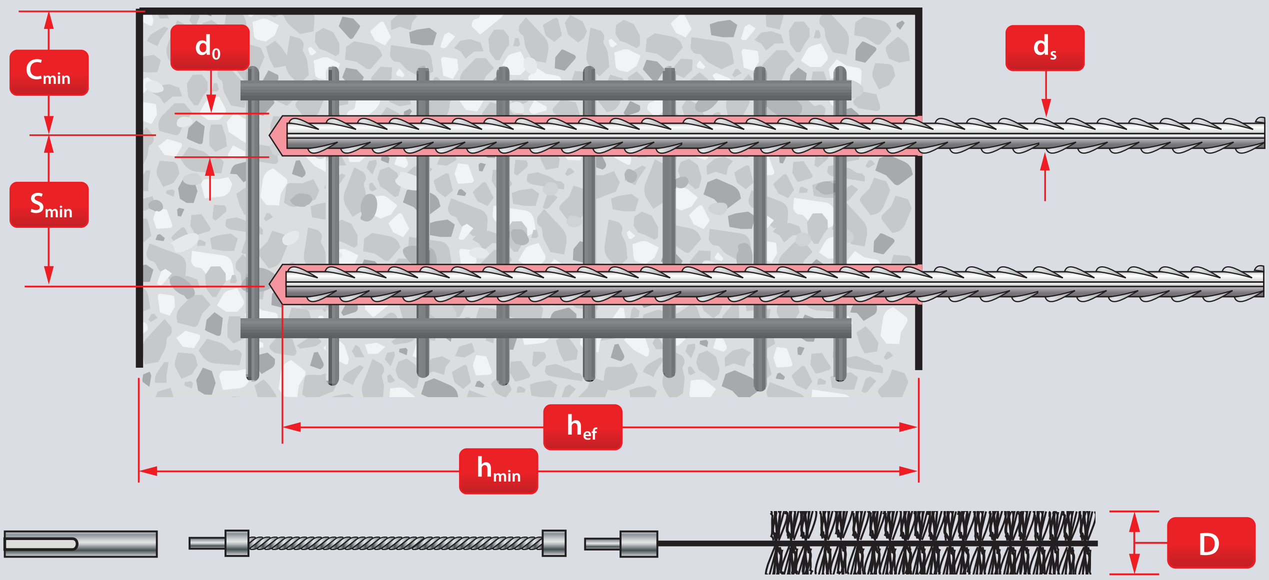
Curing Times[1]

Temperature[2]	˚C	-5 to -1	0 to +4	+5 to +9	+10 to + 14	+15 to +19	+20 to +29	+30 to +40
Processing Time		50 min	25 min	15 min	10 min	6 min	3 min	2 min
Curing Time Dry Holes		5 h	3,5 h	2 h	1h	40 min	30 min	30 min
Curing Time Wet Holes		10 h	7 h	4 h	2h	80 min	60 min	60 min

1) Cartridge Temperature must be between +5˚C and +40˚C. 2) Concrete Temperature

ETA - 19/0131

Specification Data for the use in Cracked & Uncracked Concrete and Hammer/Air Drilled Holes according to EN 1992-4:2018 and Technical Report TR 055



Installation Dimensions

Rebar Size	d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
Min. Eff. Anchorage Depth	$h_{ef,min}$	[mm]	60	60	70	75	80	90	96	100	112	128
Max. Eff. Anchorage Depth	$h_{ef,max}$	[mm]	160	200	240	280	320	400	480	500	560	640
Hole Diameter	d_0	[mm]	12	14	16	18	20	25	32	32	35	40
Required Volume per cm Embedment Depth	V_s	[ml/cm]	0,75	0,90	1,06	1,21	1,36	2,12	4,22	3,76	4,16	5,43

Member Thickness, Edge Distance & Spacing

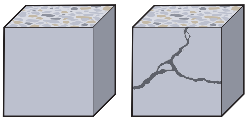
Rebar Size	d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
Min. Member Thickness	h_{min}	[mm]	h_{ef} + 30 mm ≥100 mm		$h_{ef} + 2d_0$							
Min. Edge Distance	C_{min}	[mm]	35	40	45	50	50	60	70	70	75	85
Min. Spacing	S_{min}	[mm]	40	50	60	70	75	95	120	120	130	150

Steel Brush & Piston Plug Dimensions

Rebar Size	d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
Brush Diameter	D	[mm]	13,5	15,5	17,5	20,0	20,0	27,0	34,0	34,0	37,0	43,5
Min. Brush Diameter	D_{min}	[mm]	12,5	14,5	16,5	18,5	20,5	25,5	32,5	32,5	35,5	40,5
Piston Plug	#	--	No piston plug required			18	20	25	32	32	35	40

Static and quasi-static resistance (for a single rebar)

All data in this section subject to:
- Correct setting (see setting instructions).
- No edge distance and spacing influence.
- Minimum and maximum embedment depth, as specified in the 'Installation Dimensions' table.
- Concrete C20/25, $f_{ck,cube}$ = 25 N/mm².
- Temperature range I: (max. long/short term temperature +50°C/+80°C).
- Shear loads are calculated without the influence of a lever arm.
- Recommended loads are with overal partial safety factor for action γ_G = 1,4.
  The partial safety factors for action depend on the type of loading and shall be taken from national regulations.
- Increasing factors for concrete ψ_c: C25/30 = **1,02** C30/37 = **1,04** C35/45 = **1,07** C40/50 = **1,08** C45/55 = **1,09** C50/60 = **1,10**



Design Resistance Dry/Wet Holes (Compressed Air Cleaning)

Steel Decisive

Non-Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rd,min}$	[kN]	14,1	15,6	19,7	21,9	24,1	28,7	31,7	33,7	39,9	48,8
	Tensile Max.	$N_{Rd,max}$	[kN]	19,7	30,9	44,4	60,5	79,0	123,4	177,7	192,8	241,9	316,0
	Shear Min.	$V_{Rd,min}$	[kN]	9,2	14,4	20,7	28,2	36,9	57,5	63,3	67,3	79,8	97,5
	Shear Max.	$V_{Rd,max}$	[kN]	9,2	14,4	20,7	28,2	36,9	57,6	82,9	90,0	112,9	147,4

Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rd,min}$	[kN]	5,5	6,9	10,6	14,3	17,2	20,5	22,6	24,0	28,4	34,8
	Tensile Max.	$N_{Rd,max}$	[kN]	14,7	23,0	36,2	53,4	69,7	108,9	156,8	183,3	229,9	300,3
	Shear Min.	$V_{Rd,min}$	[kN]	9,2	13,8	20,7	28,2	34,3	41,0	45,1	48,0	56,9	69,5
	Shear Max.	$V_{Rd,max}$	[kN]	9,2	14,4	20,7	28,2	36,9	57,6	82,9	90,0	112,9	147,4

Design Resistance Dry/Wet Holes (Hollow Drilling)

Steel Decisive

Non-Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rd,min}$	[kN]	11,7	13,0	16,4	18,2	20,1	24,0	26,4	28,1	33,3	40,6
	Tensile Max.	$N_{Rd,max}$	[kN]	19,7	30,9	44,4	60,5	79,0	123,4	177,7	192,8	241,9	316,0
	Shear Min.	$V_{Rd,min}$	[kN]	9,2	14,4	20,7	28,2	36,9	57,5	63,3	67,3	79,8	97,5
	Shear Max.	$V_{Rd,max}$	[kN]	9,2	14,4	20,7	28,2	36,9	57,6	82,9	90,0	112,9	147,4

Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rd,min}$	[kN]	4,6	5,8	8,8	11,9	14,3	17,1	18,8	20,0	23,7	29,0
	Tensile Max.	$N_{Rd,max}$	[kN]	12,3	19,2	30,2	44,5	58,1	90,8	130,7	152,7	191,6	250,2
	Shear Min.	$V_{Rd,min}$	[kN]	9,2	13,8	20,7	28,2	34,3	41,0	45,1	48,0	56,9	69,5
	Shear Max.	$V_{Rd,max}$	[kN]	9,2	14,4	20,7	28,2	36,9	57,6	82,9	90,0	112,9	147,4

Design Resistance (Flooded Holes)

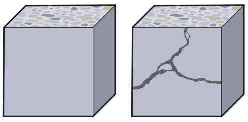
Steel Decisive

Non-Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rd,min}$	[kN]	10,1	11,2	14,1	15,6	17,2	20,5	22,6	24,0	28,5	34,8
	Tensile Max.	$N_{Rd,max}$	[kN]	19,7	30,9	44,4	60,5	79,0	123,4	177,7	192,8	241,9	316,0
	Shear Min.	$V_{Rd,min}$	[kN]	9,2	14,4	20,7	28,2	36,9	57,5	63,3	67,3	79,8	97,5
	Shear Max.	$V_{Rd,max}$	[kN]	9,2	14,4	20,7	28,2	36,9	57,6	82,9	90,0	112,9	147,4

Design Resistance (Flooded Holes, Cont'd)

Steel Decisive

Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rd,min}$	[kN]	3,9	4,9	7,5	10,2	12,3	14,6	16,1	17,1	20,3	24,8
	Tensile Max.	$N_{Rd,max}$	[kN]	10,5	16,5	25,9	38,1	49,8	77,8	112,0	130,9	164,2	214,5
	Shear Min.	$V_{Rd,min}$	[kN]	9,2	13,8	20,7	28,2	34,3	41,0	45,1	48,0	56,9	69,5
	Shear Max.	$V_{Rd,max}$	[kN]	9,2	14,4	20,7	28,2	36,9	57,6	82,9	90,0	112,9	147,4



Recommended Loads Dry/Wet Holes (Compressed Air Cleaning)

Non-Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rrec,min}$	[kN]	10,1	11,2	14,1	15,6	17,2	20,5	22,6	24,0	28,5	34,8
	Tensile Max.	$N_{Rrec,max}$	[kN]	14,1	22,0	31,7	43,2	56,4	88,2	126,9	137,7	172,8	225,7
	Shear Min.	$V_{Rrec,min}$	[kN]	6,6	10,3	14,8	20,2	26,3	41,1	45,2	48,1	57,0	69,6
	Shear Max.	$V_{Rrec,max}$	[kN]	6,6	10,3	14,8	20,2	26,3	41,1	59,2	64,3	80,6	105,3

Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rrec,min}$	[kN]	3,9	4,9	7,5	10,2	12,3	14,6	16,1	17,1	20,3	24,8
	Tensile Max.	$N_{Rrec,max}$	[kN]	10,5	16,5	25,9	38,1	49,8	77,8	112,0	130,9	164,2	214,5
	Shear Min.	$V_{Rrec,min}$	[kN]	6,6	9,9	14,8	20,2	24,5	29,3	32,2	34,3	40,6	49,7
	Shear Max.	$V_{Rrec,max}$	[kN]	6,6	10,3	14,8	20,2	26,3	41,1	59,2	64,3	80,6	105,3

Recommended Loads Dry/Wet Holes (Hollow Drilling)

Non-Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rrec,min}$	[kN]	8,4	9,3	11,7	13,0	14,3	17,1	18,8	20,0	23,8	29,0
	Tensile Max.	$N_{Rrec,max}$	[kN]	14,1	22,0	31,7	43,2	56,4	88,2	126,9	137,7	172,8	225,7
	Shear Min.	$V_{Rrec,min}$	[kN]	6,6	10,3	14,8	20,2	26,3	41,1	45,2	48,1	57,0	69,6
	Shear Max.	$V_{Rrec,max}$	[kN]	6,6	10,3	14,8	20,2	26,3	41,1	59,2	64,3	80,6	105,3

Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rrec,min}$	[kN]	3,3	4,1	6,3	8,5	10,2	12,2	13,4	14,3	16,9	20,7
	Tensile Max.	$N_{Rrec,max}$	[kN]	8,8	13,7	21,5	31,8	41,5	64,8	93,4	109,1	136,8	178,7
	Shear Min.	$V_{Rrec,min}$	[kN]	6,6	9,9	14,8	20,2	24,5	29,3	32,2	34,3	40,6	49,7
	Shear Max.	$V_{Rrec,max}$	[kN]	6,6	10,3	14,8	20,2	26,3	41,1	59,2	64,3	80,6	105,3

Recommended Loads (Flooded Holes)

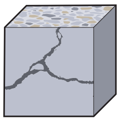
Non-Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rrec,min}$	[kN]	7,2	8,0	10,1	11,2	12,3	14,7	16,2	17,2	20,4	24,9
	Tensile Max.	$N_{Rrec,max}$	[kN]	14,1	22,0	31,7	43,2	56,4	88,2	126,9	137,7	172,8	225,7
	Shear Min.	$V_{Rrec,min}$	[kN]	6,6	10,3	14,8	20,2	26,3	41,1	45,2	48,1	57,0	69,6
	Shear Max.	$V_{Rrec,max}$	[kN]	6,6	10,3	14,8	20,2	26,3	41,1	59,2	64,3	80,6	105,3

Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rrec,min}$	[kN]	2,8	3,5	5,4	7,3	8,8	10,5	11,5	12,2	14,5	17,7
	Tensile Max.	$N_{Rrec,max}$	[kN]	7,5	11,8	18,5	27,2	35,6	55,6	80,0	93,5	117,3	153,2
	Shear Min.	$V_{Rrec,min}$	[kN]	6,6	9,9	14,8	20,2	24,5	29,3	32,2	34,3	40,6	49,7
	Shear Max.	$V_{Rrec,max}$	[kN]	6,6	10,3	14,8	20,2	26,3	41,1	59,2	64,3	80,6	105,3

Seismic resistance (for a single rebar)

All data in this section subject to:

- Correct setting (see setting instructions).
- No edge distance and spacing influence.
- Minimum and maximum embedment depth, as specified in the 'Installation Dimensions' table.
- Concrete C20/25, $f_{ck,cube}$ = 25 N/mm².
- Temperature range I: (max. long/short term temperature +50°C/+80°C).
- Shear loads are calculated without the influence of a lever arm.
- α_{gap} = 1,0 (using special filling washer according ETA-19/0131 Annex A 3).
- Increasing factors for concrete ψc: C25/30 to C50/60 = **1,0**



Design Resistance Dry/Wet Holes in case of seismic performance category C1 (Compressed Air Cleaning)

Steel Decisive

Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rd,eq,min}$	[kN]	5,5	6,9	10,6	13,3	14,6	17,4	19,2	20,4	24,2	29,5
	Tensile Max.	$N_{Rd,eq,max}$	[kN]	14,7	23,0	36,2	53,4	69,7	108,9	156,8	183,3	229,9	300,3
	Shear Min.	$V_{Rd,eq,min}$	[kN]	6,5	10,1	14,5	19,8	24,8	29,6	32,6	34,7	41,1	50,2
	Shear Max.	$V_{Rd,eq,max}$	[kN]	6,5	10,1	14,5	19,8	25,8	40,3	58,1	63,0	79,0	103,2

Design Resistance Dry/Wet Holes in case of seismic performance category C1 (Hollow Drilling)

Steel Decisive

Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rd,eq,min}$	[kN]	4,6	5,8	8,8	11,0	12,2	14,5	16,0	17,0	20,2	24,6
	Tensile Max.	$N_{Rd,eq,max}$	[kN]	12,3	19,2	30,2	44,5	58,1	90,8	130,7	152,7	191,6	250,2
	Shear Min.	$V_{Rd,eq,min}$	[kN]	6,5	10,1	14,5	19,8	24,8	29,6	32,6	34,7	41,1	50,2
	Shear Max.	$V_{Rd,eq,max}$	[kN]	6,5	10,1	14,5	19,8	25,8	40,3	58,1	63,0	79,0	103,2

Design Resistance in case of seismic performance category C1 (Flooded Holes)

Steel Decisive

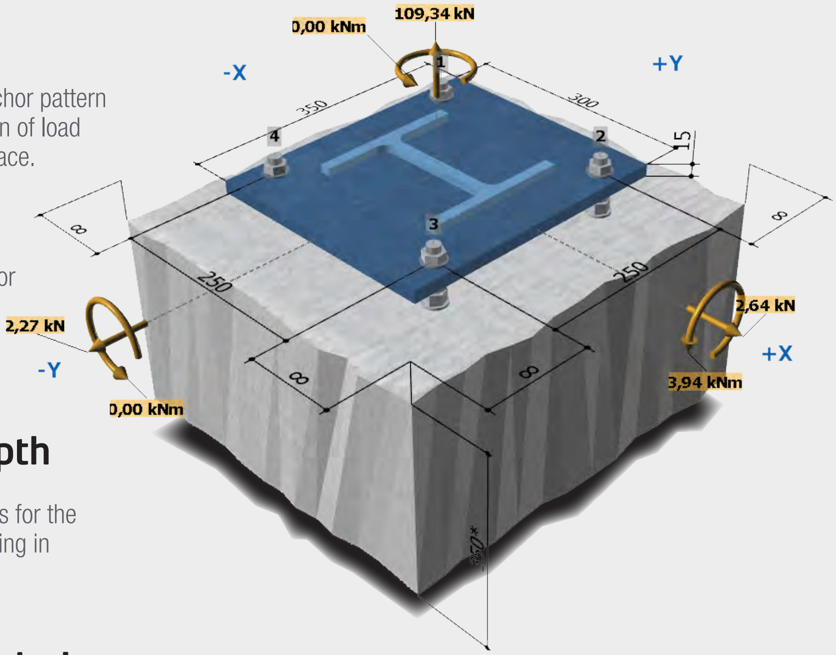
Cracked Concrete		d_{nom}		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
B500B	Tensile Min.	$N_{Rd,eq,min}$	[kN]	3,9	4,9	7,5	9,5	10,4	12,4	13,7	14,6	17,3	21,1
	Tensile Max.	$N_{Rd,eq,max}$	[kN]	10,5	16,5	25,9	38,1	49,8	77,8	112,0	130,9	164,2	214,5
	Shear Min.	$V_{Rd,eq,min}$	[kN]	6,5	10,1	14,5	19,8	24,8	29,6	32,6	34,7	41,1	50,2
	Shear Max.	$V_{Rd,eq,max}$	[kN]	6,5	10,1	14,5	19,8	25,8	40,3	58,1	63,0	79,0	103,2

Free Anchor Design Software for Structural Safety!

B+BTec DesignFiX® Anchor Design made Easy!

Input Freedom & 3D User Interface

B+BTEC DesignFiX® offers complete freedom to select an anchor pattern and base plate configuration, as well as the position and direction of load combinations. Changes are made directly into the 3D user interface.

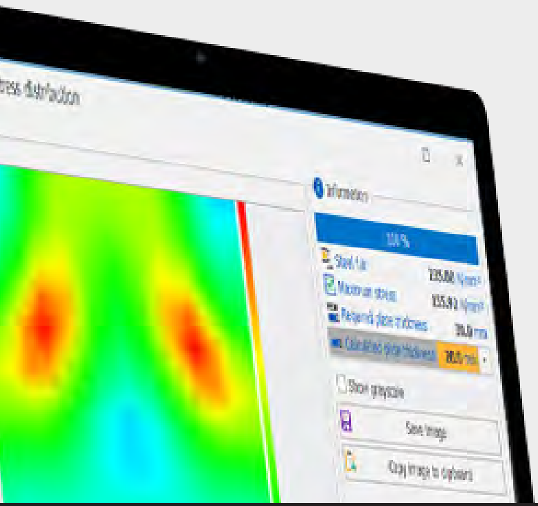


Anchor Type Comparison

B+BTEC DesignFiX® displays the usability of the various anchor types (according to ETAG-001, Annex A, TR029), including the values for each load type. This allows you to compare the calculation results of the different anchor types in a single easy to read panel.

Calculation Effective Anchorage Depth

When selecting an Injection Mortar **B+BTEC DesignFiX®** allows for the automatic calculation of the most effective anchorage depth, taking in consideration the minimal and maximum values of the ETA.



Calculation Base Plate Thickness

The integrated FEM-Calculation Method (Finite Element Method) in **B+BTEC DesignFiX®** allows you to calculate the base plate thickness based upon the stresses in the base plate in combination with the base plate configuration.

B+BTec DesignFiX®

Look for this logo on bbtectools.com for Anchor Compatibility

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