









The powerful injection mortar for cracked concrete



APPROVALS

			
ETA-17/0979 EAD 330499-00-0601		ETA-17/1056 ETAG 001-5	
Option 1 for cracked concrete		Post-installed rebar connection	
seismic performance category C1, C2			
	Fire resistance classification R 120 Anchor types see test report		
	See ICC-ES Evaluation Report at www.iccs.org Inspection agency: IEA (AA-707)		

ADVANTAGES

- Approved for seismic applications, which ensure safety even under extreme conditions.
- Highest temperature range for epoxy mortar.
- Longest shelf life up to 3 years provides flexibility of storage.
- FIS EM Plus is also approved for diamond drilled and water-filled drill holes, thus ensuring more flexibility on the construction site.
- High bond strengths and minor mortar shrinkage allow maximum load application in cracked and non-cracked concrete, even with large threaded rod diameters of up to M30 and rebar diameter up to T40.
- The low voc content complies with green building requirements/lead.

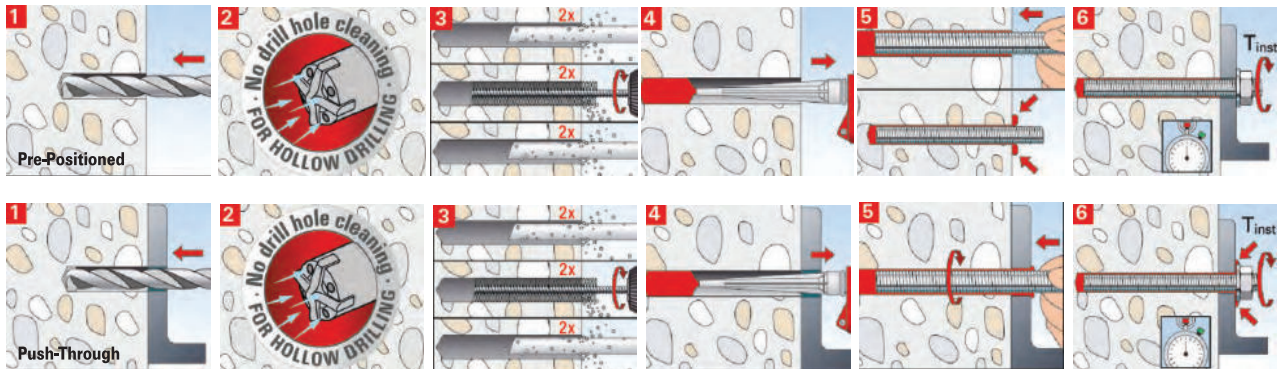
BUILDING MATERIALS

- Approved for anchoring in:**
- Concrete C20/25 to C50/60
 - Cracked and non-cracked
 - Seismic conditions
 - Under water
 - Diamond drill holes
- Approved for rebar connection in:**
- Concrete C12/15 to C50/60

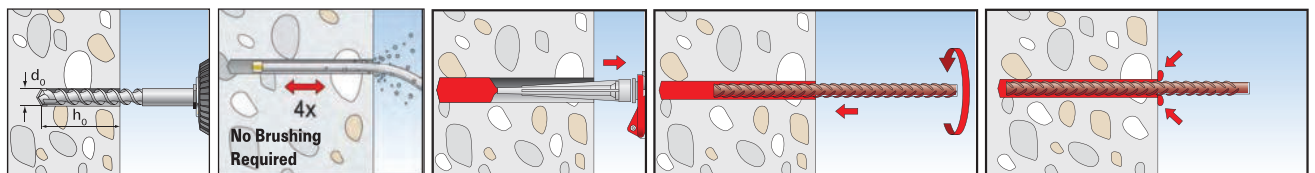
Also tested for:

- Natural stone with dense structure
- Diamond core drilling

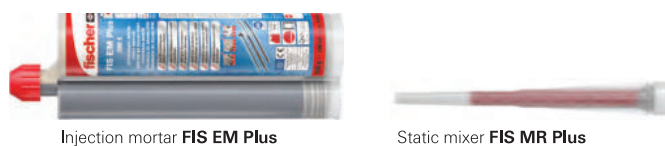
INSTALLATION - Threaded Rod



INSTALLATION DETAILS - Rebar



TECHNICAL DATA



Item	Art-No.	Languages on the cartridge	Contents	Sales unit (pcs)
FIS EM Plus 390 S	544154	DE, EN, FR, NL, ES, PT	1 cartridge 390 ml, 2 x static mixer FIS MR Plus	6
FIS EM 390 S BT (bucket)	544172	DE, EN, FR, NL, ES, PT	20 cartridges 390 ml + 20 static mixer FIS MR	1
FIS MR Plus	545853	-	10 static mixer FIS MR Plus in Polybag	10
FIS MR Plus PBH	546158	-	10 static mixer FIS MR Plus in Polybag with hanger	10

CURING TIME

Cartridge temperature (mortar)	Gelling time (Maximum processing time)	Temperature at anchoring base	Curing time
+5°C - +9°C	120 min.	+5°C - +9°C	40 hrs.
+10°C - +19°C	30 min.	+10°C - +19°C	18 hrs.
+20°C - +29°C	14 min.	+20°C - +29°C	10 hrs.
≥30°C	7 min.	≥30°C	5 hrs.

The above times apply from the moment of contact between resin and hardener in the static mixer.

For installation, the cartridge temperature must be at least +5 °C. For longer installation times, i.e. when interruptions occur in work, the mixer should be replaced.

In wet concrete or water filled holes the curing times must be doubled.

LOADS

Loads for a single anchor in concrete ^{1) 2) 5) 8) 9)}

For the design the complete approval ETA - 17/0979 has to be considered.

Design Resistance ¹⁾

Rod diameter hef(mm) Anchor type	Dia 8 80				Dia 10 100				Dia 12 120				Dia 14 140				Dia 16 160				Dia 18 180		Dia 20 200					
	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	Rebar	Rebar	5.8	8.8	A4-70	Rebar		
Drill diameter (mm)	12				14				14				16				18				20		24					
Torque (Nm)	10				20				40				50				60				-		120					
Non-cracked Concrete																												
Tension C20/25 Nrd (kN)	12.7	19.5	13.7	18.2	19.3	30.9	21.7	28.4	28.7	44.3	31.6	40.8	38.7	55.8	43.1	55.7	52.6	68.1	58.8	68.1	81.3	82.0	95.2	91.7	95.2	91.7	95.2	91.7
Tension C50/60 Nrd (kN)	12.7	19.5	13.7	18.2	19.3	30.9	21.7	28.4	28.7	45.0	31.6	40.8	38.7	61.3	43.1	55.7	52.6	83.7	58.8	72.7	92.0	82.0	130.7	91.7	113.5	91.7	113.5	91.7
Shear ≥ C25/25	7.2	11.7	8.2	10.1	12.0	18.5	13.0	15.8	16.8	26.9	18.9	22.8	23.2	36.8	25.8	31.1	31.2	50.2	35.2	40.6	51.5	48.8	78.4	54.9	63.5	54.9	63.5	54.9
Cracked Concrete																												
Tension C20/25 Nrd (kN)	10.0	10.0	10.0	9.4	15.7	15.7	15.7	14.7	27.1	27.1	27.1	24.1	34.9	34.9	34.9	32.8	45.6	45.6	45.6	42.9	54.3	67.9	67.9	67.9	67.0	67.9	67.0	67.0
Tension C50/60 Nrd (kN)	11.0	11.0	11.0	10.2	17.1	17.1	17.1	16.0	28.7	29.6	29.6	26.3	38.0	38.0	38.0	35.8	49.7	49.7	49.7	46.7	59.1	77.6	77.6	77.6	73.0	77.6	73.0	73.0
Shear ≥ C25/25	7.2	11.7	8.2	10.1	12.0	18.5	13.0	15.8	16.8	26.9	18.9	22.8	23.2	36.8	25.8	31.1	31.2	50.2	35.2	40.6	51.5	48.8	78.4	54.9	63.5	54.9	63.5	54.9

Rod diameter hef(mm) Anchor type	Dia 22 220				Dia 24 240				Dia 25 250	Dia 26 260	Dia 27 270			Dia 28 280			Dia 30 300				Dia 32 320	Dia 34 340	Dia 36 360	Dia 40 400		
	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	Rebar	Rebar	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	Rebar	Rebar	Rebar	Rebar
Drill diameter (mm)	25				28				30	30	35			35			35				40	40	40	45	55	
Torque (Nm)	135				150				-	-	200			-			300				-	-	-	-	-	
Non-cracked Concrete																										
Tension C20/25 Nrd (kN)	101.3	109.9	109.9	109.9	118.0	125.2	125.2	125.2	133.1	141.1	149.4	149.4	149.4	157.7	174.9	174.9	174.9	174.9	174.9	174.9	174.9	192.7	211.1	230.0	269.3	269.3
Tension C50/60 Nrd (kN)	101.3	161.6	113.4	137.4	118.0	188.3	132.1	157.7	171.1	185.1	153.0	231.4	214.2	214.7	187.0	271.0	261.8	246.4	280.4	280.4	280.4	290.1	325.3	325.3	401.6	401.6
Shear ≥ C25/25	60.8	97.0	67.9	76.9	71.2	113.0	79.2	91.5	99.3	107.4	92.0	146.9	102.9	124.6	112.8	179.5	125.8	143.0	162.7	183.7	183.7	206.0	206.0	206.0	254.4	254.4
Cracked Concrete																										
Tension C20/25 Nrd (kN)	78.3	67.9	67.9	67.9	89.2	89.2	89.2	89.2	94.9	100.6	106.5	106.5	106.5	112.4	124.7	124.7	124.7	124.7	124.7	124.7	124.7	137.4	150.5	163.9	192.0	192.0
Tension C50/60 Nrd (kN)	93.9	85.3	85.3	80.3	111.7	111.7	111.7	105.1	114.1	123.4	141.4	141.4	141.4	143.1	174.6	174.6	174.6	164.3	186.9	186.9	186.9	211.0	236.6	236.6	292.1	292.1
Shear ≥ C25/25	60.8	97.0	67.9	76.9	71.2	113.0	79.2	91.5	99.3	107.4	92.0	146.9	102.9	124.6	112.8	179.5	125.8	143.0	162.7	183.7	183.7	206.0	206.0	206.0	254.4	254.4

Recommended Resistance ²⁾

Rod diameter hef Quality	Dia 8 80				Dia 10 100				Dia 12 120				Dia 14 140				Dia 16 160				Dia 18 180		Dia 20 200			
	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	Rebar	Rebar	5.8	8.8	A4-70	Rebar
Drill diameter (mm)	12				14				14				16				18				20		24			
Torque (Nm)	10				20				40				50				60				-		120			
Non-cracked concrete																										
Tension C20/25 Nrd (kN)	9.1	13.9	9.8	13.0	13.8	22.1	15.5	20.3	20.5	31.6	22.5	29.2	27.6	39.8	30.8	39.8	37.6	48.7	42.0	48.7	58.1	58.6	68.0	65.5	68.0	
Tension C50/60 Nrd (kN)	9.1	13.9	9.8	13.0	13.8	22.1	15.5	20.3	20.5	32.1	22.5	29.2	27.6	43.8	30.8	39.8	37.6	59.8	42.0	51.9	65.7	58.6	93.3	65.5	81.1	
Shear ≥ C25/25	5.1	8.4	5.9	7.2	8.6	13.2	9.3	11.3	12.0	19.2	13.5	16.3	16.6	26.3	18.4	22.2	22.3	35.9	25.2	29.0	36.8	34.9	56.0	39.2	45.4	
Cracked Concrete																										
Tension C20/25 Nrd (kN)	7.2	7.2	7.2	6.7	11.2	11.2	11.2	10.5	19.4	19.4	19.4	17.2	24.9	24.9	24.9	23.4	32.5	32.5	32.5	30.6	38.8	48.5	48.5	48.5	47.8	
Tension C50/60 Nrd (kN)	7.8	7.8	7.8	7.3	12.2	12.2	12.2	11.4	20.5	21.1	21.1	18.8	27.2	27.2	27.2	25.6	35.5	35.5	35.5	33.4	42.2	55.4	55.4	55.4	52.2	
Shear ≥ C25/25	5.1	8.4	5.9	7.2	8.6	13.2	9.3	11.3	12.0	19.2	13.5	16.3	16.6	26.3	18.4	22.2	22.3	35.9	25.2	29.0	36.8	34.9	56.0	39.2	45.4	

Rod diameter hef Quality	Dia 22 220				Dia 24 240				Dia 25 250	Dia 26 260	Dia 27 270			Dia 28 280			Dia 30 300				Dia 32 320	Dia 34 340	Dia 36 360	Dia 40 400		
	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	Rebar	Rebar	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	5.8	8.8	A4-70	Rebar	Rebar	Rebar	Rebar	Rebar
Drill diameter (mm)	25				28				30	30	35			35			35				40	40	40	45	55	
Torque (Nm)	135				150				-	-	200			-			300				-	-	-	-	-	
Non-cracked concrete																										
Tension C20/25 Nrd (kN)	72.4	78.5	78.5	78.5	84.3	89.4	89.4	89.4	95.1	100.8	106.7	106.7	106.7	112.7	125.0	125.0	125.0	125.0	137.7	150.8	164.3	192.4	192.4	192.4	192.4	192.4
Tension C50/60 Nrd (kN)	72.4	115.4	81.0	98.1	84.3	134.5	94.4	112.7	122.2	132.2	109.3	165.3	153.0	153.3	133.6	193.6	187.0	176.0	200.3	207.2	232.3	286.8	286.8	286.8	286.8	286.8
Shear ≥ C25/25	43.4	69.3	48.5	55.0	50.9	80.7	56.6	65.4	70.9	76.7	65.7	104.9	73.5	89.0	80.6	128.2	89.9	102.1	116.2	131.2	147.2	181.7	181.7	181.7	181.7	181.7
Cracked Concrete																										
Tension C20/25 Nrd (kN)	55.9	48.5	48.5	48.5	63.7	63.7	63.7	63.7	67.8	71.9	76.1	76.1	76.1	80.3	89.1	89.1	89.1	89.1	98.1	107.5	117.1	137.1	137.1	137.1	137.1	137.1
Tension C50/60 Nrd (kN)	67.1	61.0	61.0	57.4	79.8	79.8	79.8	75.1	81.5	88.1	101.0	101.0	101.0	102.2	124.7	124.7	124.7	117.3	133.5	150.7	169.0	208.6	208.6	208.6	208.6	208.6
Shear ≥ C25/25	43.4	69.3	48.5	55.0	50.9	80.7	56.6	65.4	70.9	76.7	65.7	104.9	73.5	89.0	80.6	128.2	89.9	102.1	116.2	131.2	147.2	181.7	181.7	181.7	181.7	181.7

(1) The partial safety factors for material resistance as regulated in the approval.

(2) Partial safety factor for load $\gamma_L = 1.4$ are considered for recommended load capacities.

(3) Minimum possible axial spacings resp. edge distance while reducing the permissible load/design load.

(4) For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see approval.

(5) For higher concrete strength classes up to C50/60 higher permissible loads may be possible.

(6) The given loads are valid in dry and humid concrete for temperatures substrate up to +35°C (resp. short term up to 60°C) and best possible cleaning according to approval.

(7) Rebar grade used for above calculation is FY= 460 N/mm².

(8) The above loads use for embedment depth = 10 x dia.

(9) Embedment depth can be reduced or increased to get desired loads as per approval.

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