

# Injection mortar FIS EM

The high-performance mortar for concrete.

## OVERVIEW



Injection mortar  
**FIS EM 390 S**



Injection mortar  
**FIS EM 1100 S**



Static mixer  
**FIS SE**

**Suitable for:**

- Non-cracked concrete
- Reinforcement bars



**For fixing of:**

- Steel constructions
- Consoles
- Machines
- Staircases
- High-racks
- Wooden constructions
- Reinforcement bars

## DESCRIPTION

- Best performance mortar in the shuttle cartridge based on epoxy resin.
- Optimum solution for concrete (anchor rods and reinforcement bars).
- Resin and hardener are stored in two separate chambers and are not mixed and activated until pushed through the static mixer.
- Partially used cartridges can easily be reused by changing the static mixer.

### Advantages/Benefits

- Very good bonding of the mortar ensures highest loads in concrete.
- Suitable for underwater installations.
- Suitable for diamond drilled holes.
- Expansion-free anchoring allows low axial spacings and edge distances.
- Ergonomic application guns for quick and easy installation.



### Accessories/Recommended loads

- For fixing in concrete, see page 81 et seq.
- Appropriate application guns, see page 111/112

## TECHNICAL DATA



Type	Art.No.	ID	languages on the label	contents	Qty. per box
FIS EM 390 S HWK	<b>40038</b>	8	D, GB, F, I, NL, E	20 cartridge 390 ml + 40 static mixer	1
FIS EM 390 S	<b>93048</b>	9	D, GB, F, I, NL, E	1 cartridge 390 ml + 2 static mixer	6
FIS EM 390 S	<b>93049</b>	6	GB, PRC, JP, ROK, CZ, PL	1 cartridge 390 ml + 2 static mixer	6
FIS EM 1100 S	<b>96865</b>	9	D, NL, GB, F, U, E, PRC, JP, ROK	1 cartridge 1100 ml + 2 static mixer	6
FIS SE	<b>96448</b>	4	-	1 static mixer	10

### FIXING PRINCIPLES

In detail: The general principles for installation, the correct drilling procedure and much more on page 26.

## CURING TIME

### Gelling and curing time of fischer FIS EM

Cartridge temperature (mortar)	Gelling time	temperature at anchoring base	Curing time
- 5°C – + 5°C	4 hrs.	- 5°C – + 5°C	80 hrs.
+ 5°C – + 10°C	2 hrs.	+ 5°C – + 10°C	40 hrs.
+ 10°C – + 20°C	30 min.	+ 10°C – + 20°C	18 hrs.
+ 20°C – + 30°C	14 min.	+ 20°C – + 30°C	10 hrs.
+ 30°C – + 40°C	7 min.	+ 30°C – + 40°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. With temperatures above +30°C to +40°C the cartridges have to be cooled down to +15°C or +20°C. For longer installation times, i.e. when interruptions occur in work, the mixer should be replaced.

## LOADS

### Mean ultimate loads, design resistant and recommended loads for single anchors of fischer Injection system FIS EM used with fischer threaded rods with large spacing and edge distance.

Anchor size		Non-cracked concrete																			
		M 8			M 10			M 12			M 16										
Kind of steel		gvz	A4	C	gvz	A4	C	gvz	A4	C	gvz	A4	C	gvz	A4	C					
Steel grade		5.8	8.8	10.9	A4-70	1.4529	5.8	8.8	10.9	A4-70	1.4529	5.8	8.8	10.9	A4-70	1.4529	5.8	8.8	10.9	A4-70	1.4529
Effektive anchorage depth	$h_{ef,min}$ [mm]	40			40			48			64										
	$h_{ef,max}$ [mm]	120			150			180			240										
Drill hole depth	$h_D$ [mm]	$h_D = h_{ef}$																			
Drill hole diameter	$d_D$ [mm]	10			12			14			18										
<b>Mean ultimate loads <math>N_U</math> and <math>V_U</math> [kN]</b>																					
Tensile	0° $N_U$ [kN]	$h_{ef,min}$	17.1			17.1			22.4			34.6									
		$h_{ef,max}$	19.0*	29.0*	37.0*	26.0*	30.0*	46.0*	58.0*	41.0*	44.0*	67.0*	84.0*	59.0*	82.0*	126.0*	157.0*	110.0*			
Shear	90° $V_U$ [kN]	$h_{ef,min}$	9.2*	14.6*	17.0*	12.8*	14.5*	17.1			21.1*	22.4			39.2*	62.8*	69.1	54.8*			
		$h_{ef,max}$	9.2*	14.6*	17.0*	12.8*	14.5*	23.2	27.0*	20.3*	21.1*	33.7*	40.0*	29.5*	39.2*	62.8*	74.0*	54.8*			
<b>Design resistant loads <math>N_{Rd}</math> and <math>V_{Rd}</math> [kN]</b>																					
Tensile	0° $N_{Rd}$ [kN]	$h_{ef,min}$	7.1			7.1			9.3			14.4									
		$h_{ef,max}$	12.8	19.3	22.5	13.9	17.3	20.3	30.7	35.1	21.9	27.3	29.7	44.7	50.5	31.6	39.9	55.4	84.0	89.8	58.8
Shear	90° $V_{Rd}$ [kN]	$h_{ef,min}$	7.4	8.5		8.2	8.5	8.5			11.2			31.4			34.5				
		$h_{ef,max}$	7.4	11.7	11.3	8.2	10.2	11.6	18.6	18.0	13.0	16.2	16.9	27.0	18.9	23.6	31.4	50.2	49.3	35.1	43.8
<b>Recommended loads <math>N_{rec}</math> and <math>V_{rec}</math> [kN]</b>																					
Tensile	0° $N_{rec}$ [kN]	$h_{ef,min}$	5.1			5.1			6.7			10.3									
		$h_{ef,max}$	9.2	13.8	16.0	9.9	12.4	14.5	21.9	25.1	15.7	19.5	21.2	31.9	36.1	22.5	28.1	39.6	60.0	64.1	42.0
Shear	90° $V_{rec}$ [kN]	$h_{ef,min}$	5.3	6.1		5.9	6.1	6.1			8.0			22.4			24.6				
		$h_{ef,max}$	5.3	8.3	8.1	5.9	7.3	8.3	13.3	12.9	9.3	11.6	12.1	19.3	19.0	13.5	16.9	22.4	35.9	35.2	25.1
<b>Recommended bending moment <math>M_{rec}</math> [Nm]</b>																					
	$M_{rec}$ [Nm]	11.4	17.1	17.6	11.9	14.9	22.3	34.3	35.7	23.8	29.7	38.9	60.0	62.4	42.1	52.6	98.8	152.0	158.1	106.7	133.1
<b>Component dimensions, minimum axial spacings and edge distances</b>																					
Characteristic axial spacing	$s_{cr,Np}$ [mm]	220			270			330			430										
Characteristic edge distance	$c_{cr,Np}$ [mm]	110			135			165			215										
Minimum axial spacing <sup>1)</sup>	$s_{min}$ [mm]	40			45			55			65										
Minimum edge distance <sup>1)</sup>	$c_{min}$ [mm]	40			45			55			65										
Minimum structural component thickness	$h_{min}$ [mm]	70			70			78			96										
	$h_{ef,max}$ [mm]	150			180			210			272										
Clearance-hole in fixture to be attached for pre-positioned installation	$d_f \leq$ [mm]	9			12			14			18										
Clearance-hole in fixture to be attached for push-trough installation	$d_f \leq$ [mm]	11			14			16			20										
Required torque	$T_{inst}$ [Nm]	10			20			40			60										
Required mortar volume FIS EM	[Scale units] $h_{ef,min}$	2			2			2			4										
	[Scale units] $h_{ef,max}$	4			6			8			14										

\* Steel failure decisive.

<sup>1)</sup> For minimum axial spacing and minimum edge distance the above described loads have to be reduced (See "fischer Technical Handbook" or design software "CC-COMPUFIX")!

Values given above are valid under the following assumptions:

- Sufficient mechanical cleaning of the drill hole using stainless steel brushes.
- Dry concrete, temperature range from - 40 °up to + 43 °C .

All values apply for concrete C20/25 without edge or spacing influences. Design resistant loads: Recommended loads:

material safety factor  $\gamma_M$  is included. Material safety factor  $\gamma_M$  depends on the type of anchor. material safety factor  $\gamma_M$  and safety factor for load  $\gamma_L = 1.4$  are included.

Continued next page.

# Injection mortar FIS EM

## LOADS

Mean ultimate loads, design resistant and recommended loads for single anchors of fischer Injection system FIS EM used with fischer threaded rods with large axial spacing and edge distance.

Anchor size		Non-cracked concrete																	
		M 20					M 24					M 30							
Kind of steel		gvz			A4	C	gvz			A4	C	gvz			A4	C			
Steel grade		5.8	8.8	10.9	A4-70	1.4529	5.8	8.8	10.9	A4-70	1.4529	5.8	8.8	10.9	A4-70	1.4529			
Effective anchorage depth	$h_{ef,min}$ [mm]	80					96					120							
	$h_{ef,max}$ [mm]	300					360					450							
Drill hole depth	$h_D$ [mm]																		
Drill hole diameter	$d_0$ [mm]	24					28					35							
<b>Mean ultimate loads <math>N_u</math> and <math>V_u</math> [kN]</b>																			
Tensile	0° $N_u$ [kN]	$h_{ef,min}$	48.3					63.5					88.7						
		$h_{ef,max}$	127.0*	196.0*	245.0*	171.0*	183.0*	282.0*		247.0*	292.0*	449.0*	561.0*	392.0*					
Shear	90° $V_u$ [kN]	$h_{ef,min}$	61.2*			96.6		85.7*		88.2*		127.0		123.4*		140.2*		177.5	
		$h_{ef,max}$	61.2*	98.0*	115.0*	85.7*	88.2*	141.2*	166.0*	123.4*	140.2*	224.4*	264.0*	196.2*					
<b>Design resistant loads <math>N_{Rd}</math> and <math>V_{Rd}</math> [kN]</b>																			
Tensile	0° $N_{Rd}$ [kN]	$h_{ef,min}$	20.1					26.4					36.9						
		$h_{ef,max}$	85.8	125.7	164.6	91.4	114.0	123.6	171.9	132.1	164.7	197.3	267.8	209.6	261.3				
Shear	90° $V_{Rd}$ [kN]	$h_{ef,min}$	48.2					63.3				88.5							
		$h_{ef,max}$	49.0	78.4	76.7	54.9	68.6	70.6	113.0	110.7	79.1	98.7	112.2	179.5	176.0	125.8	157.0		
<b>Recommended loads <math>N_{rec}</math> and <math>V_{rec}</math> [kN]</b>																			
Tensile	0° $N_{rec}$ [kN]	$h_{ef,min}$	14.3					18.8					26.3						
		$h_{ef,max}$	61.3	89.8	65.3	81.4	88.3	122.8	94.3	117.6	140.9	191.3	149.7	186.7					
Shear	90° $V_{rec}$ [kN]	$h_{ef,min}$	34.4					45.2				63.2							
		$h_{ef,max}$	35.0	56.0	54.8	39.2	49.0	50.4	80.7	79.0	56.5	70.5	80.1	128.2	125.7	89.8	112.1		
<b>Recommended bending moment <math>M_{rec}</math> [Nm]</b>																			
	$M_{rec}$ [Nm]	193.1	296.6	308.6	207.9	259.4	333.1	512.0	533.3	359.4	448.6	668.0	1026.9	1070.0	720.7	899.4			
<b>Component dimensions, minimum axial spacings and edge distances</b>																			
Characteristic axial spacing	$s_{cr,Np}$ [mm]	510					600					740							
Characteristic edge distance	$c_{cr,Np}$ [mm]	255					300					370							
Minimum axial spacing <sup>1)</sup>	$s_{min}$ [mm]	85					105					140							
Minimum edge distance <sup>1)</sup>	$c_{min}$ [mm]	85					105					140							
Minimum structural component thickness	$h_{min}$ [mm]	$h_{ef,min}$					144					180							
		$h_{ef,max}$					408					510							
Clearance-hole in fixture to be attached for pre-positioned installation	$d_f \leq$ [mm]	22					26					33							
Clearance-hole in fixture to be attached for push-through installation	$d_f \leq$ [mm]	26					30					40							
Required torque	$T_{inst}$ [Nm]	120					150					300							
Required mortar volume	[Scale units]	$h_{ef,min}$					10					14							
		$h_{ef,max}$					36					52							
FIS EM	[Scale units]	$h_{ef,max}$					36					52							

\* Steel failure decisive.

<sup>1)</sup> For minimum axial spacing and minimum edge distance the above described loads have to be reduced (See "fischer Technical Handbook" or design software "CC-COMPUFIX")!

Values given above are valid under the following assumptions:

- Sufficient mechanical cleaning of the drill hole using stainless steel brushes.
- Dry concrete, temperature range from - 40 °C up to + 43 °C .

All values apply for concrete C20/25 without edge or spacing influences.

Design resistant loads: material safety factor  $\gamma_M$  is included. Material safety factor  $\gamma_M$  depends on the type of anchor.

Recommended loads: material safety factor  $\gamma_M$  and safety factor for load  $\gamma_L = 1.4$  are included.