MIT700RE Pure Epoxy

Bonded anchor for use in concrete. The anchor is placed into a drilled hole filled with injection mortar. The steel element is anchored via the bond between metal part, injection mortar and concrete. The steel consists of a threaded rod, internal threaded rod or reinforcing bar.

Option 1 | REBAR | F30-120 | REBAR | C1 | C2 | NEW GENERATION

1 SPECIFICATIONS OF INTENDED USE

Anchorages subject to:
-Static and quasi-static loads: M8 to M30, Rebar Ø8 to Ø32, MIG-M6 to MIG-M20
-Seismic action for Performance Category C1 and C2

Approvals:
-European Technical Assessment for Option 1
-European Technical Assessment for REBAR
-Fire resistance test certification F30-F120
-Fire resistance test certification REBAR
-Seismic performance category C1 and C2

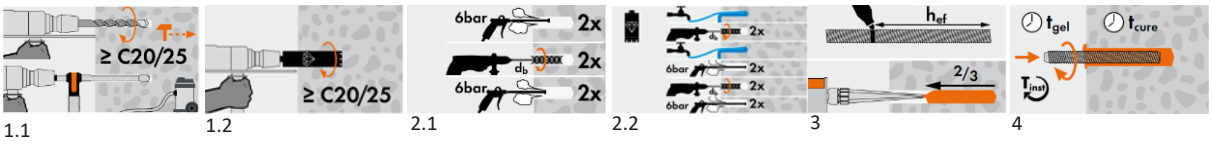
Base materials:
-Reinforced or unreinforced cracked or non-cracked normal weight concrete strength classes C20/25 to C50/60 according to EN 206-1:2000 + A1:2016
-Dry or wet concrete and flooded bore holes (see ETA-19/0203 of 2nd December 2020)

Installation:
-Dry or wet concrete and flooded holes (not sea water)
-Hole drilling by hammer, hollow, compressed air or diamond drill mode
-Overhead installation allowed
-Anchor Installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site

2 CURING TIME AND INSTALLATION INSTRUCTIONS

MAXIMUM WORKING TIME AND MINIMUM CURING TIME IN CONCRETE

	0 ÷ 4°C	5 ÷ 9°C	10 ÷ 14°C	15 ÷ 19°C	20 ÷ 24°C	25 ÷ 34°C	35 ÷ 39°C	≥ 40°C
max. working time t_{gel} [min]	90	80	60	40	30	12	8	8
min. curing time in dry concrete t_{cure} [h]	144	48	28	18	12	9	6	4
min. curing time in wet concrete t_{cure} [h]	288	96	56	36	24	18	12	8
Cartridge temperature	+5°C to +40°C							



1.1 1.2 2.1 2.2 3 4

Graphic installation guide for MIT700RE hollow drill bit, hammer, or compressed air drilling

1.1 Drilling the hole with hammer drill or compressed air drill. Automatic hole cleaning with HDB.

2.1 Compressed air cleaning (≥ 6 bar) can be used for all sizes. For HDB no cleaning required.

3. Prior to inserting the anchor rod into the filled bore hole, the position of the embedment depth shall be marked on the anchor rods. Inject mixture into the hole only when an even color is flowing. Start filling from the bottom of the hole to avoid air pockets.

4. Push fastener into the filled bore hole while turning slightly to ensure distribution of the mortar and remove possible closed in air. Tighten with a torque spanner to the predetermined value T_{inst} after complete curing of the mortar (see table).

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Graphic installation guide for MIT700RE diamond drill

1.2 Drilling the hole with diamond drill.

2.2 Fill drill hole with water until water comes out, after that brush the drill hole then blow the hole with compressed air (≥ 6 bar)

3. Prior to inserting the anchor rod into the filled bore hole, the position of the embedment depth shall be marked on the anchor rods. Inject mixture into the hole only when an even color is flowing. Start filling from the bottom of the hole to avoid air pockets.

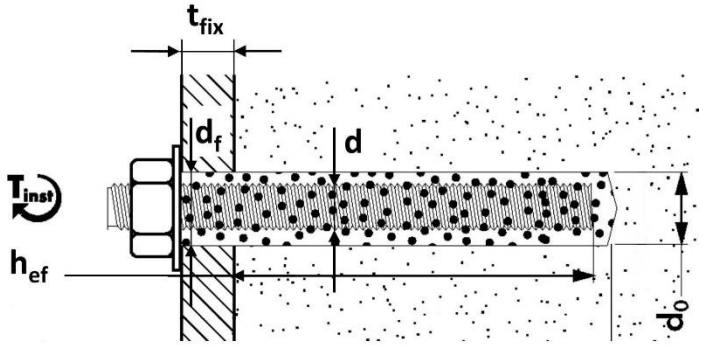
4. Push fastener into the filled bore hole while turning slightly to ensure distribution of the injection mortar and remove possible closed in air. Tighten with a torque spanner to the predetermined value T_{inst} after complete curing of the injection mortar (see table).

3 INSTALLATION DATA IN CONCRETE

Installation parameters for Mungo Injection system MIT700RE in concrete are based on ETA-19/0203 of 2nd December 2020.

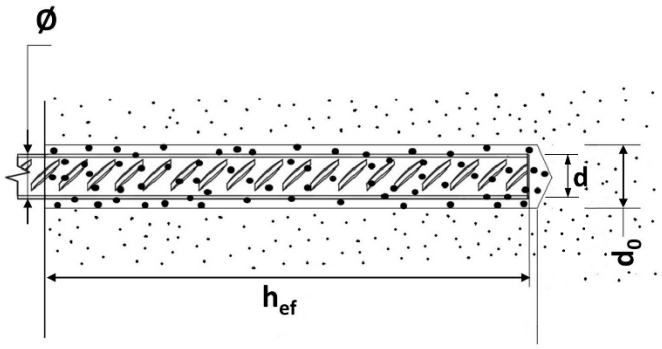
3.1 Installation parameters for threaded rod

ANCHOR SIZE MIT700RE threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Anchor/Thread diameter	d	[mm]	8	10	12	16	20	24	27	30
Diameter of clearence hole in fixture	d_f	[mm]	12	14	16	20	24	30	33	40
INSTALLATION PARAMETER										
Drill hole diameter in substrate	d_0	[mm]	10	12	14	18	22	28	30	35
Effective anchorage depth	$h_{ef,min}$	[mm]	60	60	70	80	90	96	108	120
	$h_{ef,max}$	[mm]	160	200	240	320	400	480	540	600
Installation torque	T_{inst}	[Nm]	10	20	40	60	100	170	250	300
Minimum thickness of concrete member	h_{min}	[mm]	$h_{ef} + 30mm \geq 100mm$			$h_{ef} + 2d_0$				
minimum edge distance in concrete	c_{min}	[mm]	35	40	45	50	60	65	75	80
Minimum spacing in concrete	s_{min}	[mm]	40	50	60	75	95	115	125	140



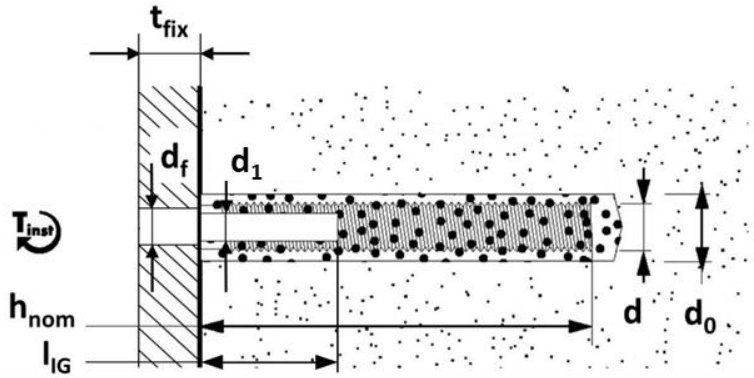
3.2 Installation parameters for reinforcing bar

ANCHOR SIZE MIT700RE rebar			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
Anchor/Thread diameter	d	[mm]	8	10	12	14	16	20	24	25	28	32
INSTALLATION PARAMETERS												
Drill hole diameter in substrate	d_0	[mm]	10	12	14	18	20	25	32	32	35	40
Effective anchorage depth	$h_{ef,min}$	[mm]	60	60	70	75	80	90	96	100	112	128
	$h_{ef,max}$	[mm]	160	200	240	280	320	400	480	500	560	640
Minimum thickness of concrete memeber	h_{min}	[mm]	h_{ef} + 30mm ≥ 100mm			$h_{ef} + 2d_0$						
Minimum edge distance in concrete	c_{min}	[mm]	35	40	45	50	50	60	70	70	75	85
Minimum spacing in concrete	s_{min}	[mm]	40	50	60	70	75	95	120	120	130	150



3.3 Installation parameters for internal threaded anchor rod

ANCHOR SIZE MIT700RE internal threaded anchor rod			IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Anchor/Thread diameter	$d = d_{nom}$	[mm]	10	12	16	20	24	30
Internal diameter of anchor rod	d_1	[mm]	6	8	10	12	16	20
Diameter of clearence hole in fixture	d_f	[mm]	7	9	12	14	18	22
INSTALLATION PARAMETERS								
Drill hole diameter in substrate	d_0	[mm]	12	14	18	22	28	35
Effective anchorage depth	$h_{ef,min}$	[mm]	60	70	80	90	96	120
	$h_{ef,max}$	[mm]	200	240	320	400	480	600
Thread engagment length	$l_{IG,min}$	[mm]	8	8	10	12	16	20
	$l_{IG,max}$	[mm]	20	20	25	30	32	40
Installation torque	T_{inst}	[Nm]	10	10	20	40	60	100
Minimum thickness of concrete memeber	h_{min}	[mm]	h_{ef} + 30mm ≥ 100mm		$h_{ef} + 2d_0$			
Minimum edge distance	c_{min}	[mm]	40	45	50	60	65	80
Minimum spacing	s_{min}	[mm]	50	60	75	95	115	140



4 RECOMMENDED TENSION RESISTANCE

Basic performance data for MITRE700 Injection System in cracked and non-cracked concrete C20/25 for 50 years without influence of edge distance, spacing and splitting failure due to dimensions of the concrete member.

REQUIRED PROOFS FOR RECOMMENDED TENSION RESISTANCE:

For design tension resistance with chemical system MIT-SE Plus the minimum value for combined pull-out, concrete cone failure and steel failure needs to be considered:

For use in non-cracked concrete: $N_{rec,ucr} = \min(N_{rec,c,ucr}; N_{rec,s})$

For use in cracked concrete: $N_{rec,cr} = \min(N_{rec,c,cr}; N_{rec,s})$

4.1 Recommended tension resistance ($N_{rec,c}$) for combined pull-out and concrete cone failure (cracked or non-cracked concrete C20/25 with threaded rod)

METRICAL THREAD SIZE				[mm]	M8	M10	M12	M16	M20	M24	M27	M30
Setting Depth h_{ef} [mm]	60	Non-Cracked	$N_{rec,c,ucr}$	[kN]	10.89*	10.89*						
		Cracked	$N_{rec,c,cr}$		4.02	5.03						
	70	Non-Cracked	$N_{rec,c,ucr}$	[kN]	13.41	13.72*	13.72*					
		Cracked	$N_{rec,c,cr}$		4.69	5.87	8.55					
	80	Non-Cracked	$N_{rec,c,ucr}$	[kN]	15.33	16.76*	16.76*	16.76*				
		Cracked	$N_{rec,c,cr}$		5.36	6.70	9.77	11.73*				
	90	Non-Cracked	$N_{rec,c,ucr}$	[kN]	17.24	20.00*	20.00*	20.00*	20.00*			
		Cracked	$N_{rec,c,cr}$		6.03	7.54	10.99	14.00*	14.00*			
	100	Non-Cracked	$N_{rec,c,ucr}$	[kN]	19.16	23.43*	23.43*	23.43*	23.43*	23.43*		
		Cracked	$N_{rec,c,cr}$		6.70	8.38	12.21	16.28	16.40*	16.40*		
	120	Non-Cracked	$N_{rec,c,ucr}$	[kN]	22.99	28.73	30.79*	30.79*	30.79*	30.79*	30.79*	30.79*
		Cracked	$N_{rec,c,cr}$		8.05	10.06	14.65	19.54	21.56*	21.56*	21.56*	21.56*
	140	Non-Cracked	$N_{rec,c,ucr}$	[kN]	26.82	33.52	38.22	38.80*	38.80*	38.80*	38.80*	38.80*
		Cracked	$N_{rec,c,cr}$		9.39	11.73	17.10	22.80	27.16*	27.16*	27.16*	27.16*
	160	Non-Cracked	$N_{rec,c,ucr}$	[kN]	30.65	38.31	43.68	47.41*	47.41*	47.41*	47.41*	47.41*
		Cracked	$N_{rec,c,cr}$		10.73	13.41	19.54	26.05	32.57	33.19*	33.19*	33.19*
	180	Non-Cracked	$N_{rec,c,ucr}$	[kN]		43.10	49.14	56.57*	56.57*	56.57*	56.57*	56.57*
		Cracked	$N_{rec,c,cr}$			15.09	21.98	29.31	36.64	39.60*	39.60*	39.60*
	200	Non-Cracked	$N_{rec,c,ucr}$	[kN]		47.89	54.60	66.26*	66.26*	66.26*	66.26*	66.26*
		Cracked	$N_{rec,c,cr}$			16.76	24.42	32.57	40.71	46.38*	46.38*	46.38*
	240	Non-Cracked	$N_{rec,c,ucr}$	[kN]			65.52	87.10*	87.10*	87.10*	87.10*	87.10*
		Cracked	$N_{rec,c,cr}$				29.31	39.08	48.85	58.62	60.97*	60.97*
	280	Non-Cracked	$N_{rec,c,ucr}$	[kN]				101.91	109.76*	109.76*	109.76*	109.76*
		Cracked	$N_{rec,c,cr}$					45.59	56.99	68.39	76.83*	76.83*
	320	Non-Cracked	$N_{rec,c,ucr}$	[kN]				116.47	134.10*	134.10*	134.10*	134.10*
		Cracked	$N_{rec,c,cr}$					52.11	65.13	78.16	87.93	93.87*
	360	Non-Cracked	$N_{rec,c,ucr}$	[kN]					155.17	160.01*	160.01*	160.01*
		Cracked	$N_{rec,c,cr}$						73.27	87.93	89.92	109.91
	400	Non-Cracked	$N_{rec,c,ucr}$	[kN]					172.41	187.40*	187.40*	187.40*
		Cracked	$N_{rec,c,cr}$						81.41	97.70	109.91	122.12
	440	Non-Cracked	$N_{rec,c,ucr}$	[kN]						214.94	216.21*	216.21*
		Cracked	$N_{rec,c,cr}$							107.47	120.90	134.33
	480	Non-Cracked	$N_{rec,c,ucr}$	[kN]						234.48	246.35*	246.35*
		Cracked	$N_{rec,c,cr}$							117.24	131.89	146.55
	540	Non-Cracked	$N_{rec,c,ucr}$	[kN]							279.30	293.95*
		Cracked	$N_{rec,c,cr}$								148.38	164.87
	600	Non-Cracked	$N_{rec,c,ucr}$	[kN]								344.28*
		Cracked	$N_{rec,c,cr}$									183.18

*Concrete cone failure

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Recommended tension resistance for steel failure ($N_{rec,s}$):

Metrical Thread Size			[mm]	M8	M10	M12	M16	M20	M24	M27	M30
Steel property class	Zinc Plated 4.6	$N_{rec,s}$	[kN]	5.23	8.27	12.04	22.42	34.97	50.40	65.51	80.13
	Zinc Plated 5.8	$N_{rec,s}$	[kN]	8.72	13.79	20.06	37.37	58.29	84.00	109.19	133.54
	Zinc Plated 8.8	$N_{rec,s}$	[kN]	13.95	22.07	32.10	59.79	93.27	134.40	174.70	213.67
	Stainless steel A4-70	$N_{rec,s}$	[kN]	9.79	15.49	22.53	41.97	65.46	94.33	87.58	107.12
	Stainless steel HCR, class 70	$N_{rec,s}$	[kN]	9.79	15.49	22.53	41.97	65.46	94.33	87.58	107.12

Recommended tension resistance for steel failure ($N_{rec,s}$) can be applied for cracked or non-cracked concrete.

4.2 Recommended tension resistance ($N_{rec,c}$) for combined pull-out and concrete cone failure (cracked or non-cracked concrete C20/25 with reinforcing bar (REBAR)):

Rebar Size				[mm]	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
Setting Depth h_{ef} [mm]	60	Non-Cracked	$N_{rec,c,ucr}$	[kN]	9.20	10.89*								
		Cracked	$N_{rec,c,cr}$		4.02	5.03								
	70	Non-Cracked	$N_{rec,c,ucr}$	[kN]	10.73	13.41	13.72*							
		Cracked	$N_{rec,c,cr}$		4.69	5.87	8.55							
	80	Non-Cracked	$N_{rec,c,ucr}$	[kN]	12.26	15.33	16.76*	16.76*	16.76*					
		Cracked	$N_{rec,c,cr}$		5.36	6.70	9.77	11.40	11.73*					
	90	Non-Cracked	$N_{rec,c,ucr}$	[kN]	13.79	17.24	20.00*	20.00*	20.00*	20.00*				
		Cracked	$N_{rec,c,cr}$		6.03	7.54	10.99	12.82	14.00*	14.00*				
	100	Non-Cracked	$N_{rec,c,ucr}$	[kN]	15.33	19.16	22.99	23.43*	23.43*	23.43*	23.43*	23.43*		
		Cracked	$N_{rec,c,cr}$		6.70	8.38	12.21	14.25	16.28	16.40*	16.40*	16.40*		
	120	Non-Cracked	$N_{rec,c,ucr}$	[kN]	18.39	22.99	27.59	30.79*	30.79*	30.79*	30.79*	30.79*	30.79*	
		Cracked	$N_{rec,c,cr}$		8.05	10.06	14.65	17.10	19.54	21.56*	21.56*	21.56*	21.56*	
	140	Non-Cracked	$N_{rec,c,ucr}$	[kN]	20.46	26.82	32.18	37.55	38.80*	38.80*	38.80*	38.80*	38.80*	38.80*
		Cracked	$N_{rec,c,cr}$		9.39	11.73	17.10	19.95	22.80	27.16*	27.16*	27.16*	27.16*	27.16*
	160	Non-Cracked	$N_{rec,c,ucr}$	[kN]	24.52	30.65	36.78	42.91	47.41*	47.41*	47.41*	47.41*	47.41*	47.41*
		Cracked	$N_{rec,c,cr}$		10.73	13.41	19.54	22.80	26.05	32.57	33.19*	33.19*	33.19*	33.19*
	180	Non-Cracked	$N_{rec,c,ucr}$	[kN]		34.48	41.38	48.27	55.17	56.57*	56.57*	56.57*	56.57*	56.57*
		Cracked	$N_{rec,c,cr}$			15.09	21.98	25.65	29.31	36.64	39.60*	39.60*	39.60*	39.60*
	200	Non-Cracked	$N_{rec,c,ucr}$	[kN]		38.31	45.98	53.64	61.30	66.26*	66.26*	66.26*	66.26*	66.26*
		Cracked	$N_{rec,c,cr}$			16.76	24.42	28.50	32.57	40.71	46.38*	46.38*	46.38*	46.38*
	240	Non-Cracked	$N_{rec,c,ucr}$	[kN]			55.17	64.37	73.56	87.10*	87.10*	87.10*	87.10*	87.10*
		Cracked	$N_{rec,c,cr}$				29.31	34.19	39.08	48.85	58.62	60.97*	60.97*	60.97*
	280	Non-Cracked	$N_{rec,c,ucr}$	[kN]				75.09	85.82	107.28	109.76*	109.76*	109.76*	109.76*
		Cracked	$N_{rec,c,cr}$					39.89	45.59	56.99	68.39	71.24	49.39	76.83*
	320	Non-Cracked	$N_{rec,c,ucr}$	[kN]					85.82	122.60	134.10*	134.10*	134.10*	134.10*
		Cracked	$N_{rec,c,cr}$						52.11	65.13	78.16	81.41	91.18	93.87*
	360	Non-Cracked	$N_{rec,c,ucr}$	[kN]						137.93	155.17	160.01*	160.01*	160.01*
		Cracked	$N_{rec,c,cr}$							73.27	87.93	91.59	102.58	112.01*
	400	Non-Cracked	$N_{rec,c,ucr}$	[kN]						153.25	172.41	187.40*	187.40*	187.40*
		Cracked	$N_{rec,c,cr}$							81.41	97.70	101.77	113.98	130.26
	480	Non-Cracked	$N_{rec,c,ucr}$	[kN]							206.89	215.51	241.37	246.35*
		Cracked	$N_{rec,c,cr}$								117.24	122.12	136.78	156.32
	500	Non-Cracked	$N_{rec,c,ucr}$	[kN]								224.49	251.43	261.90*
		Cracked	$N_{rec,c,cr}$									127.21	142.48	162.83
	560	Non-Cracked	$N_{rec,c,ucr}$	[kN]									281.60	310.43*
		Cracked	$N_{rec,c,cr}$										159.57	182.37
	640	Non-Cracked	$N_{rec,c,ucr}$	[kN]										367.80
		Cracked	$N_{rec,c,cr}$											208.42

*Concrete cone failure

Recommended tension resistance for steel failure ($N_{rec,s}$):

Rebar Size		[mm]	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
Steel property B500B	$N_{rec,s}$	[kN]	13.84	21.63	31.14	42.39	55.37	86.51	124.57	135.17	169.56	221.47

Recommended tension resistance for steel failure ($N_{rec,s}$) can be applied for cracked or non-cracked concrete.

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4.3 Recommended tension resistance ($N_{rec,cp}$) for combined pull-out and concrete cone failure (cracked or non-cracked concrete C20/25 with internal threaded rod):

Internal Threaded Anchor Rod					MIG-M6	MIG-M8	MIG-M10
Setting Depth h_{ef} [mm]	80	Non-Cracked	$N_{rec,c,ucr}$	[kN]	16.76*	16.76*	16.76*
		Cracked	$N_{rec,c,cr}$		6.70	9.77	11.73*
	90	Non-Cracked	$N_{rec,c,ucr}$	[kN]	20.00*		
		Cracked	$N_{rec,c,cr}$		7.54		
	100	Non-Cracked	$N_{rec,c,ucr}$	[kN]		23.43*	23.43*
		Cracked	$N_{rec,c,cr}$			12.21	16.28

*Concrete cone failure

Recommended tension resistance for steel failure ($N_{rec,s}$):

Internal Threaded Anchor Rod				MIG-M6	MIG-M8	MIG-M10
Steel class	Zinc Plated 5.8	$N_{rec,s}$	[kN]	4.76	8.10	13.81
	Stainless steel A4-70	$N_{rec,s}$	[kN]	5.35	9.93	15.66

Recommended tension resistance for steel failure ($N_{rec,s}$) can be applied for cracked or non-cracked concrete.

5 RECOMMENDED SHEAR RESISTANCE

Basic performance data for MITRE700 Injection System in cracked and non-cracked concrete C20/25 for 50 years without influence of edge distance, spacing and splitting failure due to dimensions of the concrete member.

REQUIRED PROOFS FOR RECOMMENDED SHEAR RESISTANCE:

For design shear resistance with chemical system MIT-SE Plus the minimum value for concrete pry-out failure and steel failure needs to be considered:

For use in non-cracked concrete: $V_{rec,ucr} = \min(V_{rec,cp,ucr}; V_{rec,s})$

For use in cracked concrete: $V_{rec,cr} = \min(V_{rec,cp,cr}; V_{rec,s})$

5.1 Recommended shear resistance ($V_{rec,cp}$) for concrete pry-out failure (cracked or non-cracked concrete C20/25 with threaded rod):

Metrical Thread Size				[mm]	M8	M10	M12	M16	M20	M24	M27	M30
Setting Depth h_{ef} [mm]	60	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	21.77*	21.77*						
		Cracked	$V_{rec,cp,cr}$		8.05	10.06						
	70	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	26.82	27.44*	27.44*					
		Cracked	$V_{rec,cp,cr}$		9.39	11.73	17.10					
	80	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	30.65	33.52*	33.52*	33.52*				
		Cracked	$V_{rec,cp,cr}$		10.73	13.41	19.54	23.47*				
	90	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	34.48	40.00*	40.00*	40.00*	40.00*			
		Cracked	$V_{rec,cp,cr}$		12.07	15.09	21.98	28.00*	28.00*			
	100	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	38.31	46.85*	46.85*	46.85*	46.85*	46.85*		
		Cracked	$V_{rec,cp,cr}$		13.41	16.76	24.42	32.57	32.80*	32.80*		
	120	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	45.98	57.47	61.59*	61.59*	61.59*	61.59*	61.59*	61.59*
		Cracked	$V_{rec,cp,cr}$		16.09	20.11	29.31	39.08	43.11*	43.11*	43.11*	43.11*
	140	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	53.64	67.05	76.43	77.61*	77.61*	77.61*	77.61*	77.61*
		Cracked	$V_{rec,cp,cr}$		18.77	23.47	34.19	45.59	54.33*	54.33*	54.33*	54.33*
	160	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	61.30	76.63	87.35	94.82*	94.82*	94.82*	94.82*	94.82*
		Cracked	$V_{rec,cp,cr}$		21.46	26.82	39.08	52.11	65.13	66.37*	66.37*	66.37*
	180	Non-Cracked	$V_{rec,cp,ucr}$	[kN]		86.20	98.27	113.14*	113.14*	113.14*	113.14*	113.14*
		Cracked	$V_{rec,cp,cr}$			30.17	43.96	58.62	73.27	79.20*	79.20*	79.20*
	200	Non-Cracked	$V_{rec,cp,ucr}$	[kN]		95.78	109.19	132.51*	132.51*	132.51*	132.51*	132.51*
		Cracked	$V_{rec,cp,cr}$			33.52	48.85	65.13	81.41	92.76*	92.76*	92.76*
	240	Non-Cracked	$V_{rec,cp,ucr}$	[kN]			131.03	174.19*	174.19*	174.19*	174.19*	174.19*
		Cracked	$V_{rec,cp,cr}$				58.62	78.16	97.70	117.24	121.94*	121.94*
	280	Non-Cracked	$V_{rec,cp,ucr}$	[kN]				203.82	219.51*	219.51*	219.51*	219.51*
		Cracked	$V_{rec,cp,cr}$					91.18	113.98	136.78	153.66*	153.66*
	320	Non-Cracked	$V_{rec,cp,ucr}$	[kN]				232.94	268.19*	268.19*	268.19*	268.19*
		Cracked	$V_{rec,cp,cr}$					104.21	130.26	156.32	175.86	187.13*
	360	Non-Cracked	$V_{rec,cp,ucr}$	[kN]					310.33	320.02*	320.02*	320.02*
		Cracked	$V_{rec,cp,cr}$						146.55	175.86	197.84	219.82
	400	Non-Cracked	$V_{rec,cp,ucr}$	[kN]					344.82	374.81*	374.81*	374.81*
		Cracked	$V_{rec,cp,cr}$						162.83	195.40	219.82	244.24
	440	Non-Cracked	$V_{rec,cp,ucr}$	[kN]						429.87	432.41*	432.41*
		Cracked	$V_{rec,cp,cr}$							214.94	241.80	268.67
	480	Non-Cracked	$V_{rec,cp,ucr}$	[kN]						468.95	492.70*	492.70*
		Cracked	$V_{rec,cp,cr}$							234.48	263.78	293.09
	540	Non-Cracked	$V_{rec,cp,ucr}$	[kN]							558.60	587.91*
		Cracked	$V_{rec,cp,cr}$								296.76	329.73
	600	Non-Cracked	$V_{rec,cp,ucr}$	[kN]								688.57*
		Cracked	$V_{rec,cp,cr}$									366.37

*Concrete failure

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Recommended shear resistance for steel failure ($V_{rec,s}$):

Metrical Thread Size			[mm]	M8[1)]	M10[1)]	M12	M16	M20	M24	M27	M30
Steel property class	Zinc Plated 4.6	$V_{rec,s}$	[kN]	3.76	5.95	8.65	16.11	25.13	36.22	47.07	57.58
	Zinc Plated 5.8	$V_{rec,s}$	[kN]	6.28	9.93	14.44	26.91	41.97	60.48	78.62	96.15
	Zinc Plated 8.8	$V_{rec,s}$	[kN]	8.37	13.24	19.26	35.87	55.96	80.64	104.82	128.20
	Stainless steel A4-70	$V_{rec,s}$	[kN]	5.87	9.28	13.50	25.15	39.23	56.54	NPA	NPA
	Stainless steel HCR, class 70	$V_{rec,s}$	[kN]	5.87	9.28	13.50	25.15	39.23	56.54	NPA	NPA

Recommended shear resistance for steel failure ($V_{rec,s}$) can be applied for cracked or non-cracked concrete.

5.2 Recommended shear resistance ($V_{rec,cp}$) for concrete pry-out failure (cracked or non-cracked concrete C20/25 with reinforcing bar (REBAR)):

Rebar Size				[mm]	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
Setting Depth h_{ef} [mm]	60	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	18.39	21.77*								
		Cracked	$V_{rec,cp,cr}$		8.05	10.06								
	70	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	21.46	26.82	27.44*							
		Cracked	$V_{rec,cp,cr}$		9.39	11.73	17.10							
	80	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	24.52	30.65	33.52*	33.52*	33.52*					
		Cracked	$V_{rec,cp,cr}$		10.73	13.41	19.54	22.80	23.47*					
	90	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	27.59	34.48	40.00*	40.00*	40.00*	40.00*				
		Cracked	$V_{rec,cp,cr}$		12.07	15.09	21.98	25.65	28.00*	28.00*				
	100	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	30.65	38.31	45.98	46.85*	46.85*	46.85*	46.85*	46.85*		
		Cracked	$V_{rec,cp,cr}$		13.41	16.76	24.42	28.50	32.57	23.80*	23.80*	23.80*		
	120	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	36.78	45.98	55.17	61.59*	61.59*	61.59*	61.59*	61.59*	61.59*	
		Cracked	$V_{rec,cp,cr}$		16.09	20.11	29.31	34.19	39.08	43.11*	43.11*	43.11*	43.11*	
	140	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	42.91	53.64	64.37	75.09	77.61*	77.61*	77.61*	77.61*	77.61*	77.61*
		Cracked	$V_{rec,cp,cr}$		18.77	23.47	34.19	39.89	45.59	45.33*	45.33*	45.33*	45.33*	45.33*
	160	Non-Cracked	$V_{rec,cp,ucr}$	[kN]	49.04	61.30	73.56	85.82	94.82*	94.82*	94.82*	94.82*	94.82*	94.82*
		Cracked	$V_{rec,cp,cr}$		21.46	26.82	39.08	45.59	52.11	65.13	66.37*	66.37*	66.37*	66.37*
	180	Non-Cracked	$V_{rec,cp,ucr}$	[kN]		68.96	82.76	96.55	113.14*	113.14*	113.14*	113.14*	113.14*	113.14*
		Cracked	$V_{rec,cp,cr}$			30.17	43.96	51.29	58.62	73.27	79.20*	79.20*	79.20*	79.20*
	200	Non-Cracked	$V_{rec,cp,ucr}$	[kN]		76.63	91.95	107.28	122.60	132.51*	132.51*	132.51*	132.51*	132.51*
		Cracked	$V_{rec,cp,cr}$			33.52	48.85	56.99	65.13	81.41	92.76*	92.76*	92.76*	92.76*
	240	Non-Cracked	$V_{rec,cp,ucr}$	[kN]			110.34	128.73	147.12	174.19*	174.19*	174.19*	174.19*	174.19*
		Cracked	$V_{rec,cp,cr}$				58.62	68.39	78.16	97.70	117.24	121.94*	121.94*	121.94*
	280	Non-Cracked	$V_{rec,cp,ucr}$	[kN]				150.19	171.64	214.55	219.51*	219.51*	219.51*	219.51*
		Cracked	$V_{rec,cp,cr}$					79.79	91.18	113.98	136.78	142.48	153.66*	153.66*
	320	Non-Cracked	$V_{rec,cp,ucr}$	[kN]					196.16	245.20	268.19*	268.19*	268.19*	268.19*
		Cracked	$V_{rec,cp,cr}$						104.21	130.26	156.32	162.83	182.37	187.73*
	360	Non-Cracked	$V_{rec,cp,ucr}$	[kN]						275.85	310.33	320.02*	320.02*	320.02*
		Cracked	$V_{rec,cp,cr}$							146.55	175.86	183.18	205.17	224.01*
	400	Non-Cracked	$V_{rec,cp,ucr}$	[kN]						306.50	344.82	359.18	374.81*	374.81*
		Cracked	$V_{rec,cp,cr}$							162.83	195.40	203.54	227.96	260.53
	480	Non-Cracked	$V_{rec,cp,ucr}$	[kN]							413.78	431.02	482.74	492.70*
		Cracked	$V_{rec,cp,cr}$								234.48	244.24	273.55	312.63
	500	Non-Cracked	$V_{rec,cp,ucr}$	[kN]								448.98	502.86	523.81*
		Cracked	$V_{rec,cp,cr}$									254.42	284.95	325.66
	560	Non-Cracked	$V_{rec,cp,ucr}$	[kN]									563.20	620.87*
		Cracked	$V_{rec,cp,cr}$										319.15	364.74
	640	Non-Cracked	$V_{rec,cp,ucr}$	[kN]										735.61
		Cracked	$V_{rec,cp,cr}$											416.84

*Concrete failure

Recommended shear resistance for steel failure ($V_{rec,s}$):

Rebar Size		[mm]	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32
Steel property B500B	$V_{rec,s}$	[kN]	6.46	10.09	14.53	19.78	25.84	40.37	58.13	63.08	79.13	103.35

Recommended shear resistance for steel failure ($V_{rec,s}$) can be applied for cracked or non-cracked concrete.

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5.3 Recommended shear resistance ($V_{rec,cp}$) for concrete pry-out failure (cracked or non-cracked concrete C20/25 with internal threaded anchor rod):

Internal threaded anchor rod				[mm]	MIG-M6	MIG-M8	MIG-M10
Setting Depth hef [mm]	80	Non-Cracked	Vrec,cp,ucr	[kN]	33.52*	33.52*	33.52*
		Cracked	Vrec,cp,cr		13.41	19.54	23.47*
	90	Non-Cracked	Vrec,cp,ucr	[kN]	40.00*		
		Cracked	Vrec,cp,cr		15.09		
	100	Non-Cracked	Vrec,cp,ucr	[kN]		46.85*	46.85*
		Cracked	Vrec,cp,cr			24.42	23.57

*Concrete failure

Recommended shear resistance for steel failure ($V_{rec,s}$):

Internal threaded anchor rod				[mm]	MIG-M6	MIG-M8	MIG-M10
Steel class		Zinc Plated 5.8	Vrec.s	[kN]	2.86	5.14	8.57
		Stainless steel A4-70	Vrec.s	[kN]	3.21	5.95	9.16

Recommended shear resistance for steel failure ($V_{rec,s}$) can be applied for cracked or non-cracked concrete.

6 MORTAR AND CHEMICAL PROPERTIES

Properties	Test Method	Result
UV resistance		Pass
Watertightness	DIN EN 12390-8	0 mm
Density		1,5 kg / dm^3
Compressive strength	EN 196 Part 1	122 N/mm^2
Flexural strength	EN 196 Part 1	66 N/mm^2
Axial tensile strenght	EN 196 Part 1	44 N/mm^2
E modulus	EN 196 Teil1	6300 N/mm^2
Shrinkage	DIN 52450	< 1,4 %
Hardness Shore A	DIN EN ISO 868	99,4
Hardness Shore D	DIN EN USI 868	86,1
Electrical resistance	IEC 93	8,0 10^{12} Ωm
Thermal conductivity	DIN EN 993-15	0,65 W/m·K
Spec. Heat capacity	DIN EN 993-15	1350 J/kg·K

Chemical Agent	Concentration	Resistant	Not Resistant
Accumulator acid			*
Acetic acid	10		*
Acetic acid	40		*
Laitance		*	
Acetone	5		*
Acetone	10		*
Acetone	100		*
Ammonia, aqueous solution	5	*	
Ammonia, aqueous solution	32		*
Aniline	100		*
Beer	100	*	
chlorine	all	*	
Benzol	100		*
Boric Acid, aqueous solution		*	
Calcium carbonate, suspended in wa	all	*	
Calcium chloride, suspended in wate		*	
Calcium hydroxide, suspended in wa		*	
Chlorinated lime (Calcium hypochlor	10		*
Carbon tetrachloride	100	*	
Caustic soda solution	10	*	
Caustic soda solution	40	*	
Citric acid	10		*
Citric acid	50		*
Citric acid	all	*	
Chlorine water, swimming pool	all		*
Demineralized water	all		*
Diesel oil	100	*	
Ethyl alcohol, aqueous solution	100		*
Ethyl alcohol, aqueous solution	50		*
Formic acid	10	*	
Formic acid	30		*
Formic acid	100		*
Formaldehyde, aqueous solution	20	*	
Formaldehyde, aqueous solution	30	*	
Freon		*	
Fuel Oil		*	
Gasoline (premium grade)	100	*	
Glycol (Ethylene glycol)		*	
Hydraulic fluid	conc.		*
Hydrochloric acid (Muriatic Acid)	conc.		*
Hydrogen peroxide	10		*
Hydrogen peroxide	30		*

Isopropyl alcohol	100		*
Lactic acid	10		*
Lactic acid	all		*
Linseed oil	100	*	
Lubricating oil	100	*	
Magnesium chloride, aqueous soluti	all	*	
Standard benzine			*
Methanol	100		*
Motor oil (SAE 20 W-50)	100	*	
Nitric acid	10		*
Oleic acid	100	*	
Perchloroethylene	100	*	
Petroleum	100	*	
Phenol, aqueous solution	8		*
Benzyl alcohol	100		*
Phosphoric acid	85	*	
Phosphoric acid	10	*	
Potash lye (Potassium hydroxide)	10	*	
Potash lye (Potassium hydroxide)	40	*	
Potassium carbonate, aqueous solut	all	*	
Potassium chlorite, aqueous solutio	all	*	
Potassium nitrate, aqueous solution	all	*	
Sea water, salty	all	*	
Sodium carbonate	all	*	
Sodium Chloride, aqueous solution	all	*	
Sodium phosphate, aqueous solutio	all	*	
Sodium silicate	all	*	
Sulfuric acid	10		*
Sulfuric acid	30		*
Sulfuric acid	70		*
Tartaric acid	all	*	
Tetrachloroethylene	100	*	
Toluene			*
Trichloroethylene	100		*
Turpentine	100	*	

4 IMPORTANT NOTICE

For the design the complete technical assessment ETA-19/0203 of 2 December 2020 has to be considered. Values given above are only valid under the assumptions of sufficient cleaning and anchoring according to ETA-19/0203, Annex B4 – B8. Recommended resistance data in this document, do not consider the influence of edge distance, spacing and splitting failure due to limited dimensions of concrete member and in case of such influence, the above values should be reduced. In recommended resistance the partial safety factor as regulated in the ETA and partial safety factor of the load γ_F = 1.4 are considered. For combination of tensile loads, shear loads, bending moments as well as well as reduced edge distances or spacing's (anchor groups) see ETA or Mungo design software. The data above must be checked by the user under the responsibility of an engineer experienced in anchorage and concrete work. This is to ensure there are no errors and all data is complete and accurate and complies with all rules and regulations for the actual conditions and application.

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