

Mortar Injection System with ETA Assessment **Option 1** for Cracked & Non-Cracked Concrete

Anchor Rods ASTA M8 - M30

- Steel 5.8 and 8.8 Zinc Plated and Hot Dip Galvanized
- Stainless Steel A4-50 and A4-70
- High Corrosion Resistant Steel 1.4529



Use Conditions

- Installation in Cracked & Non-Cracked Concrete C20/25 to C50/60 according to EN 206-1:2000
- For Static and quasi static loading & Seismic Action C1
- In Dry, Wet and Flooded Holes
- Structures subject to dry internal and permanent damp internal conditions.
- Structures subject to external atmospheric exposure.
- Overhead Installation allowed.

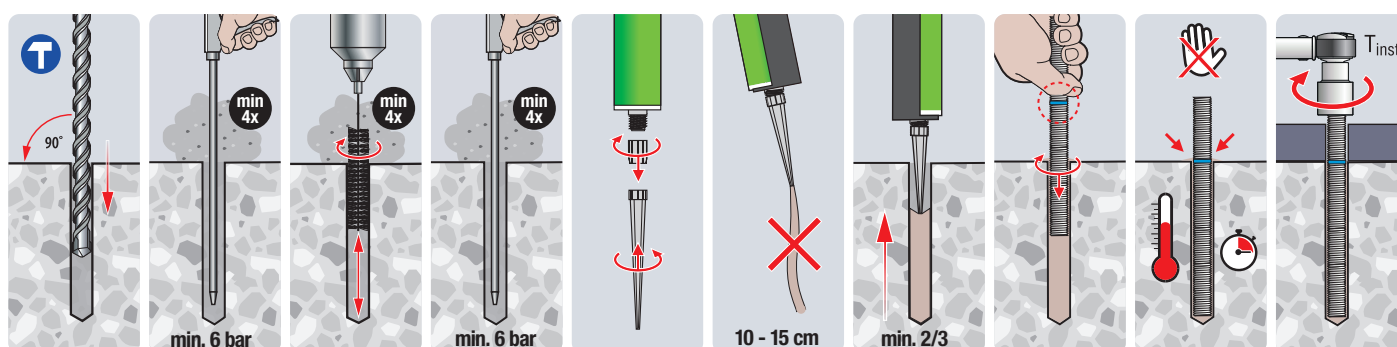
Typical Applications

- Infrastructure Construction (Roads, Viaducts, Sound Barriers, Crash Barriers, Harbours, High Rise Construction, Steel Construction)
- Production Facilities (Installation of Cranes, Robots, Conveyor Lines etc.)

Approvals & Test Reports



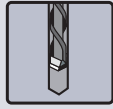
Installation Procedures



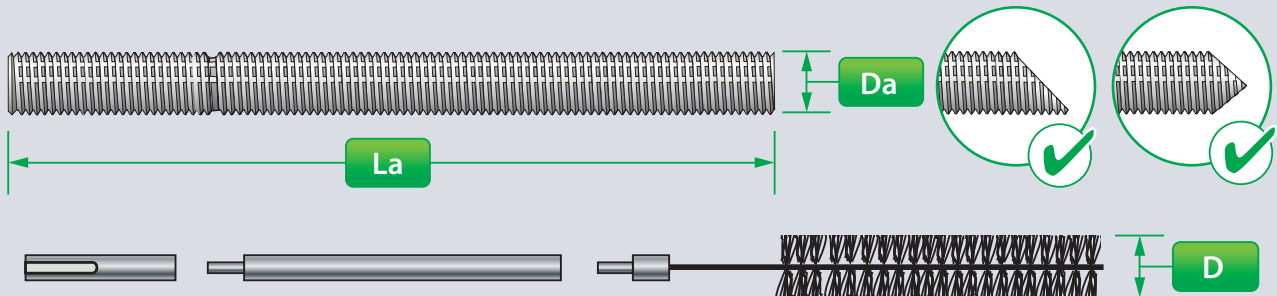
Curing Times

Temperature ¹⁾	°C	-10 ²⁾	-5	0	+5	+10	+20	+30 ³⁾	+35 ³⁾	+40 ³⁾
Processing Time		90 min	90 min	45 min	25 min	15 min	6 min	4 min	2 min	1,5 min
Curing Time Dry Holes		24 h	14 h	7 h	2 h	80 min	45 min	25 min	20 min	15 min
Curing Time Wet Holes		48 h	28 h	14 h	4 h	160 min	90 min	50 min	40 min	30 min

1) Concrete Temperature 2) Cartridge Temperature must be min. +15°C. 3) Cartridge Temperature **must** be under +20°C.

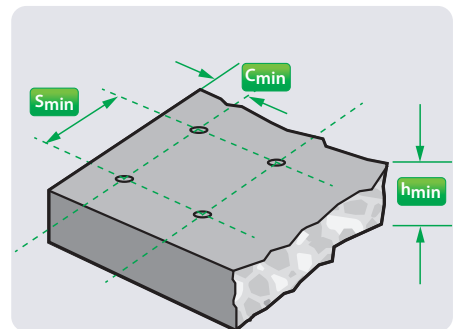
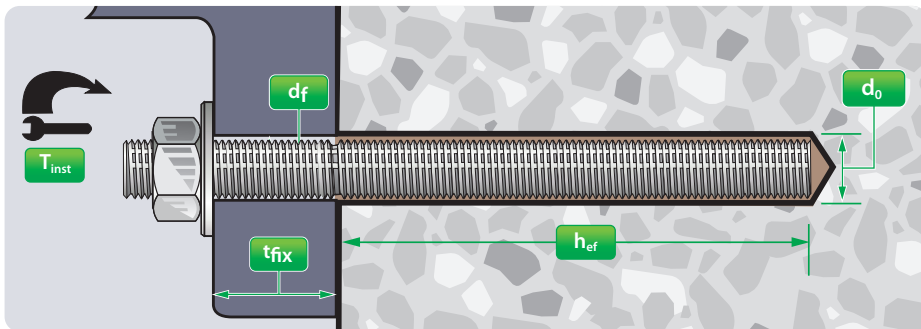


Specification Data for the use in Cracked & Uncracked Concrete and Carbide/Air Drilled Holes according to ETAG TR029 and CEN/TS 1992-4



Installation Dimensions

Anchor Size	Da		m8	m10	m12	m16	m20	m24	m27	m30
Rod Length	$La \geq$	[mm]	110	130	160	190	260	300	340	360
Effective Anchorage Depth	h_{ef}	[mm]	60-160	60-200	70-240	80-320	90-400	96-480	108-540	120-600
Hole Diameter	d_o	[mm]	10	12	14	18	24	28	32	35
Depth of Drill Hole	h_o	[mm]	80	90	110	125	170	210	240	280
Diameter Fixture Hole	d_f	[mm]	9	12	14	18	22	26	30	33
Fixture Thickness	$t_{fix} \leq$	[mm]	20	30	35	45	70	65	70	50
Recommended Torque	T_{inst}	[Nm]	10	20	40	80	120	160	180	200
Required Volume per cm Embedment Depth	V_s	[ml/cm]	0,44	0,59	0,75	1,09	2,25	2,87	3,72	4,37



Member Thickness, Edge Distance & Spacing

Anchor Size	Da		m8	m10	m12	m16	m20	m24	m27	m30
Min. Member Thickness	h_{min}	[mm]	110	120	140	160	220	265	305	350
Min. Edge Distance	C_{min}	[mm]	40	50	60	80	100	120	135	150
Min. Spacing	S_{min}	[mm]	40	50	60	80	100	120	135	150

Steel Brush Dimensions

Anchor Size	Da		m8	m10	m12	m16	m20	m24	m27	m30
Brush Diameter	D	[mm]	12	14	16	20	26	30	34	37
Min. Brush Diameter	D_{min}	[mm]	10,5	12,5	14,5	18,5	24,5	28,5	32,5	35,5

Performance Data¹⁾

Steel Failure

- 1) **Performance Data:** Loads in kN for a single anchor in Concrete C20/C25*. Temperature 24°C/40°C for long/short term.
No influence of Edge- or Center to Center Distances.
Increasing factors for concrete ψ_c : C30/37: **1,04** C40/50: **1,08** C50/60: **1,10**
- 2) **Shear Loads:** Steel strength in kN without bending moment.
- 3) **Recommended Loads** incl. Safety factor $\gamma_c = 1,4$.

Design Resistance Dry/Wet Holes

Non-Cracked Concrete		D _a		m8	m10	m12	m16	m20	m24	m27	m30
Steel 5.8	Tensile	N _{Rd}	[kN]	12,0	18,8	27,6	39,2	62,1	85,4	110,8	131,9
	Shear ²⁾	V _{Rd}	[kN]	7,2	11,2	16,8	31,2	48,8	70,4	92,0	112,0
Steel 8.8	Tensile	N _{Rd}	[kN]	13,4	18,8	27,6	39,2	62,1	85,4	110,8	131,9
	Shear ²⁾	V _{Rd}	[kN]	12,0	18,4	27,2	50,4	78,4	112,8	147,2	179,2
A4-50	Tensile	N _{Rd}	[kN]							80,1	97,9
	Shear ²⁾	V _{Rd}	[kN]							48,3	58,8
A4-70	Tensile	N _{Rd}	[kN]	13,4	18,8	27,6	39,2	62,1	85,4		
	Shear ²⁾	V _{Rd}	[kN]	8,3	12,8	19,2	35,3	55,1	79,5		

Cracked Concrete		D _a		m8	m10	m12	m16	m20	m24	m27	m30
Steel 5.8	Tensile	N _{Rd}	[kN]			12,7	19,2	32,6	48,4	76,6	93,7
	Shear ²⁾	V _{Rd}	[kN]			16,8	31,2	48,8	70,4	92,0	112,0
Steel 8.8	Tensile	N _{Rd}	[kN]			12,7	19,2	32,6	48,4	76,6	93,7
	Shear ²⁾	V _{Rd}	[kN]			27,2	50,4	78,4	112,8	147,2	179,2
A4-50	Tensile	N _{Rd}	[kN]							76,6	93,7
	Shear ²⁾	V _{Rd}	[kN]							48,3	58,8
A4-70	Tensile	N _{Rd}	[kN]			12,7	19,2	32,6	48,4		
	Shear ²⁾	V _{Rd}	[kN]			19,2	35,3	55,1	79,5		

Design Resistance Flooded Holes

Non-Cracked Concrete		D _a		m8	m10	m12	m16	m20	m24	m27	m30
Steel 5.8	Tensile	N _{Rd}	[kN]	7,2	11,4	16,8	25,4				
	Shear ²⁾	V _{Rd}	[kN]	7,2	11,2	16,8	31,2				
Steel 8.8	Tensile	N _{Rd}	[kN]	7,2	11,4	16,8	25,4				
	Shear ²⁾	V _{Rd}	[kN]	12,0	18,4	27,2	50,4				
A4-50	Tensile	N _{Rd}	[kN]								
	Shear ²⁾	V _{Rd}	[kN]								
A4-70	Tensile	N _{Rd}	[kN]	7,2	11,4	16,8	25,4				
	Shear ²⁾	V _{Rd}	[kN]	8,3	12,8	19,2	35,3				

Cracked Concrete		D _a		m8	m10	m12	m16	m20	m24	m27	m30
Steel 5.8	Tensile	N _{Rd}	[kN]			10,9	16,5				
	Shear ²⁾	V _{Rd}	[kN]			16,8	31,2				
Steel 8.8	Tensile	N _{Rd}	[kN]			10,9	16,5				
	Shear ²⁾	V _{Rd}	[kN]			27,2	50,4				
A4-50	Tensile	N _{Rd}	[kN]								
	Shear ²⁾	V _{Rd}	[kN]								
A4-70	Tensile	N _{Rd}	[kN]			10,9	16,5				
	Shear ²⁾	V _{Rd}	[kN]			19,2	35,3				

Performance Data¹⁾

Recommended Loads Dry/Wet Holes

Non-Cracked Concrete		D _a		m8	m10	m12	m16	m20	m24	m27	m30
Steel 5.8	Tensile	N _{rec}	[kN]	8,6	13,5	19,7	28,0	44,4	61,0	79,2	93,9
	Shear ²⁾	V _{rec}	[kN]	5,1	8,0	12,0	22,3	34,9	50,3	65,7	80,0
Steel 8.8	Tensile	N _{rec}	[kN]	9,6	13,5	19,7	28,0	44,4	61,0	79,2	93,9
	Shear ²⁾	V _{rec}	[kN]	8,6	13,1	19,4	36,0	56,0	80,6	105,1	128,0
A4-50	Tensile	N _{rec}	[kN]							57,2	69,9
	Shear ²⁾	V _{rec}	[kN]							34,5	42,0
A4-70	Tensile	N _{rec}	[kN]	9,6	13,5	19,7	28,0	44,4	61,0		
	Shear ²⁾	V _{rec}	[kN]	6,0	9,2	13,7	25,2	39,4	56,8		

Cracked Concrete		D _a		m8	m10	m12	m16	m20	m24	m27	m30
Steel 5.8	Tensile	N _{rec}	[kN]			9,1	13,7	23,3	34,6	54,7	66,9
	Shear ²⁾	V _{rec}	[kN]			12,0	22,3	34,9	50,3	65,7	80,0
Steel 8.8	Tensile	N _{rec}	[kN]			9,1	13,7	23,3	34,6	54,7	66,9
	Shear ²⁾	V _{rec}	[kN]			19,4	36,0	56,0	80,6	105,1	128,0
A4-50	Tensile	N _{rec}	[kN]							54,7	66,9
	Shear ²⁾	V _{rec}	[kN]							34,5	42,0
A4-70	Tensile	N _{rec}	[kN]			9,1	13,7	23,3	34,6		
	Shear ²⁾	V _{rec}	[kN]			13,7	25,2	39,4	56,8		

Recommended Loads Flooded Holes

Non-Cracked Concrete		D _a		m8	m10	m12	m16	m20	m24	m27	m30
Steel 5.8	Tensile	N _{rec}	[kN]	5,1	8,2	12,0	18,2				
	Shear ²⁾	V _{rec}	[kN]	5,1	8,0	12,0	22,3				
Steel 8.8	Tensile	N _{rec}	[kN]	5,1	8,2	12,0	18,2				
	Shear ²⁾	V _{rec}	[kN]	8,6	13,1	19,4	36,0				
A4-50	Tensile	N _{rec}	[kN]								
	Shear ²⁾	V _{rec}	[kN]								
A4-70	Tensile	N _{rec}	[kN]	5,1	8,2	12,0	18,2				
	Shear ²⁾	V _{rec}	[kN]	6,0	9,2	13,7	25,2				

Cracked Concrete		D _a		m8	m10	m12	m16	m20	m24	m27	m30
Steel 5.8	Tensile	N _{rec}	[kN]			7,8	11,8				
	Shear ²⁾	V _{rec}	[kN]			12,0	22,3				
Steel 8.8	Tensile	N _{rec}	[kN]			7,8	11,8				
	Shear ²⁾	V _{rec}	[kN]			19,4	36,0				
A4-50	Tensile	N _{rec}	[kN]								
	Shear ²⁾	V _{rec}	[kN]								
A4-70	Tensile	N _{rec}	[kN]			7,8	11,8				
	Shear ²⁾	V _{rec}	[kN]			13,7	25,2				