

The solid injection mortar for standard applications in cracked concrete and masonry



ÉPÍTANYAGOK

Engedélyezett rögzítések:

- Repedéses beton C20/25-től C50/60-ig
- Üreges könnyűbeton téglá
- Üreges téglá
- Üreges mészhomoktéglá
- Tömör mészhomoktéglá
- Tömör téglá
- Pórusbeton

Továbbá alkalmazható:

- Beton C12/15
- Üreges betontéglá

ENGEDÉLYEK



ADVANTAGES

ALKALMAZÁSOK

FUNCTIONING

- The FIS VL is approved for use in cracked concrete and masonry, and achieves a high load-bearing capacity in these conditions.

Permissible loads of a single anchor in cracked normal concrete (concrete tension zone) of strength class C20/25

- The injection mortar, based on vinylester resin, allows for anchorings in water-filled drill holes (410 ml cartridges only), thus allowing for rapid progress.

- The temperature resistance of the FIS VL injection mortar of -40 °C to +120 °C allows for a solid load level even when subjected to high temperature demands, thus providing great flexibility.

- FIS VL HIGH SPEED has a significantly shorter curing time than FIS VL, thus also ensuring swift work progress even at low temperatures.

- Acélszerkezetek
- Ácsszerkezetek
- Védőkorlátok
- Homlokzatok

Maximum torque

- Acél konzolok
- Gépek
- Oszlopok
- Árnyéklók
- Előtetők
- Kapuk
- Konzolok
- Csővezetékek
- Rácsok
- Szatelit antennák

Permissible tensile load

Permissible shear load

Required edge distance (with one edge) for

Max. tension load

Max. shear load

Required spacing for

Min. spacing

Min. edge distance

- The FIS VL is a 2-component injection mortar based on vinylester.

Resin and hardener are stored in separate chambers and are reduced the load

- The 410 ml coaxial cartridge can be easily used with the fischer FIS AC dispenser.

- Partially used cartridges can be reused simply by changing the static mixer.

- Related accessories for use in concrete and masonry can be found on page.

MSZAKI ADATOK



Injektáló ragasztó FIS VL

Type	Material fixing element	Min. member thickness	Effective anchorage depth	Maximum torque	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for	Max. tension load	Max. shear load	Required spacing for	Min. spacing	Min. edge distance
		h_{min} [mm]	h_{ef} [mm]	M_{max} [Nm]	N_{perm} [kN]	V_{perm} [kN]	c [mm]	c [mm]	c [mm]	s_{cr} [mm]	s_{min} [mm]	c_{min} [mm]
M10	A4-70	100	60	4,5	40	8,6	90	185	180	45	45	45
		120	90	6,7			125	270				
		230	200	13,8			110	235				
		100	60	4,5			90	180				
		120	90	6,7			125	270				
		230	200	15,0			125	600				
		100	60	4,5			90	180				
		120	90	6,7			125	270				
		230	200	15,0			125	600				
		100	70	6,3			105	255				
		140	110	9,9			145	330				
		240	240	20,5			140	720				
M16	A4-70	140	110	6,3	60	13,5	105	330	210	65	65	65
		270	240	9,9			145	330				
		120	80	21,5			145	720				
		170	125	9,6			120	445				
		360	320	15,0			185	375				
		120	80	37,6			120	960				
		170	125	9,6			23,0	460				
		360	320	15,0			35,9	375				
		120	80	38,3			120	960				
		170	125	9,6			23,0	460				
		360	320	15,0			25,2	375				
		120	80	38,3			185	960				
M20	A4-70	140	90	12,2	120	29,3	135	530	270	85	85	85
		220	170	23,3			225	510				
		450	400	54,9			225	1200				
		140	90	12,2			135	270				
		220	170	23,3			225	510				
		450	400	54,9			225	1200				
		140	90	12,2			29,3	270				
		220	170	23,3			39,3	510				
		450	400	54,9			225	1200				
		140	90	12,2			135	270				
		220	170	23,3			225	510				
		450	400	54,9			225	1200				

For the design the complete assessment ETA-10/0352 has to be considered. ¹⁰⁾

¹⁾ Also valid for anchor rod RGM in the same property class.

²⁾ The partial safety factors for material resistance as regulated in the ETA-10/0352 as well as a partial safety factor for load actions of $\gamma_L = 1,4$ are considered. As an single anchor counts e.g. an with a spacing $s \geq 3 \cdot h_{ef}$ and an edge distance $c \geq 1,5 \cdot h_{ef}$. Accurate data see ETA-10/0352.

³⁾ The given loads are valid for injection mortar FIS VL for fixations in dry and humid concrete for temperatures in the substrate up to 50 °C (resp. short term up to 80 °C. For drill hole cleaning see ETA-10/0352.

⁴⁾ For higher concrete strength classes up to C50/60 higher permissible loads may be possible.

⁵⁾ Drill method hammer drilling. For further allowable application conditions see ETA-10/0352.

⁶⁾ For the sizes M10 - M20 the min. anchorage depth and the max. anchorage depth are given. The anchorage depth can be chosen freely between these borders.

⁷⁾ For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see ETA-10/0352.

⁸⁾ Minimum possible axial spacings resp. edge distance while reducing the permissible load.

⁹⁾ Minimum possible spacing resp. edge distance while reducing the permissible load for the required minimum member thickness. The combination of minimum edge distance and minimum spacing possible. One of both values has to be increased acc. ETA-10/0352.

¹⁰⁾ The given loads refer to the European Technical Assessment ETA-10/0352, issue date 10/08/2017. Design of the loads according ETAG 001, Technical Report TR 029 (for static resp. quasi-static)

¹¹⁾ A reinforcement in the concrete to prevent splitting is required. The width of the cracks has to be limited under consideration of the splitting forces at $w_k \sim 0,3$ mm.

LOADS

Injection system FIS VL: Injection mortar FIS VL with Threaded rod FIS A ¹⁾

zinc plated steel / stainless steel

Permissible loads of a single anchor in non-cracked normal concrete (concrete compression zone) of strength class C20/25 (~B25) ²⁾³⁾⁴⁾⁵⁾										Minimum spacings while reducing the load	
Type	Material fixing element	Min. member thickness	Effective anchorage depth	Maximum torque moment	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance
							Max. tension load c	Max. shear load c			
		h _{min} [mm]	h _{ef} ⁶⁾ [mm]	T _{max} [Nm]	N _{perm} ⁶⁾ [kN]	V _{perm} ⁶⁾ [kN]	[mm]	[mm]	[mm]	[mm]	[mm]
M6	5.8	100	50	5	3,4	2,9	65	50	150	40	40
		60	4,0		180						
		110	4,8		220						
	8.8	100	50		3,4	4,6		70	150		
		60	4,0		180						
		110	4,8		220						
	A4-70	100	50		3,4	3,2		55	150		
		60	4,0		180						
		110	4,8		220						
M8	5.8	100	60	10	6,6	5,1	90	180	40	40	
		110	80		8,8		100	240			
		190	160		9,0		40	480			
	8.8	100	60		6,6	8,4	90	125			180
		110	80		8,8		100	115			240
		190	160		13,9		75	100			480
	A4-70	100	60		6,6	5,9	90	85			180
		110	80		8,8		100	80			240
		190	160		9,8		40	75			480
M10	5.8	100	60	20	8,2	8,6	90	125	180	45	45
		120	90		12,3		125	105	270		
		230	200		13,8		45	95	600		
	8.8	100	60		8,2	13,3	90	200	180		
		120	90		12,3		125	175	270		
		230	200		22,1		90	130	600		
	A4-70	100	60		8,2	9,3	90	135	180		
		120	90		12,3		125	115	270		
		230	200		15,5		50	100	600		
M12	5.8	100	70	40	11,5	12,0	140	175	210	55	55
		140	110		18,1		180	135	330		
		270	240		20,5		55	120	720		
	8.8	100	70		11,5	19,3	140	295	210		
		140	110		18,1		180	235	330		
		270	240		32,1		110	170	720		
	A4-70	100	70		11,5	13,5	140	200	210		
		140	110		18,1		180	155	330		
		270	240		22,5		60	130	720		
M16	5.8	120	80	60	14,3	22,3	160	305	240	65	65
		170	125		24,9		245	235	375		
		360	320		37,6		80	175	960		
	8.8	120	80		14,3	34,4	160	495	240		
		170	125		24,9		245	405	375		
		360	320		59,8		230	255	960		
	A4-70	120	80		14,3	25,2	160	350	240		
		170	125		24,9		245	270	375		
		360	320		42,0		100	190	960		

LOADS

Injection system FIS VL: Injection mortar FIS VL with Threaded rod FIS A ¹⁾

zinc plated steel / stainless steel

Permissible loads of a single anchor in non-cracked normal concrete (concrete compression zone) of strength class C20/25 (~B25) ²⁾³⁾⁴⁾⁵⁾										Minimum spacings w reducing the load	
Type	Material fixing element	Min. member thickness	Effective anchorage depth	Maximum torque moment	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance
							Max. tension load c	Max. shear load c			
		h _{min} [mm]	h _{ef} ⁶⁾ [mm]	T _{max} [Nm]	N _{perm} ⁶⁾ [kN]	V _{perm} ⁶⁾ [kN]	[mm]	[mm]	[mm]	[mm]	[mm]
M20	5.8	140	90	120	17,1	34,9	170	435	270	85	85
		220	170		40,3		340	305	510		
		450	400		58,6		110	230	1200		
	8.8	140	90		17,1	41,1	170	525	270		
		220	170		40,3	56,0	340	530	510		
		450	400		93,3	375	350	1200			
	A4-70	140	90		17,1	39,3	170	500	270		
		220	170		40,3		340	350	510		
		450	400		65,5		135	255	1200		
M24	5.8	160	96	150	18,8	45,2	170	540	290	105	105
		270	210		56,5		435	400	630		
		540	480		84,3		140	295	1440		
	8.8	160	96		18,8	45,2	170	540	290		
		270	210		56,5	80,7	435	685	630		
		540	480		129,3	505	455	1440			
	A4-70	160	96		18,8	45,2	170	540	290		
		270	210		56,5	56,6	435	455	630		
		540	480		94,4		205	320	1440		
M27	5.8	170	108	200	22,5	54,0	195	605	325	125	125
		310	250		71,5		495	475	750		
		600	540		109,5		200	345	1620		
	8.8	170	108		22,5	54,0	195	605	325		
		310	250		71,5	104,9	495	825	750		
		600	540		154,5	570	560	1620			
	A4-70	170	108		22,5	54,0	195	605	325		
		310	250		71,5	73,6	495	545	750		
		600	540		122,7		315	380	1620		
M30	5.8	190	120	300	26,3	63,2	210	660	360	140	140
		350	280		89,0		595	545	840		
		670	600		133,8		270	395	1800		
	8.8	190	120		26,3	63,2	210	660	360		
		350	280		89,0	128,2	595	940	840		
		670	600		190,7	700	645	1800			
	A4-70	190	120		26,3	63,2	210	660	360		
		350	280		89,0	89,9	595	620	840		
		670	600		150,0		400	430	1800		

For the design the complete assessment ETA-10/0352 has to be considered. ¹⁰⁾

¹⁾ Also valid for anchor rod RGM in the same property class.

²⁾ The partial safety factors for material resistance as regulated in the ETA-10/0352 as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \cdot h_{ef}$ and an edge distance $c \geq 1.5 \cdot h_{ef}$. Accurate data see ETA-10/0352.

³⁾ The given loads are valid for injection mortar FIS VL for fixations in dry and humid concrete for temperatures in the substrate up to 50 °C (resp. short term up to 80 °C. For drill hole cleaning see ETA-10/0352.

⁴⁾ For higher concrete strength classes up to C50/60 higher permissible loads may be possible.

⁵⁾ Drill method hammer drilling. For further allowable application conditions see ETA-10/0352.

⁶⁾ For the sizes M6 - M30 the min. anchorage depth and the max. anchorage depth are given. The anchorage depth can be chosen freely between these borders.

⁷⁾ For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see ETA-10/0352.

⁸⁾ Minimum possible axial spacings resp. edge distance while reducing the permissible load.

⁹⁾ Minimum possible spacing resp. edge distance while reducing the permissible load for the required minimum member thickness. The combination of minimum edge distance and minimum spacing is not always possible. One of both values has to be increased acc. ETA-10/0352.

¹⁰⁾ The given loads refer to the European Technical Assessment ETA-10/0352, issue date 10/08/2017. Design of the loads according ETAG 001, Technical Report TR 029 (for static resp. quasi-static loads).

LOADS

Injection system FIS VL: Injection mortar FIS VL with Internal threaded anchor RG M I

zinc plated steel / stainless steel

Permissible loads of a single anchor in non-cracked normal concrete (concrete compression zone) of strength class C20/25 (~B25) ^{1) 2) 3)}										Minimum spacings w reducing the load	
Type	Screw material resp. screw surface	Min. member thickness	Effective anchorage depth	Maximum torque moment	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge dis
							Max. tension load c	Max. shear load c			
RG M8 I	5.8	120	90	10	9,0	5,3	95	65	270	55	55
	8.8				11,9	8,3	135	95			
	A4-70				9,9	5,9	110	70			
RG M10 I	5.8	130	90	20	13,8	8,3	140	90	270	65	65
	8.8				15,9	13,3	170	155			
	A4-70				15,7	9,3		100			
RG M12 I	5.8	170	125	40	19,8	12,1	190	110	375	75	75
	8.8					19,3		190			
	A4-70					13,5		125			
RG M16 I	5.8	210	160	80	29,8	22,4	240	180	480	95	95
	8.8					35,8		320			
	A4-70					25,1		205			
RG M20 I	5.8	270	200	120	45,6	35,4	330	245	600	125	125
	8.8					42,9		315			
	A4-70					39,4		280			

For the design the complete assessment ETA-10/0352 has to be considered. ⁷⁾

¹⁾ The partial safety factors for material resistance as regulated in the ETA-10/0352 as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As an single anchor counts e.g. an anchor with a spacing $s \geq 3 \cdot h_{ef}$ and an edge distance $c \geq 1.5 \cdot h_{ef}$. Accurate data see ETA-10/0352.

²⁾ For higher concrete strength classes up to C50/60 higher permissible loads may be possible.

³⁾ Drill method hammer drilling. For further allowable application conditions see ETA-10/0352.

⁴⁾ For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see ETA-10/0352.

⁵⁾ Minimum possible axial spacings resp. edge distance while reducing the permissible load.

⁶⁾ Minimum possible spacing resp. edge distance while reducing the permissible load for the required minimum member thickness. The combination of minimum edge distance and minimum spacing may be possible. One of both values has to be increased acc. ETA-10/0352.

⁷⁾ The given loads refer to the European Technical Assessment ETA-10/0352, issue date 10/08/2017. Design of the loads according ETAG 001, Technical Report TR 029 (for static resp. quasi-static loads).

LOADS

Injection system FIS VL with threaded rod FIS A⁴⁾

Highest permissible loads ^{1) 5)} for a single anchor in solid brick masonry (without injection anchor sleeve) for pre-positioned or pushed through installation.

For the design the complete assessment ETA-15/0263 has to be considered.

Type	Compressive brick strength f_b [N/mm ²]	Brick raw density ρ [kg/dm ³]	Minimum brick dimensions ⁶⁾ (L x W x H) [mm]	Min. effective anchorage depth h_{ef} [mm]	Min. member thickness h_{min} [mm]	Maximum torque $T_{inst,max}$ [Nm]	Permissible tensile load ³⁾ N_{perm} [kN]	Permissible shear load ³⁾ V_{perm} [kN]	Characteristic spacing parallel to bed joint $s_{cr \parallel}$ [mm]	Characteristic spacing perpendicular to bed joint $s_{cr \perp}$ [mm]	Min. spacing ²⁾ $s_{min \parallel} / s_{min \perp}$ [mm]	Characteristic
Solid brick Mz, NF acc. to EN 771-1												
M8	≥10	≥1,8	240x115x71	50	115	10	1,14	0,71	150	75	150 / 75	
M10				50			1,00	1,14	150		150 / 75	
M10				80			1,43	1,14	240		240 / 75	
M10				200			2,43	3,40	240		240 / 75	
M12				50			0,86	1,14	150		150 / 75	
M12				80			1,51	1,14	240		240 / 75	
M12	200	3,20	2,43	240	240 / 75							
M8	≥20	≥1,8	240x115x71	50	115	10	1,57	1,14	150	75	150 / 75	
M10				50			1,43	1,71	150		150 / 75	
M10				80			2,00	1,71	240		240 / 75	
M10				200			2,43	2,43	240		240 / 75	
M12				50			1,29	1,57	150		150 / 75	
M12				80			2,29	1,57	240		240 / 75	
M12	200	2,43	2,43	240	240 / 75							
Solid sand-lime brick KS acc. to EN 771												
M8	≥10	≥1,8	240x115x71	50	115	10	0,71	1,14	240	75	240 / 75	
M10				50			0,71	1,14				
M10				80			0,71	1,14				
M10				200			2,43	1,14				
M12				50			0,71	1,43				
M12				80			0,71	1,43				
M12	200	2,43	1,43									
M8	≥20	≥1,8	240x115x71	50	115	10	1,00	1,57	240	75	240 / 75	
M10				50			1,00	1,57				
M10				80			1,00	1,57				
M10				200			2,43	1,57				
M12				50			1,00	2,00				
M12				80			1,00	2,00				
M12	200	2,43	2,00									

¹⁾ The required partial safety factors for material resistance as well as a partial safety factor for load actions of $\gamma_L = 1,4$ are considered.

²⁾ Minimum feasible spacings resp. edge distance. Details as well as to the distances to joints see assessment.

³⁾ For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see assessment.

⁴⁾ Zinc-plated, stainless steel A4 and high corrosion-resistant steel C.

⁵⁾ The given loads are valid for installation and use of fixations in dry masonry - use category d/d - for temperatures in the substrate up to +50 °C (resp. short term up to 80 °C) and drill hole clean according to assessment. The given brick types in combination with the permissible loads are an extract of the assessment.

⁶⁾ Hole patterns see assessment.

LOADS

Injection system FIS VL with threaded rod FIS A⁵⁾ and anchor sleeve FIS H..K

Highest permissible loads^{1) 6)} for a single anchor in solid brick masonry (with injection anchor sleeve) for pre-positioned installation. For the design the complete assessment ETA-15/0263 has to be considered.

Type of anchor sleeve with anchor rod	Compressive-brick-strength f_b [N/mm ²]	Brick raw density ρ [kg/dm ³]	Minimum brick dimensions ⁶⁾ (L x W x H) [mm]	Min. effective anchorage depth ⁴⁾ h_{ef} [mm]	Min. member thickness h_{min} [mm]	Maximum torque $T_{inst,max}$ [Nm]	Permissible tensile load ³⁾ N_{perm} [kN]	Permissible shear load ³⁾ V_{perm} [kN]	Characteristic spacing parallel to bed joint $s_{cr \parallel}$ [mm]	Characteristic spacing perpendicular to bed joint $s_{cr \perp}$ [mm]	Min. spacing ²⁾ $s_{min \parallel} / s_{min \perp}$ [mm]	Characteristic min. edge distance $c_{cr} = c_{min}$ [mm]
Solid sand-lime brick KS acc. to EN 771												
12x85 M8	≥ 10	≥ 1,8	240x115x113	85	115	2	1,71	0,86	240	115	240 / 115	100
16x85 M10							1,00	1,00				
20x85 M12							2,43	1,00				
12x85 M8	≥ 20			85	115		2,43	1,29				
16x85 M10							1,57	1,57				
20x85 M12							2,43	1,57				

¹⁾ The required partial safety factors for material resistance as well as a partial safety factor for load actions of $\gamma_L = 1,4$ are considered.

²⁾ Minimum feasible spacings resp. edge distance. Details as well as to the distances to joints see assessment.

³⁾ For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see assessment.

⁴⁾ The maximum anchorage depth is corresponding with the relevant anchor sleeves FIS H..K (see technical data).

⁵⁾ Zinc-plated, stainless steel A4 and high corrosion-resistant steel C.

⁶⁾ The given loads are valid for installation and use of fixations in dry masonry - use category d/d - for temperatures in the substrate up to +50 °C (resp. short term up to 80 °C) and drill hole cleaning according to assessment. The given brick types in combination with the permissible loads are an extract of the assessment.

⁷⁾ Hole patterns see assessment.

LOADS

Injection system FIS VL with threaded rod FIS A⁵⁾ and anchor sleeve FIS H...K

Highest permissible loads^{1) 6)} for a single anchor in perforated brick masonry (with injection anchor sleeve) for pre-positioned installation. For the design the complete assessment ETA-15/0263 has to be considered.

Type of anchor sleeve with anchor rod	Compressive brick strength f_b [N/mm ²]	Brick raw density ρ [kg/dm ³]	Minimum brick dimensions ⁷⁾ (L x W x H) [mm]	Min. effective anchorage depth ⁴⁾ h_{ef} [mm]	Min. member thickness h_{min} [mm]	Maximum torque $T_{inst,max}$ [Nm]	Permissible tensile load ³⁾ N_{perm} [kN]	Permissible shear load ³⁾ V_{perm} [kN]	Characteristic spacing parallel to bed joint $s_{cr \parallel}$ [mm]	Characteristic spacing perpendicular to bed joint $s_{cr \perp}$ [mm]	Min. spacing ²⁾ $s_{min \parallel} / s_{min \perp}$ [mm]	Characteristic spacing
Vertically perforated brick Hlz, acc. to EN 771-1												
12x85 M8	≥ 10	≥ 0,9	240x175x113	85	175	2,0	1,14	1,14	240	115	240 / 115	
16x85 M10							1,00	1,57				
20x85 M12							1,43	1,71				
Perforated sand-lime brick KSL acc. to EN 771-2												
12x85 M8	≥ 12	≥ 1,4	240x175x113	85	175	2,0	0,71	0,71	240	115	100 / 115	
16x85 M8/M10							0,86	1,29				
20x85 M12							1,00	1,29				
12x85 M8	≥ 20						1,29	1,29				
16x85 M8/M10							1,43	2,14				
20x85 M12							1,71	2,14				
Lightweight concrete hollow block Hbl acc. to EN 771-3												
12x85 M8	≥ 4	≥ 1,0	362x240x240	85	240	2,0	0,86	0,57	365	240	365 / 240	
16x85 M10												
20x85 M12												

¹⁾ The required partial safety factors for material resistance as well as a partial safety factor for load actions of $\gamma_L = 1,4$ are considered.

²⁾ Minimum feasible spacings resp. edge distance. Details as well as to the distances to joints see assessment.

³⁾ For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see assessment.

⁴⁾ The maximum anchorage depth is corresponding with the relevant anchor sleeves FIS H...K (see technical data).

⁵⁾ Zinc-plated, stainless steel A4 and high corrosion-resistant steel C.

⁶⁾ The given loads are valid for installation and use of fixations in dry masonry - use category d/d - for temperatures in the substrate up to +50 °C (resp. short term up to 80 °C) and drill hole clean according to assessment. The given brick types in combination with the permissible loads are an extract of the assessment.

⁷⁾ Hole patterns see assessment.

LOADS

Injection system FIS VL with threaded rod FIS A⁴⁾

Highest permissible loads^{1) 5)} for a single anchor in aerated concrete.

For the design the complete assessment ETA-15/0263 has to be considered.

Type anchor rod	Compressive brick-strength f_b [N/mm ²]	Brick raw density ρ [kg/dm ³]	Minimum brick dimensions (L x W x H) [mm]	Min. effective-anchorage depth h_{ef} [mm]	Min. member thickness h_{min} [mm]	Maximum torque $T_{inst,max}$ [Nm]	Permissible tensile load ³⁾ N_{perm} [kN]	Permissible shear load ²⁾ V_{perm} [kN]	Characteristic spacing parallel to bed joint $s_{cr \parallel}$ [mm]	Characteristic spacing perpendicular to bed joint $s_{cr \perp}$ [mm]	Min. spacing ²⁾ $s_{min \parallel} / s_{min \perp}$ [mm]	Characteristic minimum distance $c_{cr} = c_{min}$ [mm]	
Aerated concrete acc. to EN 771-4													
M8	≥ 2	≥ 0,35	-	100	130		1	0,54	0,43	250	250	250	100
M10							2	0,54	0,43				
M12							2	0,54	0,54				
M8	≥ 4	≥ 0,50					1	0,71	0,89				
M10							2	0,89	0,71				
M12							2	0,89	0,89				
M8	≥ 6	≥ 0,65	1	1,25	1,07								
M10			2	1,79	1,07								
M12			2	1,79	1,25								

¹⁾ The required partial safety factors for material resistance as well as a partial safety factor for load actions of $\gamma_L = 1,4$ are considered.

²⁾ Minimum feasible spacings resp. edge distance. Details as well as to the distances to joints see assessment.

³⁾ For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see assessment.

⁴⁾ Zinc-plated, stainless steel A4 and high corrosion-resistant steel C.

⁵⁾ The given loads are valid for installation and use of fixations in dry masonry - use category d/d - for temperatures in the substrate up to +50 °C (resp. short term up to 80 °C) and drill hole cleaning according to assessment. The given brick types in combination with the permissible loads are an extract of the assessment.