MQL Universal Nylon Frame Plug

MQL Universal Nylon Frame Plug with a special screw made from high quality Polyamide PA6, approved for multiple use in concrete and masonry

ETAG 020 F90

1 SPECIFICATIONS OF INTENDED USE

Anchorages subject to:
- For multiple use in concrete and masonry for non-structural applications, such as façade systems, for fixing or supporting elements which contribute to the stability of the systems

Base materials:
- Cracked and non-cracked, reinforced or unreinforced normal weight concrete of strength classes ≥ C12/15 according to EN 206-1:2014
-Masonry walls and aerated concrete blocks

Approvals:
- European Technical Approval, ETAG 020 anchors for multiple use in concrete and masonry for non-structural applications

Installation:
-The influence of larger embedment depths, lower mortar strength and/or different bricks and blocks (according ETA-11/0008 regarding base material, size of the units, compressive strength) has to be detected by job site tests)

Product assortment:
- MQL Universal Nylon Frame Plug for softer materials can be complied with countersunk, hexagon or with hexagon collar screw in in zinc plated version and with countersunk or with hexagon collar screw in stainless steel (A4/316)

Safety in case of fire:
- Anchorages satisfy requirements for Class A 1
- Assessment of resistance under fire exposure F90 for fastening of façade systems (for further information see ETA-11/0008)

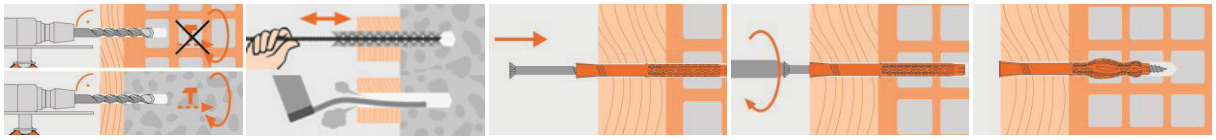
2 PRODUCT DESCRIPTION - MATERIALS

Product	Designation	Material	Nominal characteristic steel yield strength f_{yk} [N/mm^2]	Nominal characteristic steel ultimate strength f_{uk} [N/mm^2]	Surface coating
1	MQL Frame Plug (sleeve)	Polyamide, PA6 (Nylon)	—	—	—
2	Carbon steel (screw)	Carbon steel	480	600	Galvanized >5µm, blue passivated
3	Stainless steel (screw)	Stainless steel A4 (EN 10088)	450	700	—

3 INSTALATION INSTRUCTIONS

1. Make the hole (no hammer drilling in hollow masonry brick or aerated concrete),
2. Cleaning the hole (not necessary with hollow brick),
3. Setting the preassembled fastener through the part to be fixed,
4. Push the anchor till the collar of the sleeve contacts the part to be fixed, then fix the part with screw and
5. Tighten the screw until the MQL Universal Nylon Frame Plug collar contact the screw.

Graphic installation instruction for MQL Universal Nylon Frame Plug



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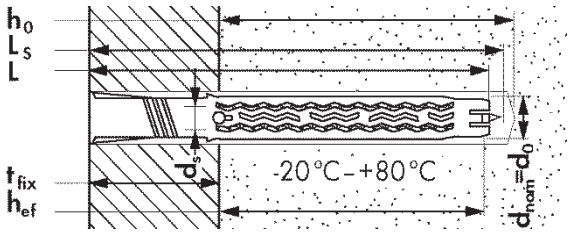
4 INSTALATION DATA

Fastener size				MQL 10	MQL 8[2)]
Anchor outer diameter	d_{nom}	[mm]		10	8
Anchor length	L	[mm]		80-300	80-160
Screw diameter	d_s	[mm]		7	6
Installation parameters					
Nominal drilling diameter	d_0	[mm]		10	8
Depth of the drill hole	$h_0 \geq$	[mm]		80	80
Effective anchorage depth	h_{ef}	[mm]		70	70
Screw length	L_s	[mm]		L + 5 mm	
Maximum fixture thickness	t_{fix}	[mm]		≤ 230	≤ 90

[2)] Not part of the European Technical Assessment



5 BASIC PERFORMANCE DATA IN CRACKED OR NON-CRACKED CONCRETE

Basic performance data for MQL Universal Nylon Frame Plug in cracked or non-cracked concrete, without influence of edge distance, spacing and splitting failure due to dimensions of concrete member.

CONCRETE					MQL 10	MQL 8[2)]
Effective anchorage depth		h_{ef}	[mm]		70	70
Minimum thickness of concrete member		h_{min}	[mm]		100	100
Minimum edge distance	≥ C16/20	C_{min}	[mm]		50	50
	C12/15	C_{min}	[mm]		70	70
Minimum spacing	≥ C16/20	S_{min}	[mm]		100	100
	C12/15	S_{min}	[mm]		140	140
CHARACTERISTIC RESISTANCE						
Tension load for non-cracked concrete[1)]	≥ C20/25	N_{Rk}	[kN]		5.00	4.50
Tension load for cracked concrete	≥ C16/20	N_{Rk}	[kN]		2.50	-
	C12/15	N_{Rk}	[kN]		1.50	-
Shear load for cracked or non-cracked concrete	Galvanized Steel	V_{Rk}	[kN]		8.50	5.90
	Stainless Steel	V_{Rk}	[kN]		8.50	6.80
Bending moment, steel failure	Galvanized Steel	M_{Rk}	[Nm]		15.30	8.80
	Stainless Steel	M_{Rk}	[Nm]		17.80	10.30
DESIGN RESITANCE						
Tension load for non-cracked concrete[1)]	≥ C20/25	N_{Rd}	[kN]		2.80	2.50
Tension load for cracked or non-cracked concrete	≥ C16/20	N_{Rd}	[kN]		1.40	-
	C12/15	N_{Rd}	[kN]		0.80	-
Shear load for cracked or non-cracked concrete	Galvanized Steel	V_{Rd}	[kN]		6.80	4.70
	Stainless Steel	V_{Rd}	[kN]		5.40	4.40
Bending moment, steel failure	Galvanized Steel	M_{Rd}	[Nm]		12.20	7.00
	Stainless Steel	M_{Rd}	[Nm]		11.40	6.60
RECOMENDED RESISTANCE						
Tension load for non-cracked concrete[1)]	≥ C20/25	N_{rec}	[kN]		2.00	1.80
Tension load for cracked or non-cracked concrete	≥ C16/20	N_{rec}	[kN]		1.00	-
	C12/15	N_{rec}	[kN]		0.60	-
Shear load for cracked or non-cracked concrete	Galvanized Steel	V_{rec}	[kN]		4.90	3.40
	Stainless Steel	V_{rec}	[kN]		3.90	3.10
Bending moment, steel failure	Galvanized Steel	M_{rec}	[Nm]		8.70	5.00
	Stainless Steel	M_{rec}	[Nm]		8.10	4.70

[1)] Mungo lab tested
[2)] Not part of the European Technical Assessment

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6 VALUES OF RESISTANCE UNDER TENSION AND SHEAR LOADS IN MASONRY UNITS

6.1 Clay masonry

CLAY SOLID BRICK					MQL 10	MQL 8[2)]
Effective anchorage depth			h_{ef}	[mm]	70	70
Clay solid brick acc. to EN 771-1:2011 / din 105-100:2012-01 Mz 20/2.0		Brick dimensions [mm]	240x115x113			
		Bulk density	≥ ρ	[kg/dm³]	2.00	
		Minimum member thickness	h_{min}	[mm]	115	115
		Minimum edge distance	C_{min}	[mm]	100	100
		Min. spacing (Vertical to edge)	$S_{1,min}$	[mm]	200	200
		Min. spacing (Parallel to edge)	$S_{2,min}$	[mm]	400	400
CHARACTERISTIC RESISTANCE						
Tension load for minimum compressive strength		≥ 10 N/mm²	N_{Rk}	[kN]	2.00	-
		≥ 20 N/mm²	N_{Rk}	[kN]	3.00	-
Shear load for minimum compressive strength		≥ 10 N/mm²	V_{Rk}	[kN]	2.00	-
		≥ 20 N/mm²	V_{Rk}	[kN]	3.00	-
DESIGN RESITANCE						
Tension load for minimum compressive strength		≥ 10 N/mm²	N_{Rd}	[kN]	0.80	-
		≥ 20 N/mm²	N_{Rd}	[kN]	1.20	-
Shear load for minimum compressive strength		≥ 10 N/mm²	V_{Rd}	[kN]	0.80	-
		≥ 20 N/mm²	V_{Rd}	[kN]	1.20	-
RECOMENDED RESISTANCE						
Tension load for minimum compressive strength		≥ 10 N/mm²	N_{rec}	[kN]	0.60	-
		≥ 20 N/mm²	N_{rec}	[kN]	0.90	-
Shear load for minimum compressive strength		≥ 10 N/mm²	V_{rec}	[kN]	0.60	-
		≥ 20 N/mm²	V_{rec}	[kN]	0.90	-

[2)] Not part of the European Technical Assessment

CLAY HOLLOW BRICK					MQL 10	MQL 8[2)]
Effective anchorage depth			h_{ef}	[mm]	70	70
Clay brick Hlz 12/1.2		Brick dimensions [mm]	300x240x240			
		Bulk density	≥ ρ	[kg/dm³]	1.20	
		Minimum member thickness	h_{min}	[mm]	240	240
		Minimum edge distance	C_{min}	[mm]	100	100
		Min. spacing (Vertical to edge)	$S_{1,min}$	[mm]	200	200
		Min. spacing (Parallel to edge)	$S_{2,min}$	[mm]	400	400
CHARACTERISTIC RESISTANCE						
Tension load for minimum compressive strength		≥ 12 N/mm²	N_{Rk}	[kN]	1.20	-
		≥ 20 N/mm²	N_{Rk}	[kN]	2.00	-
Shear load for minimum compressive strength [3)]		≥ 12 N/mm²	V_{Rk}	[kN]	1.20	-
		≥ 20 N/mm²	V_{Rk}	[kN]	2.00	-
DESIGN RESITANCE						
Tension load for minimum compressive strength		≥ 12 N/mm²	N_{Rd}	[kN]	0.50	-
		≥ 20 N/mm²	N_{Rd}	[kN]	0.80	-
Shear load for minimum compressive strength [3)]		≥ 12 N/mm²	V_{Rd}	[kN]	0.50	-
		≥ 20 N/mm²	V_{Rd}	[kN]	0.80	-
RECOMENDED RESISTANCE						
Tension load for minimum compressive strength		≥ 12 N/mm²	N_{rec}	[kN]	0.40	-
		≥ 20 N/mm²	N_{rec}	[kN]	0.60	-
Shear load for minimum compressive strength [3)]		≥ 12 N/mm²	V_{rec}	[kN]	0.40	-
		≥ 20 N/mm²	V_{rec}	[kN]	0.60	-

[2)] Not part of the European Technical Assessment
[3)] Shear load with lever arm is not allowed

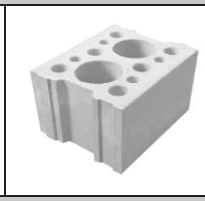
CLAY HOLLOW BRICK					MQL 10	MQL 8[2)]
Effective anchorage depth			h_{ef}	[mm]	70	70
Ital. perforated brick Mattone		Brick dimensions [mm]	300x240x195			
		Bulk density	≥ ρ	[kg/dm³]	0.84	
		Minimum member thickness	h_{min}	[mm]	240	240
		Minimum edge distance	C_{min}	[mm]	100	100
		Min. spacing (Vertical to edge)	$S_{1,min}$	[mm]	200	200
		Min. spacing (Parallel to edge)	$S_{2,min}$	[mm]	400	400
CHARACTERISTIC RESISTANCE						
Tension load for minimum compressive strength		≥ 10 N/mm²	N_{Rk}	[kN]	0.90	0.90
Shear load for minimum compressive strength [3)]		≥ 10 N/mm²	V_{Rk}	[kN]	0.90	0.90
DESIGN RESISTANCE						
Tension load for minimum compressive strength		≥ 10 N/mm²	N_{Rd}	[kN]	0.40	0.40
Shear load for minimum compressive strength [3)]		≥ 10 N/mm²	V_{Rd}	[kN]	0.40	0.40
RECOMENDED RESISTANCE						
Tension load for minimum compressive strength		≥ 10 N/mm²	N_{rec}	[kN]	0.30	0.30
Shear load for minimum compressive strength [3)]		≥ 10 N/mm²	V_{rec}	[kN]	0.30	0.30

[2)] Not part of the European Technical Assessment
[3)] Shear load with lever arm is not allowed

6.2 Calcium silicate masonry

CALCIUM SILICATE SOLID BRICK					MB 10	MQL 8[2)]
Effective anchorage depth			h_{ef}	[mm]	70	70
Calcium silicate solid brick KSV 12/2.0		Brick dimensions [mm]	240x115x113			
		Bulk density	≥ ρ	[kg/dm³]	2.00	
		Minimum member thickness	h_{min}	[mm]	115	115
		Minimum edge distance	C_{min}	[mm]	100	100
		Min. spacing (Vertical to edge)	$S_{1,min}$	[mm]	200	200
		Min. spacing (Parallel to edge)	$S_{2,min}$	[mm]	400	400
CHARACTERISTIC RESISTANCE						
Tension load for minimum compressive strength		≥ 10 N/mm²	N_{Rk}	[kN]	1.50	-
		≥ 20 N/mm²	N_{Rk}	[kN]	2.50	-
Shear load for minimum compressive strength		≥ 10 N/mm²	V_{Rk}	[kN]	1.50	-
		≥ 20 N/mm²	V_{Rk}	[kN]	2.50	-
DESIGN RESITANCE						
Tension load for minimum compressive strength		≥ 10 N/mm²	N_{Rd}	[kN]	0.60	-
		≥ 20 N/mm²	N_{Rd}	[kN]	1.00	-
Shear load for minimum compressive strength		≥ 10 N/mm²	V_{Rd}	[kN]	0.60	-
		≥ 20 N/mm²	V_{Rd}	[kN]	1.00	-
RECOMENDED RESISTANCE						
Tension load for minimum compressive strength		≥ 10 N/mm²	N_{rec}	[kN]	0.40	-
		≥ 20 N/mm²	N_{rec}	[kN]	0.70	-
Shear load for minimum compressive strength		≥ 10 N/mm²	V_{rec}	[kN]	0.40	-
		≥ 20 N/mm²	V_{rec}	[kN]	0.70	-

[2)] Not part of the European Technical Assessment

CALCIUM SILICATE HOLLOW BRICK					MQL 10	MQL 8[2]
Effective anchorage depth			h_{ef}	[mm]	70	70
Calcium silicate KSL 12/1.4		Brick dimensions [mm]	300x240x115			
		Bulk density	≥ ρ	[kg/dm³]	1.40	
		Minimum member thickness	h_{min}	[mm]	240	240
		Minimum edge distance	C_{min}	[mm]	100	100
		Min. spacing (Vertical to edge)	$S_{1,min}$	[mm]	200	200
		Min. spacing (Parallel to edge)	$S_{2,min}$	[mm]	400	400
CHARACTERISTIC RESISTANCE						
Tension load for minimum compressive strength		≥ 8 N/mm²	N_{Rk}	[kN]	1.20	1.20
		≥ 12 N/mm²	N_{Rk}	[kN]	2.00	2.00
Shear load for minimum compressive strength [3]		≥ 8 N/mm²	V_{Rk}	[kN]	1.20	1.20
		≥ 12 N/mm²	V_{Rk}	[kN]	2.00	2.00
DESIGN RESISTANCE						
Tension load for minimum compressive strength		≥ 8 N/mm²	N_{Rd}	[kN]	0.50	0.50
		≥ 12 N/mm²	N_{Rd}	[kN]	0.80	0.80
Shear load for minimum compressive strength [3]		≥ 8 N/mm²	V_{Rd}	[kN]	0.50	0.50
		≥ 12 N/mm²	V_{Rd}	[kN]	0.80	0.80
RECOMENDED RESISTANCE						
Tension load for minimum compressive strength		≥ 10 N/mm²	N_{rec}	[kN]	0.40	0.40
		≥ 12 N/mm²	N_{rec}	[kN]	0.60	0.60
Shear load for minimum compressive strength [3]		≥ 10 N/mm²	V_{rec}	[kN]	0.40	0.40
		≥ 12 N/mm²	V_{rec}	[kN]	0.60	0.60

[2] Not part of the European Technical Assessment
[3] Shear load with lever arm is not allowed

6.3 Autoclaved aerated concrete (AAC)

AUTOCLAVED AERATED CONCRETE					MQL 10[2]	MQL 8[2]
Effective anchorage depth			h_{ef}	[mm]	70	70
Autoclaved aerated concrete (EN 771-4:2011)		Brick dimensions [mm]	250x150x240			
		Bulk density	≥ ρ	[kg/dm³]	0.55	
		Minimum member thickness	h_{min}	[mm]	150	150
		Minimum edge distance	C_{min}	[mm]	125	125
		Min. spacing (Vertical to edge)	$S_{1,min}$	[mm]	250	250
		Min. spacing (Parallel to edge)	$S_{2,min}$	[mm]	500	500
CHARACTERISTIC RESISTANCE						
Tension load for minimum compressive strength		≥ 5.2 N/mm²	N_{Rk}	[kN]	1.40	1.20
Shear load for minimum compressive strength		≥ 5.2 N/mm²	V_{Rk}	[kN]	1.40	1.20
DESIGN RESISTANCE						
Tension load for minimum compressive strength		≥ 5.2 N/mm²	N_{Rd}	[kN]	0.70	0.60
Shear load for minimum compressive strength		≥ 5.2 N/mm²	V_{Rd}	[kN]	0.70	0.60
RECOMENDED RESISTANCE						
Tension load for minimum compressive strength		≥ 5.2 N/mm²	N_{rec}	[kN]	0.50	0.40
Shear load for minimum compressive strength		≥ 5.2 N/mm²	V_{rec}	[kN]	0.50	0.40

[2] Not part of the European Technical Assessment

7 IMPORTANT NOTICE

Values given in this document are valid under the assumptions of sufficient cleaning of the drill hole (not necessary with hollow brick). Resistance for tension, shear or combined tension and shear loading, is valid for a group of ≥ 3 anchors. For the design the complete European Technical Assessment has to be considered. In recommended resistance the partial safety factor for material as regulated in the ETA, as well as a partial safety factor for load action γL = 1.4 are considered. For combination of tensile loads, shear loads, bending moments as well as reduced edge distances or spacing's (anchor groups) see ETA or Mungo design software. The data 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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