Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment

ETA-11/0008 of 31 August 2023

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Mungo MQL Universal Frame Plug
Product family to which the construction product belongs	Plastic anchors for redundant non-structural systems in concrete and masonry
Manufacturer	Mungo Befestigungstechnik AG Bornfeldstrasse 2 4603 OLTEN SCHWEIZ
Manufacturing plant	Plants of Mungo
This European Technical Assessment contains	17 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	330284-00-0604, Edition 12/2020
This version replaces	ETA-11/0008 issued on 9 November 2020

Deutsches Institut für Bautechnik
Kolonnenstraße 30 B | 10829 Berlin | GERMANY | Phone: +49 30 78730-0 | Fax: +49 30 78730-320 | Email: dibt@dibt.de | www.dibt.de

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Specific Part

1 Technical description of the product

The universal frame plug Mungo MQL is a plastic anchor consisting of a sleeve made of polyamide and an accompanying specific screw of galvanised steel or of stainless steel.

The plastic sleeve is expanded by screwing in the specific screw which presses the sleeve against the wall of the drilled hole.

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchors of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C 1

3.2 Mechanical resistance and stability (BWR 4)

Essential characteristic	Performance
Resistance to steel failure under tension loading	See Annex C 1
Resistance to steel failure under shear loading	See Annex C 1
Resistance to pull-out or concrete failure under tension loading (base material group a)	See Annex C 1
Resistance in any load direction without lever arm (base material group b, c, d)	See Annexes C 2 – C 5
Edge distance and spacing (base material group a)	See Annex B 2
Edge distance and spacing (base material group b, c, d)	See Annex B 3
Displacements under short-term and long-term loading	See Annex C 1
Durability	See Annex B 1 and A 3

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with European Assessment Document EAD 330284-00-0604 the applicable European legal act is: 97/463/EC.

The system to be applied is: 2+

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 31 August 2023 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Aksünger

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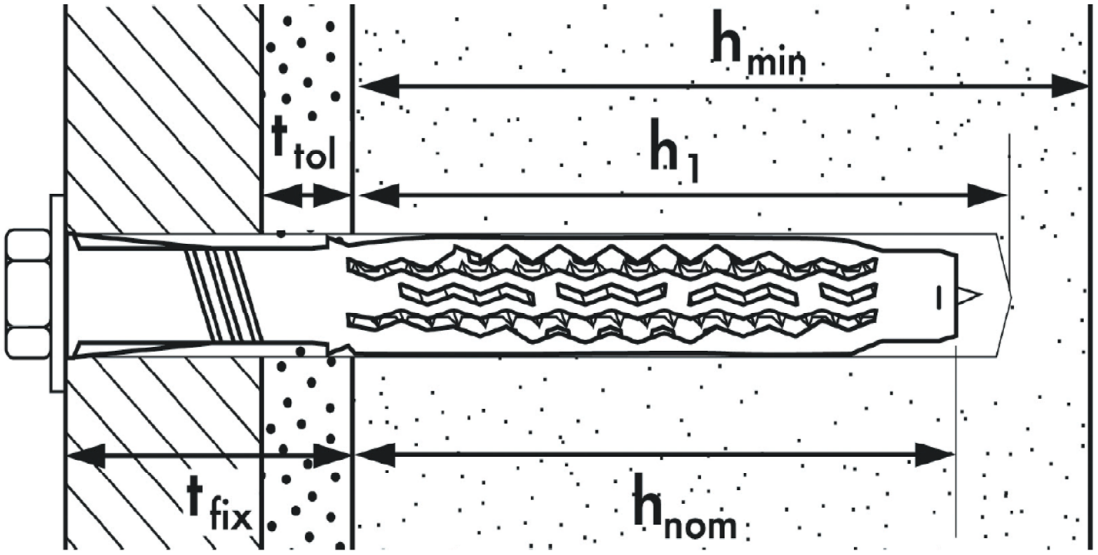
Installed condition for MQL 10



Legend

h_{min} = minimum thickness of structural part
h_1 = depth of drilled hole to deepest point
t_{tol} = thickness of equalizing layer or non-load-bearing coating (non-structural layer)
t_{fix} = thickness of fixture (including non-load-bearing coating)
h_{nom} = overall anchor embedment depth in the base material

Mungo MQL Universal Frame Plug	
Product description Installed condition	**Annex A 1**

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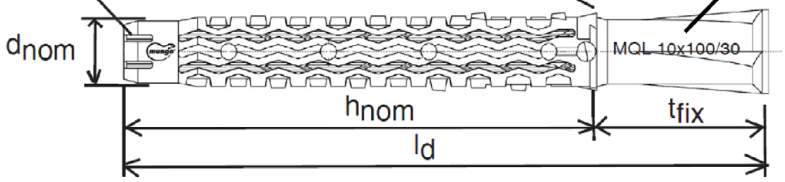
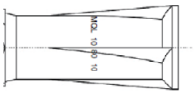
Sleeve: Marking:
Symbol of the manufacturer

marking of
embedment depth

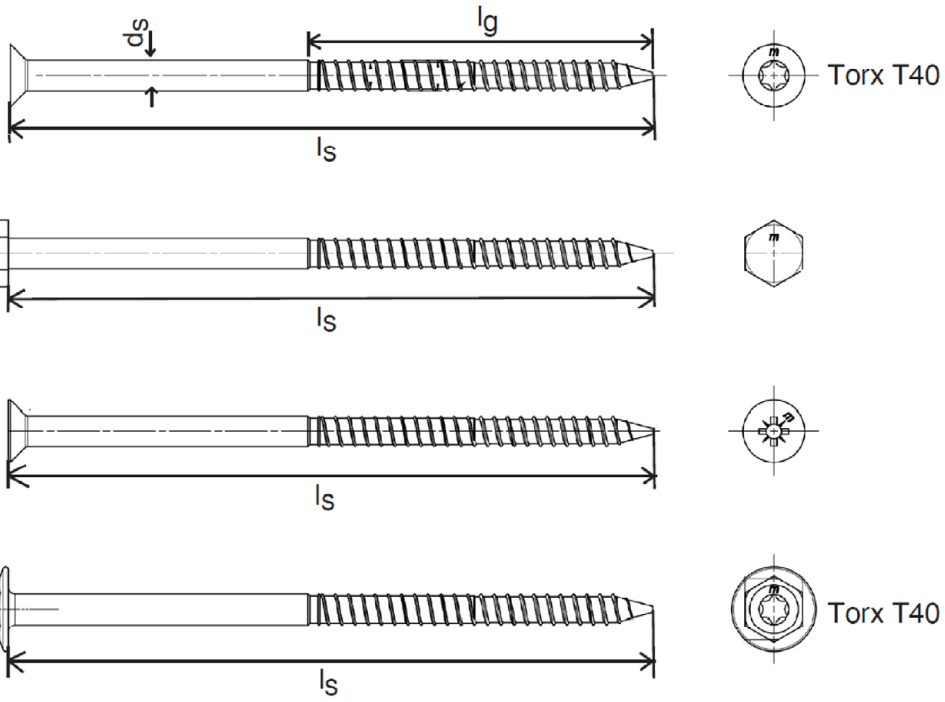
Marking:
type of anchor
anchor size
anchor length l_d, e.g. MQL 10/100





Version with broad collar:

Special screws:



Mungo MQL Universal Frame Plug	
Product description Anchor types and special screws	**Annex A 2**

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Table A1: Dimensions

Anchor type	Plastic sleeve							Special screw [2]		
	h_{nom} [mm]	d_{nom} [mm]	$t_{fix,min}$ [mm]	$t_{fix,max}$ [mm]	l_d [mm]	d_{kd} [mm]	d_k [mm]	d_s [mm]	l_G [mm]	$l_{S,min}$ [mm]
MQL 10[1]	70	10	10	330	80 - 400	2	18	7	77	85

[1] For description of the anchor the length of the plastic sleeve l_d is indicated additionally, e.g. for l_d=140 mm: MQL 10x140

[2] The screw length l_s is 5 mm larger than the length of the plastic sleeve l_s, so the screw penetrates the appropriate plastic sleeve correctly.

Table A2: Materials

Name	Material	
Plastic sleeve	Polyamide, PA6 colour orange	
Special screw	steel 6.8, zinc plated ≥ 5µm according to EN ISO 4042:2018 blue passivated	
	stainless steel according to EN 10088-3:2014	
	material number	Corrision resistance class (CRC) in accordance with EN 1993-1-4:2006+A1:2015
	1.4401	III
	1.4301	II
	1.4571	III

Mungo MQL Universal Frame Plug	**Annex A 3**
Product description Dimensions and materials	

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Specifications of intended use

Anchorages subject to:

- Static and quasi-static loads
- Redundant non-structural systems

Table B1: Intended use in terms of base material and temperature range

Intended use		See Annex	Anchor type MQL 10
Base material [3]			
a	Reinforced or unreinforced compacted normal weight concrete[3] without fibres, strength classes≥ C12/15 acc. to EN 206:2013+A1:2016	C 1	✓
b	Solid brick masonry [1][2][3]	C 2	✓
c	Hollow brick masonry [2][3]	C 3 + C 4	✓
d	Autoclaved aerated concrete (AAC) [3]	C 5	✓
Temperature range			
Tb	min T = -20°C to +80°C (maximum short term temperature +80°C and maximum long term temperature +50°C)		✓

[1] Note: The characteristic resistance is also valid for larger brick sizes and higher compressive strength.
[2] Clay bricks and calcium silicate bricks and mortar strength class≥ M2,5 acc. to EN 998-2:2016
[3] For other base materials of base material group a, b, c or d the characteristic resistance of the anchor may be determined by job site tests according to TR 051, Edition April 2018.

Use conditions (environmental conditions):

- Structures subject to dry internal conditions (zinc coated steel, stainless steel).
- The specific screw made of galvanised steel or stainless steel 1.4301 may also be used in structures subject to external atmospheric exposure, if the area of the head of the screw is protected against moisture and driving rain after mounting of the fixing unit in this way, that intrusion of moisture into the anchor shaft is prevented. Therefore there shall be an external cladding or a ventilated rainscreen mounted in front of the head of the screw and the head of the screw itself shall be coated with a soft plastic, permanently elastic bitumen-oil-combination coating (e. g. undercoating or body cavity protection for cars).
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel 1.4401 or 1.4571).

  Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

Design:

- The anchorages are to be designed in accordance with EOTA TR 064, Edition May 2018, under the responsibility of an engineer experienced in anchorages and masonry work.
- Verifiable calculation notes and drawings shall be prepared taking account of the loads to be anchored, the nature and strength of the base materials and the dimensions of the anchorage members as well as of the relevant tolerances. The position of the anchor is indicated on the design drawings.

Installation:

- Hole drilling by the drill modes according to Annex C 1 – C 5
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Installation temperature from -20°C to +50°C
- Exposure to UV due to solar radiation of the anchor not protected ≤ 6 weeks

Mungo MQL Universal Frame Plug	**Annex B 1**
Intended use Specifications	

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Table B2: Installation parameters

Anchor type			MQL 10
Base material			Concrete solid brick hollow brick AAC
Overall anchor embedment depth in the base material [1)2)]	h_{nom}	[mm]	≥ 70
Nominal drill hole diameter	d_{nom}	[mm]	10
Cutting diameter of drill bit	d_{cut}	[mm]	≤ 10,45
Depth of drill hole to deepest point [1)]	h_1	[mm]	80
Diameter of clearance hole in fixture	d_f	[mm]	10,5

1) see Annex A 1
2) In masonry made of hollow or perforated bricks the influence of h_{nom} > 70 mm has to be determined by job site tests according to EOTA TR 051, Edition April 2018.

Table B3: Minimum thickness of member, edge distance and anchor spacing in concrete (base material group "a")

Anchor type	Strength class	Minimum thickness of member	Characteristic edge distance	Characteristic spacing	Minimum edge distance	Minimum spacing
		h_{min}	$c_{cr,N}$	$s_{cr,N}$	c_{min}	s_{min}
		[mm]	[mm]	[mm]	[mm]	[mm]
MQL 10	C12/15	100	140	140	70	140
	≥C16/20	100	100	100	50	100

Fixing points with spacing a ≤ $s_{cr,N}$ are considered as a group with a max. characteristic resistance $N_{Rk,p}$ according to Table C3. For a spacing a > $s_{cr,N}$ the anchors are considered as single anchors, each with a characteristic resistance $N_{Rk,p}$ according to Table C3.

Mungo MQL Universal Frame Plug	**Annex B 2**
Intended use Installation parameters, edge distance and spacing in concrete	

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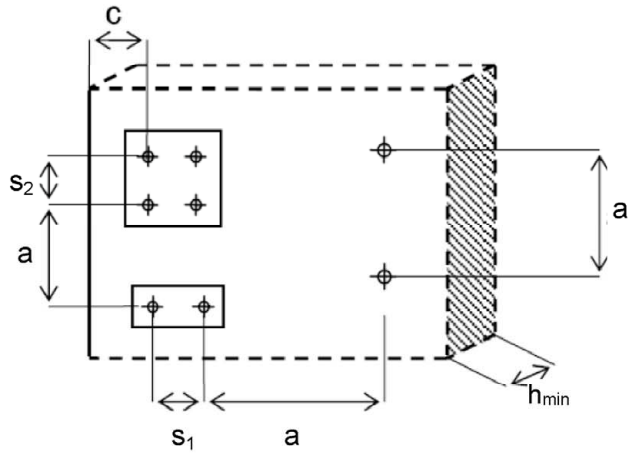
Table B4: Minimum thickness of member, edge distance and anchor spacing in solid and hollow masonry (base material group "b" and "c")

Base material	See Annex	Minimum member thickness	Minimum edge distance	Characteristic spacing	Minimum spacing	
					vertical to edge	parallel to edge
		h_{min}	c_{min}	a_{min}	$s_{1,min}$	$s_{2,min}$
		[mm]	[mm]	[mm]	[mm]	[mm]
Solid clay brick Mz 20/2,0 - 2DF	C 2	115	100	max (250 mm, $s_{1,min}$, $s_{2,min}$)	200	400
Solid calcium silicate bricks KS 12/2,0 - 2DF	C 2	115				
Hollow clay brick HLz 12/1,2 - 10DF	C 3	240				
Ital. Hollow clay brick Mattone	C 3	240				
Calcium silicate hollow brick KSL 12/1,2-10DF	C 4	240				

Table B5: Minimum thickness of member, edge distance and anchor spacing in autoclaved aerated concrete (AAC) (base material group "d")

Base material	See Annex	Minimum member thickness	Minimum edge distance	Characteristic spacing	Minimum spacing	
					vertical to edge	parallel to edge
		h_{min}	c_{min}	a_{min}	$s_{1,min}$	$s_{2,min}$
		[mm]	[mm]	[mm]	[mm]	[mm]
AAC according to EN 771-4:2011+A1:2015	C 5	240	100	max (250 mm; $s_{1,min}$; $s_{2,min}$)	200	400

Scheme of spacing and edge distances



Mungo MQL Universal Frame Plug

Intended use
Edge distance and spacing in solid masonry, hollow masonry and AAC

Annex B 3

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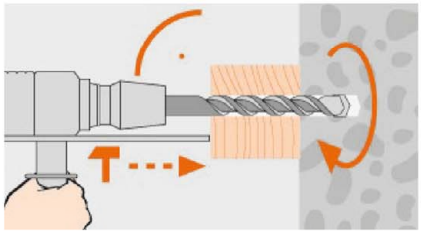
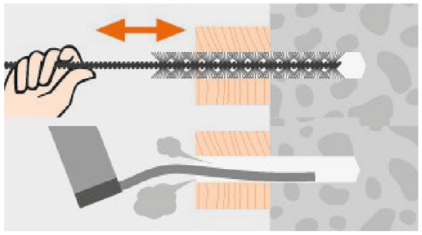
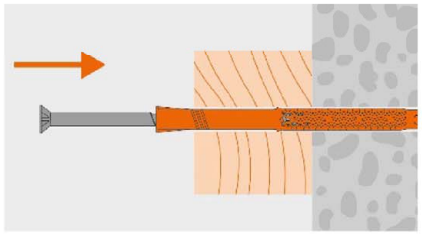
Installation instructions in concrete and solid brick:



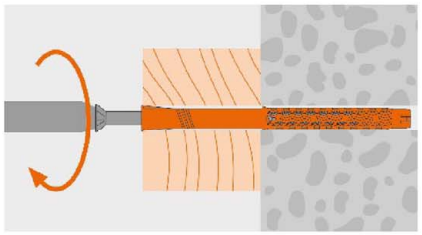
Drill the hole by **hammer drilling.**
Chose drill diameter and drill hole depth according to Table B2.
Temperature of base material ≥ -20°C.



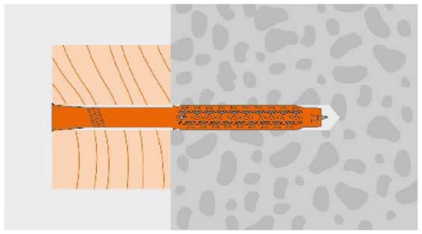
Pre-cleaning the drill hole with a brush, then hole-blowing with a pump.



Setting the anchor with the preassembled fastener through the part to be fixed.



Push the anchor till the collar of the sleeve contacts the part to be fixed, then fix the part with screw.



Tightening the fastener until sleeve collar contact.

Mungo MQL Universal Frame Plug	**Annex B 4**
Intended use Installation instructions in concrete and solid brick	

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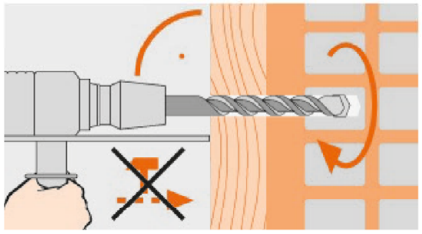
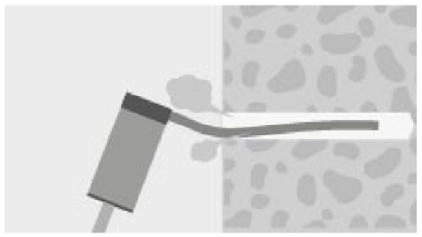
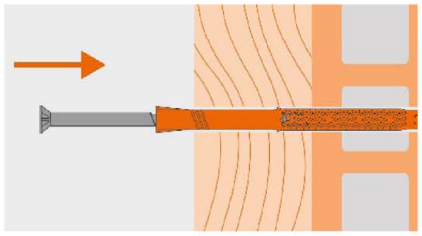
Installation instructions in hollow brick and autoclaved aerated concrete (AAC):



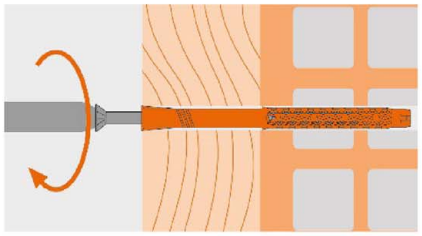
Drill the hole according to the method given in Table C6 and C7 by **rotary drilling** (without hammering) or **hammer drilling**.
Chose drill hole diameter and drill hole depth according to Table B2.
Temperature of base material ≥ -20°C.



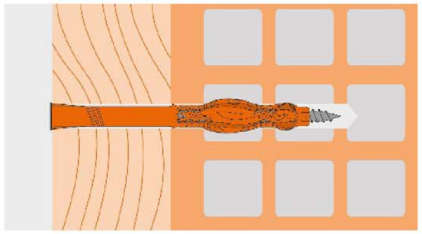
Blow out drill hole (only for autoclaved aerated concrete (AAC))



Setting the anchor with the preassembled fastener through the part to be fixed.



Push the anchor until the collar contacts the part to be fixed, then fix the part with screw.



Tighten the fastener until sleeve collar contact.

Mungo MQL Universal Frame Plug	**Annex B 5**
Intended use Installation instructions in hollow brick	

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Table C1: Characteristic bending resistance of the special screw

Anchor type			MQL 10	
Steel type			**Zinc plated steel**	**Stainless steel**
Characteristic bending resistance	$M_{Rk,s}$	[Nm]	15,3	17,8
Partial factor	γ_{Ms} [1)]	[-]	1,25	1,56

[1)] In absence of other national regulations.

Table C2: Characteristic resistance of the screw

Anchor type			MQL 10	
Failure of expansion element (special screw)			**Zinc plated steel**	**Stainless steel**
Characteristic tension resistance	$N_{Rk,s}$	[kN]	17,0	19,8
Partial factor for $N_{Rk,s}$	γ_{Ms} [1)]	[-]	1,5	1,87
Characteristic shear resistance	$V_{Rk,s}$	[kN]	8,5	8,5
Partial factor for $V_{Rk,s}$	γ_{Ms} [1)]	[-]	1,25	1,56

[1)] In absence of other national regulations.

Table C3: Characteristic resistance in in concrete (base material group "a")

Anchor type			MQL 10
Drilling method			Hammer drilling
Pullout failure (plastic sleeve)			
concrete C12/15			
Characteristic resistance 50°C[1)] / 80°C[2)]	$N_{Rk,p}$	[kN]	1,5
concrete ≥ C16/20			
Characteristic resistance 50°C[1)] / 80°C[2)]	$N_{Rk,p}$	[kN]	2,5

[1)] Maximum long term temperature
[2)] Maximum short term temperature

Table C4: Displacements[1)] under tension and shear load

Anchor type	Tension load			Shear load		
	F [2)]	δ_{N0}	$\delta_{N\infty}$	F [2)]	δ_{V0}	$\delta_{V\infty}$
	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
MQL 10	1,0	0,06	0,12	4,5	3,0 [3)]	4,5 [3)]

[1)] Valid for all temperature ranges.
[2)] Intermediate values by linear interpolation.
[3)] The displacements under shear load may increase in case of an annular gap in the fixture.

Tabelle C5: Values under fire exposure in concrete C20/25 to C50/60 in any load direction, non-permanent centric load and whitout lever arm

Anchor type	Fire resistance class	$F_{Rk,fi,90}$
MQL 10	R 90	0,8 kN

Mungo MQL Universal Frame Plug	**Annex C 1**
Performances Characteristic resistance in concrete, characteristic resistance of the screw displacements under tension and shear load in concrete and masonry	

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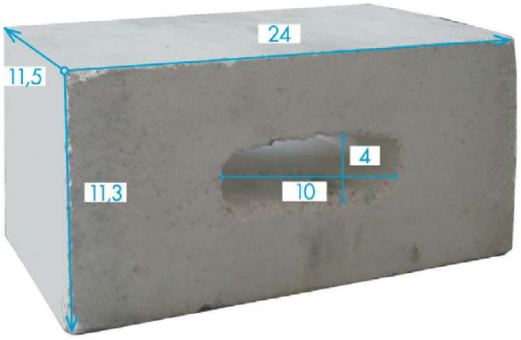
Table C6: Characteristic resistance for MQL 10 in solid masonry (base material group "b") – clay brick and calcium silicate brick

Base material	Geometry (format/ length/ width/ height) [cm]	Min. compressive strength f_b [N/mm²] bulk density ≥ ρ [kg/dm³]	Drilling method 1)	Characteristic resistance F_{Rk} [kN]
				MQL 10
Clay solid brick 2DF 240mm/ 115mm / 113mm according to EN 771-1:2011+A1:2015				
Mz 20/2,0		10 / 2,0	H	2,0
		20 / 2,0	H	3,0
Calcium silicate solid brick 2DF 240mm/ 115mm/ 113mm according to EN 771-2:2011+A1:2015				
KSV 12/2,0		10 / 2,0	H	1,5
		20 / 2,0	H	2,5

1) H = Hammer drilling; R = Rotary drilling

Mungo MQL Universal Frame Plug	**Annex C 2**
Performances Characteristic resistances in solid masonry	

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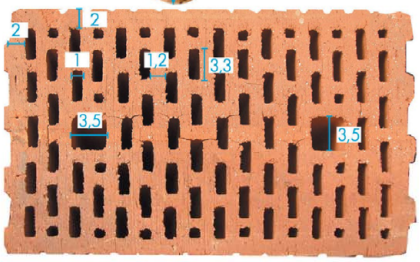
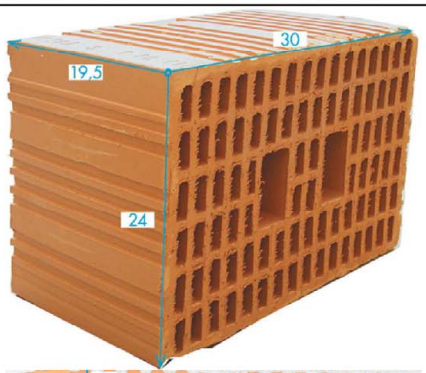
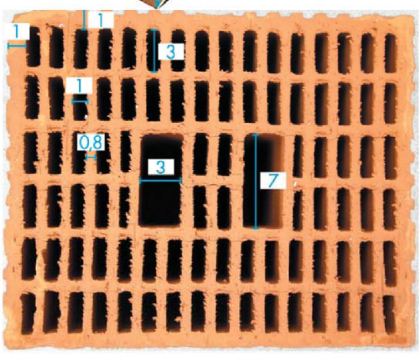
Table C7: Characteristic resistance for MQL 10 in perforated masonry (base material group "c") – clay brick

Base material	Geometry (format/ length/ width/ height) [cm]	Min. compressive strength f_b [N/mm²] bulk density ≥ ρ [kg/dm³]	Drilling method [1]	Characteristic resistance F_{Rk} [kN]
				MQL 10
Clay brick 10DF 300mm/ 240mm/ 240mm and 300mm/ 240mm/ 195mm with perforation according to EN 771-1:2011+A1:2015				
HLz 12/1,2		12 / 1,2	R	1,2 [2]
		20 / 1,2	R	2,0 [2]
Ital. perforated brick Mattone		10 / 0,84	R	0,9 [2]
				

[1] H = Hammer drilling; R = Rotary drilling
[2] Shear load with lever arm is not allowed.

Mungo MQL Universal Frame Plug	**Annex C 3**
Performances Characteristic resistances in perforated masonry	

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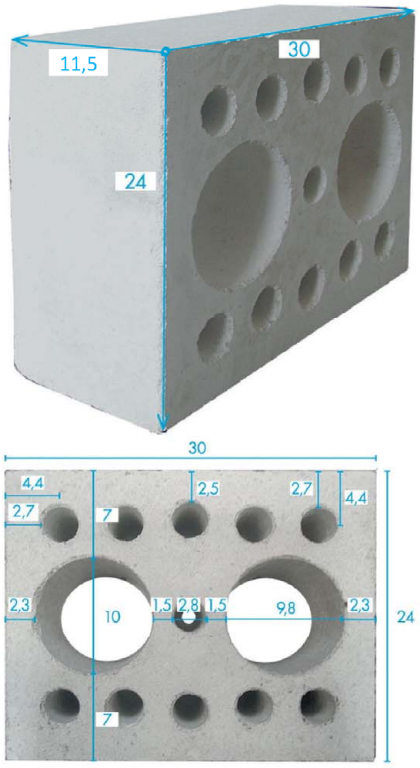
Table C8: Characteristic resistance for MQL 10 in perforated masonry (base material group "c") –calcium silicate brick

Base material	Geometry (format/ length/ width/ height) [cm]	Min. compressive strength f_b [N/mm²] bulk density ≥ ρ [kg/dm³]	Drilling method [1]	Characteristic resistance F_{Rk} [kN]
				MQL 10
Calcium silicate brick 300mm / 240mm/ 115mm with perforation according to EN 771-2:2011+A1:2015				
KSL 12/1,4		8 / 1,4	H	1,2 [2]
		12 / 1,4	H	2,0 [2]

[1] H = Hammer drilling; R = Rotary drilling
[2] Shear load with lever arm is not allowed.

Mungo MQL Universal Frame Plug	**Annex C 4**
Performances Characteristic resistances in perforated masonry	

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Table C9: Characteristic resistance for MQL 10 in autoclaved aerated concrete (AAC) (base material group „d“)

Base material	Mean compressive strength $f_{c,m}$ [N/mm²]	Drilling method [1)]	Characteristic resistance F_{Rk} [kN] MQL 10
autoclaved aerated concrete (AAC) according to EN 771-4:2011+A1:2015			
AAC 2	≥ 2,4	R	0,3
AAC 6	≥ 5,9	R	1,5
Partial factor (if no national regulations exist)		γ_{MAAC}	2,0

[1)] R = Rotary drilling

Mungo MQL Universal Frame Plug

Performances
Characteristic resistances in AAC

Annex C 5