

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-15/0068
of 16 March 2015

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

MB/ MBR

Product family
to which the construction product belongs

Plastic anchor for multiple use in concrete and masonry
for non-structural applications

Manufacturer

Mungo Befestigungstechnik AG
Bornfeldstrasse 2
4603 OLTEN
SCHWEIZ

Manufacturing plant

Werk 1
Werk 2
Werk 3
Werk 4
Werk 5

This European Technical Assessment
contains

16 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

Guideline for European technical approval of "Plastic
anchors for multiple use in concrete and masonry for
non-structural applications", ETAG 020,
Edition March 2012,
used as European Assessment Document (EAD)
according to Article 66 Paragraph 3 of Regulation (EU)
No 305/2011.

European Technical Assessment
ETA-15/0068
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Specific Part

1 Technical description of the product

The MB/ MBR is a plastic anchor consisting of a plastic 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 Mechanical resistance and stability (BWR 1)

The essential characteristics regarding mechanical resistance and stability are included under the Basic Works Requirement Safety in use.

3.2 Safety in case of fire (BWR 2)

| Essential characteristic | Performance |
|--------------------------|--|
| Reaction to fire | Anchorage satisfy requirements for Class A 1 |
| Resistance to fire | See Annex C 1 |

3.3 Hygiene, health and the environment (BWR 3)

Not applicable

3.4 Safety and accessibility (BWR 4)

| Essential characteristic | Performance |
|---|---------------------|
| Characteristic resistance for tension and shear loads | See Annex C 1 – C 4 |
| Characteristic resistance for bending moments | See Annex C 1 |
| Displacements under shear and tension loads | See Annex C 1 |
| Anchor distances and dimensions of members | See Annex B 2 – B 3 |

3.5 Protection against noise (BWR 5)

Not applicable

3.6 Energy economy and heat retention (BWR 6)

Not applicable

3.7 Sustainable use of natural resources (BWR 7)

The sustainable use of natural resources was not investigated.

3.8 General aspects

The verification of durability is part of testing the essential characteristics. Durability is only ensured if the specifications of intended use according to Annex B are taken into account.

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

According to Decision 97/463/EC of the Commission of 27 June 1997 (Official Journal of the European Communities L 198 of 25.07.1997, p. 31–32) the system of assessment and verification of constancy of performance (AVCP) (see Annex V and Article 65 Paragraph 2 to Regulation (EU) No 305/2011) given in the following table applies.

| Product | Intended use | Level or class | System |
|---|--|----------------|--------|
| Plastic anchors for use in concrete and masonry | For use in systems, such as façade systems, for fixing or supporting elements which contribute to the stability of the systems | — | 2+ |

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

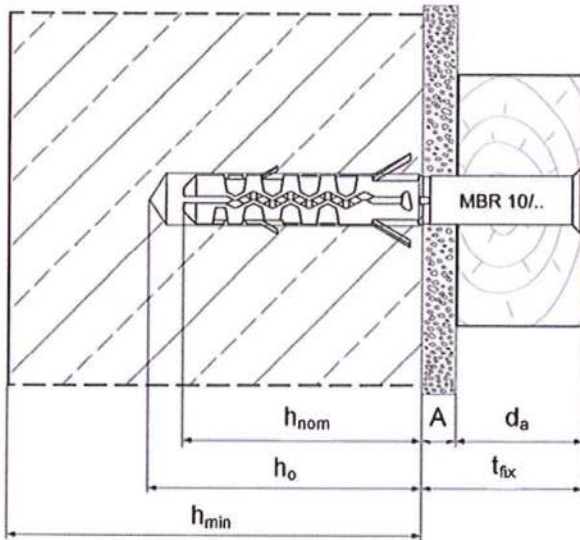
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 16 March 2015 by Deutsches Institut für Bautechnik

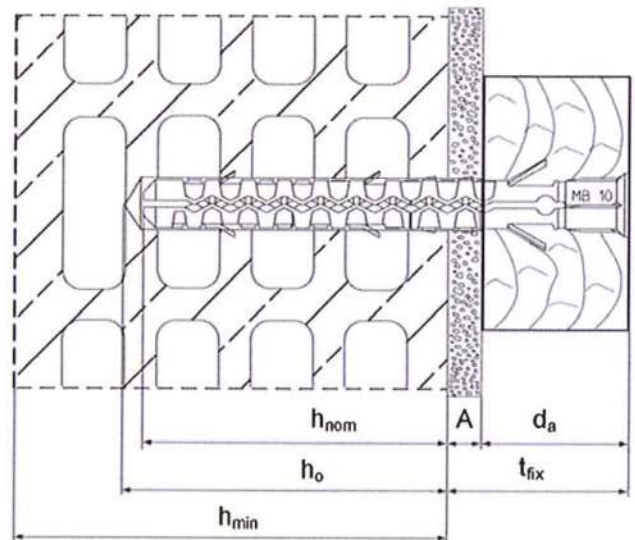
Andreas Kummerow
p.p. Head of Department

beglaubigt:
Aksünger

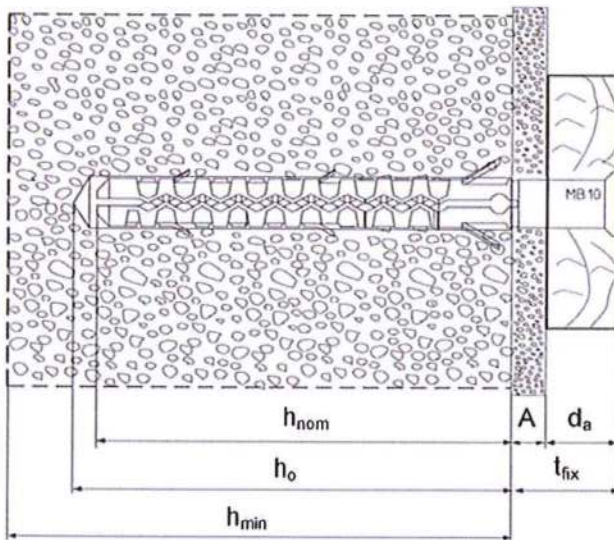
Installed condition for MB 10 and MBR 10



Installation in concrete and solid brick (e.g. MBR 10)



Installation in hollow brick (e.g. MB 10)



Installation in autoclaved aerated concrete (only for MB 10)

Legend

- h_{min} = thickness of structural part
- d_a = thickness of attached part
- h_{nom} = embedment depth
- h_o = drill hole depth
- A = tolerance compensation
- t_{fix} = thickness of fixture

MB/ MBR

Product description
Installed condition

Annex A 1

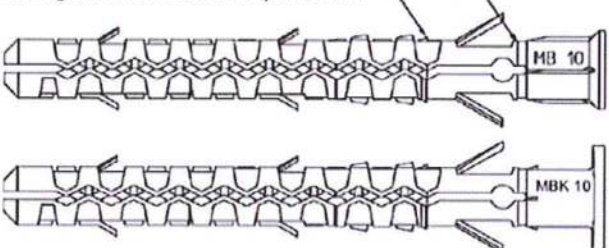
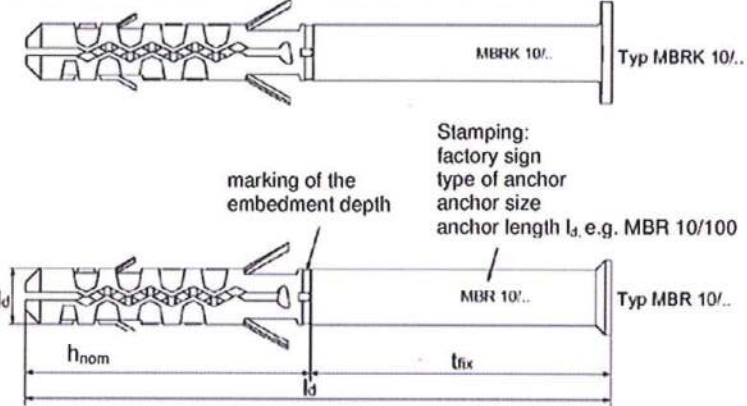
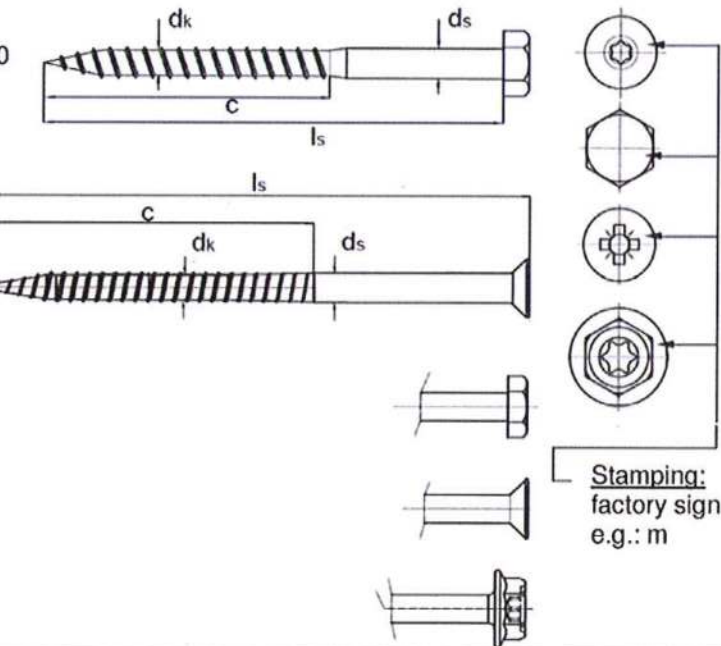
| Anchor type | Embedment depth h_{nom} [mm] | Anchor sleeve |
|---|---|--|
| <p>MB 10</p> | <p>70 For autoclaved aerated concrete: 90</p> | <p>marking of the embedment depth 70 mm marking of the embedment depth 90 mm</p>  |
| <p>MBR 10</p> | <p>50</p> |  <p>Stamping: factory sign type of anchor anchor size anchor length l_a, e.g. MBR 10/100</p> |
| <p>Special screws MB 10 and MBR 10</p> | <p>only for MBR 10x60 MBRK 10x60</p> <p>for MBR 10 MBRK 10 MB 10 MBK 10</p> |  <p>Stamping: factory sign e.g.: m</p> |
| <p>MB/ MBR</p> | | |
| <p>Product description Anchor types and special screws</p> | | <p>Annex A 2</p> |

Table A1: Dimensions

| Anchor ¹⁾ | Plastic sleeve | | | Special screw ²⁾³⁾ | | |
|---------------------------|----------------|----------------------|--|-------------------------------|------------|----------|
| | d_d [mm] | h_{nom} [mm] | l_d [mm] | d_s [mm] | d_k [mm] | c [mm] |
| MBR 10/ 60 MBRK 10/ 60 | 10 | 50 | 60 | 7 | 6,1 | 50 |
| MBR 10/ xx MBRK 10/ xx | 10 | 50 | 80, 100, 120, 140, 160, 200, 240 | 7 | 6,1 | 75 |
| MB10/ xx MBK10/ xx | 10 | 70/ 90 ⁴⁾ | 80, 100, 120, 140, 160, 200, 240, 280, 300 | 7 | 6,1 | 75 |

- 1) For the anchor's description the plastic sleeve's length l_d is indicated additionally, e.g. for $l_d=140$ mm: anchor MBR 10/140.
- 2) The screw's length l_s amounts 5 mm longer than the plastic sleeve's length l_s , so the fastener penetrates correctly the appropriate plastic sleeve.
- 3) For attached metal parts the fastener with hexagonal drive may be used in the version zinc plated. See section 1.
- 4) When applied in autoclaved aerated concrete an embedment depth of 90 mm has to be used.

Table A2: Materials

| Name | Material |
|----------------|--|
| Plastic sleeve | Polyamide, PA6, colour orange |
| Specific screw | steel 6.8 ($f_{uk} = 600 \text{ N/mm}^2$, $f_{yk} = 480 \text{ N/mm}^2$), zinc plated $\geq 5\mu\text{m}$ acc. to EN ISO 4042:2001-01 |
| | non-corrosive steel A4 EN 10088-3:2014 mit $f_{uk} = 700 \text{ N/mm}^2$, $f_{yk} = 450 \text{ N/mm}^2$ |

MB/ MBR

Product description
Dimensions and materials

Annex A 3

Specifications of intended use

Anchorage subject to:

- Static and quasi-static loads
- Multiple fixing of non-structural applications

Table B1: Application categories in terms of base material and temperature range

| Application categories | | See annex | Anchor type | |
|--|---|-----------|-------------|--------|
| | | | MB 10 | MBR 10 |
| Base material ³⁾ | | | | |
| a | Reinforced or unreinforced normal weight concrete with strength classes \geq C12/15 acc. to EN 206-1:2014 | C 1 | ✓ | ✓ |
| b | Solid brick masonry ¹⁾²⁾ | C 2 | ✓ | ✓ |
| c | Hollow brick masonry ²⁾ | C 3 + C 4 | ✓ | ✓ |
| d | Autoclaved aerated concrete | C 4 | ✓ | - |
| 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, calcium silicate bricks and concrete - or lightweight concrete blocks and mortar strength class \geq M2,5 acc. to EN 998-2:2010 ³⁾ For other base materials of the use categories b, c and d the characteristic resistance of the anchor may be determined by job site tests according to ETAG 020, Annex B, Edition March 2012. | | | | |

Use conditions (environmental conditions):

- Structures subject to dry internal conditions (zinc coated steel, stainless steel).
- The specific screw made of galvanised also may 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).
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 the ETAG 020, Edition March 2012, Annex C 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.
- Fasteners are only to be used for multiple use for non-structural application according to ETAG 020, Edition March 2012.

Installation:

- Hole drilling by the drill modes according to Annex C1 - C4
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site acc. to annex B 4 and B 5.
- Installation temperature from -20°C to +50°C
- Exposure to UV due to solar radiation of the anchor not protected \leq 6 weeks

| | |
|------------------------------------|------------------|
| MB/ MBR | Annex B 1 |
| Intended use Specifications | |

Table B2: Installation parameters

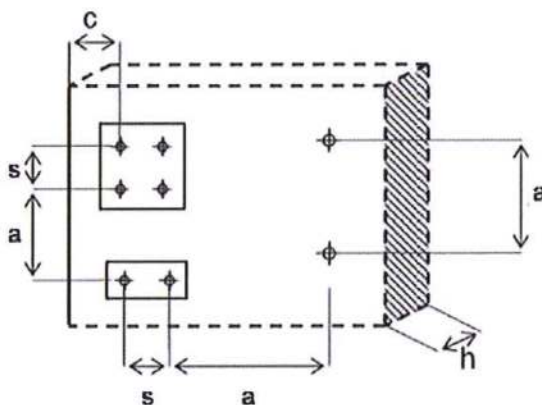
| Anchor type | | | MBR 10 | MB 10 | MB 10 |
|---------------------------------------|----------------|------|--|--|-----------------------------------|
| Base material | | | Concrete, solid brick and hollow brick | Concrete, solid brick and hollow brick | autoclaved aerated concrete (AAC) |
| Embedment depth | h_{nom} | [mm] | 50 | 70 | 90 |
| Nominal drill hole diameter | d_{nom} | [mm] | 10 | 10 | 9 |
| Cutting diameter of drill bit | $d_{cut} \leq$ | [mm] | 10,45 | 10,45 | 9,45 |
| Depth of drill hole | h_o | [mm] | 60 | 80 | 100 |
| Diameter of clearance hole in fixture | d_f | [mm] | 10,5 | | |
| max. thickness of member | max t_{fix} | [mm] | 190 | 230 | 210 |
| min. thickness of member | min t_{fix} | [mm] | 0 | | |

Table B3: Minimum thickness of member, edge distance and spacing in concrete

| Anchor type | Strength category | Minimum thickness of member | Characteristic edge distance | Characteristic spacing | Minimum edge distance | Minimum spacing |
|-------------|-------------------|-----------------------------|------------------------------|------------------------|-----------------------|-------------------|
| | | h_{min} [mm] | $c_{cr,N}$ [mm] | $s_{cr,N}$ [mm] | c_{min} [mm] | s_{min} [mm] |
| MB 10 | C12/15 | 100 | 70 | 75 | 70 | 70 |
| | \geq C16/20 | 100 | 50 | 55 | 50 | 50 |
| MBR 10 | C12/15 | 100 | 70 | 75 | 70 | 70 |
| | \geq C16/20 | 100 | 50 | 55 | 50 | 50 |

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

Scheme of spacing and edge distances



MB/ MBR

Intended use
Installation parameters, edge distance and spacing in concrete

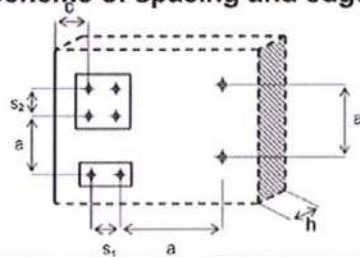
Annex B 2

Table B4: Minimum thickness of member, edge distance and spacing in solid brick, hollow brick and AAC

| Anchor type | Base material | See Annex | Minimum thickness of structural part h_{min} [mm] | Minimum edge distance c_{min} [mm] | Minimum spacing | |
|-----------------|--|-----------|---|--|---|---|
| | | | | | vertical to edge $s_{1,min}$ [mm] | parallel to edge $s_{2,min}$ [mm] |
| MB 10 | Clay brick Mz 12-1,8-NF (DIN 105-100:2012-01) | C 2 | 112 | 120 | 240 | 480 |
| MB 10 | KSV 12-1,8-2DF (DIN V 106:2005-10) | C 2 | 115 | 120 | 240 | 480 |
| MB 10 MBR 10 | KS-Ratio flat element 20-2,0-8DF (DIN V 106:2005-10) | C 2 | 115 | 100 | 200 | 400 |
| MB 10 | Light concrete solid brick Vbl 2-0,8-2DF (DIN V 18152-100:2005-10) | C 2 | 115 | 120 | 240 | 480 |
| MB 10 | Light concrete –flat element PE12-0,5 Z-17.1-699 from 09.10.2012 | C 2 | 115 | 120 | 240 | 480 |
| MBR 10 | Liapor solid brick | C 2 | 115 | 100 | 200 | 400 |
| MB 10 MBR 10 | ROGGWILL *QS/SZ* CE 21-12-13 SWISSMODUL 300x150x190 | C 3 | 150 | 150 | 300 | 600 |
| MBR 10 | Block 37/17,5 brickyard 87727 Klosterbeuren, Germany Z-17.1-1038 from 16.07.2010 | C 3 | 175 | 185 | 370 | 740 |
| MB 10 | Plan 30/24 brickyard 87727 Klosterbeuren, Germany Z-17.1-993 from 09.07.2010 | C 3 | 240 | 150 | 300 | 600 |
| MB 10 | Calcium silicate hollow brick KSL 12-1,2-10DF (DIN V 106:2005-10) | C 3 | 240 | 150 | 300 | 600 |
| MB 10 MBR 10 | KS-Ratio flat element 12-1,6-8DF (DIN V 106:2005-10) | C 3 | 115 | 100 | 200 | 400 |
| MBR 10 | Concrete hollow block Hbn 6-1,2 8DF (DIN V 18153-100:2005-10) | C 4 | 115 | 100 | 200 | 400 |
| MB 10 | autoclaved aerated concrete (AAC) acc. to EN 771-3:2011 | C 4 | 150 | 125 | 250 | 500 |
| MB 10 | Reinforced autoclaved aerated concrete acc. to EN 12602:2013 | C 4 | 150 | 125 (150 ¹⁾) | 250 (300 ¹⁾) | 500 (600 ¹⁾) |

1) For slabs of width ≤ 700 mm

Scheme of spacing and edge distances in solid and hollow brick and AAC



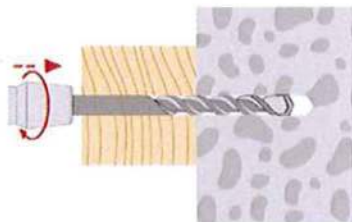
$$a \geq \max(250 \text{ mm}; s_{1,min}; s_{2,min})$$

MB/ MBR

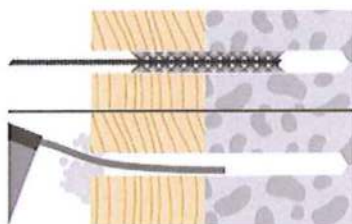
Intended use
Installation instructions in concrete and solid brick

Annex B 3

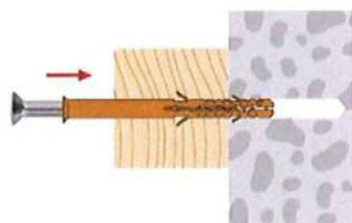
Installation instructions in concrete and solid brick:



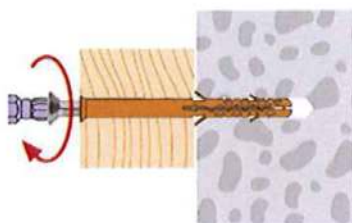
Drilling hole by hammer drilling
Drill hole diameter and drill hole depth according to table B2
Temperature of base material $\geq -20^{\circ}\text{C}$



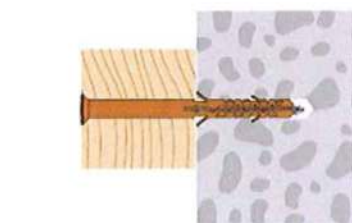
Pre-cleaning the drill hole with a brush, then hole-blowing with a pump



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



Push the anchor till the waistband contacts the part to be fixed, then fix the part with screw



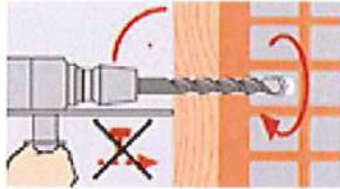
Tightening the fastener till head contact

MB/ MBR

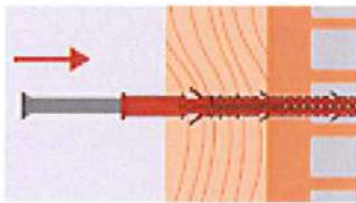
Intended use
Installation instructions in concrete and solid brick

Annex B 4

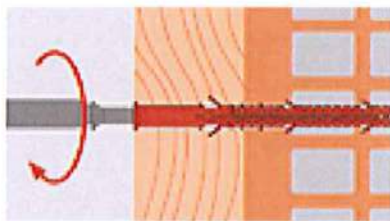
Installation instructions in hollow brick and autoclaved aerated concrete (AAC):



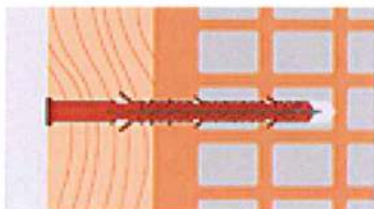
Drilling hole without hammering
Drill hole diameter and drill hole depth according to table B2
Temperature of base material $\geq -20^{\circ}\text{C}$



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



Push the anchor till the waistband contacts the part to be fixed, then fix the part with screw



Tighten the fastener till head contact

MB/ MBR

Intended use
Installation instructions in hollow brick and autoclaved aerated concrete

Annex B 5

Table C1: Characteristic bending resistance of the special screw

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

¹⁾ In absence of other national regulations.

Table C2: Characteristic resistance of the screw

| Steel type | | | Steel zinc plated | | Stainless steel | |
|---|-----------------------------|------|-------------------|-------|-----------------|-------|
| Anchor type | | | MBR 10 | MB 10 | MBR 10 | MB 10 |
| Total anchor length in base material | h_{nom} | [mm] | 50 | 70 | 50 | 70 |
| Failure of expansion element (special screw) | | | | | | |
| Characteristic tension resistance | $N_{Rk,s}$ | [kN] | 17,0 | | 19,8 | |
| Partial safety factor for $N_{Rk,s}$ | γ_{Ms} ¹⁾ | [-] | 1,5 | | 1,87 | |
| Characteristic shear resistance | $V_{Rk,s}$ | [kN] | 8,5 | | 8,5 | |
| Partial safety factor for $V_{Rk,s}$ | γ_{Ms} ¹⁾ | [-] | 1,25 | | 1,56 | |

¹⁾ In absence of other national regulations.

Table C3: Characteristic resistance in concrete (use category a)

| Steel type | | | Steel zinc plated | | Stainless steel | |
|---|-----------------------------|------|-------------------|-------|-----------------|-------|
| Anchor type | | | MBR 10 | MB 10 | MBR 10 | MB 10 |
| Total anchor length in base material | h_{nom} | [mm] | 50 | 70 | 50 | 70 |
| Drilling method | | | | | | |
| hammer drilling | | | | | | |
| Pullout failure (plastic sleeve) | | | | | | |
| concrete C12/15 | | | | | | |
| Characteristic resistance 50°C ²⁾ / 80°C ³⁾ | $N_{Rk,p}$ | [kN] | 0,9 | 1,5 | 0,9 | 1,5 |
| Partial safety factor for $N_{Rk,p}$ | γ_{Mc} ¹⁾ | [-] | 1,8 | | | |
| concrete ≥ C16/20 | | | | | | |
| Characteristic resistance 50°C ²⁾ / 80°C ³⁾ | $N_{Rk,p}$ | [kN] | 1,5 | 2,5 | 1,5 | 2,5 |
| Partial safety factor for $N_{Rk,p}$ | γ_{Mc} ¹⁾ | [-] | 1,8 | | | |

¹⁾ In absence of other national regulations.

²⁾ Maximum long term temperature

³⁾ Maximum short term temperature

Table C4: Displacements¹⁾ under tension and shear load in concrete and masonry

| Anchor type | Embedment depth | Tension load | | | Shear load | | |
|-------------|-----------------|-------------------|---------------|--------------------|-------------------|-------------------|--------------------|
| | h_{nom} | F ²⁾ | δ_{N0} | $\delta_{N\infty}$ | F ²⁾ | δ_{V0} | $\delta_{V\infty}$ |
| | [mm] | [kN] | [mm] | [mm] | [kN] | [mm] | [mm] |
| MB 10 | 70 AAC: 90 | 1,0 | 0,2 | 0,4 | 4,8 | 3,4 ³⁾ | 5,1 ³⁾ |
| MBR 10 | 50 | 0,8 | 0,2 | 0,4 | 4,8 | 3,4 ³⁾ | 5,1 ³⁾ |

¹⁾ Valid for all temperature ranges.

²⁾ Intermediate values by linear interpolation.

³⁾ The displacements under shear load can increase in case of annular gap in fixture.

Table C5: Characteristic values under fire exposure in concrete C20/25 to C50/60 in any load direction, no permanent centric tension load and without lever arm.

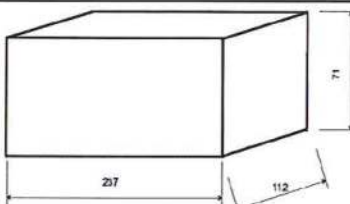
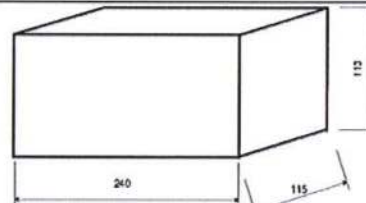
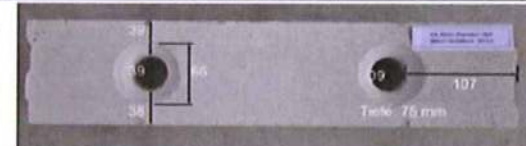
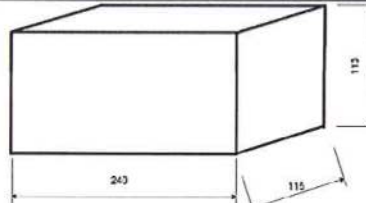
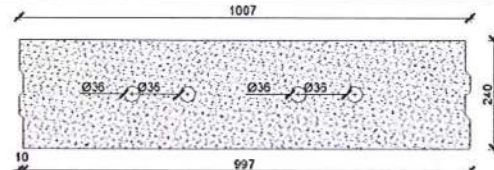

| Anchor type | Fire resistance class | F_{Rk} |
|------------------|-----------------------|----------|
| MB 10 and MBR 10 | R 90 | ≤ 0,8 kN |

MB/ MBR

Performances
Characteristic resistances,
displacements under tension and shear load in concrete and masonry

Annex C 1

Table C6: Characteristic resistance for MBR 10 and MB 10 in solid masonry (use category b) – clay brick, calcium silicate brick and lightweight concrete blocks

| Base material (supplier) | Geometry (format/ length/ width/ height) [mm] | Min. compressive strength f_b [N/mm ²] bulk density $\geq \rho$ [kg/dm ³] | Drilling method ¹⁾ | Characteristic resistance F_{Rk} [kN] | | |
|---|---|--|-------------------------------|---|-------|---|
| | | | | MBR 10 | MB 10 | |
| Solid brick acc. to EN 771-1:2011 | | | | | | |
| Clay brick Mz 12-1,8-NF (DIN 105-100:2012-01) |  | 10 / 1,8 | H | - | 1,5 | |
| | | 20 / 1,8 | H | - | 2,0 | |
| Calcium silicate solid brick acc. to EN 771-2:2011 | | | | | | |
| KSV 12-1,8-2DF (DIN V 106:2005-10) |  | 10 / 1,8 | H | - | 1,5 | |
| | | 20 / 1,8 | H | - | 2,0 | |
| KS-Ratio-flat element 20-2,0-8DF (DIN V 106:2005-10) |  | 10 / 2,0 | H | 2,0 | 1,5 | |
| | | 20 / 2,0 | H | 2,5 | 2,0 | |
| Solid brick made of concrete (with dense and lightweight aggregates) acc. to EN 771-3:2011 | | | | | | |
| Lightweight concrete solid brick- Vbl 2-0,8-2DF (DIN 18152-100:2005-10) |  | 2 / 0,5 | H | - | 0,3 | |
| | | 4 / 0,8 | H | - | 0,4 | |
| | | 10 / 1,2 | H | - | 1,2 | |
| | | 20 / 2,0 | H | - | 1,5 | |
| Lightweight concrete flat element PE12-0,5 Z-17.1-699 from 09.10.2012 |  | 2 / 0,5 | H | - | 0,3 | |
| | | 4 / 0,8 | H | - | 0,4 | |
| Liapor solid brick | 240 115 95 |  | 10 / 1,2 | H | 0,9 | - |
| Partial safety factor (in absence of other national regulations) | | | γ_{Mm} | 2,5 | | |

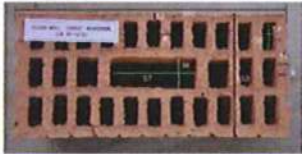


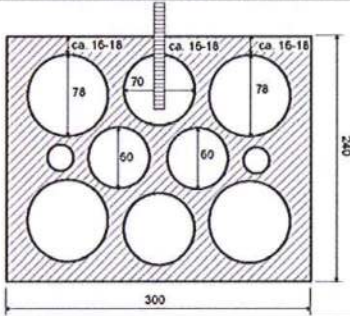
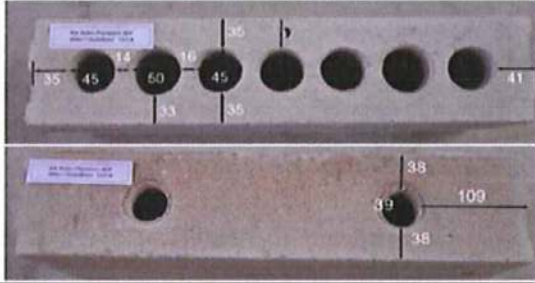
¹⁾ H = Hammer drilling; R = Rotary drilling

MB/ MBR

Performances
Characteristic resistances in solid masonry

Annex C 2

Table C7: Characteristic resistance for MBR 10 and MB 10 in hollow or perforated masonry (use category c) – clay brick and calcium silicate brick, lightweight concrete blocks

| Base material (supplier) | Geometry (format/ length/ width/ height) [mm] | Min. compressive strength f_b [N/mm ²] bulk density $\geq \rho$ [kg/dm ³] | Drilling method ¹⁾ | Characteristic resistance F_{Rk} [kN] | |
|--|--|---|-------------------------------|---|--------------------|
| | | | | MBR 10 | MB 10 |
| Clay brick with perforation acc. to EN 771-1:2011 | | | | | |
| ROGG WILL *QS/SZ* ROGGWILL CE 21-12-13 SWISSMODUL 300x150x190 |  300 150 190 | 25 / 0,80 | R | 0,4 ²⁾ | 0,75 ²⁾ |
| Block 37/17,5 brickyard 87727 Klosterbeuren, Germany Z-17.1-1038 from 16.07.2010 |  373 175 238 | 12 / 1,4 | R | 0,6 ²⁾ | - |
| Plan 30/24 brickyard 87727 Klosterbeuren, Germany Z-17.1-993 from 09.07.2010 |  308 240 249 | 12 / 1,2 | R | - | 0,5 ²⁾ |
| Calcium silicate brick with perforation acc. to EN 771-1:2011 | | | | | |
| Calcium silicate hollow brick - KSL 12-1,2-10DF (DIN V 106: 2005-10) |  10DF 300 240 238 | 12 / 1,2 | R | - | 0,4 ²⁾ |
| KS-Ratio flat element 12-1,6-8DF (DIN V 106: 2005-10) |  8DF 498 115 248 | 12 / 1,6 | R | 1,2 | 0,75 |
| Partial safety factor (in absence of other national regulations) | | | γ_{Mm} | 2,5 | |

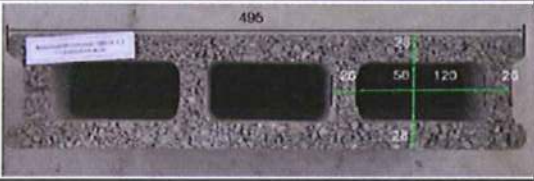
¹⁾ H = Hammer drilling; R = Rotary drilling; ²⁾ shear load with lever arm is not allowed.

MB/ MBR

Performances
Characteristic resistances in hollow masonry

Annex C 3

Table C8: Characteristic resistance for MBR 10 and MB 10 in hollow masonry (use category c) – lightweight concrete blocks

| Base material (supplier) | Geometry (format/ length/ width/ height) [mm] | Min. compressive strength f_b [N/mm ²] bulk density $\geq \rho$ [kg/dm ³] | Drilling method ¹⁾ | Characteristic resistance F_{Rk} [kN] | |
|--|--|---|-------------------------------|---|-------|
| | | | | MBR 10 | MB 10 |
| Concrete masonry units (with dense and lightweight aggregates) acc. to EN 771-3:2011 | | | | | |
| Concrete hollow block Hbn 6-1,2 8DF (DIN V 18153-100:2005-10) | 8DF 495 115 238  | 6 / 1,2 | R | 0,3 | - |
| Partial safety factor (in absence of other national regulations) | | | γ_{Mm} | 2,5 | |

¹⁾ H = Hammer drilling; R = Rotary drilling

Table C9: Characteristic resistance for MB 10 in [kN] in autoclaved aerated concrete / AAC (use category d)

| Base material (supplier) | Geometry (format/ length/ width/ height) [mm] | Min. compressive strength f_b [N/mm ²] bulk density $\geq \rho$ [kg/dm ³] | Drilling method ¹⁾ | Characteristic resistance F_{Rk} [kN] |
|--|---|---|-------------------------------|---|
| | | | | MB 10 |
| Autoclaved aerated concrete masonry units acc. to EN 771-4 :2011 | | | | |
| AAC | 250 | - | R | 0,4 |
| | 150 240 | | | 5,2 / 0,55 |
| Reinforced autoclaved aerated concrete acc. to EN 12602:2013 | | | | |
| AAC | 250 | - | R | 0,3 |
| | 150 240 | | | 5,2 / 0,55 |
| Partial safety factor (in absence of other national regulations) | | | γ_{MAAC} | 2,0 |

¹⁾ H = Hammer drilling; R = Rotary drilling

MB/ MBR

Performances

Characteristic resistances in hollow masonry and autoclaved aerated concrete

Annex C 4