



## European Technical Approval ETA-13/0259

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung  
*Trade name*

Berner Porenbetonanker BPX-I  
*Berner aircrete anchor BPX-I*

Zulassungsinhaber  
*Holder of approval*

Berner Trading Holding GmbH  
Bernerstraße 6  
74653 Künzelsau  
DEUTSCHLAND

Zulassungsgegenstand  
und Verwendungszweck  
*Generic type and use  
of construction product*

Metalldübel in den Größen M6 bis M12 zur Verankerung im Porenbeton  
*Metal anchor of sizes M6 to M12 for use in autoclaved aerated concrete*

Geltungsdauer:  
*Validity:* vom  
*from*  
bis  
*to*

17 April 2013  
26 November 2017

Herstellwerk  
*Manufacturing plant*

Berner Herstellwerk 6  
Berner manufacturing plant 6

Diese Zulassung umfasst  
*This Approval contains*

15 Seiten einschließlich 7 Anhänge  
*15 pages including 7 annexes*

## I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
  - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products<sup>1</sup>, modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998<sup>4</sup>, as amended by Article 2 of the law of 8 November 2011<sup>5</sup>;*
  - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC<sup>6</sup>.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
- 3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.
- 4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
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- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

<sup>1</sup> Official Journal of the European Communities L 40, 11 February 1989, p. 12  
<sup>2</sup> Official Journal of the European Communities L 220, 30 August 1993, p. 1  
<sup>3</sup> Official Journal of the European Union L 284, 31 October 2003, p. 25  
<sup>4</sup> *Bundesgesetzblatt Teil I 1998*, p. 812  
<sup>5</sup> *Bundesgesetzblatt Teil I 2011*, p. 2178  
<sup>6</sup> Official Journal of the European Communities L 17, 20 January 1994, p. 34

## II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

### 1 Definition of product and intended use

#### 1.1 Definition of the construction product

The Berner aircrete anchor BPX-I is a deformation controlled expansion anchor made of galvanised steel. The anchor consists of an internal threaded socket, a cone bolt and an expansion sleeve. The anchor transfers loads into autoclaved aerated concrete via mechanical interlock.

The anchor is set into a predrilled bore hole and anchored with a hexagon installation tool until the installation tool is pushed out of the internal hexagon socket. The fixture is installed with a screw-in part (threaded rods or screw).

An illustration of the product and intended use is given in Annexes 1 and 2.

#### 1.2 Intended use

The anchor is intended to be used for anchorages for which requirements for safety in use in the sense of the Essential Requirement 4 of Council Directive 89/106 EEC shall be fulfilled and failure of anchorages made with these products would cause risk to human life and/or lead to considerable economic consequences.

The anchor is to be used only for anchorages subject to static or quasi-static loading in following autoclaved aerated concrete members (AAC):

- Cracked reinforced slabs (non-cracked slabs are included) according to EN 12602:2008 of
  - strength class  $f_{ck} \geq 3,3 \text{ N/mm}^2$  with dry density  $\rho_m \geq 0,50 \text{ kg/dm}^3$  and
  - strength class  $f_{ck} \geq 4,4 \text{ N/mm}^2$  with dry density  $\rho_m \geq 0,55 \text{ kg/dm}^3$ ,
- Non-cracked reinforced slabs according to EN 12602:2008 of
  - strength class  $f_{ck} \geq 1,6 \text{ N/mm}^2$  with dry density  $\rho_m \geq 0,25 \text{ kg/dm}^3$  to
  - strength class  $f_{ck} \geq 6,0 \text{ N/mm}^2$  with dry density  $\rho_m \geq 0,65 \text{ kg/dm}^3$  and
- Masonry units (non-cracked) according to EN 771-4:2011 of
  - strength class  $f_{ck} \geq 1,6 \text{ N/mm}^2$  with dry density  $\rho_m \geq 0,25 \text{ kg/dm}^3$  to
  - strength class  $f_{ck} \geq 6,0 \text{ N/mm}^2$  with dry density  $\rho_m \geq 0,65 \text{ kg/dm}^3$ .

The mortar strength class of the masonry has to be M 2,5 according to EN 998-2:2010 at minimum.

The anchor may only be used in structures subject to dry internal conditions.

The provisions made in this European technical approval are based on an assumed working life of the anchor of 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.

## 2 Characteristics of the product and methods of verification

### 2.1 Characteristics of the product

The anchor corresponds to the drawings and information given in the annexes. The characteristic material values, dimensions and tolerances of the anchor not indicated in annexes shall correspond to the respective values laid down in the technical documentation<sup>7</sup> of this European technical approval.

Each anchor shall be marked according to Annex 1.

The characteristic values for the design of the anchorages are given in Annexes 4 to 6.

The anchor meets the requirements of class A1 in relation to reaction to fire.

Regarding resistance to fire no performance is determined.

### 2.2 Methods of verification

The assessment of fitness of the fastener for the intended use in relation to the requirement for safety in use in the sense of the Essential requirement N°4 of Council Directive 89/106/EEC has been made based on the following tests:

- 1) Tension tests of single anchors in low and high strength AAC
- 2) Tension tests of single anchors at the edge with minimum edge distances
- 3) Shear tests of single anchors in cracked and non-cracked AAC
- 4) Shear tests of single anchors away and towards the free edge
- 5) Tension tests of anchor groups in low strength AAC
- 6) Tension tests at butt joints
- 7) Installation safety tests
- 8) Tests on functioning in wet AAC
- 9) Tests on functioning in low and high strength AAC
- 10) Tests on functioning in crack movements
- 11) Tests on functioning under sustained loads
- 12) Tests on functioning under repeated loads
- 13) Torque tests.

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

<sup>7</sup> The technical documentation of this European technical approval is deposited at the Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

### 3 Evaluation and attestation of conformity and CE marking

#### 3.1 System of attestation of conformity

According to the communication of the European Commission<sup>8</sup> the system 1 of attestation of conformity applies. This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

- (a) Tasks for the manufacturer:
  - (1) factory production control;
  - (2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;
- (b) Tasks for the approved body:
  - (3) initial type-testing of the product;
  - (4) initial inspection of factory and of factory production control;
  - (5) continuous surveillance, assessment and approval of factory production control.

*Note: Approved bodies are also referred to as "notified bodies".*

#### 3.2 Responsibilities

##### 3.2.1 Tasks for the manufacturer

###### 3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use initial / raw / constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.<sup>9</sup>

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

###### 3.2.1.2 Other tasks for the manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

<sup>8</sup> Letter of the European Commission of 15/10/2004 to EOTA

<sup>9</sup> The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

### 3.2.2 Tasks for the approved bodies

The approved body shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

### 3.3 CE marking

The CE marking shall be affixed on each packaging of the anchors. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the holder of the approval (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate for the product,
- the number of the European technical approval,
- size of the anchor.

## 4 Assumptions under which the fitness of the product for the intended use was favourably assessed

### 4.1 Manufacturing

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced.

Deutsches Institut für Bautechnik will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

#### 4.2 Design of anchorages

The fitness of the anchor for the intended use is given under the following conditions:

The anchorages are designed in accordance with the ETAG 029, Annex C<sup>10</sup>, Design method B under the responsibility of an engineer experienced in anchorages and concrete and masonry work.

In reinforced slabs the design value of shear stress in the member caused by the anchorage shall be less or equal to 40% of the design values of resistance in the critical cross section of the member.

It is to be ensured that the strength class and the dry density of the autoclaved aerated concrete in which the anchor is to be placed is not lower than the strength class and the dry density of the autoclaved aerated concrete to which the characteristic resistance (given in Annex 4, Table 4) apply.

Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings.

The screw-in parts (screws or threaded rods) shall be specified regarding to the material and the screw-in length according to the specifications given in Annex 3, Tables 2 and 3.

The proof of local transmission of the anchor loads into the autoclaved aerated concrete is delivered by using the design method mentioned above. Proof of transmission of the anchor loads to the supports of the autoclaved aerated concrete members shall be done by the engineer of the construction works.

#### 4.3 Installation of anchors

The fitness for use of the anchor can only be assumed if the anchor is installed as follows:

- Anchor installation carried out by appropriately qualified personnel under the supervision of the person responsible for technical matters on site,
- Use of the anchor only as supplied by the manufacturer,
- Anchor installation in accordance with the manufacturer's specifications and drawings using the tools indicated in the technical documentation of this European technical approval,
- Keeping distances to edges and joints and spacing without minus tolerances,
- Placing drill holes without damaging the reinforcement,
- Holes to be drilled perpendicular to the surface of the base material by rotary drilling,
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application,
- Hole cleaning and anchor installation in accordance with manufacturer's installation instructions (Annex 7),
- Keeping the installation parameters (Annex 3, Table 3),
- The anchor may be used only once,
- Screw-in parts (screws and threaded rods including nuts and washer) must comply with the specification in Annex 3.

<sup>10</sup> The Guideline ETAG 029, "Metal Injection Anchors for Use in Masonry, Annex C: Design Methods for Anchorages" is published in English on EOTA website [www.eota.eu](http://www.eota.eu).

## 5 Indications to the manufacturer

The manufacturer is responsible to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to 4.2 and 4.3 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European technical approval. In addition, all installation data shall be shown clearly on the packaging and/or on an enclosed instruction sheet, preferably using illustrations.

The minimum data required are:

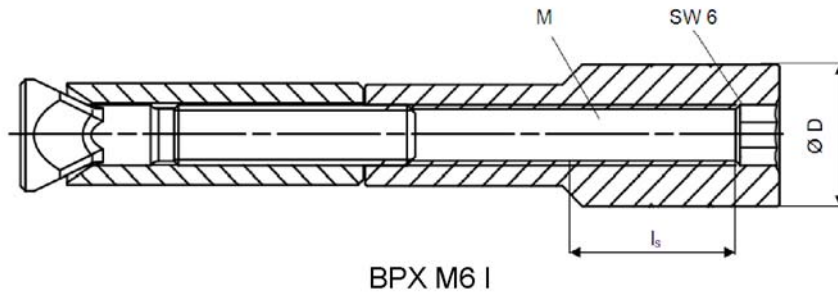
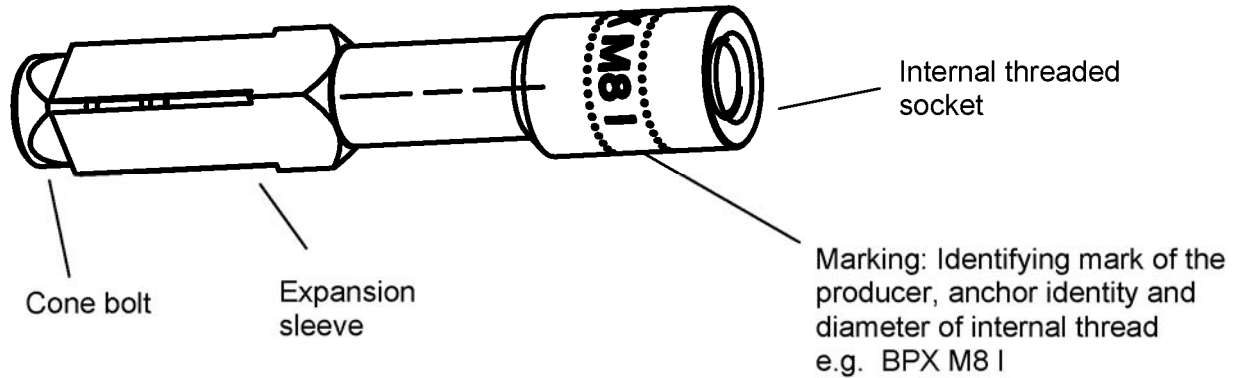
- Drill bit diameter,
- Size of the anchor,
- Maximum thickness of the fixture,
- Minimum embedment depth,
- Minimum hole depth,
- Information on the installation procedure, including cleaning of the hole, preferably by means of an illustration,
- Reference to any special installation equipment needed,
- Maximum installation torque moment
- Identification of the manufacturing batch.

All data shall be presented in a clear and explicit form.

Georg Feistel  
Head of Department

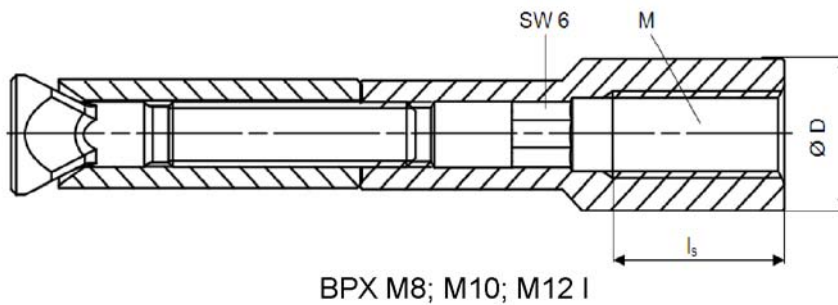
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Anchor direction ←

Included installation tool M6 for a (cordless) drill-/screwdriver or a torque wrench/ratchet  
BPX M6 I

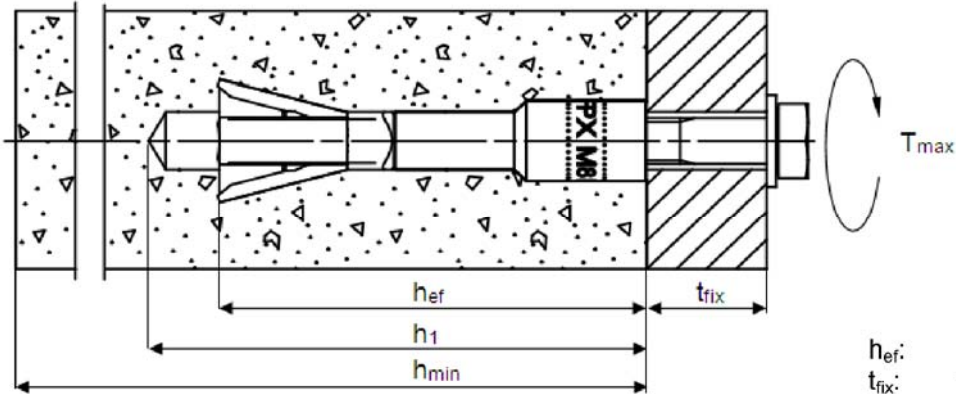


Included installation tool M8-M12 for a (cordless) drill-/screwdriver or a torque wrench/ratchet  
BPX-M8; M10; M12 I

Berner aircrete anchor BPX-I

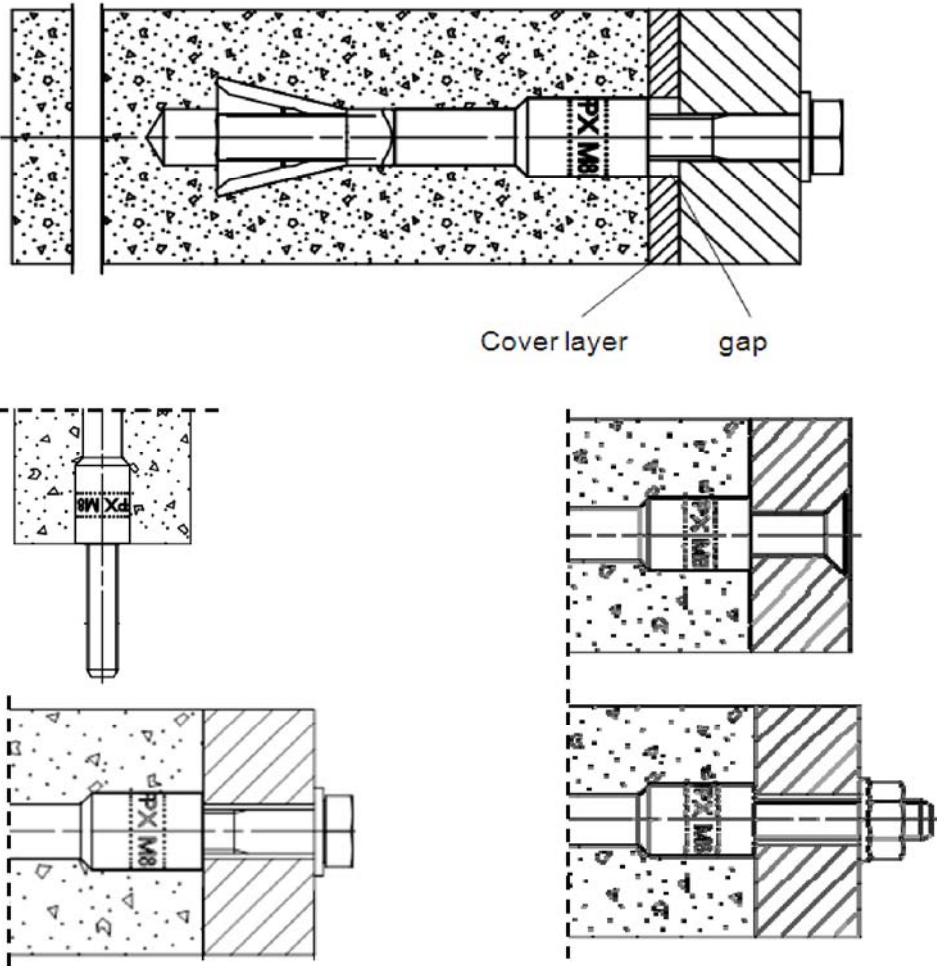
Product and Installation tool

Annex 1



$h_{ef}$ : effective anchorage depth.  
 $t_{fix}$ : thickness of fixture.  
 $h_1$ : drill hole depth.  
 $h_{min}$ : minimal member thickness.  
 $T_{max}$ : Maximum fastening torque.  
 $l_s$ : screw-in depth.  
 $d_f$ : Diameter of clearance hole in fixture.

Example of possible applications



Berner aircrete anchor BPX-I

Intended Use

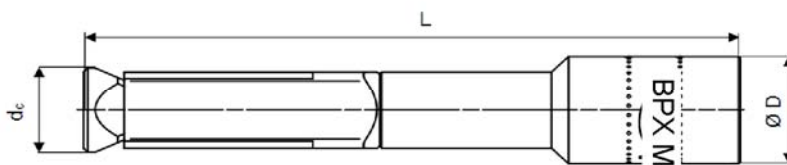
Annex 2

**Table 1: Anchor Dimensions [mm]**

Anchor type		BPX-I			
		M6	M8	M10	M12
Internal Thread	M =	6	8	10	12
Anchor length	L =	75			
Diameter head internal threaded bolt	Ø D =	14			16
Cone bolt	Ø d <sub>c</sub> =	11			
BPX-I internal hexagon size	SW =	6 <sup>1)</sup>	6 <sup>2)</sup>		

<sup>1)</sup> Hexagon socket on the top of the internal thread

<sup>2)</sup> Hexagon socket on the bottom of the internal thread



**Table 2: Material**

No.	Designation	BPX-I
1	Cone bolt <sup>1)</sup>	Steel strength; f <sub>uk</sub> ≥ 800 N/mm <sup>2</sup> , f <sub>yk</sub> ≥ 640 N/mm <sup>2</sup>
2	Expansion sleeve <sup>1)</sup>	f <sub>uk</sub> ≥ 450 N/mm <sup>2</sup> , f <sub>yk</sub> ≥ 360 N/mm <sup>2</sup>
3	Internal threaded bolt <sup>1)</sup>	f <sub>uk</sub> ≥ 450 N/mm <sup>2</sup> , f <sub>yk</sub> ≥ 360 N/mm <sup>2</sup>
4	Screw-in-parts <sup>1)</sup>	Minimum steel strength class 4.8, DIN EN ISO 898-1

<sup>1)</sup> Galvanized according to EN ISO 4042, ≥ 5 µm

**Table 3: Installation Parameters**

Anchor type		BPX-I			
		M6	M8	M10	M12
Minimum member thickness with cleaning <sup>1)</sup>	h <sub>min</sub> [mm]	100			
Minimum member thickness without cleaning	h <sub>min</sub> [mm]	120			
Nominal drill hole Diameter	d <sub>0</sub> = [mm]	10			
Maximum diameter of drill bit	d <sub>cut</sub> ≤ [mm]	10,45			
Depth of drill hole with cleaning <sup>1)</sup>	h <sub>1</sub> ≥ [mm]	80			
Depth of drill hole without cleaning	h <sub>1</sub> ≥ [mm]	95			
Diameter of clearance hole	d <sub>f</sub> ≤ [mm]	7	9	12	14
Effective anchorage depth	h <sub>ef</sub> [mm]	70			
Maximum fastening torque <sup>2)</sup>	T <sub>max</sub> = [Nm]	3			
Thickness of fixture	t <sub>fix</sub> ≤ [mm]	200			
Minimum screw-in depth internal thread	l <sub>s</sub> ≥ [mm]	10	8	10	12
Maximum screw-in depth internal thread	l <sub>s</sub> ≤ [mm]	15	15	15	15

<sup>1)</sup> For member thickness h ≤ 120 mm, the drill hole shall be cleaned and the depth of the drill hole shall be reduced to 80 mm in order to avoid damage on the other side of the wall.

<sup>2)</sup> If the anchor cannot retain against the fixture no installation torque may be applied (T<sub>max</sub> = 0).

Berner aircrete anchor BPX-I

Anchor dimensions / Material / Installation parameters

Annex 3

**Table 4:** Characteristic resistance for all load directions

Anchor type BPX-I		BPX-I				
		M6	M8	M10	M12	
<b>Single anchor in AAC slabs</b> <sup>5)</sup>						
<b>Characteristic resistance in cracked AAC slabs</b> according to strength class $f_{ck}$ and dry density $\rho_m$ .	$F_{Rk}$ [kN]	$f_{ck} \geq 3,3 - \rho_m \geq 0,50$	1,5			
		$f_{ck} \geq 4,4 - \rho_m \geq 0,55$	2,0			
<b>Characteristic resistance in non-cracked AAC slabs</b> according to strength class $f_{ck}$ and dry density $\rho_m$ .	$F_{Rk}$ [kN]	$f_{ck} \geq 3,3 - \rho_m \geq 0,50$	2,0			
		$f_{ck} \geq 4,4 - \rho_m \geq 0,55$	3,0			
Partial safety factor for AAC slabs		$\gamma_{MAAC}$ <sup>1)</sup>		1,73		
<b>Single anchor in AAC masonry</b> <sup>5)</sup>						
<b>Characteristic resistance in AAC masonry</b> <sup>4)</sup> according to strength class $f_{ck}$ and dry density $\rho_m$ . Intermediate values by linear interpolation	$F_{Rk}$ [kN]	$f_{ck} \geq 1,6 - \rho_m \geq 0,25$	0,9			
		$f_{ck} \geq 2,0 - \rho_m \geq 0,35$	1,2			
		$f_{ck} \geq 4,0 - \rho_m \geq 0,50$	2,5			
		$f_{ck} \geq 6,0 - \rho_m \geq 0,65$	4,0			
Partial safety factor for AAC masonry		$\gamma_{MAAC}$		2,0		
<b>Single anchor in AAC slabs and AAC masonry</b> <sup>5)</sup>						
<b>Characteristic resistance steel failure with lever arm</b> In combination with screw / threaded rod of galvanised steel complying with DIN EN ISO 898	$M_{Rk,s}$ [Nm]	Strength class 4.8	6	15	30	52
		Strength class 5.8	8	19	37	65
		Strength class 6.8	9	23	44	78
		Strength class 8.8	12	30	60	105
Partial safety factor for steel		$\gamma_{Ms}$		1,25		
<b>Anchor groups in AAC slabs and AAC masonry</b>						
<b>Characteristic resistance for anchor groups with <math>n = 2-4</math> anchors in cracked and non-cracked AAC slabs and in AAC masonry</b> <sup>4)</sup>						
<b>Characteristic resistance</b> for $n = 2, n = 4$ <sup>2)</sup> $s_{min} \geq 100$ mm, $C_{min, anchor group} \geq 250$ mm		$F_{Rk,n}$ [kN]	2 x $F_{Rk}$ [kN]			
<b>Characteristic resistance</b> for $n \geq 3$ <sup>2)</sup> $s_{min} \geq 140$ mm, $C_{min, anchor group} \geq 700$ mm		$F_{Rk,n}$ [kN]	$n \times F_{Rk}$ [kN]			
<b>Characteristic resistance redundancy when the joints are not visible</b> <sup>3)</sup>		$F_{Rk,n,Redundancy}$ [kN]	0,5 x $F_{Rk,n}$ [kN]			
Partial safety factor for AAC slabs		$\gamma_{MAAC}$ <sup>1)</sup>		1,73		
Partial safety factor for AAC masonry		$\gamma_{MAAC}$		2,0		

<sup>1)</sup> The partial safety factor  $\gamma_2 = 1,0$  is included.

<sup>2)</sup> Rectangular arrangement according to drawing Annex 5 and Annex 6.

<sup>3)</sup> Only for multiple use according to ETAG 001 Part 6.

<sup>4)</sup> The evaluation of  $N_{Rk,pb}$  according ETAG 029, Section C.5.2.1.5 is necessary. The smaller value from  $N_{Rk,pb}$  and  $F_{Rk}$  is decisive.

<sup>5)</sup> Maximum 2 single anchors in the same formation as the anchor groups. For 2 single anchors with spacing smaller than  $a$  ( $s_{min} \geq 100$  mm) the characteristic resistance of the anchor group is decisive.

The characteristic strength class  $f_{ck}$  [N/mm<sup>2</sup>] and the characteristic dry density  $\rho_m$  [kg/dm<sup>3</sup>] have to comply with EN 771-4 for AAC masonry and EN 12602 for AAC slabs.

Berner aircrete anchor BPX-I

Characteristic resistance for all load directions

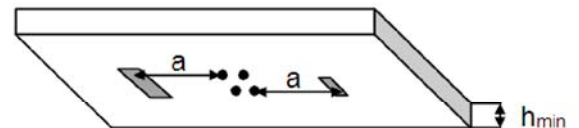
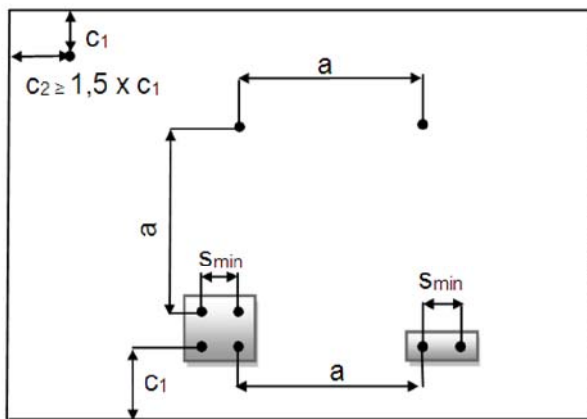
Annex 4

**Table 5:** Displacement under tension loads, shear loads and diagonal loads in AAC <sup>1)</sup>

Anchor type BPX-I		BPX-I			
		M6	M8	M10	M12
Displacement tension load in cracked AAC for all AAC strength classes	$\delta_{N0}$ [mm]	1,0			
	$\delta_{N\infty}$ [mm]	2,0			
Displacement tension load in non-cracked AAC for all AAC strength classes	$\delta_{N0}$ [mm]	1,0			
	$\delta_{N\infty}$ [mm]	1,0			
Displacement shear load in cracked and non-cracked AAC $f_{ck}=1,6 - \rho_m \geq 0,25$ <sup>2)</sup>	$\delta_{V0}$ [mm]	2,5			
	$\delta_{V\infty}$ [mm]	3,7			
Displacement shear load in cracked and non-cracked AAC $f_{ck} \geq 6,0 - \rho_m \geq 0,65$ <sup>2)</sup>	$\delta_{V0}$ [mm]	5,0			
	$\delta_{V\infty}$ [mm]	7,3			

<sup>1)</sup> Displacement at service load level  $F_{RK} / (\gamma_{MAAC} \times 1,4)$ .

<sup>2)</sup> Intermediate values by linear interpolation, taking in account the AAC strength.



**Table 6:** Minimum edge distances and spacing in AAC slabs

Anchor type BPX-I		BPX-I			
		M6	M8	M10	M12
Minimum member thickness	$h_{min}$ [mm]	100			
Minimum spacing	$s_{min}$ [mm]	100			
Minimum edge distance, single anchor <sup>1)</sup>	$c_1$ [mm]	125 <sup>4)</sup>			
Minimum edge distance, anchor groups <sup>2)</sup>	$c_1$ [mm]	250			
Minimum edge distance, orthogonal $c_1$	$c_2$ [mm]	1,5 x $c_1$			
Minimum spacing between single anchors	$a$ [mm]	600			
Minimum spacing between anchors groups <sup>2) 3)</sup>	$a$ [mm]	750			

<sup>1)</sup> Maximum 2 single anchors in the same formation as the anchor groups. For 2 single anchors with spacing smaller than 600 mm ( $s_{min} \geq 100$  mm) the same spacing in between and edge distances ( $a$ ;  $c_1$ ) like for the anchor group are valid.

<sup>2)</sup> For only tension loads the spacing and edge distances for groups can be reduced to the spacing and edge distances of single anchors.

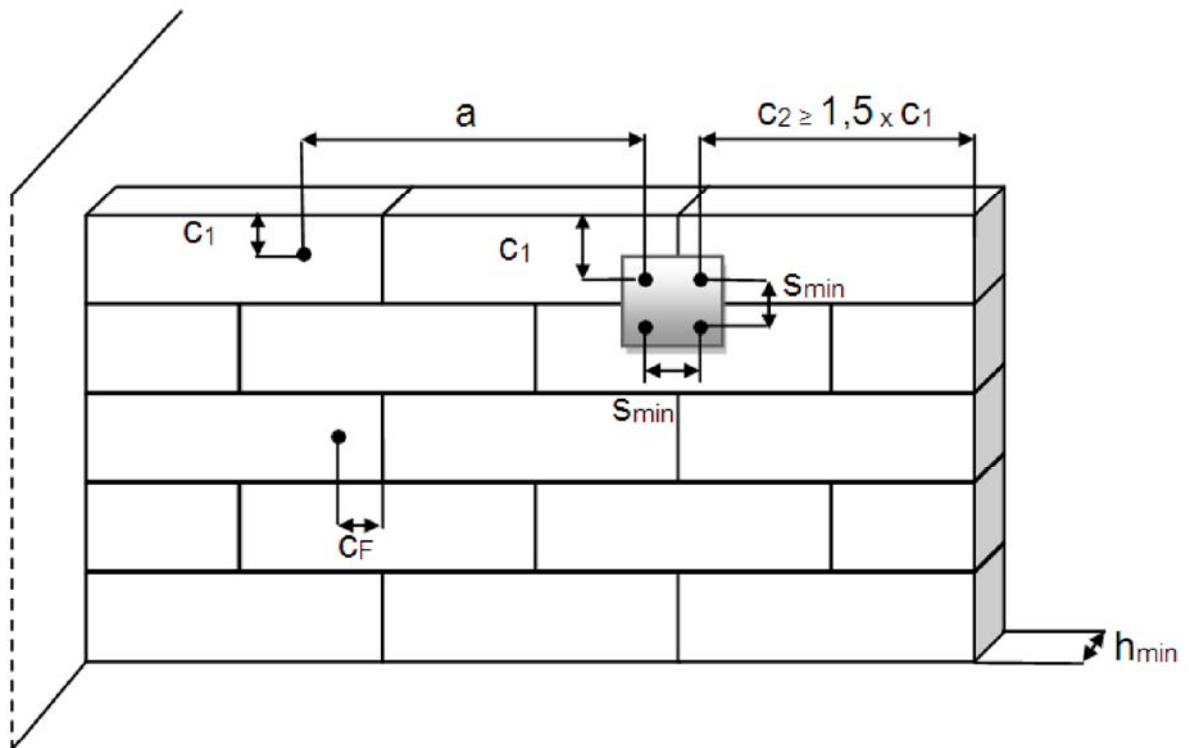
<sup>3)</sup> If there is no edge, or the edge distance is  $\geq a$ , the spacing between anchor groups can be reduced to the spacing between single anchors.

<sup>4)</sup> The edge distance of reinforced slabs with a width  $\leq 700$  mm has to be  $\geq 150$  mm.

Berner aircrete anchor BPX-I

Displacements  
Member thickness, edge distances and spacing in AAC slabs

Annex 5



**Table 7:** Minimum edge distances and spacing in AAC masonry

Anchor type BPX-I		BPX-I			
		M6	M8	M10	M12
Minimum member thickness	$h_{min}$ [mm]	100			
Minimum spacing	$s_{min}$ [mm]	100			
Minimum joint distance, single anchor	$c_F$ [mm]	0 <sup>1)</sup> / 75 <sup>2)</sup> / 125 <sup>3)</sup>			
Minimum edge distance, single anchor <sup>4)</sup>	$c_1$ [mm]	125			
Minimum edge distance, anchor groups <sup>5)</sup>	$c_1$ [mm]	250			
Minimum edge distance, orthogonal $c_1$	$c_2$ [mm]	1,5 x $c_1$			
Minimum spacing between single anchors <sup>4)</sup>	$a$ [mm]	375			
Minimum spacing between anchors groups <sup>5)6)</sup>	$a$ [mm]	750			

<sup>1)</sup> For joint completely filled with mortar with a joint width  $\leq 12$ mm and a compressive strength according to EN 998-2  $\geq f_{ck}$  AAC no distances to joints are required.

<sup>2)</sup>  $c_F$  for only tension and /or shear loads parallel to the joints which are not filled with mortar and a joint width  $\leq 2$  mm.

<sup>3)</sup>  $c_F = c_1$  for shear load or diagonal load orthogonal to the joints which are not filled with mortar and a joint width  $\geq 0$  mm.

<sup>4)</sup> Maximum 2 single anchors in the same formation as the anchor groups. For 2 single anchors with spacing smaller than 375 mm ( $s_{min} \geq 100$  mm) the same spacing in between and edge distances ( $a$ ;  $c_1$ ) like for the anchor group are valid.

<sup>5)</sup> For only tension loads the spacing and edge distances of anchor groups can be reduced to the spacing and edge distances of single anchors.

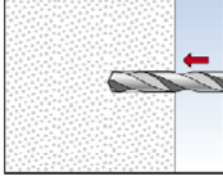
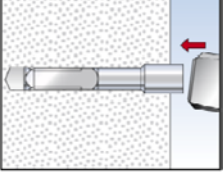
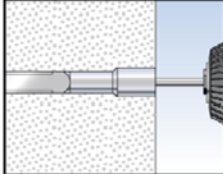
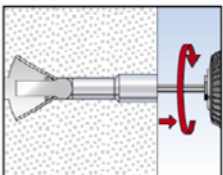
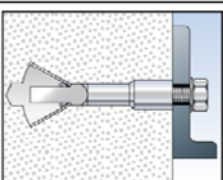
<sup>6)</sup> If there is no edge, or the edge distance is  $\geq a$ , the spacing between anchor groups can be reduced to the spacing between single anchors.

Berner aircrete anchor BPX-I

Member thickness, edge distances and spacing in AAC masonry

Annex 6

Installation instruction for the Berner AAC anchor X-pansion internal thread BPX-I

	<p>1.) Drilling the hole in rotary drill mode with a drill bit <math>\varnothing 10</math> mm. The drill depth <math>h_1</math> is <math>\geq 95</math> mm. For member thicknesses <math>h \geq 120</math> mm a cleaning is generally not necessary. For member thicknesses <math>h \leq 120</math> mm a cleaning must be performed and the drill hole depth <math>h_1</math> should be reduced to 80 mm. Other methods like punching, to make the hole, are allowed. When the AAC is covered with a hard layer like tiles, the tile has to be drilled with minimum diameter of internal threaded bolt <math>\varnothing D</math>.</p>
	<p>2.) Hammering in the anchor until it is flush with the surface of the AAC.</p>
	<p>3.) Turning the internal thread bolt with the hexagon. Turning with a power screwdriver is preferred. Turning by hand with a wrench or similar is also possible. Approximately 15 turnings are necessary.</p>
	<p>4.) By turning the internal thread bolt, the cone is driven into the expansion sleeve. When the optimal expansion is reached, the hexagon is thrown out of the socket. <b>The turning of the internal thread bolt until the hexagon is thrown out of the socket is required.</b> When the tightening is impossible the anchor cannot be loaded.</p>
	<p>5.) Connecting the internal thread anchor with the fixture. The fastener (screws or threaded rods) should be determined according concerning material and screw in length according to Annex 3, Table 2 and 3. Optional tightening the fastener with a torque <math>T_{max} \leq 3</math> Nm. The anchor could be pulled against the fixture depending on the compressive strength of the AAC. If the anchor cannot support against the fixture (figure with cover layer, Annex 2) no installation torque may be applied (<math>T_{max} = 0</math>).</p>

Berner aircrete anchor BPX-I

Installation instruction

Annex 7