

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-17/0015
of 19 April 2021

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

PHILIPP PB Anchor System

Product family
to which the construction product belongs

Cast-in anchor with internal threaded socket

Manufacturer

PHILIPP GmbH
Lilienthalstraße 7-9
63741 Aschaffenburg
DEUTSCHLAND

Manufacturing plant

PHILIPP GmbH

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

EAD 330012-01-0601, Edition 02/2021

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Specific Part

1 Technical description of the product

The PHILIPP PB Anchor System in the size of 12, 16, 20, 24 and 30 is an anchor consisting of an internal threaded socket screwed and pressed on a hexagon bolt. The socket is made of galvanised steel or stainless steel. The anchor is imbedded surface-flush or sunk in the concrete. The anchorage is characterised by mechanical interlock at the head.

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 anchor 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)

| Essential characteristic | Performance |
|--|-----------------------------|
| Characteristic values for tension resistance for static and quasi-static loads and displacements | See Annex B3, B4, C1 and C2 |
| Characteristic values for shear resistance for static and quasi-static loads and displacements | See Annex C2 |
| Characteristic values for seismic performance categories C1 and C2 and displacements | No performance assessed |

3.2 Safety in case of fire (BWR 2)

| Essential characteristic | Performance |
|--------------------------|-------------------------|
| Reaction to fire | Class A1 |
| Resistance to fire | No performance assessed |

English translation prepared by DIBt

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

In accordance with EAD No. 330012-01-0601, edition 02/2021, the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

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

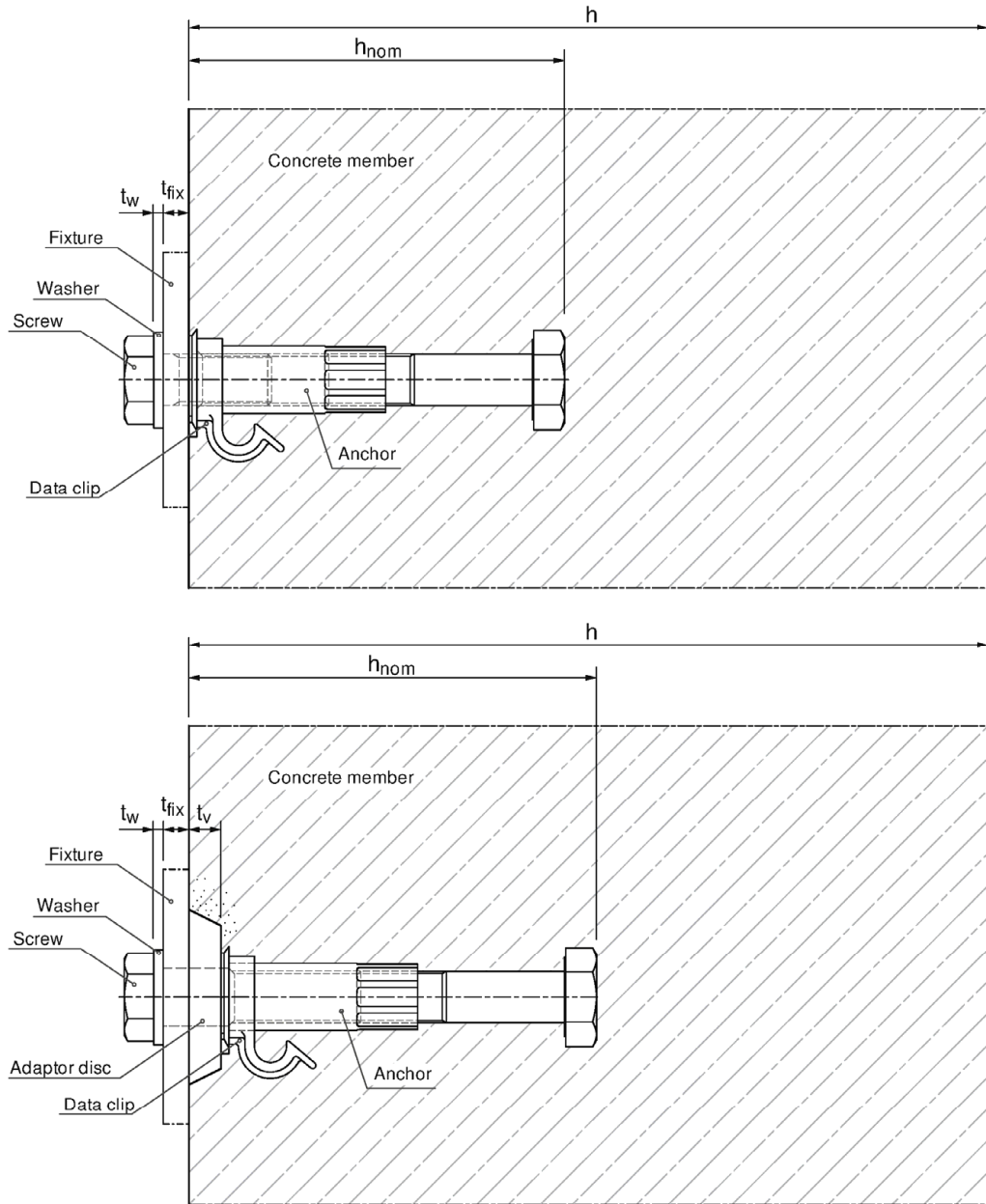
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 19 April 2021 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Aksünger

PHILIPP PB Anchor System



- h = thickness of concrete member
- h_{nom} = embedment depth
- t_w = thickness of washer
- t_{fix} = thickness of fixture
- t_v = thickness of Recess Former / Adaptor Disc

PHILIPP PB Anchor System

Product description
Installed conditions

Annex A1

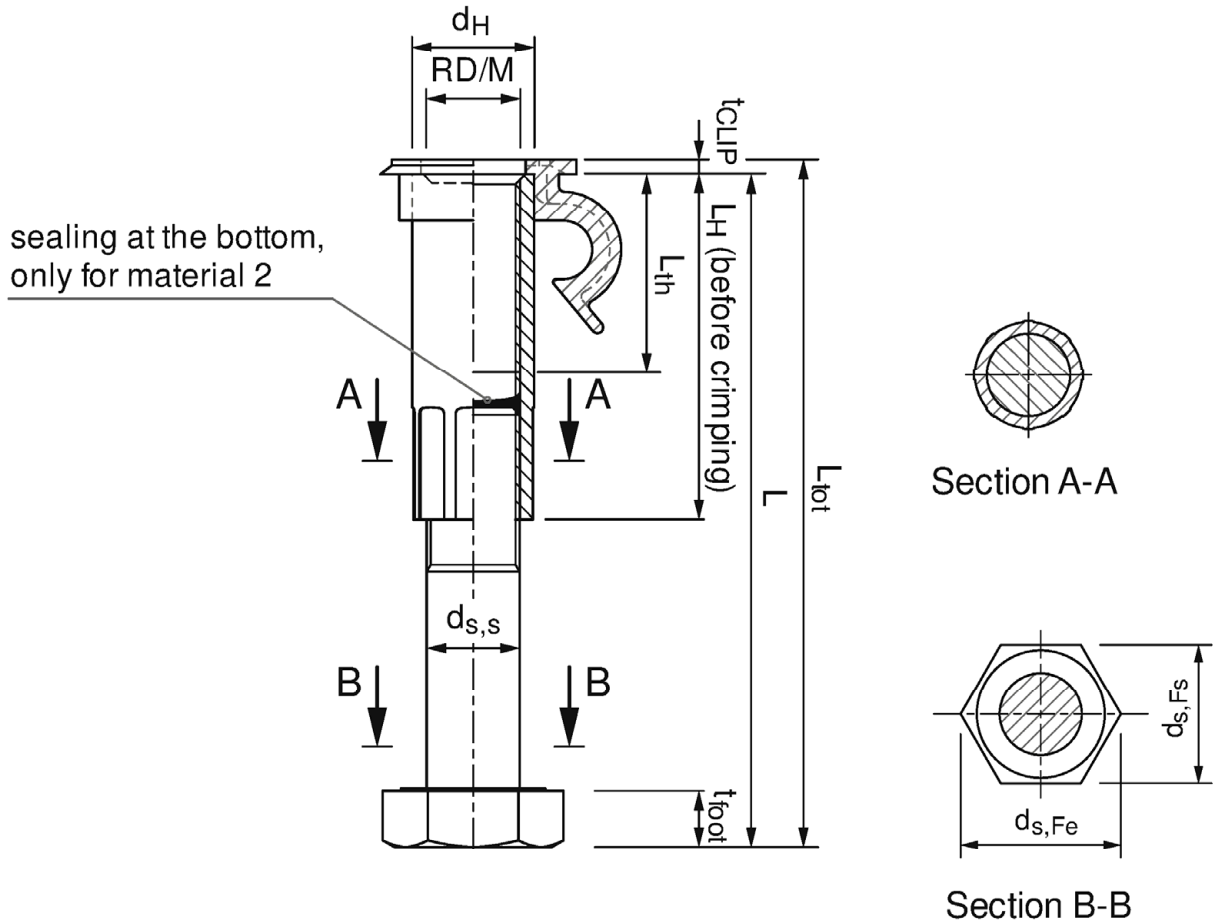


Table A1: Dimensions of PHILIPP PB Anchor and Data Clip

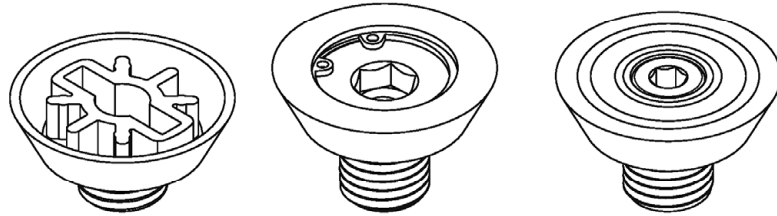
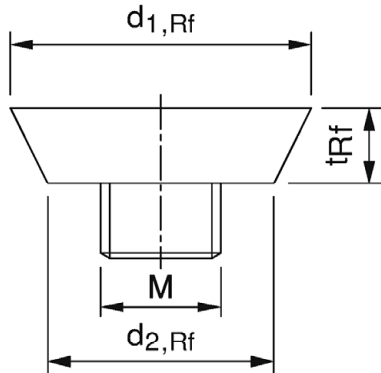
| Anchor size | d _H | | L _H | L _{th} | d _{s,s} | d _{s,Fe} | d _{s,Fs} | t _{Clip} | t _{foot} | L | L _{tot} |
|-------------|---------------------------|------------|----------------|-----------------|------------------|-------------------|-------------------|-------------------|-------------------|-------|------------------|
| | Material 1 | Material 2 | | | | | | | | | |
| | Material 1 and Material 2 | | | | | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| RD / M 12 | 15,0 | 15,0 | 43,0 | 24 | 12 | 23,9 | 22,0 | 2,5 | 7,5 | 76,5 | 79,0 |
| RD / M 16 | 21,0 | 21,0 | 59,0 | 35 | 16 | 29,6 | 27,0 | 2,5 | 10,0 | 114,5 | 117,0 |
| RD / M 20 | 27,0 | 26,7 | 71,0 | 42 | 20 | 35,0 | 32,0 | 2,5 | 12,5 | 155,0 | 157,5 |
| RD / M 24 | 31,0 | 31,0 | 85,0 | 50 | 24 | 45,2 | 41,0 | 2,5 | 15,0 | 201,0 | 203,5 |
| RD / M 30 | 39,5 | 38,0 | 102,0 | 59 | 30 | 55,4 | 50,0 | 2,5 | 18,7 | 250,0 | 252,5 |

PHILIPP PB Anchor System

Product description
Dimensions anchor and Data Clip

Annex A2

Recess Former

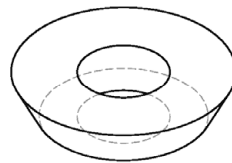
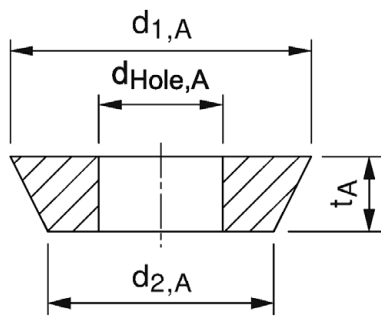


Recess Former (plastic)

Recess Former (steel)

Recess Former (magnetic)

Adaptor Disc



Adaptor Disc (galvanised/stainless steel)

Table A2: Dimensions of Recess Former and Adaptor Disc

| Anchor size | Recess Former | | | Adaptor Disc | | | |
|------------------|-------------------------|------------|----------|--------------|-----------|--------------|-------|
| | $d_{1,RF}$ | $d_{2,RF}$ | t_{RF} | $d_{1,A}$ | $d_{2,A}$ | $d_{Hole,A}$ | t_A |
| | Material 1 and 2 | | | | | | |
| [-] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| RD / M 12 | 40 | 30 | 10 | 40 | 30 | 12,5 | 10 |
| RD / M 16 | 40 | 30 | 10 | 40 | 30 | 16,5 | 10 |
| RD / M 20 | 55 | 45 | 10 | 55 | 45 | 20,5 | 10 |
| RD / M 24 | 55 | 45 | 10 | 55 | 45 | 24,5 | 10 |
| RD / M 30 | 70 | 60 | 10 | 70 | 60 | 30,5 | 10 |

PHILIPP PB Anchor System

Product description

Dimensions Recess Former and Adaptor Disc

Annex A3

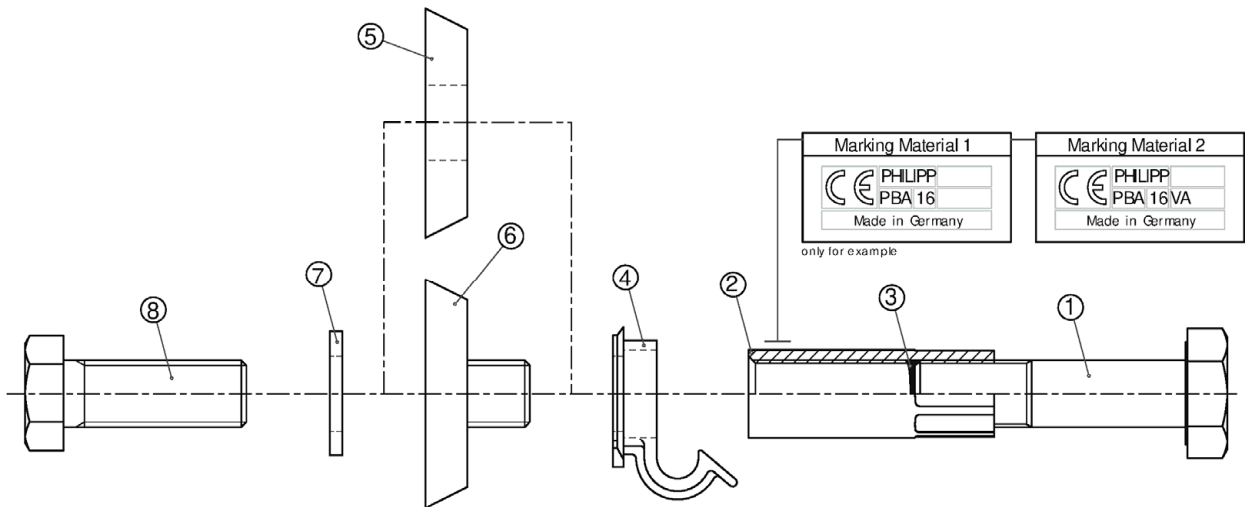
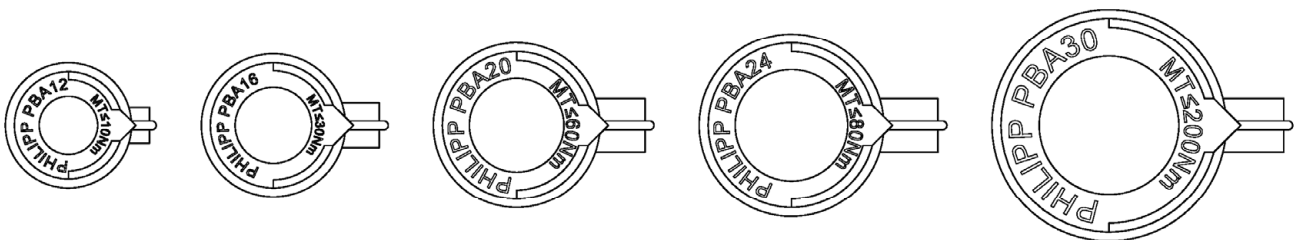


Table A3: Specification and material of the anchor and appropriate components

| Item | Component | Delivery content | Material 1 galvanised steel | Material 2 stainless steel |
|------|---------------------------|------------------|--|--|
| 1 | Hexagon Bolt | yes | acc. to DIN EN 14399-3:2015, bright, strength class 8.8 | |
| 2 | Socket | yes | E 355 + N (1.0580) acc. to EN 10025:2004 galvanised ¹⁾ | Stainless steel 1.4401/1.4404/1.4571 acc. to EN 10088:2009; CRC III |
| 3 | Sealing inside the socket | yes | not required | 2-component resin ²⁾ |
| 4 | Data Clip | yes | HD-PE (RAL 5000) / violet blue | HD-PE (RAL 7035) / light grey |
| 5 | Adaptor Disc | selectable | S235 JR (1.0037) acc. to EN 10025:2004 | Stainless steel 1.4401/1.4404/1.4571 acc. to EN 10088-4/5:2009; CRC III |
| 6 | Recess Former | selectable | HD-PE (plastic version) or S235 JR (1.0037) acc. to EN 10025:2004 (steel and magnetic version) | |
| 7 | Washer | no | Steel acc. to EN ISO 7089:2000 / 7090:2000, galvanised, $\geq 200\text{HV}$ | Stainless steel 1.4401 / 1.4404 / 1.4571 acc. to EN ISO 7089:2000 / 7090:2000, $\geq 200\text{HV}$; CRC III |
| 8 | Screw | no | Steel acc. to EN ISO 898-1:2013, galvanised, strength class 8.8 | Stainless steel acc. to EN ISO 3506-1:2009, strength class A4-70; CRC III |

¹⁾ Galvanisation with a plate thickness $\geq 5 \mu\text{m}$ incl. electroplated zinc coating (blue) acc. to EN ISO 4042:2018

²⁾ Front side of hexagonal screw covered/protected against corrosion



Top view of Data Clip.

PHILIPP PB Anchor System

Product description
Marking and materials

Annex A4

Specifications of intended use

Anchorage subject to

- static and quasi static loads
- for transmission of tensile loads, shear loads or a combination of both
- surface-flush or sunk in the concrete member
- in temperature range -40°C to $+80^{\circ}\text{C}$

Base materials

- reinforced or unreinforced normal weight concrete according to EN 206:2013 + A1:2016
- strength classes of C20/25 to C50/60
- cracked or uncracked concrete

Condition of use (Environmental conditions)

- Cast-in anchors intended for use in structures subject to dry, internal conditions (Material 1 acc. Annex A4 only if the inner area of the socket is protected against water during installation)
- Cast-in anchors made of stainless steel according EN 1993-1-4:2006 + A1:2015, Annex A, Table A.3 according to the Corrosion Resistance Class (CRC) (see Annex A4 Material 2)

Design

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work
- 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 (e.g. position of the anchor relative to reinforcement or to supports, orientating the Data Clip)
- Anchorages under static or quasi-static actions are designed in accordance with:
 - EN 1992-4:2018
- Requirements for the screw:
 - Material and strength class in accordance with Annex A4
 - Length in accordance with Annex B3 and required thickness of the fixture.
- Shear loads acting on fastenings may be assumed to act without a lever arm if the adapter disc according to Annex A 3 is used.

PHILIPP PB Anchor System

Intended use
Specifications

Annex B1

Installation

- Installation of anchors is carried out by trained and appropriately qualified workers under supervision of the person responsible for technical matters on site
- Usage of anchors only as supplied by the manufacturer without any manipulation or exchanging of components
- Installation of anchors in accordance with manufacturer's specifications given in Annex B5 and B6
- Anchors have to be fixed to the formwork so that no movement of the anchors will occur during the time of laying the reinforcement and of placing and compacting the concrete
- Concrete around anchors has to be compacted properly
- Inner area of socket has to be protected against penetration of concrete
- Inner area of socket made of galvanised steel is to be protected against water
- Inner area of socket made of stainless steel is to be protected against oil
- Maximum setting torques and the minimum and maximum screw-in depth given in Annex B3 must not be exceeded
- Anchors may only be loaded in the direction shown by the Data Clip (arrow) if a supplementary reinforcement is used
- The fixture is assembled to the cast-in anchor with a fastening screw and washer or a threaded rod, a washer and a nut. They are not provided by the manufacturer (see Annexes A4, table A3).

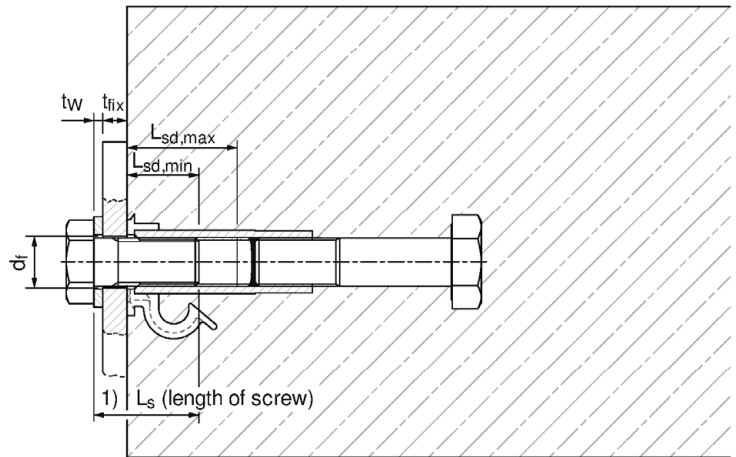
PHILIPP PB Anchor System

Intended use
Specifications

Annex B2

Application of anchor flush to the surface

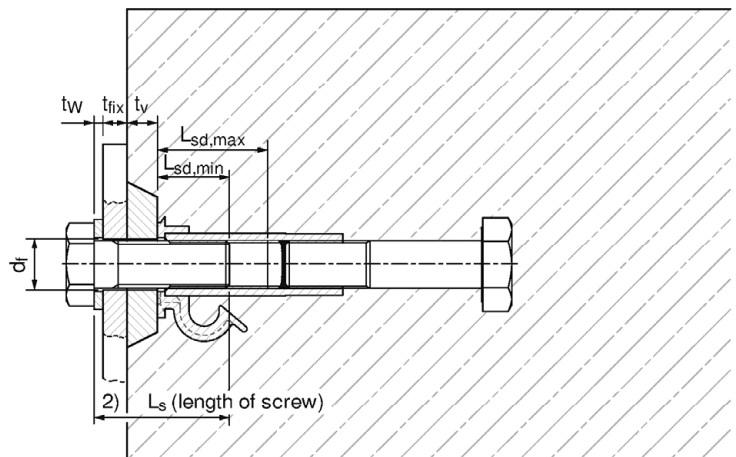
The fixture is braced directly to the concrete while the anchor is braced flush to the surface.



$$1) t_w + t_{fix} + L_{sd,min} \leq L_s \leq t_w + t_{fix} + L_{sd,max}$$

Application of anchor in recessed position

The fixture is braced directly to the concrete while the anchor is installed in recessed position using the recess former acc. to Annex A3. In this case the Adaptor Disc acc. to Annex A3 can be put into the recess.



$$2) t_w + t_{fix} + t_v + L_{sd,min} \leq L_s \leq t_w + t_{fix} + t_v + L_{sd,max}$$

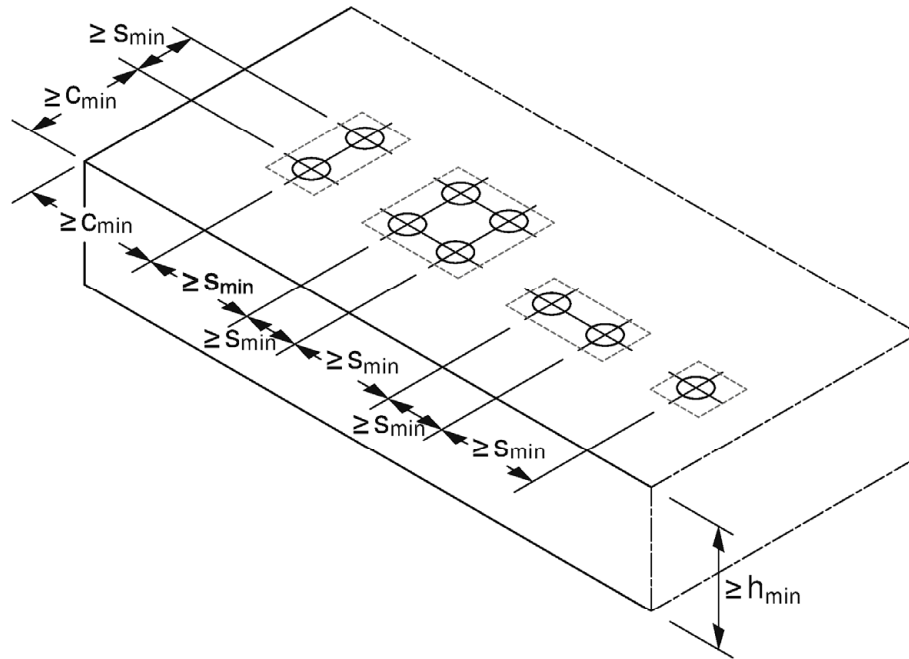
Table B1: Installation parameters

| PB Anchor | | RD / M | RD / M | RD / M | RD / M | RD / M |
|---|-------------------|-----------|-----------|-----------|-----------|------------|
| | | 12 | 16 | 20 | 24 | 30 |
| Appropriate size of screw | [mm] | M12 | M16 | M20 | M24 | M30 |
| Maximum setting torque | T_{inst} [Nm] | ≤ 10 | ≤ 30 | ≤ 60 | ≤ 80 | ≤ 200 |
| Minimum screw-in depth | $L_{sd,min}$ [mm] | 16,9 | 21,7 | 26,5 | 31,3 | 38,5 |
| Maximum screw-in depth | $L_{sd,max}$ [mm] | 26,5 | 37,5 | 44,5 | 52,5 | 61,5 |
| Thickness of the Recess Former | t_v [mm] | 10 | 10 | 10 | 10 | 10 |
| Diameter of clearance hole in the fixture | d_f [mm] | 14 | 18 | 22 | 26 | 33 |

PHILIPP PB Anchor System

Intended use
Installation parameters

Annex B3



Spacing, edge distance and minimum thickness of concrete member apply also for anchors in front-side installation.

Table B2: Minimum spacings and edge distances, minimum thickness of concrete member

| PB Anchor | | RD / M 12 | RD / M 16 | RD / M 20 | RD / M 24 | RD / M 30 |
|--|----------------|-----------|-----------|-----------|-----------|-----------|
| Minimum spacing | S_{min} [mm] | 110 | 140 | 180 | 220 | 270 |
| Minimum edge distance | C_{min} [mm] | 55 | 70 | 90 | 110 | 135 |
| Minimum thickness of concrete member ¹⁾ | h_{min} [mm] | 100 | 140 | 180 | 225 | 275 |

¹⁾ $h \geq h_{nom} + C_{nom}$ C_{nom} acc. to EN 1992-1-1:2004

PHILIPP PB Anchor System

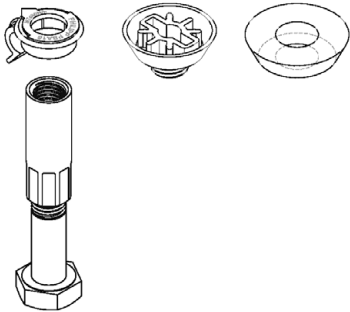
Intended use

Minimum spacings and edge distances, minimum thickness of concrete member

Annex B4

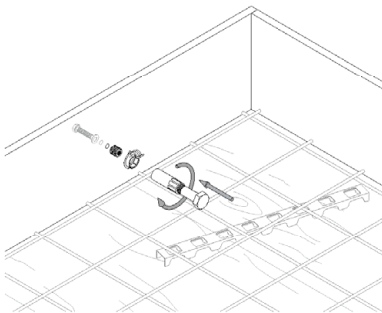
Installation instructions

1. Components

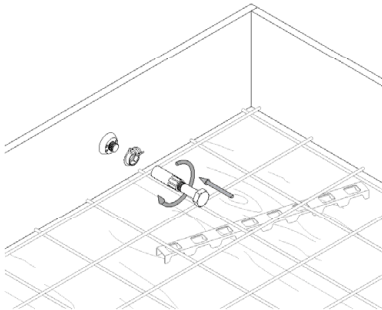


1. PHILIPP PB Anchor with socket made of galvanised steel or stainless steel
2. PHILIPP Data Clip
3. PHILIPP Recess Former (selectable (plastic, steel or magnetic))
4. PHILIPP Adaptor Disc (selectable)

2. Fixing the anchor to the formwork

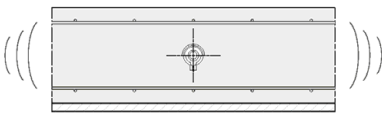


1. Put Data Clip onto the socket
- 2 a. Fix anchor to the formwork by using PHILIPP accessories for shuttering or alternatively by means of a suitable screw.
 - Keep the correct adjustment of the PB Anchor!
 - Avoid concrete penetration into the socket!
- 2 b. Fix anchor to the formwork by using PHILIPP Recess Former, possibly in combination with PHILIPP Adaptor Disc within the recess.
 - Use appropriate components acc. to Annex A4!



3. If required, fix supplementary reinforcement to the socket by using PHILIPP Data Clip.
 - Supplementary reinforcement must be fixed with contact to the socket!
 - Supplementary reinforcement must point to the correct direction according to the direction of the force!

3. Pouring and compacting of concrete



1. Fill in concrete carefully, mind the fixed anchors!
2. Compact concrete properly, avoid contact between vibrating device and PB Anchor resp. supplementary reinforcement.
 - Anchor must not be moved or damaged!

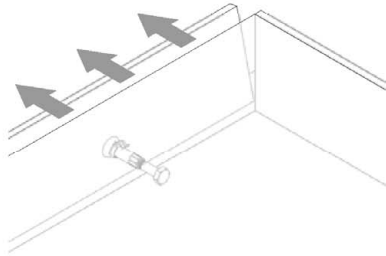
PHILIPP PB Anchor System

Intended use
Installation instructions

Annex B5

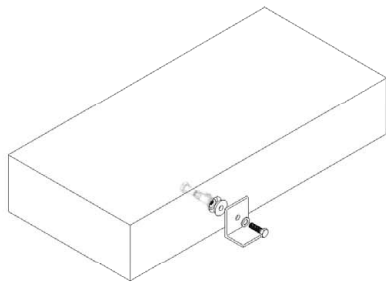
Installation instructions

4. Removal of shuttering



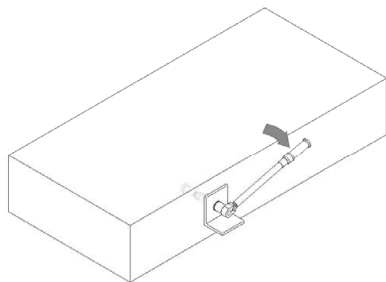
1. Remove accessories for shuttering.
2. Remove shuttering.
3. Check internal thread of PB Anchor. Clean the thread of the socket properly if concrete has been penetrated into.

5. Assembly of the fixture



1. Ensure, that the concrete has reached its designated strength.
2. Ensure, that the length of the screw is correct.
→ Maximum respectively minimum screw-in depth see Annex B3!
3. Assemble the fixture.
→ Use appropriate components acc. to Annex A4, Table A3!
→ Keep the maximum setting torque given below!
→ Note all additional information regarding the fixture!

6. Maximum setting torques



Maximum setting torques max. T_{inst} for PB Anchor

| RD / M 12 | RD / M 16 | RD / M 20 | RD / M 24 | RD / M 30 |
|-----------|-----------|-----------|-----------|-----------|
| ≤ 10 Nm | ≤ 30 Nm | ≤ 60 Nm | ≤ 80 Nm | ≤ 200 Nm |

PHILIPP PB Anchor System

Intended use
Installation instructions

Annex B6

Table C1: Characteristic resistances under tension load

| | | | | RD 12 / M 12 | RD 16 / M 16 | RD 20 / M 20 | RD 24 / M 24 | RD 30 / M 30 |
|---|--------|---------------------|------|--------------------|-----------------|-----------------|-----------------|-----------------|
| Steel failure with galvanised sockets and screws (strength class 8.8) | | | | | | | | |
| Characteristic resistance | | $N_{Rk,s}$ | [kN] | 35,0 | 77,3 | 136,1 | 161,6 | 240,9 |
| Partial factor | | $\gamma_{Ms}^{1)}$ | [-] | 1,66 | | | | |
| Steel failure with sockets and screws made of stainless steel (strength class A4-70) | | | | | | | | |
| Characteristic resistance | | $N_{Rk,s}$ | [kN] | 34,6 | 75,1 | 132,5 | 142,4 | 233,9 |
| Partial factor | | $\gamma_{Ms}^{1)}$ | [-] | 2,93 | | | | |
| Pull-out failure | | | | | | | | |
| Characteristic resistance in cracked concrete | C20/25 | $N_{Rk,p}$ | [kN] | 40,1 | 55,7 | 73,5 | 130,2 | 188,5 |
| Characteristic resistance in uncracked concrete | C20/25 | $N_{Rk,p}$ | [kN] | 56,1 | 78,0 | 102,9 | 182,3 | 263,9 |
| Increasing factor for $N_{Rk,p} = N_{Rk,p}(C20/25) \cdot \psi_c$ in cracked or uncracked concrete | C25/30 | ψ_c | [-] | 1,25 | | | | |
| | C30/37 | ψ_c | [-] | 1,50 | | | | |
| | C35/45 | ψ_c | [-] | 1,75 | | | | |
| | C40/50 | ψ_c | [-] | 2,00 | | | | |
| | C45/55 | ψ_c | [-] | 2,25 | | | | |
| | C50/60 | ψ_c | [-] | 2,50 | | | | |
| Partial factor | | $\gamma_{Mp}^{1)}$ | [-] | 1,50 | | | | |
| Concrete cone failure | | | | | | | | |
| Effective anchorage depth ²⁾ | | h_{ef} | [mm] | 71,5 | 107 | 145 | 188,5 | 233,8 |
| Factor to take into account the influence of the load transfer mechanism | | k_{cr} | [-] | 8,9 | | | | |
| | | k_{ucr} | [-] | 12,7 | | | | |
| Characteristic spacing | | $s_{cr,N}$ | [mm] | $3,0 \cdot h_{ef}$ | | | | |
| Characteristic edge distance | | $c_{cr,N}$ | [mm] | $1,5 \cdot h_{ef}$ | | | | |
| Partial factor | | $\gamma_{Mc}^{1)}$ | [-] | 1,50 | | | | |
| Splitting | | | | | | | | |
| Characteristic resistance in cracked concrete | C20/25 | $N_{Rk,sp}^0$ | [kN] | 24,1 | 44,1 | 69,5 | 103,0 | 142,3 |
| Characteristic resistance in uncracked concrete | C20/25 | $N_{Rk,sp}^0$ | [kN] | 34,3 | 62,9 | 99,2 | 147,0 | 203,0 |
| Effective anchorage depth ²⁾ | | h_{ef} | [mm] | 71,5 | 107 | 145 | 188,5 | 233,8 |
| Characteristic spacing | | $s_{cr,sp}$ | [mm] | $3,0 \cdot h_{ef}$ | | | | |
| Characteristic edge distance | | $c_{cr,sp}$ | [mm] | $1,5 \cdot h_{ef}$ | | | | |
| Partial factor | | $\gamma_{MSp}^{1)}$ | [-] | 1,50 | | | | |

¹⁾ In the absence of other national regulations

²⁾ If the anchors are installed with the PHILIPP Recess Former acc. Annex A3, h_{ef} has to be increased by 10 mm

PHILIPP PB Anchor System

Performances

Characteristic resistances under tension load

Annex C1

Table C2: Displacements

| | | | RD / M 12 | RD / M 16 | RD / M 20 | RD / M 24 | RD / M 30 |
|---|---|-------------------------|-----------|-----------|-----------|-----------|-----------|
| Displacements under tension load (Material 1 or Material 2) | | | | | | | |
| Displacement to $\delta_{N0} = 0,7$ mm in cracked concrete under tension loads ¹⁾ | N | [kN] | 21 | 28 | 35 | 56 | 77 |
| Displacements under shear load (Material 1 or Material 2) | | | | | | | |
| δ_{V0} and $\delta_{V\infty}$ | | No performance assessed | | | | | |

1) The indicated displacements are valid for short term loading. The displacements can be increased under long term loading to $\delta_{N\infty} = 1,8$ mm

Table C3: Characteristic resistances under shear load

| | | | RD / M 12 | RD / M 16 | RD / M 20 | RD / M 24 | RD / M 30 |
|---|---------------------|------|-------------------------|-----------|-----------|-----------|-----------|
| Shear load without lever arm | | | | | | | |
| Group factor (EN 1992-4, 7.2.2.3.1) | k_7 | [-] | 0,8 | | | | |
| Steel failure with galvanised sockets and screws (strength class 8.8) | | | | | | | |
| Characteristic resistance | $V_{Rk,s}$ | [kN] | 21,1 | 46,4 | 81,7 | 97,1 | 164,4 |
| Partial factor | $\gamma_{Ms}^{1)}$ | [-] | 1,38 | | | | |
| Steel failure with sockets and screws made of stainless steel (strength class A4-70) | | | | | | | |
| Characteristic resistance | $V_{Rk,s}$ | [kN] | 21,5 | 47,3 | 79,5 | 99,1 | 140,4 |
| Partial factor | $\gamma_{Ms}^{1)}$ | [-] | 2,44 | | | | |
| Shear load with lever arm | | | | | | | |
| Steel failure with galvanised sockets and screws (strength class 8.8) | | | | | | | |
| Characteristic resistance of the screw | $M_{Rk,s}^0$ | [Nm] | 104,7 | 265,5 | 518,6 | 896,1 | 1797,1 |
| Partial factor | $\gamma_{Ms}^{1)}$ | [-] | 1,25 | | | | |
| Steel failure with sockets and screws made of stainless steel (strength class A4-70) | | | | | | | |
| Characteristic resistance of the screw | $M_{Rk,s}^0$ | [Nm] | 128,4 | 232,3 | 453,7 | 1199,6 | 1572,5 |
| Partial factor | $\gamma_{Ms}^{1)}$ | [-] | 2,44 | 1,56 | | 2,44 | |
| Concrete edge failure with supplementary reinforcement | | | | | | | |
| Characteristic resistance | $V_{Rk,c,re}$ | [kN] | No performance assessed | | | | |
| Concrete pry-out failure | | | | | | | |
| Factor | k_8 | [-] | 2 | | | | |
| Partial factor | $\gamma_{Mcp}^{1)}$ | [-] | 1,50 | | | | |
| Concrete edge failure (without supplementary reinforcement)²⁾ | | | | | | | |
| Outer diameter of the socket | d_{nom} | [mm] | 15 | 21 | 25 | 25 | 25 |
| Effective length of anchor | l_f | [mm] | 43 | 59 | 71 | 85 | 102 |
| Minimum edge distance | c_{min} | [mm] | 55 | 70 | 90 | 110 | 135 |
| Partial factor | $\gamma_{Mc}^{1)}$ | [-] | 1,50 | | | | |

¹⁾ In the absence of other national regulations

²⁾ In accordance with EN 1992-4: 2018, Equation (7.41)

PHILIPP PB Anchor System

Performances

Displacements under tension load and shear load
Characteristic resistance under shear load

Annex C2