

PHILIPPGROUP

PHILIPP PB anchor



VB3-B-003-en - 05/21 - PDF

Installation and Application Instruction

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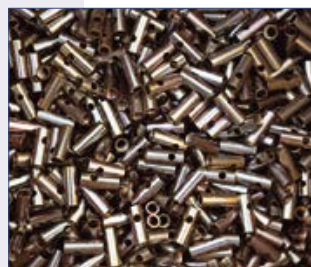
The latest design software, animated videos and CAD libraries can always be found under www.philipp-gruppe.de.

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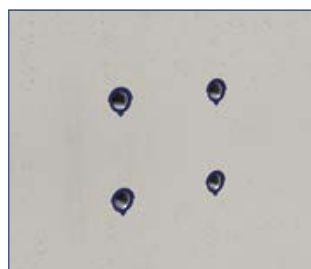
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PHILIPP PB anchor (Permanent anchor)

PHILIPP PB anchor



Advantages at a glance:

- ✓ Certified system (ETA approval)
- ✓ Multi-purpose, permanent fixing of all types of constructions
- ✓ High load-bearing capacities
- ✓ Releasable connection at any time
- ✓ Flexible formwork installation - recessed or surface-flush
- ✓ Easy, software-based design acc. to EN 1992-4:2018

You can find our design software at
[PH www.philipp-group.de](http://www.philipp-group.de)

»PHixation« new software

We provide strength and stability
in an ever-changing world.

PHILIPPGROUP

[Please click here !](#)

The advertisement features a blue header with the text '»PHixation« new software'. Below this is a photograph of a concrete structure with a sign that reads 'PHILIPPGROUP'. The text 'We provide strength and stability in an ever-changing world.' is overlaid on the image. At the bottom, there is a blue bar with a white arrow icon and the text 'Please click here !'.

PHILIPP PB anchor

PB anchor consists of the PB anchor itself, the PB marking ring with clip and the optional PB adapter plate for recessed installation.

Scope of supply PB anchor:

☑ **Version: galvanised steel**

- ☑ PB anchor (galvanised socket)
- ☑ PB marking ring with clip

optionally

- ☑ PB adapter plate (galvanised)

☑ **Version: stainless steel**

- ☑ PB anchor (socket in stainless steel SS316)
- ☑ PB marking ring with clip

optionally

- ☑ PB adapter plate (stainless steel SS316)

Available separately from PHILIPP:

☑ **Recess formers**

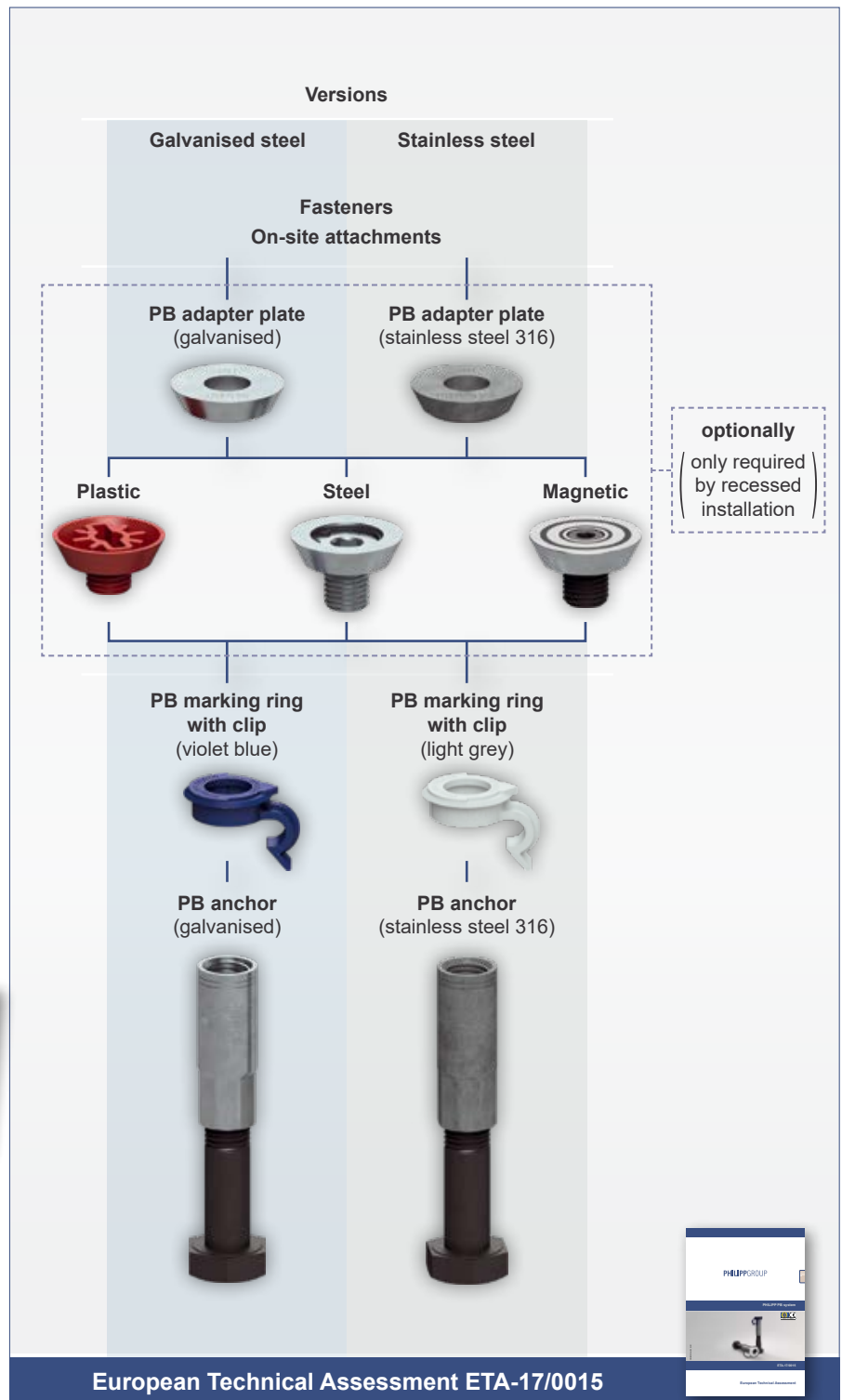
- ☑ Plastic (72KHN__)
- ☑ Steel (72KHN__STK)
- ☑ Magnetic (72MAXKHN__)



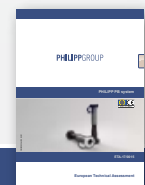
The Application Instruction for the KHN system has to be noted!



The fasteners (screws and washers) are not part of the PB anchor and have to be ordered separately. These have to be in accordance with the requested data of the static design or the design drawings. The fasteners are not available from PHILIPP.

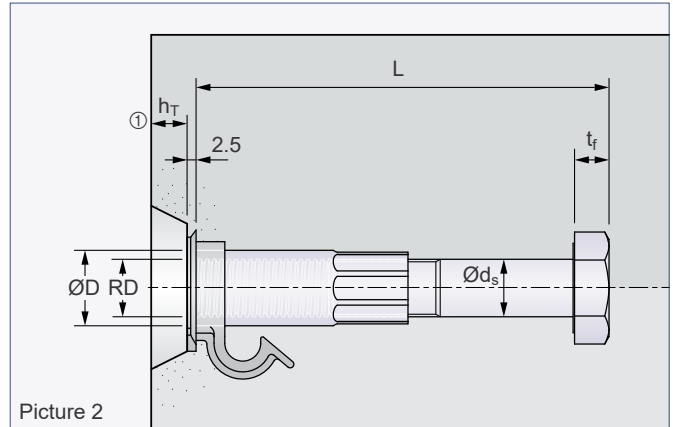
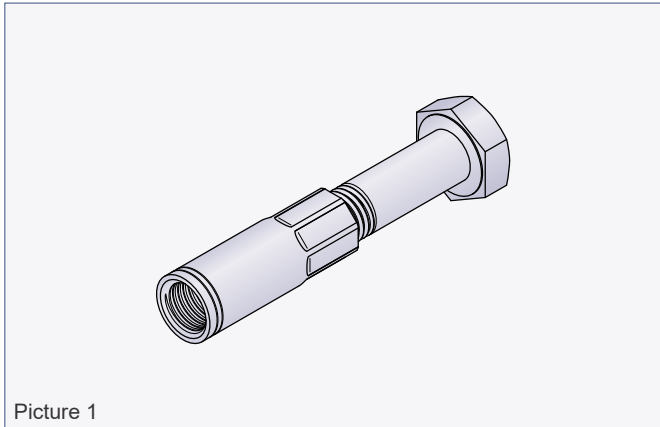


European Technical Assessment ETA-17/0015



PHILIPP PB anchor (Permanent anchor)

PB anchor



The PB anchor is designed for fixations in un/cracked normal concrete with a minimum compressive strength of C20/25 under predominantly static or quasi-static load. It is certified and approved via the European Technical Assessment (ETA-17/0015) by the Deutsches Institut für Bautechnik (DIBt), Berlin, Germany.

! The PB anchor is used exclusively for permanent fixations. An attachment of lifting devices for the transport of concrete elements is not permitted as well as the use as attachment points for load protection.

Materials

The PB anchor consists of a bright steel hexagonal bolt in strength class 8.8 with a screwed and crimped-on socket (RD thread with metric pitch). Depending on the anchor type, the socket is made of high-quality bright zinc galvanised steel or stainless steel SS316.

Sealing

The PB anchor in stainless steel is sealed on the bottom of the socket resp. on top of the bolt against corrosion. This sealing against corrosion is in accordance with EN 1992-4:2018 and ETA-17/0015 for a life cycle of 50 years.

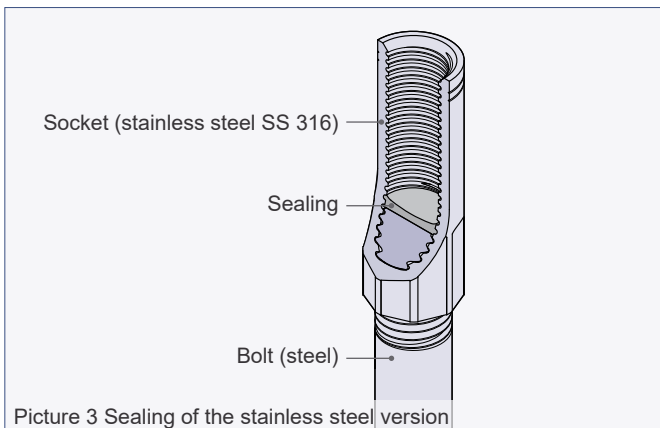


Table 1: Dimensions of the PB anchor

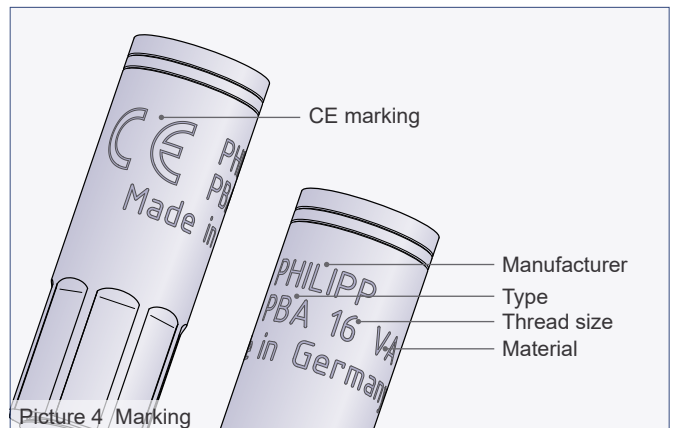
Ref.-no.	Type	Dimensions					
		RD	ØD [mm]	L [mm]	h _T [mm]	Ød _s [mm]	t _f [mm]
Version: galvanised steel							
70PBA12	PBA 12	12	15.0	67.5	10.0	12.0	7.5
70PBA16	PBA 16	16	21.0	114.5	10.0	16.0	10.5
70PBA20	PBA 20	20	27.0	155.0	10.0	20.0	12.5
70PBA24	PBA 24	24	31.0	201.0	10.0	24.0	15.0
70PBA30	PBA 30	30	39.5	250.0	10.0	30.0	18.7
Version: stainless steel							
70PBA12VA	PBA 12	12	15.0	67.5	10.0	12.0	7.5
70PBA16VA	PBA 16	16	21.0	114.5	10.0	16.0	10.5
70PBA20VA	PBA 20	20	27.0	155.0	10.0	20.0	12.5
70PBA24VA	PBA 24	24	31.0	201.0	10.0	24.0	15.0
70PBA30VA	PBA 30	30	39.5	250.0	10.0	30.0	18.7

① If the PB anchor is installed recessed, the height of the PB adapter plate must be considered (picture 2).

Marking

The PB anchor is marked as follows:

- CE marking
- Manufacturer (PHILIPP)
- Anchor version (PBA)
- Thread size (e.g. 16)
- Material (only for versions in SS316)



PB marking ring with clip / PB adapter plate

PB marking ring with clip

The PB marking ring with clip is used in order to identify the anchor in installed position, to fix the additional reinforcement in the right position (if necessary) and to show the load direction.

The plastic marking ring is put over the PB anchor socket during the installation of the anchor. Afterwards the PB anchor is fixed to the mould (picture 2).

Table 2: PB marking ring with clip (plastic)

Ref.-no.	Type	ØD [mm]	Ød [mm]	H [mm]	h ₁ [mm]
Version: galvanised steel					
74KR12PBA	PBA 12	28	13	10.5	2.5
74KR16PBA	PBA 16	32	17	10.5	2.5
74KR20PBA	PBA 20	37	21	10.5	2.5
74KR24PBA	PBA 24	41	25	10.5	2.5
74KR30PBA	PBA 30	52	31	10.5	2.5
Version: stainless steel					
74KR12PBAVA	PBA 12	28	13	10.5	2.5
74KR16PBAVA	PBA 16	32	17	10.5	2.5
74KR20PBAVA	PBA 20	37	21	10.5	2.5
74KR24PBAVA	PBA 24	41	25	10.5	2.5
74KR30PBAVA	PBA 30	52	31	10.5	2.5

Marking when installed

Following data are visible after installation:

- Colour code
- Manufacturer (PHILIPP)
- Anchor version (PBA)
- Thread size (e.g. 16)
- Load direction (arrow)
- Torque specification



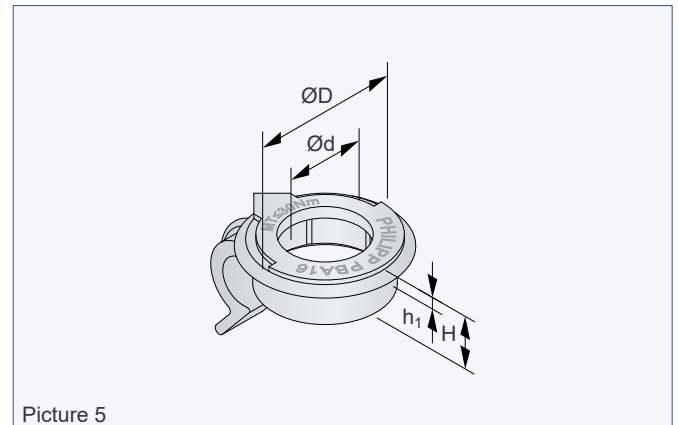
The PB anchor must always be installed in combination with the PB marking ring with clip

PB adapter plate

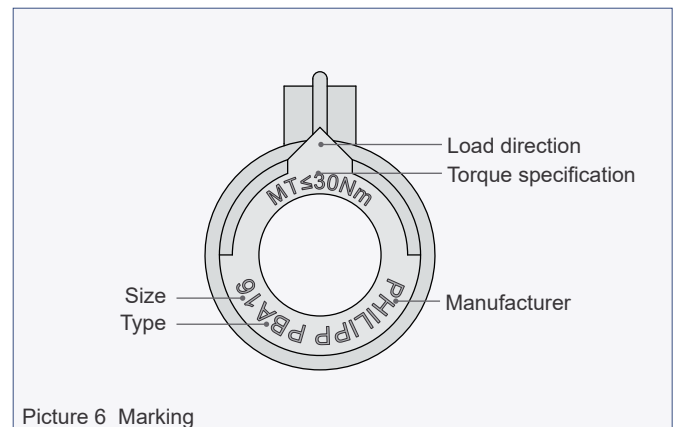
If the PB anchor is installed recessed by using a recess former, the PB adapter plate has to be placed into the recess during mounting procedure. The PB adapter plate is available in bright zinc galvanised and stainless steel.

Table 3: PB adapter plate

Ref.-no.	Type	ØD [mm]	Ød [mm]	H [mm]
Version: galvanised steel				
72AS12PBA	PBA 12	40.0	12.5	10.0
72AS16PBA	PBA 16	40.0	16.5	10.0
72AS20PBA	PBA 20	55.0	20.5	10.0
72AS24PBA	PBA 24	55.0	24.5	10.0
72AS30PBA	PBA 30	70.0	30.5	10.0
Version: stainless steel				
72AS12PBAVA	PBA 12	40.0	12.5	10.0
72AS16PBAVA	PBA 16	40.0	16.5	10.0
72AS20PBAVA	PBA 20	55.0	20.5	10.0
72AS24PBAVA	PBA 24	55.0	24.5	10.0
72AS30PBAVA	PBA 30	70.0	30.5	10.0



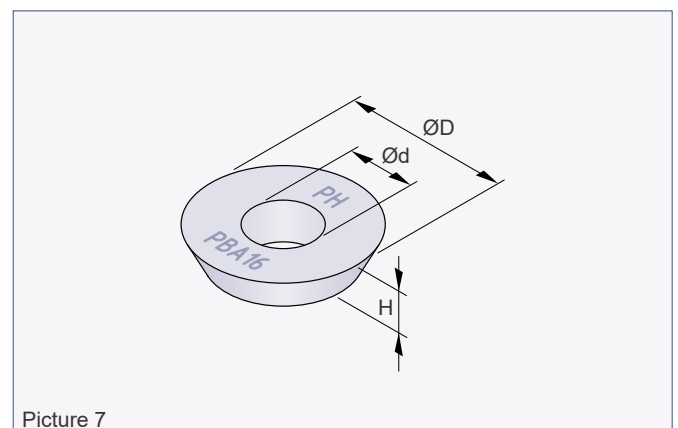
Picture 5



Picture 6 Marking

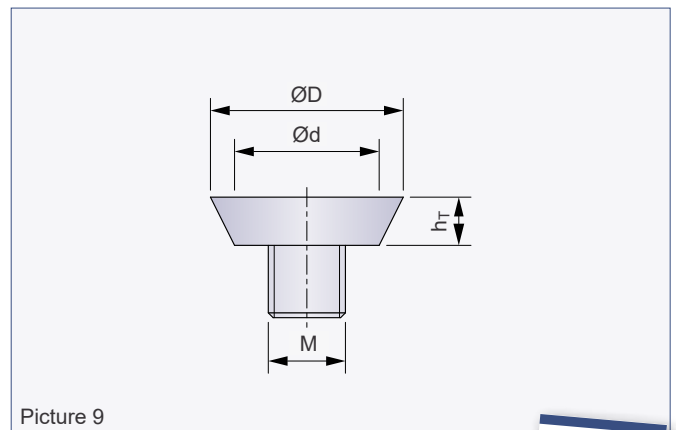
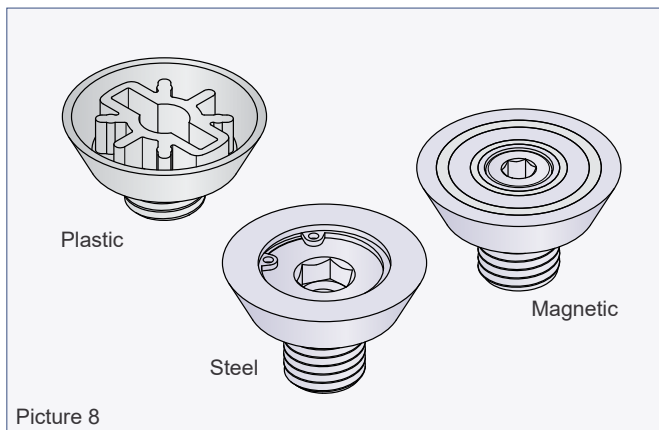


If the PB anchor is installed recessed the PB adapter plate must be used.



Picture 7

Recess formers



Use recess formers KHN for the recessed installation of the PB anchor. These are available as plastic, steel or magnetic version.

i The Application Instruction for the KHN system is to be considered!



Table 4: Recess formers (type KHN)

Ref.-no.			Dimensions			
Plastic	Steel	Magnetic	Thread [M]	$\varnothing D$ [mm]	$\varnothing d$ [mm]	h_T [mm]
72KHN12	72KHN12STK	72MAXKHN12	M12	40	30	10
72KHN16	72KHN16STK	72MAXKHN16	M16	40	30	10
72KHN20	72KHN20STK	72MAXKHN20	M20	55	45	10
72KHN24	72KHN24STK	72MAXKHN24	M24	55	45	10
72KHN30	72KHN30STK	72MAXKHN30	M30	70	60	10

Planning

Version: galvanised steel

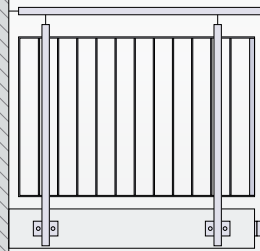
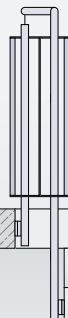


PB anchors set in concrete under dry indoor conditions (galvanised socket, in addition the inner area of the sleeve must be protected against water during the construction phase)

Version: stainless steel



Anchors set in concrete made of stainless steel are classified as sufficiently durable for the relevant corrosion resistance class (CRC III) acc. to EN 1993-1-4.

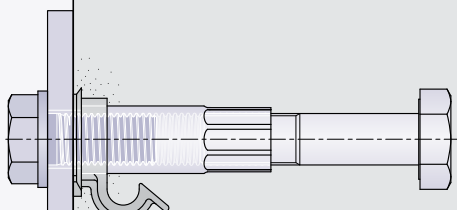


Design

The design of the fixation under predominantly static or quasi-static load is in accordance with EN 1992-4:2018 and under the responsibility of an engineer experienced in the field of anchorages and concrete construction. Verifiable technical drawings and calculations have to be prepared considering the final loads to be anchored.

Installation flush to concrete surface

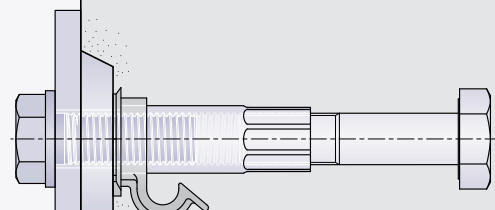
If the PB anchor is installed flush to the concrete surface the attachment has direct contact to the anchor socket as well as the concrete surface.



Picture 10 Installation flush to the surface

Recessed installation

If the anchor is installed recessed, the attachment has direct contact to the concrete surface but not to the anchor socket. Therefore the PB adapter plate shall be used.

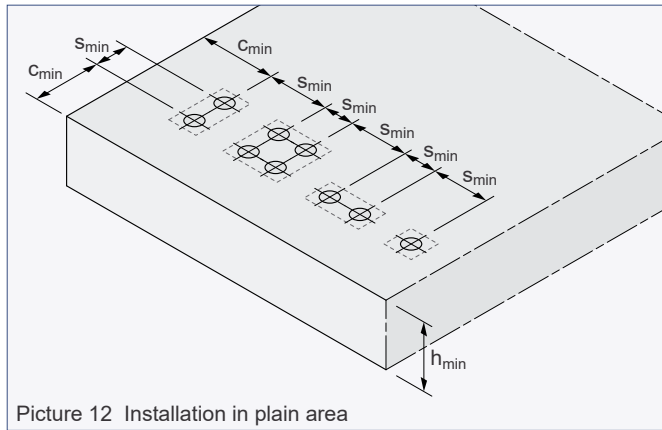


Picture 11 Recessed installation

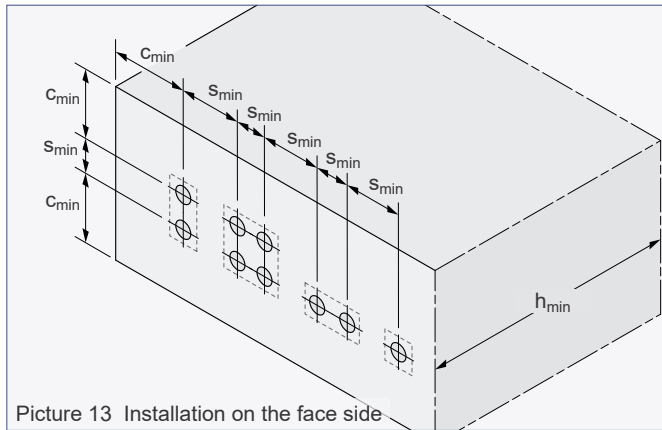
Planning

Min. element thicknesses, centre and edge distances

For a safe load transfer the installation and positioning of PB anchors in precast concrete elements requires minimum thicknesses as well as centre and edge distances.



Picture 12 Installation in plain area



Picture 13 Installation on the face side

Table 5: Minimum element thicknesses, centre and edge distances

Ref.-no.	Min. ① element thickness h_{min} [mm]	Min. centre distance S_{min} [mm]	Min. edge distance C_{min} [mm]
PBA 12	100	110	55
PBA 16	140	140	70
PBA 20	180	180	90
PBA 24	225	220	110
PBA 30	275	270	135

① $h \geq h_{nom} + c_{nom}$ (c_{nom} acc. to EN 1992-1-1:2011-01)

Concrete

Reinforced and unreinforced concrete in accordance with EN 206:2013+A1:2016 of concrete strength classes C20/25 to C50/60 can be used. In general, an anchoring in cracked and uncracked concrete is possible.

Reinforcement

Any reinforcement required shall be chosen in accordance with EN 1992-4:2018. If additional reinforcement is chosen for lateral tension in form of stirrups or U-bent reinf. (with contact to the PB anchor), it may be necessary to use stainless steel for this additional reinforcement in accordance with the concrete cover requirements.

Fasteners

For the fasteners, the minimum requirements according to table 6 must be met.

Table 6: Fasteners

Screw	Washer
Version: galvanised steel	
EN ISO 898-1:2013, bright zinc galvanised, class 8.8	EN ISO 7089:2000 / 7090:2000, bright zinc galvanised, $\geq 200HV$
Version: stainless steel	
EN ISO 3506-1:2009, strength class A4-70, CRC III	1.4401 / 1.4404 / 1.4571 EN ISO 7089:2000 / 7090:2000 $\geq 200HV$, CRC III

Planning

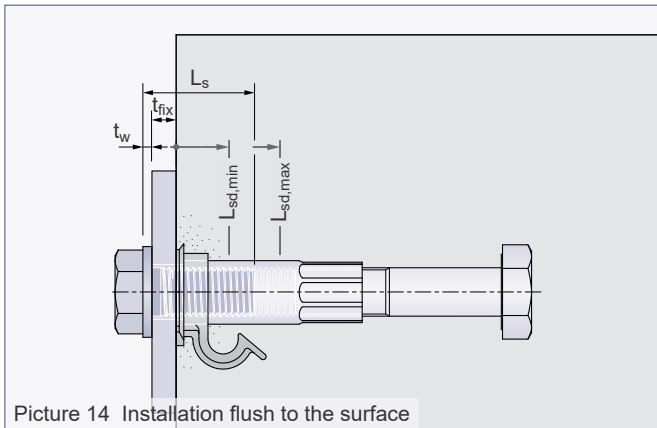
Thread reach

For a correct mounting of the attachments to the PB anchor the minimum and maximum thread reach has to be considered. These can be found in table 7.

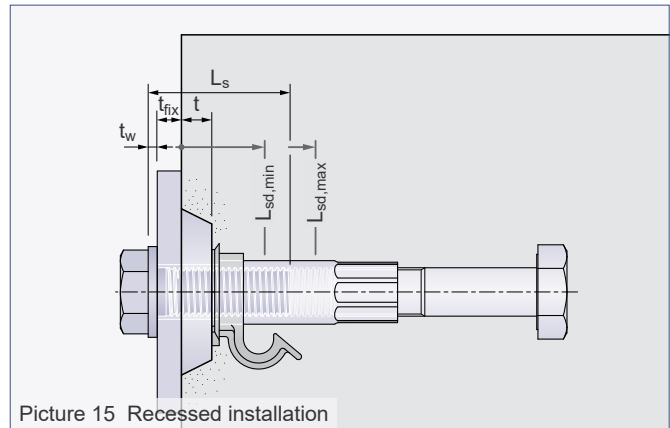


All required fasteners are not included in our scope of delivery.

L_s	Length of the screw
$L_{sd,min}$	Minimum thread reach
$L_{sd,max}$	Maximum thread reach
t_w	Thickness of the washer
t_{fix}	Thickness of the attachment
t_v	Depth of the recess



Picture 14 Installation flush to the surface



Picture 15 Recessed installation

Table 7: Thread reach

Type	Thread reach	
	$L_{sd,min}$ [mm]	$L_{sd,max}$ [mm]
PBA 12	16.9	26.5
PBA 16	21.7	37.5
PBA 20	26.5	44.5
PBA 24	31.3	52.5
PBA 30	38.5	61.5

Torque specification

The attachment to be fixed is screwed into the PB anchor set in concrete using a screw with metric ISO thread and a suitable washer. Here, the given torque specification in table 8 has to be considered.

Calculation of the required screw length

For installation flush to surface:

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

For recessed installation:

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

Example acc. to picture 14 (PBA 16):

$$3 \text{ mm} + 12 \text{ mm} + 21.7 \text{ mm} \leq L_s \leq 3 \text{ mm} + 12 \text{ mm} + 37.5 \text{ mm}$$

$$36.7 \text{ mm} \leq L_s \leq 52.5 \text{ mm}$$

Possible screws: M16 × 40 / M16 × 45 / M16 × 50

Table 8: Torque specifications M_T

Type	M_T [Nm]
PBA 12	≤ 10
PBA 16	≤ 30
PBA 20	≤ 60
PBA 24	≤ 80
PBA 30	≤ 200

Required information in design drawings

Following data shall be provided on the design drawings:

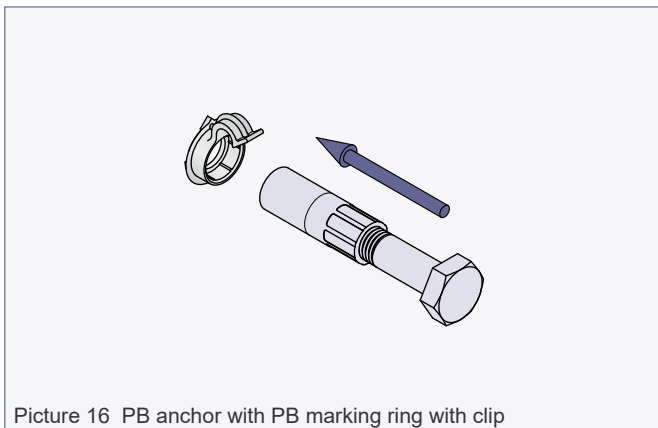
- Selected PB anchor (ref. no.)
- Position of the anchor (centre and edge distances)
- Direction of the marking ring (direction of arrow)
- Minimum reinforcement
- Minimum concrete strength according to static calculation
- Position and direction of the required additional reinforcement
- Requirements for the fasteners (material and strength class)
- Length of the fasteners and thickness of the attachment
- Details of the recess former (if the anchor is installed recessed)

PHILIPP PB anchor (Permanent anchor)

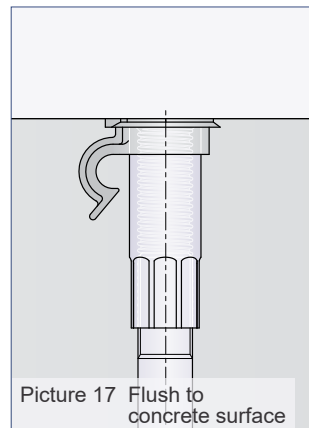
Installation of the PB anchor

Requirements for the installation

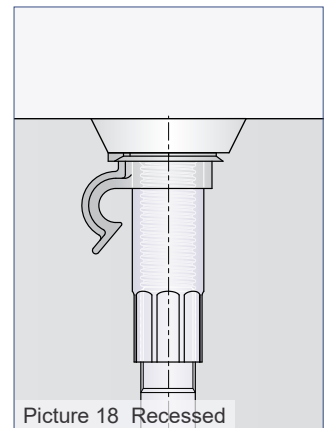
- Modifications or change of any individual component are not permitted.
- The PB anchor has to be fixed to the formwork so that its position won't be changed by the installation of the reinforcement, casting or compacting of the concrete.
- Proper compacting of concrete in the anchor area.
- The interior area of the bright zinc galvanised socket must be protected against water penetration.
- The interior area of the stainless steel socket must be protected against oil penetration.



Picture 16 PB anchor with PB marking ring with clip



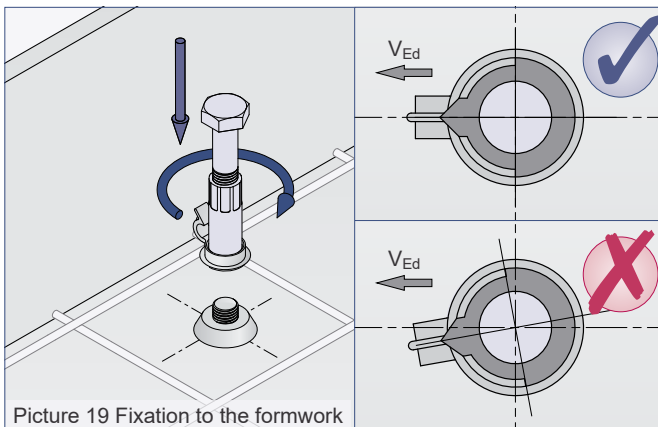
Picture 17 Flush to concrete surface



Picture 18 Recessed

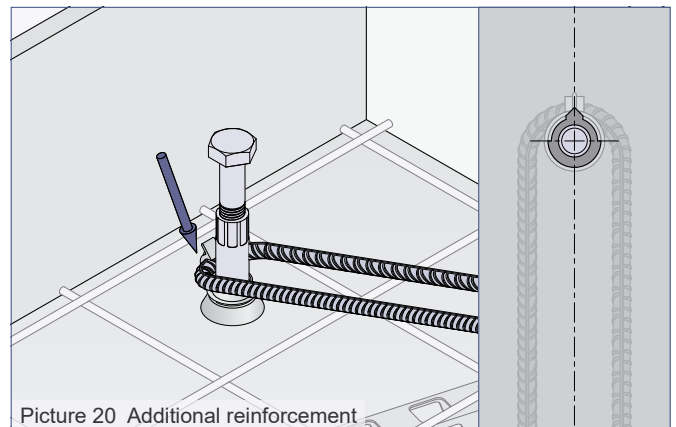
Before installation of the PB anchor the PB marking ring with clip shall be fixed on the socket.

Then, the PB anchor is fixed to the formwork either with PHILIPP Threaded adapter flush to the concrete surface or recessed by using the PHILIPP Recess former KHN.



Picture 19 Fixation to the formwork

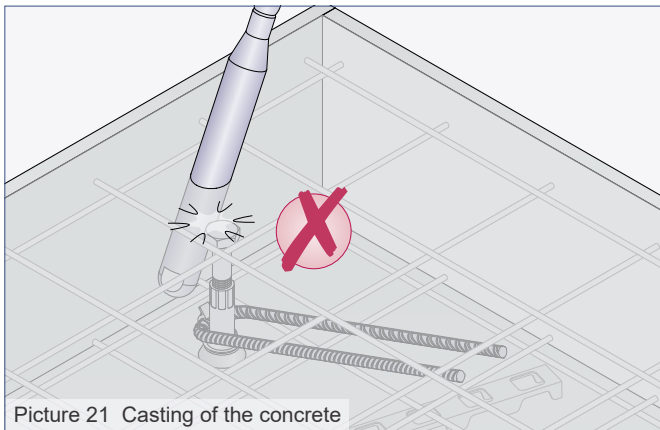
Pay attention that the PB marking ring with clip is placed in the correct direction (arrow direction (on clip) = load direction).



Picture 20 Additional reinforcement

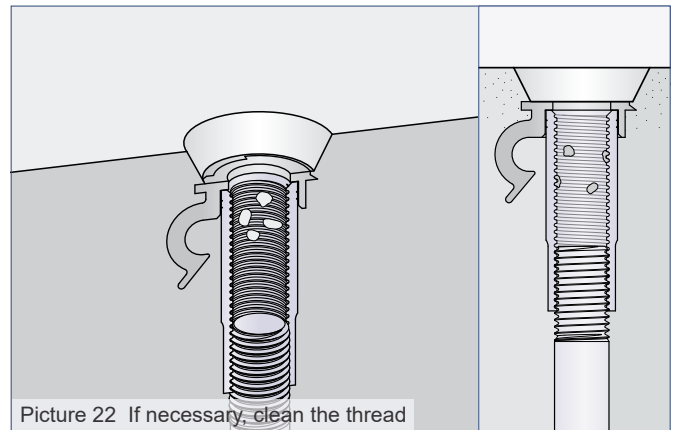
In case of additional reinforcement, this can be fixed fast and easily by the PB marking ring with clip. This additional reinforcement has to be placed opposite to the load direction (arrow direction of the PB marking ring with clip) and with contact to the socket. Here, the required concrete cover has to be ensured. If necessary, the additional reinforcement has to be placed in an inclined position or the version in stainless steel is required. Alternatively, the reinforcements can be installed according to EN 1992-4:2018.

Installation of the PB anchor



Picture 21 Casting of the concrete

The PB anchor has to be fixed to the formwork so that its position won't be changed by the installation of the reinforcement, casting or compacting of the concrete. During compacting of the concrete any contact between the vibrator and the PB anchor shall be avoided.



Picture 22 If necessary, clean the thread

If the thread is dirty, it must be cleaned before using. This can be done easily by using the PHILIPP Chaser screw.



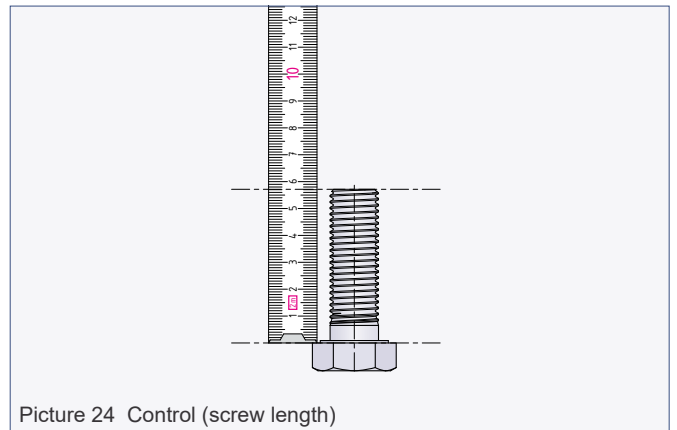
In order to avoid any penetration of water, oil or mud it is suggested to seal the PB anchor during storage and transport processes.

PHILIPP PB anchor (Permanent anchor)

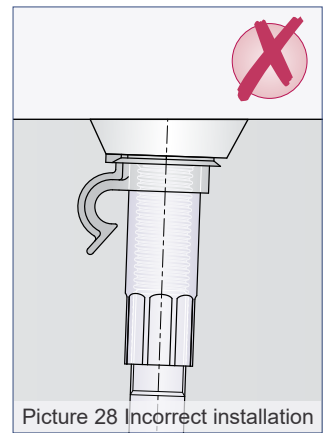
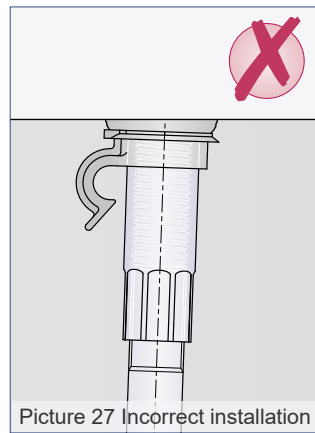
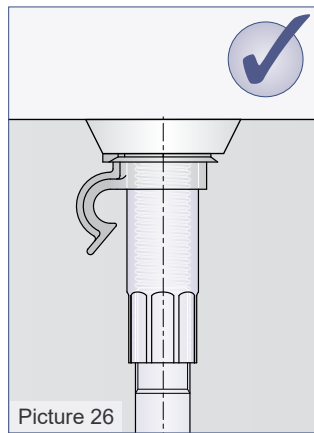
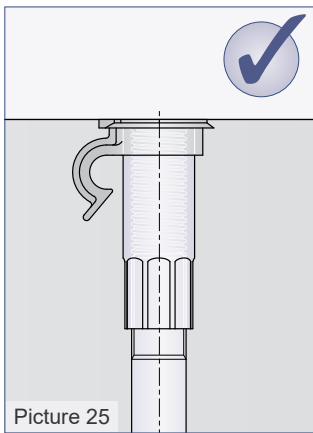
Mounting of the attachments

The required concrete strength needs to be ensured before mounting of the attachments. Furthermore, check if the length of the screws are suitable to fulfil the required minimum and maximum length of the screws (table 7).

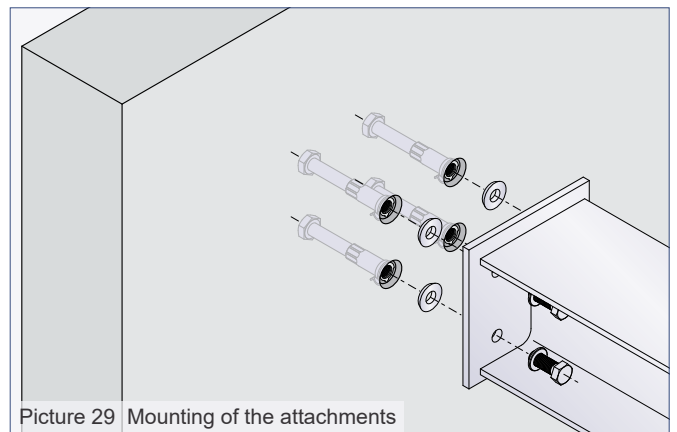
The installation of the PB anchor shall be controlled visually (picture 25 - 28). An installation to incorrectly installed PB anchors can cause damage to the anchors themselves or to the concrete.



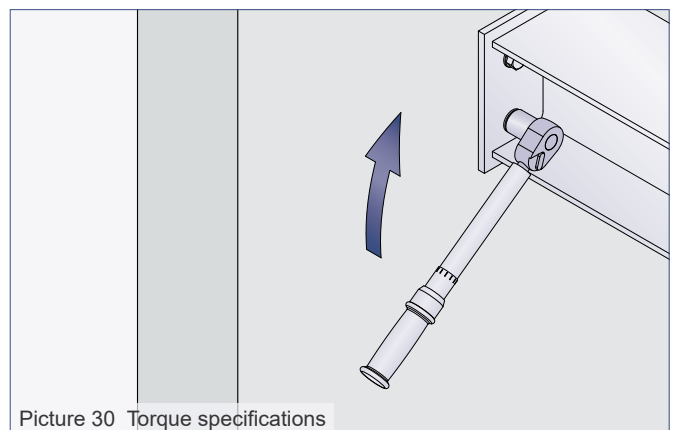
Picture 24 Control (screw length)



For the mounting of the attachments please use the specified fasteners (screws, washers) and the PB adapter plate when installed recessed.



The screws must be screwed in with the specified torque. Here, additional notes of the attachment parts shall be followed. The maximum fastening torques M_T are given in table 8 as well as on the PB marking ring with clip.



An installation with incorrect fastening torque may result in damage to the concrete or the PB anchor.

Design software

PHILIPP provides a free software for the design of PB anchors. Here are some of the advantages of the software available on the PHILIPP website www.philipp-group.de

- ☑ Simply and easily understandable user interface
- ☑ Geometry and load entries directly in a 3D model
- ☑ Direct support during the application through mouse-over help texts
- ☑ Detailed and comprehensible results of the design

- ☑ Results of the calculations are shown immediately when geometry or load entries are changed, without pressing a "design button"
- ☑ Multiple calculation of all anchor types is possible

Calculation of All Anchors

Anchor	Type	Size	h _{ef}	Tension load	Shear load	Tension and shear load
Anchor Family : PBA						
PBA	A4	RD / M 12	71,5 mm	127,02 %	34,25 %	172,94 %
PBA	GV	RD / M 12	71,5 mm	93,58 %	19,62 %	85,71 %
PBA	A4	RD / M 16	107 mm	60,27 %	15,48 %	48,27 %
PBA	GV	RD / M 16	107 mm	60,27 %	8,5 %	48,27 %
PBA	A4	RD / M 20	145 mm	49,30 %	10,6 %	38,71 %
PBA	GV	RD / M 20	145 mm	49,30 %	7,7 %	35,71 %
PBA	A4	RD / M 24	186,5 mm	40,03 %	7,7 %	25,12 %
PBA	GV	RD / M 24	186,5 mm	40,03 %	7,7 %	25,12 %
PBA	A4	RD / M 30	233,8 mm	32,98 %	5,5 %	19,54 %
PBA	GV	RD / M 30	233,8 mm	32,98 %	5,5 %	19,54 %

Results

PBA, GV, RD / H 12

Tension load

- Steel failure: 11,9 %
- Pull-out: 9,4 %
- Concrete cone failure: 25,6 %

Shear load

- Steel failure: 16,4 %
- Concrete pry-out failure: 12,8 %

Tension and shear load

- Interaction steel: 4,1 %
- Interaction concrete: 17,6 %

✓ P₁ 25,6 % ✓ B₁ 16,4 % ✓ B₁₊₂ 17,6 %

Project Management

- Position 1: 5 Piece
- Position 2: 1 Piece
- Position 3: 4 Piece
- Position 4: 2 Piece

Hints

The minimum centre distance $s = 120 \text{ mm}$ is smaller than the required centre distance $s_{\text{min}} = 180 \text{ mm}$.

- ☑ Project management for the creation of multiple designs within one project file
- ☑ Hint window, which indicates boundary conditions that lead to conflicts in the design



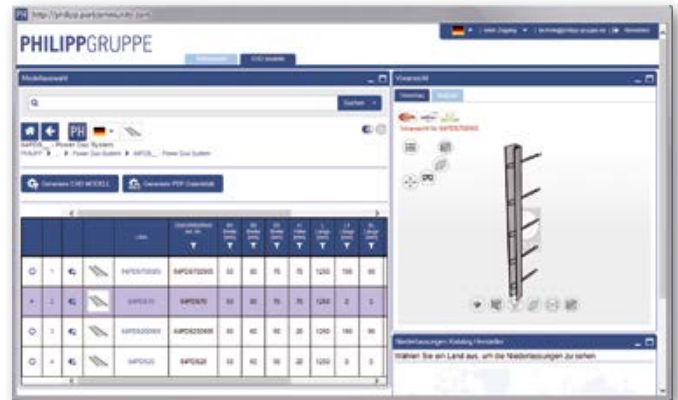
All results from the PHILIPP design software are only valid in combination with PHILIPP products to ensure the local load transfer into the concrete element. The planner is responsible for the further load transfer into the concrete element.

CAD

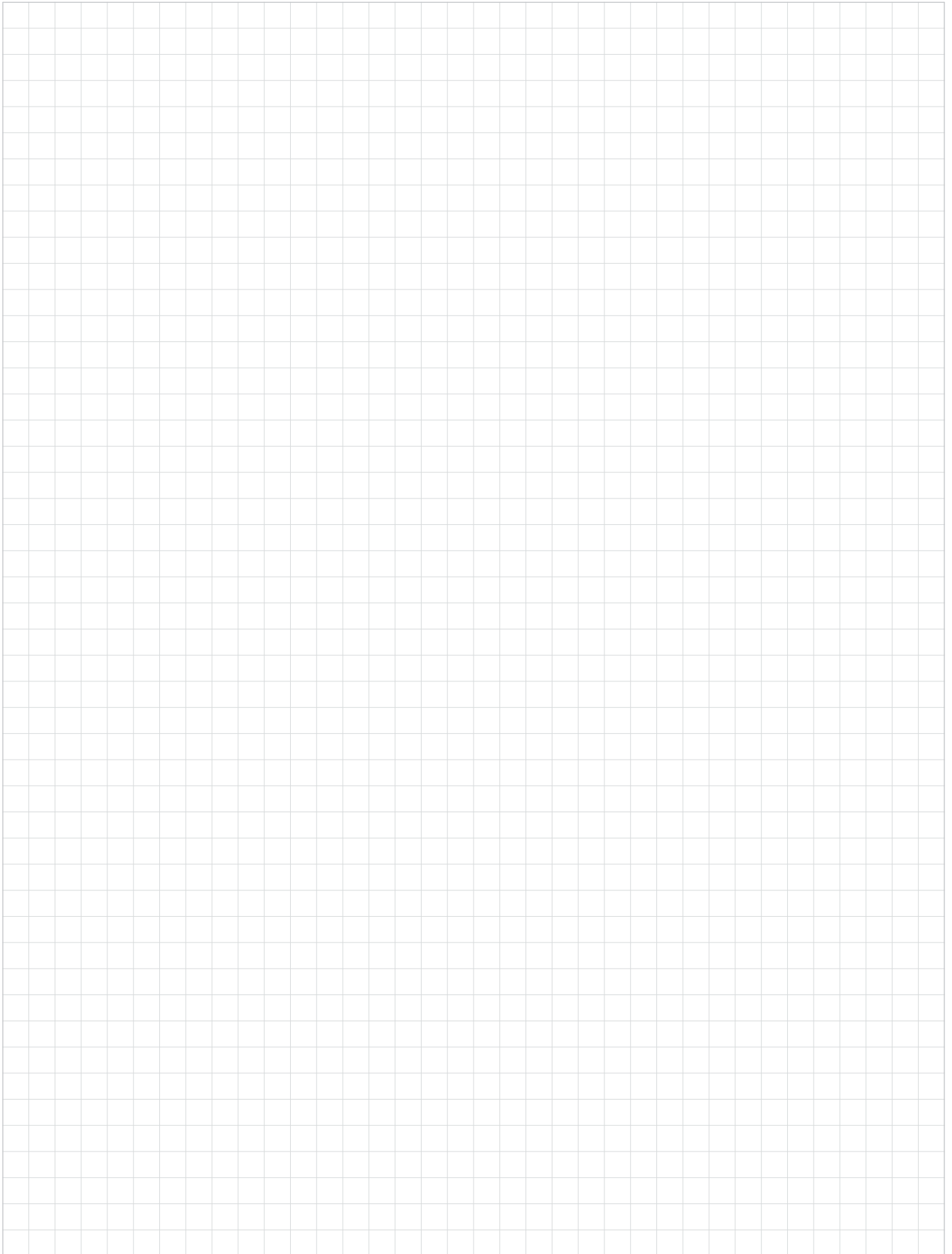
3D mounting parts

Time-saving during the planning process and support for the Building Information Modelling (BIM) method are becoming more and more important. This is the reason why the universal PHILIPP CAD library helps to work efficiently on these matters.

- More than 1,200 PHILIPP products are available as 3D model
- Universal CAD library with many export formats compatible for all CAD systems (e.g. IFC, DWG)
- Free offer for all people involved in precast building
- Time-saving in the design process thanks to the ready-made models and views
- Simply structured catalogue
- More product details are provided (e.g. weight, dimensions, material and documentations)
- Standard PartCommunity:
philipp.partcommunity.com
- BIM specific PartCommunity:
bimcatalogs.partcommunity.com



Notes:



Our customers trust us to deliver. We do everything in our power to reward their faith and we start each day intending to do better than the last. We provide strength and stability in an ever-changing world.

Welcome to the PHILIPP Group

Sustainable
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