

PHILIPPGRUPPE

PHILIPP Bearing system with noise reduction



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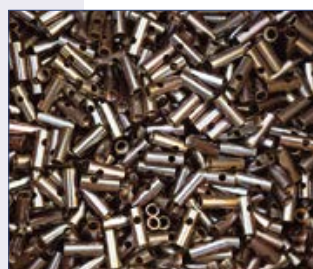
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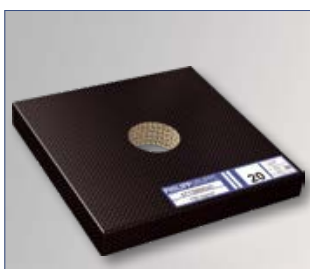
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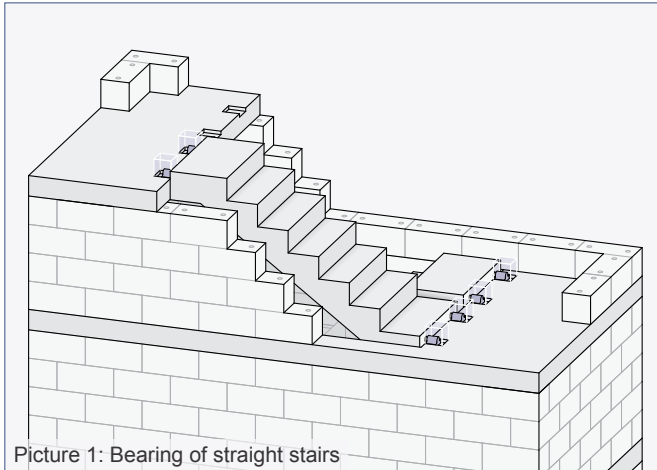
Bearing system with noise reduction (TSS system)

System description

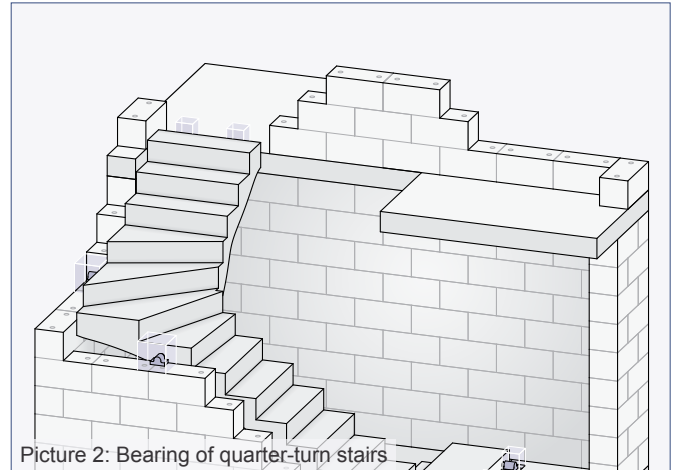
The TSS system is an approved system (German approval Z-15.7-332) for a sound-decoupled bearing of reinforced concrete elements. It can be used for the bearing of straight stairs (Picture 1), curved stairs (Picture 2 and 3) and landings (Picture 4).

A bearing of slabs (Picture 5), slabs with brackets (for e.g. walls with thermal insulation composite system; Picture 6)

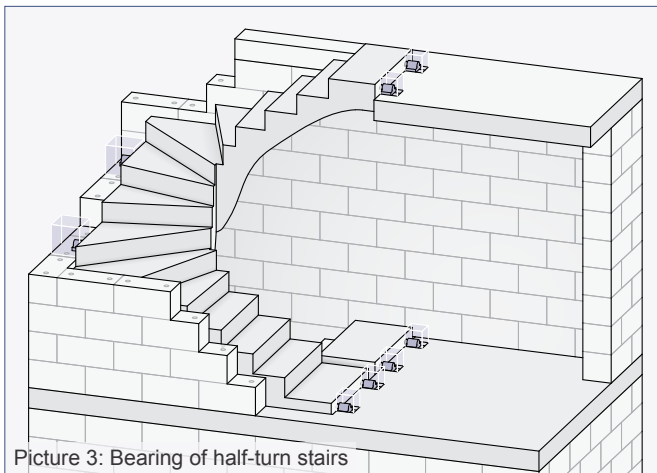
and beam-shaped units is also possible. The German approval considers the use for internal and external concrete elements under predominantly static loads. There are multi-purpose applications for the system because of the different combinations of installation parts and parts set in concrete (Picture 7).



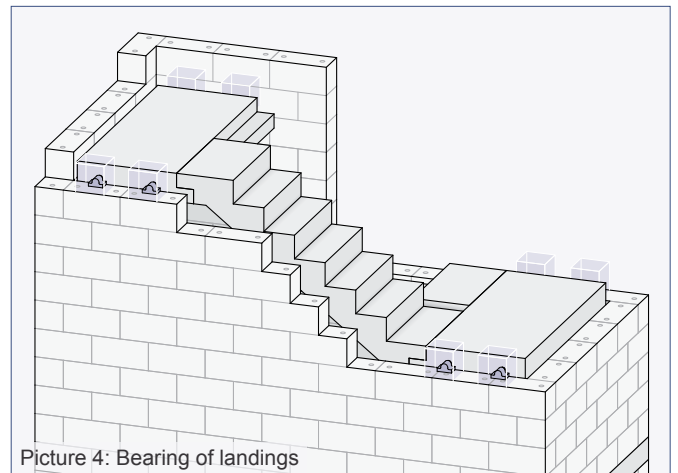
Picture 1: Bearing of straight stairs



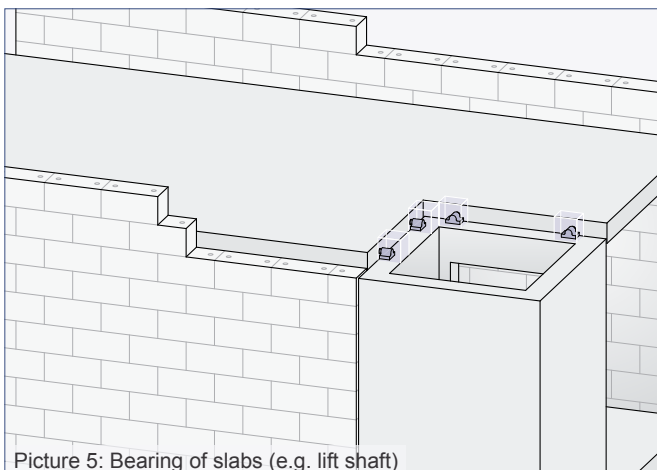
Picture 2: Bearing of quarter-turn stairs



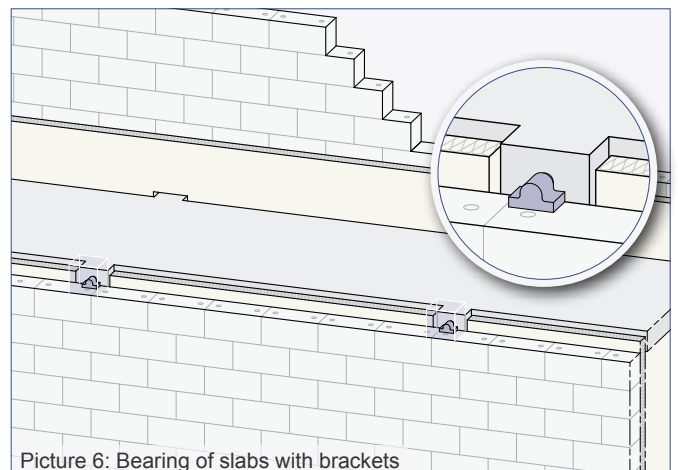
Picture 3: Bearing of half-turn stairs



Picture 4: Bearing of landings



Picture 5: Bearing of slabs (e.g. lift shaft)



Picture 6: Bearing of slabs with brackets

Bearing system with noise reduction (TSS system)

System overview

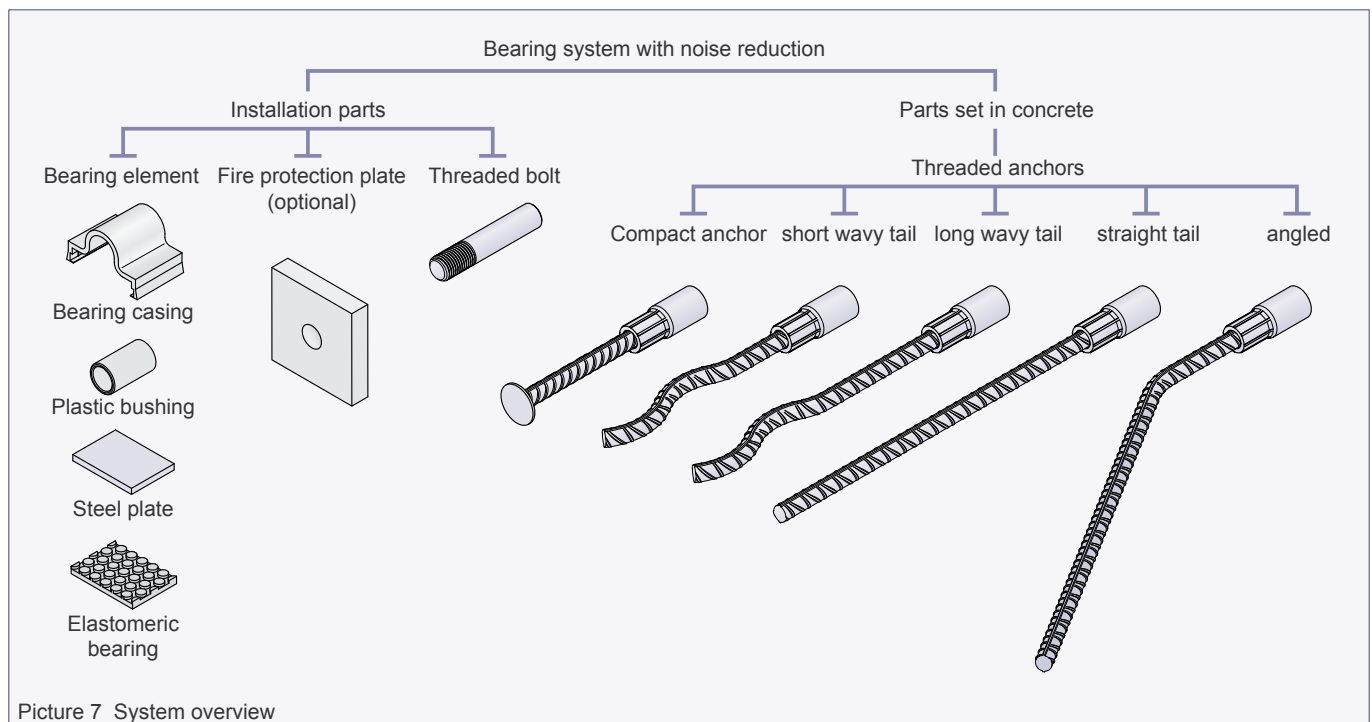
The TSS system consists of several single components (Picture 7) and is suitable for indoor use (galvanised version) as well as outdoor use (stainless steel version) in concrete elements. Each system contains a threaded anchor, a threaded bolt and the actual bearing element as main components. In turn, the bearing element consists also of several components that are delivered pre-assembled. The bearing element can be supplied with two different elastomeric bearings (Cipremont®/Compression Bearing). Find the different noise reduction capacities in Table 11.

The load is transferred via the bolt into the steel plate and the elastomeric bearing laying beneath and finally into the load-bearing elements (e.g. masonry or reinforced concrete wall). Multiple anchor types offer the planner the possibility to use the TSS system even with difficult precast construc-

tions. The threaded anchors have a special round thread RD (with metrical pitch) which is resistant against light dirt. Within the scope of this Installation Instruction, the planner has the option of adapting the bending of straight and angled anchors individually to the geometry (page 14).



This Installation Instruction provides necessary technical information. In all cases, the requirements of the national German approval must be considered!



Picture 7 System overview

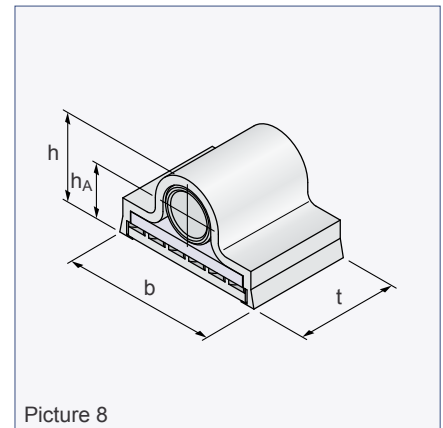
Table 1: System overview

Elastomer bearing		Installation parts		Parts set in concrete
Ref.-No.	Elastomeric bearing	Fire protection plate (optional)	Threaded bolt	Threaded anchor
Indoor (galvanised version)				
67TSEN-CIP	Cipremont®	67TSBMN020 67TSBMN030 67TSBMN050	670TSSN___ST; 670TSSN___8	67TSS360235; 67M36WE; 67M36K; 67M36; 67M361100; 67M360850GE45
67TSEN	Compression bearing			
Outdoor (stainless steel version)				
67TSENVA-CIP	Cipremont®	67TSBMN020 67TSBMN030 67TSBMN050	670TSSN___VA	75TSS360235VA; 75M36VAWE; 75M36VAK; 75M36VA; 75M361100VA; 75M360850VAGE45
67TSENVA	Compression bearing			

Installation parts

Table 2: Bearing element

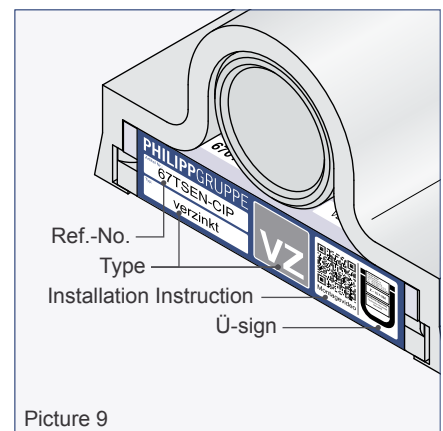
Ref.-No.	b [mm]	t [mm]	h [mm]	h _A [mm]	Elastomeric bearing	Steel plate
Galvanised version						
67TSEN-CIP	132	88	76	45	Cipremont®	bright zinc plated
67TSEN					Compression bearing	
Stainless steel version						
67TSENVA-CIP	132	88	76	45	Cipremont®	Stainless steel
67TSENVA					Compression bearing	



Picture 8

In order to identify the different bearing elements these are marked with the following information:

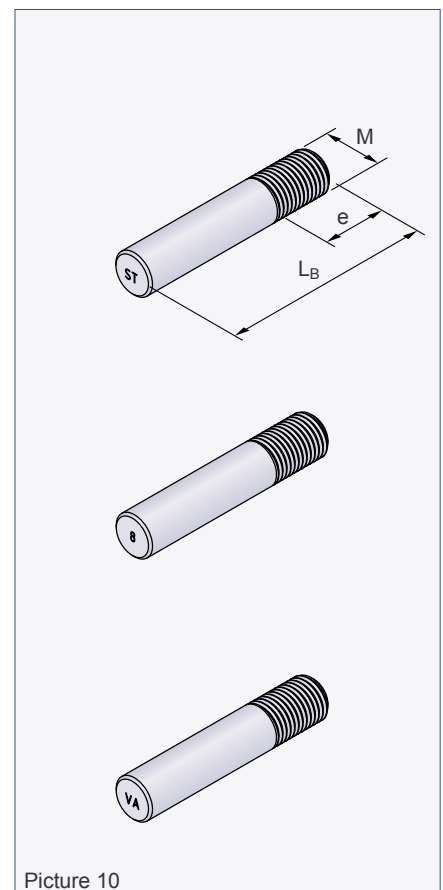
- Manufacturer
- Ref.-No. (e.g. 67TSEN-CIP)
- Type (e.g. galvanised) including coloured marking (VZ/VA)
- QR-Code for installation video
- Ü-sign
- Mounting instructions on the bottom side



Picture 9

Table 3: Threaded bolt

Ref.-No.	Thread M	e [mm]	L _B [mm]
S355 galvanised (marking ST)			
670TSSN160ST	M36	56	160
670TSSN170ST			170
670TSSN180ST			180
670TSSN190ST			190
670TSSN200ST			200
670TSSN210ST			210
670TSSN220ST			220
Tempered steel (marking 8)			
670TSSN1608	M36	56	160
670TSSN1708			170
670TSSN1808			180
670TSSN1908			190
670TSSN2008			200
670TSSN2108			210
670TSSN2208			220
Stainless steel S460 (marking VA)			
670TSSN160VA	M36	56	160
670TSSN170VA			170
670TSSN180VA			180
670TSSN190VA			190
670TSSN200VA			200
670TSSN210VA			210
670TSSN220VA			220

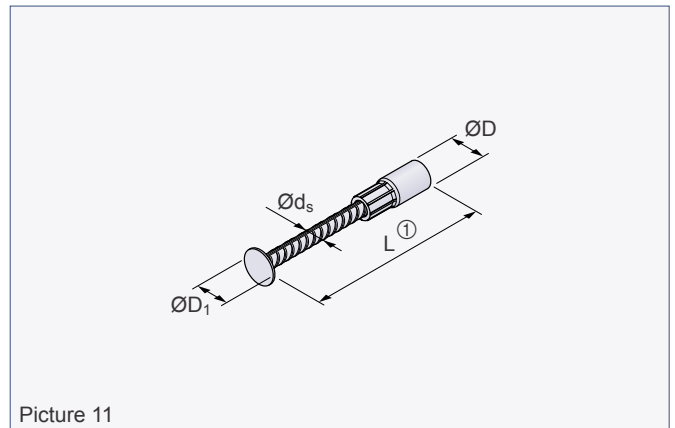


Picture 10

Parts set in concrete

Table 4: Compact anchor

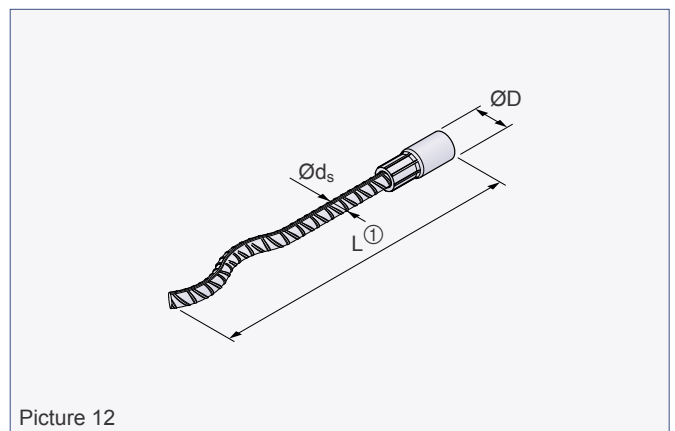
Ref.-No.	Thread	ØD	ØD ₁	L	Ød _s
	RD	[mm]	[mm]	[mm]	[mm]
Galvanised version					
67TSS360235	36	47	60	235	25
Stainless steel version					
75TSS360235VA	36	50	60	235	25



Picture 11

Table 5: Threaded anchors (short and long wavy tail)

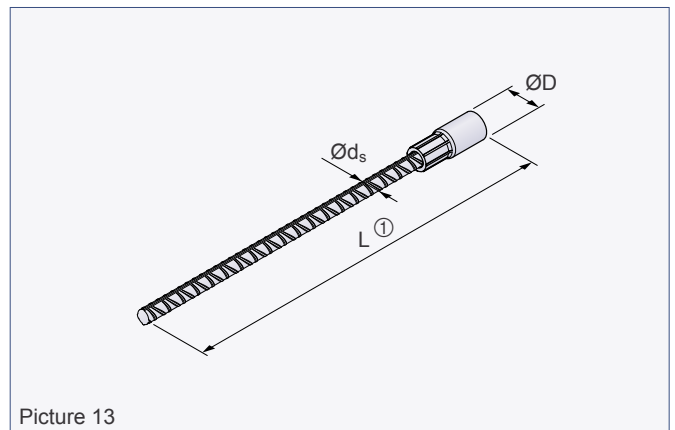
Ref.-No.	Thread	ØD	L	Ød _s
	RD	[mm]	[mm]	[mm]
Galvanised version				
67M36K	36	47	380	25
67M36WE	36	47	570	25
Stainless steel version				
75M36VAK	36	50	380	25
75M36VAWE	36	50	570	25



Picture 12

Table 6: Threaded anchor (straight tail) ②

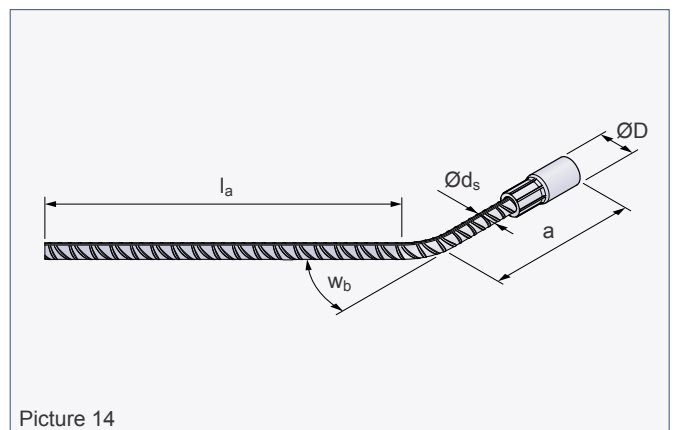
Ref.-No.	Thread	ØD	L	Ød _s
	RD	[mm]	[mm]	[mm]
Galvanised version				
67M36	36	47	690	25
67M361100	36	47	1100	25
Stainless steel version				
75M36VA	36	50	690	25
75M361100VA	36	50	1100	25



Picture 13

Table 7: Threaded anchor (45° angled) ②

Ref.-No.	Thread	ØD	Ød _s	a	l _a	w _b
	RD	[mm]	[mm]	[mm]	[mm]	[°]
Galvanised version						
67M360850GE45	36	47	25	165	690	45
Stainless steel version						
75M360850VAGE45	36	50	25	165	690	45



Picture 14

① The shortest anchor length L is sufficient to guarantee the bearing capacity. Longer anchors are possible.

② Anchors are suitable for bending by the user. (Refer to notes on page 14)

Installation instructions

Installation options

Following installation options are possible for the TSS system.

Compact anchor

67TSS360235;
75TSS360235VA

Threaded anchor - short wavy tail

67M36K;
75M36VAK

Threaded anchor - long wavy tail

67M36WE;
75M36VAWE

Threaded anchor - straight tail

67M36; 67M361100;
75M36VA; 75M361100VA

Picture 15

Threaded anchor - angled

240 mm
125 mm
 $d_{br} = 175 \text{ mm}$
 $0^\circ - 45^\circ$
bent by the user

67M36; 67M361100;
75M36VA; 75M361100VA

Compact anchor

67TSS360235; 75TSS360235VA;

Threaded anchor - 45° angled

165 mm
50 mm
bent by PHILIPP
 45°
 $d_{br} = 175 \text{ mm}$
offset by the user

67M360850GE45;
75M360850VAGE45

Threaded anchor - angled

240 mm
125 mm
 $d_{br} = 175 \text{ mm}$
 $0^\circ - 45^\circ$
bent by the user

67M36; 67M361100;
75M36VA; 75M361100VA

Picture 16

Installation instructions

Element dimensions

Table 8 specifies element thicknesses, distances, bracket widths and depths attention have to be paid to. The anchor should be installed centred in the reinforced concrete element relating to the element thickness ($d/2$). If the anchor is installed in a bracket, it shall be placed in the centre of the bracket ($b_k/2$).

If a FEM calculation is necessary to find out the support reactions, the spring stiffness has to be considered. For more information about the spring stiffnesses please refer to Picture 21. The structural engineer has to prove the load transfer of the support reactions.

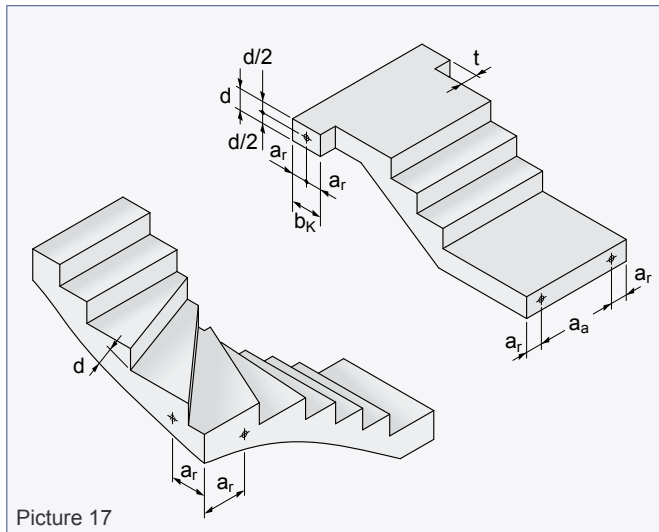


Table 8: Concrete element dimensions

Minimum element thickness d [mm]	Minimum edge distance a_r [mm]	Minimum centre distance a_a [mm]	Minimum bracket width b_k [mm]	Maximum bracket depth t [mm]
≥ 140 ①②	≥ 100	≥ 200	≥ 200	≤ 150

① In case of fire protection requirements, higher component thicknesses may be required.

② With a given minimum element thickness of 140 mm the concrete cover is $c_{nom} = 15$ mm and the minimum concrete strength C20/25. If the exposure class requires a higher concrete cover, the minimum element thickness shall be increased (Picture 24).

Calculation of the bolt length

The installation distance results from the addition of the bearing edge distance and the given wall distance ($m \geq A_L + A_W$). Then, the bolt length is to be selected from table 9. Hand-tight and completely into the anchor the threaded bolt is screwed. A tightening torque must not be applied here. Finally, the bearing element is pushed onto the bolt until the back plane touches the end of the bolt. For the specification of the bearing edge distance A_L (Picture 18) the structural engineer is responsible.

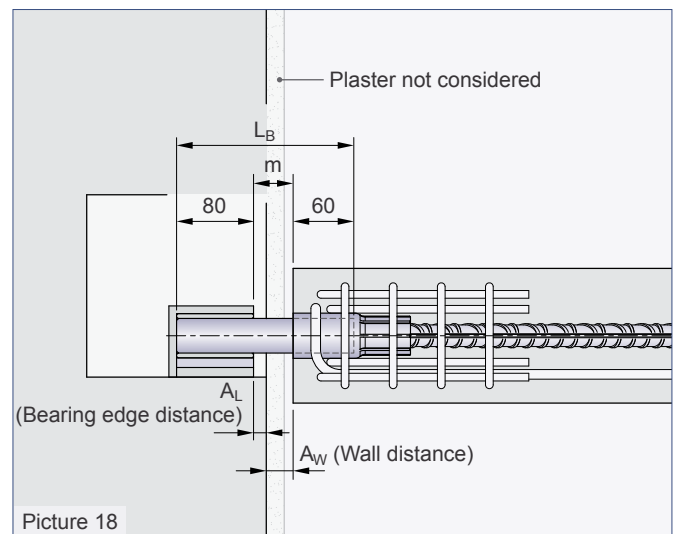


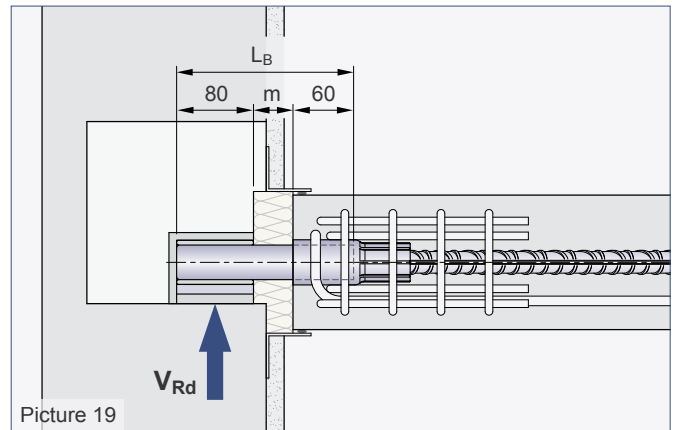
Table 9: Installation distances

Installation distance max. m [mm]	Bolt length min. L_B [mm]
20	160
30	170
40	180
50	190
60	200
70	210
80	220

Design / bearing capacities of the system

For predominantly static loads the TSS system is designed for. The allowed load bearing capacities vary depending on the mounting distance m (Picture 19) and the material of the threaded bolt (Table 10). Here, the mounting distance is defined as the distance of the threaded anchor in the concrete element to the front edge of the bearing element (Picture 18 and 19). If the threaded anchor is fixed to the mould using a plastic, magnetic or steel Nailing plate the mounting distance m has to be increased by the depth of the recess. The concrete quality of the element to be borne can be chosen from C20/25 to C50/60 with regard to the strength class. The load bearing capacity shall be verified with $V_{Ed} / V_{Rd} \leq 1.0$.

For each individual case the transfer of the loads to the bearings of the adjacent components shall be verified for the ultimate limit state and the serviceability limit state. If the bearing element is used in masonry wall, the action effects shall be verified in accordance with EN 1996-1.



Picture 19



For further regulations about planning, design and installation please refer to the German approval (Z-15.7-332).

Table 10: Load bearing capacities depending on the mounting distance

Ref.-No.	Bolt length ① L_B [mm]	Installation distance ① m [mm]	Perm. V_{Rd} [kN]
S355 galvanised (marking ST)			
670TSSN160ST	160	20	24.8
670TSSN170ST	170	30	21.3
670TSSN180ST	180	40	18.6
670TSSN190ST	190	50	16.5
670TSSN200ST	200	60	14.9
670TSSN210ST	210	70	13.5
670TSSN220ST	220	80	12.4
Tempered steel (marking 8)			
670TSSN1608	160	20	38.2
670TSSN1708	170	30	36.1
670TSSN1808	180	40	33.9
670TSSN1908	190	50	31.8
670TSSN2008	200	60	29.7
670TSSN2108	210	70	27.5
670TSSN2208	220	80	25.4
Stainless steel S460 (marking VA)			
670TSSN160VA	160	20	28.0
670TSSN170VA	170	30	24.0
670TSSN180VA	180	40	21.0
670TSSN190VA	190	50	18.7
670TSSN200VA	200	60	16.8
670TSSN210VA	210	70	15.3
670TSSN220VA	220	80	14.0

① More information about the bolt length L_B and installation distance m on page 9 (Calculation of the bolt length)

Impact sound

Impact sound reduction

The application of the TSS system ensures the increased impact sound protection recommended by DIN 4109 supplement 2. Compared to conventional bearings the TSS system achieves a considerable reduction of impact sound. For the different types of the TSS system the determined impact sound reduction is given in table 11 as a function

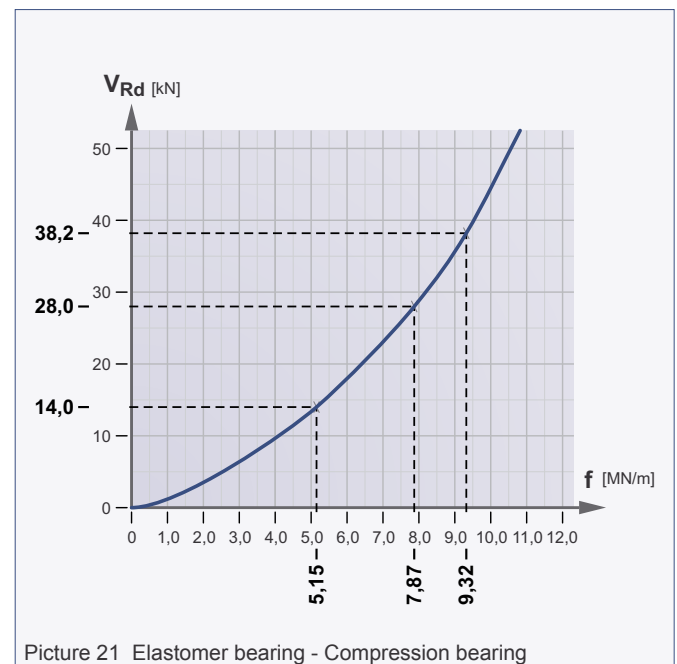
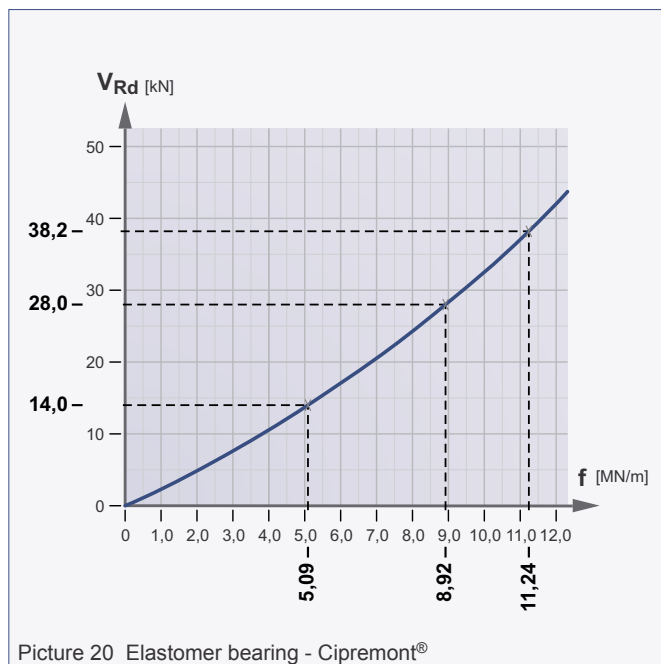
of the actual bearing element and an increasing support reaction. All values of the impact sound reduction are results from tests done by the notified body ITA ("Ingenieurgesellschaft für Technische Akustik mbH") in Germany.

Table 11: Impact sound reduction

Impact sound insulation acc. to DIN 4109	Supplement 2 to DIN 4109 increased impact sound insulation	Weighted normalised impact sound pressure level table 20 supplement 1, DIN 4109	Arithmetically achievable impact sound pressure level	Impact sound reduction
req. $L'_{n,w}$ [dB]	req. $L'_{n,w}$ [dB]	$L_{n,w,eq,R}$ [dB]	$L'_{n,w,R}$ [dB]	$\Delta L_{w,R}$ [dB]
67TSEN-CIP / 67TSEN-CIP (Cipremont®)				
58	46	58	27 - 38	31 - 20
67TSEN / 67TSEN (Compression bearing)				
58	46	58	39 - 44	19 - 14

Spring stiffness

If a FEM calculation is required to determine the support reactions the spring stiffness according to Picture 20 or 21 is to be used for each individual support.

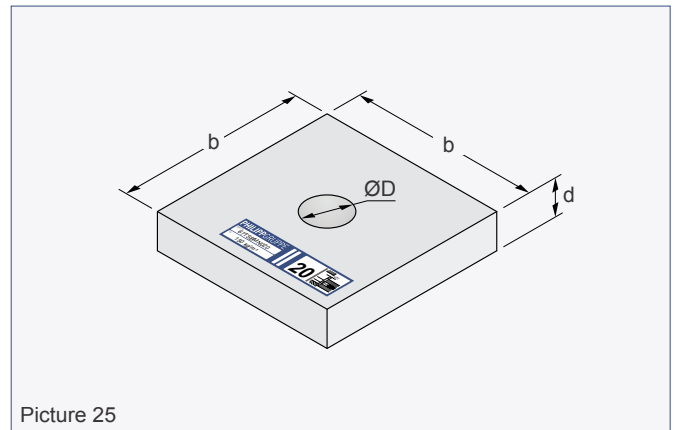


Fire protection plate

The TSS fire protection plate meets the requirements of the fire protection expert opinion for non-flammable mineral wool. It guarantees the fire resistance class R90 according to DIN 4102-2 when the edge distances specified in table 8 are observed. The Fire protection plate consists of a jacketed mineral wool core and is available in thicknesses of 20, 30 and 50 mm. It must be placed with slight pressure load on both sides to the final installation position close to both elements.

Installation

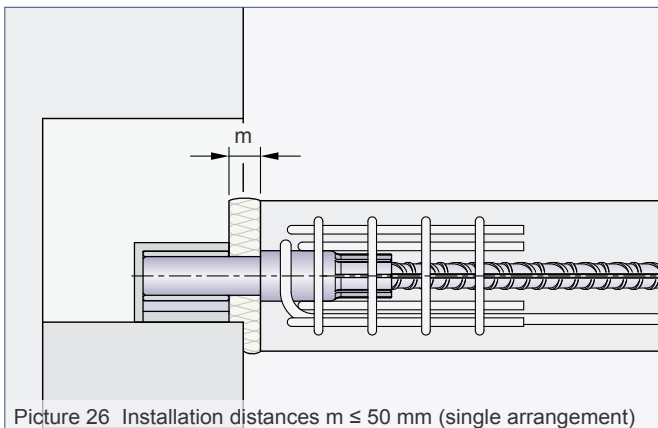
The Fire protection plate is pushed onto the fully screwed-in threaded bolt. In order to cover installation distances from 30 mm up to 80 mm with the plate, it is possible to combine plates of different thicknesses. Pay attention during the actual installation of the TSS that the bearing element is pushed onto the bolt until the back plane touches the end of the bolt. Depending on the dimension of the bearing edge distance it might be necessary to cut the fire protection plate in the bearing area.



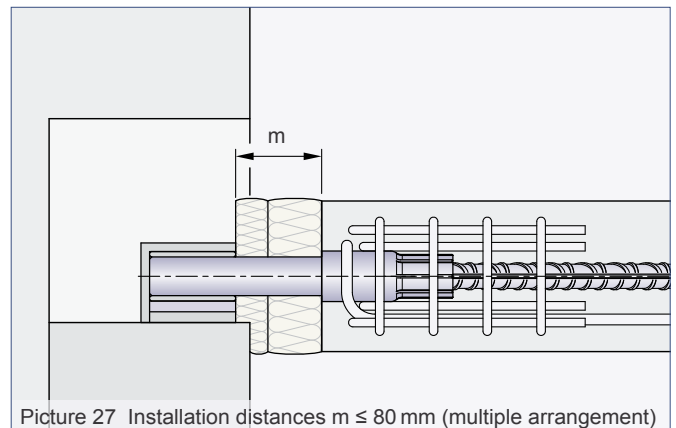
Picture 25

Table 13: Fire protection plate

Ref.-No.	Type [kg/m ³]	ØD [mm]	d [mm]	b [mm]
67TSBMN020	150	36	20	150
67TSBMN030	150	36	30	150
67TSBMN050	150	36	50	150



Picture 26 Installation distances $m \leq 50$ mm (single arrangement)

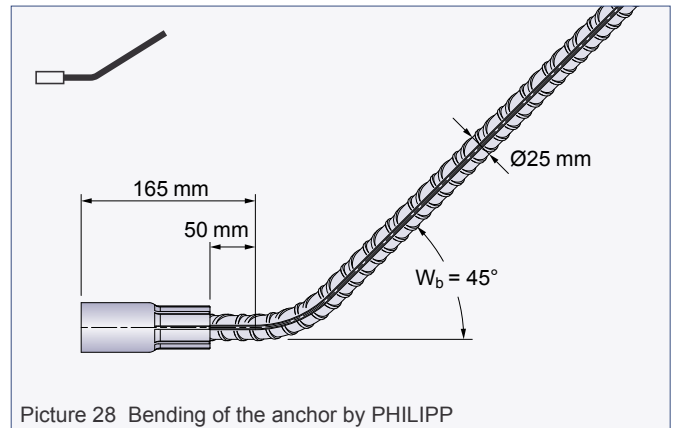


Picture 27 Installation distances $m \leq 80$ mm (multiple arrangement)

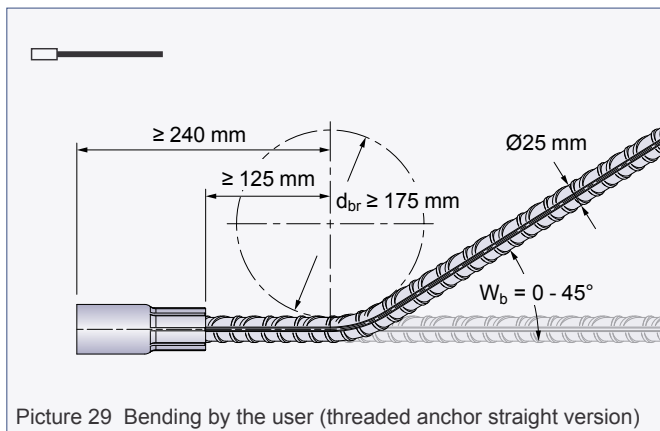
Bending of threaded anchors

Bending of threaded anchors by the user

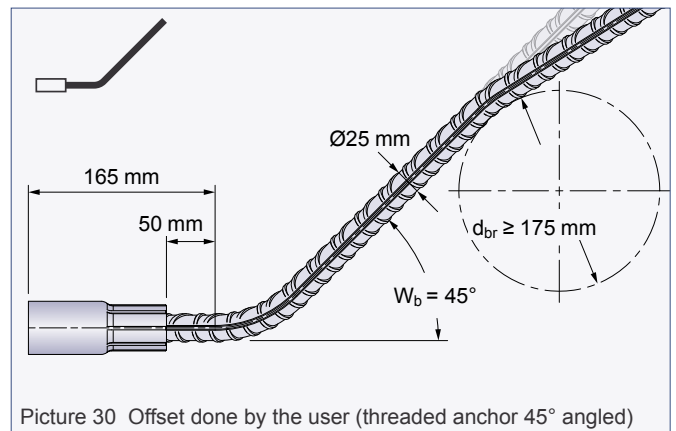
The bending of threaded anchors requires a minimum distance to the socket, at least 5 times of the rebar diameter (125 mm). If the anchor is already bent by PHILIPP, this dimension can be reduced to 2 times of the rebar diameter. The mantrel diameter d_{br} must be at least 7 times of the rebar diameter (175 mm). If the threaded anchor is bent a deformation of the crimped-on socket must be avoided.



Picture 28 Bending of the anchor by PHILIPP



Picture 29 Bending by the user (threaded anchor straight version)



Picture 30 Offset done by the user (threaded anchor 45° angled)

Installation of the bearing element

During installation, the threaded bolt is completely screwed into the socket by hand through a recess in the wall. Naturally, the block-out in the wall has to be adapted to the requirements given at the job-site. Guiding values are given in the following pictures.

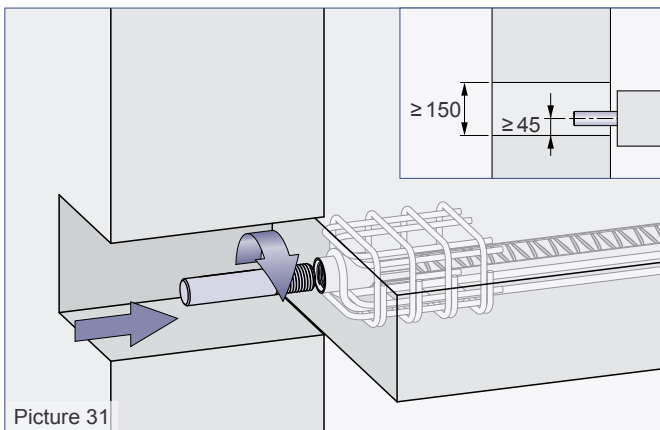
Then, the bearing element is completely pushed onto the bolt screwed-in. A mortar bed, the bearing element is placed on, levels minor irregularities. Also possible is to take steel plates in order to achieve a uniform level of support.

A grouting of the previously created block-out is necessary to ensure a long-lasting bearing. Here, attention has to be paid not to create acoustic bridges during grouting.

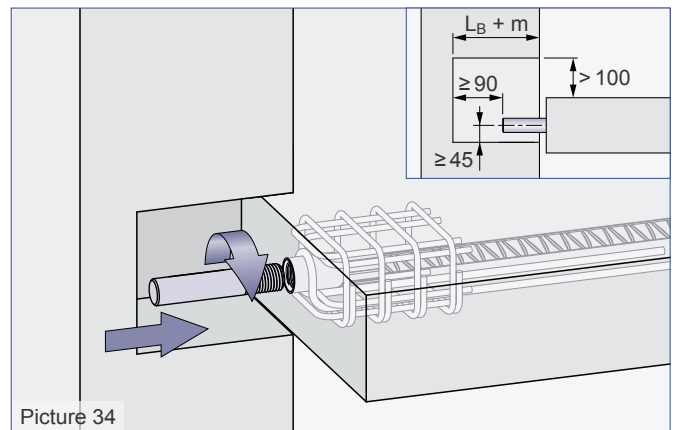
If the Fire protection plate is used, it shall be pushed onto the bolt first, then the bearing element follows.



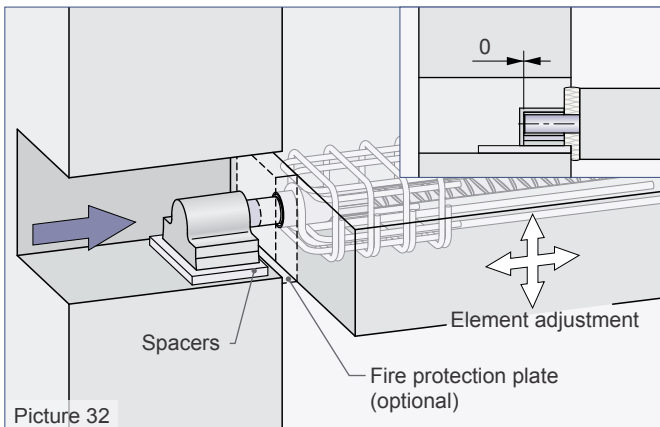
The bearing elements must not be pushed on the screwed-in threaded bolt during transport of the concrete elements.



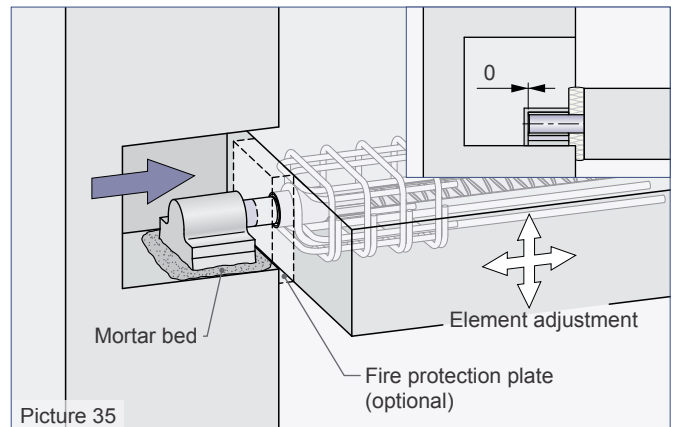
Picture 31



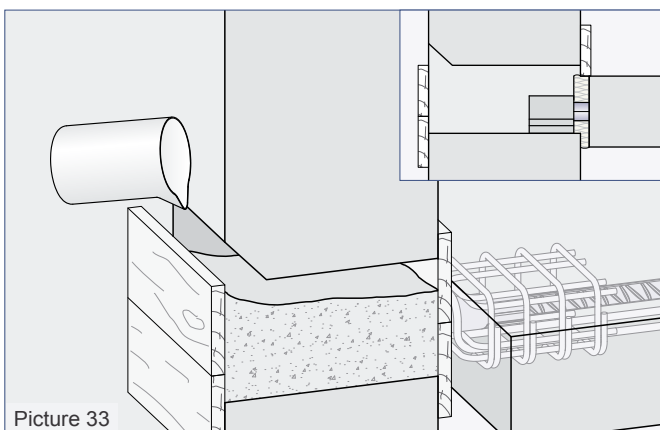
Picture 34



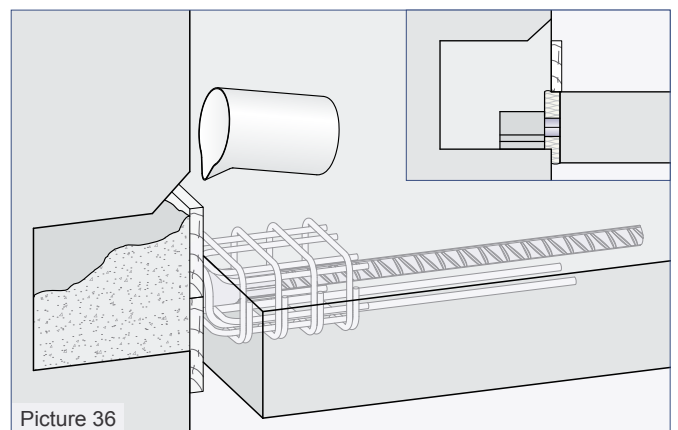
Picture 32



Picture 35



Picture 33



Picture 36

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
solutions

PHILIPPGROUP



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