



# PHILIPP Hole Anchor System

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## Installation Instruction



07/07 - EN

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**Table 7:** Reinforcement of Thin Concrete Units; Concrete Strength  $\beta_w \geq 15 \text{ N/mm}^2$

Load Group	Load Rate	Tension $\beta \leq 30^\circ$			Tension $\beta > 30^\circ$			
		Crosswise Reinforcement double sided [mm <sup>2</sup> /m]	Stirrups BSt 500S n dia. x L <sub>1</sub> [mm]	Edge Reinforcement BSt 500 S [mm]	Crosswise Reinforcement double sided [mm <sup>2</sup> /m]	Stirrups BSt 500S n dia. x L <sub>1</sub> [mm]	Edge Reinforcement BSt 500 S [mm]	⊕ Diagonal Reinforcement BSt 500 S n dia. x L <sub>0</sub> [mm]
2.5	0.7	131	constructive	constructive	131	4 dia. 6 x 300	dia. 8	dia. 6 x 450
	1.4	131	2 dia. 6 x 400	constructive	131	4 dia. 6 x 400	dia. 8	dia. 6 x 900
	2.0	131	2 dia. 6 x 500	constructive	131	4 dia. 6 x 500	dia. 8	dia. 8 x 950
	2.5	131	2 dia. 8 x 600	constructive	131	4 dia. 8 x 600	dia. 10	dia. 8 x 1200
5.0	3.0	131	2 dia. 8 x 700	constructive	131	4 dia. 8 x 700	dia. 10	dia. 10 x 1150
	4.0	131	2 dia. 8 x 800	constructive	131	4 dia. 8 x 800	dia. 12	dia. 10 x 1500
	5.0	131	2 dia. 10 x 800	constructive	131	4 dia. 10 x 800	dia. 12	dia. 12 x 1550
10.0	7.5	188	4 dia. 10 x 800	dia. 10	188	4 dia. 10 x 800	dia. 12	dia. 14 x 2000
	10.0	188	6 dia. 10 x 1000	dia. 12	188	6 dia. 10 x 1000	dia. 14	dia. 16 x 2300
26.0	14.0	257	6 dia. 10 x 1000	dia. 14	257	8 dia. 10 x 1000	dia. 14	dia. 20 x 2600
	22.0	257	8 dia. 10 x 1200	dia. 14	257	8 dia. 10 x 1200	dia. 16	dia. 28 x 3450

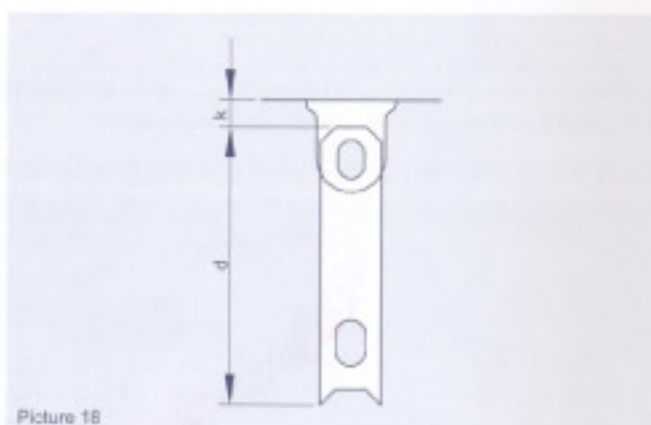
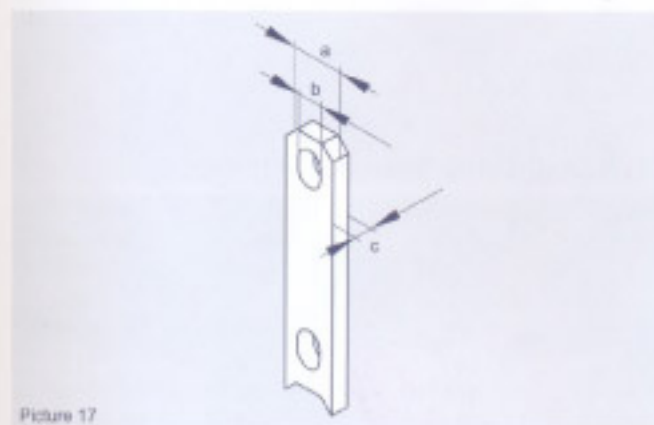
⊕ Diagonal tension reinforcement is not required if

- at a concrete strength of  $\beta_w \geq 15 \text{ N/mm}^2$  + 3-fold min. thickness of unit
- at a concrete strength of  $\beta_w \geq 25 \text{ N/mm}^2$  + 2.5-fold min. thickness of unit
- at a concrete strength of  $\beta_w \geq 35 \text{ N/mm}^2$  + 2-fold min. thickness of unit

## 3.2 Two Hole Anchor PLA-ZA

### 3.2.1 Anchor Dimensions

The head of the two hole anchor is identical to the head of the spread anchor. There is a second hole for additional reinforcement. The anchorage in concrete is achieved by means of a reinforcement tail. Longer anchors with additional holes can be produced on request.



**Table 8:** Dimensions Two Hole Anchor PLA-ZA

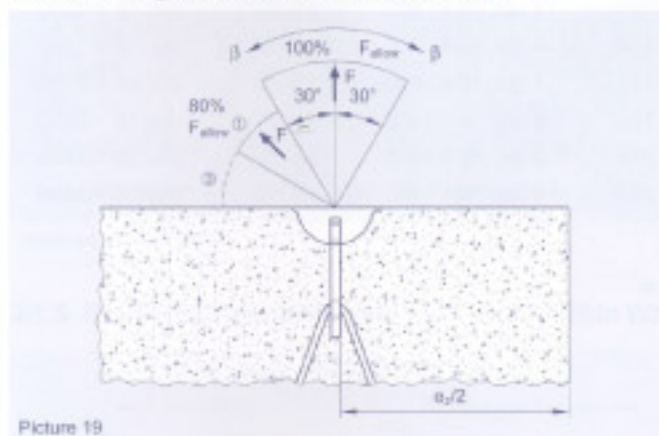
Designation bright	Art.-No.	Designation hot-dip galvanized	Art.-No.	Load Group	a	b	c	d	k
					[mm]	[mm]	[mm]	[mm]	[mm]
PLA-ZA 1.4- 9	48ZA014090	PLA-ZA 1.4- 9 FV	48ZA014090FV	2.5	30	14	6	90	10
PLA-ZA 2.0- 9	48ZA020090	PLA-ZA 2.0- 9 FV	48ZA020090FV		30	14	8	90	
PLA-ZA 2.5- 9	48ZA025090	PLA-ZA 2.5- 9 FV	48ZA025090FV		30	14	10	90	
PLA-ZA 3.0-12	48ZA030120	PLA-ZA 3.0-12 FV	48ZA030120FV	5.0	40	18	10	120	10
PLA-ZA 4.0-12	48ZA040120	PLA-ZA 4.0-12 FV	48ZA040120FV		40	18	12	120	
PLA-ZA 5.0-12	48ZA050120	PLA-ZA 5.0-12 FV	48ZA050120FV		40	18	15	120	

**Continuation Table 8: Dimensions Two Hole Anchor PLA-ZA**

Designation bright	Art.-No.	Designation hot-dip galvanized	Art.-No.	Load Group	a [mm]	b [mm]	c [mm]	d [mm]	k [mm]
PLA-ZA 7.5-16	48ZA075160	PLA-ZA 7.5-16 FV	48ZA075160FV	10.0	60	26	16	160	15
PLA-ZA 10.0-17	48ZA100165	PLA-ZA 10.0-17 FV	48ZA100165FV		60	30	20	165	
PLA-ZA 14.0-24	48ZA140240	PLA-ZA 14.0-24 FV	48ZA140240FV		80	35	20	240	
PLA-ZA 22.0-30	48ZA220300	PLA-ZA 22.0-30 FV	48ZA220300FV	26.0	90	35	28	300	15
PLA-ZA 26.0-30	48ZA260300	PLA-ZA 26.0-30 FV	48ZA260300FV		120	65	30	300	

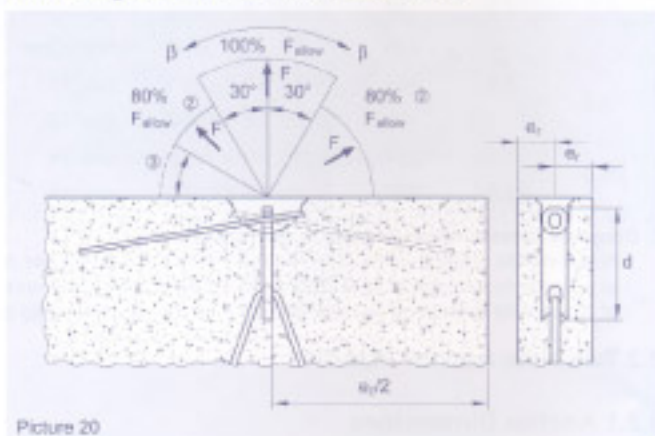
### 3.2.2 Load Bearing Capacities, Edge and Center Distances

#### Without diagonal tension reinforcement



Picture 19

#### With diagonal tension reinforcement



Picture 20

The diagonal tension reinforcement has to be positioned close to the recess former.

⊙ Diagonal tension with  $30^\circ < \beta \leq 60^\circ$  without diagonal tension reinforcement only admissible when:

$\beta_{wy} \geq 15 \text{ N/mm}^2 + 3\text{-fold min. thickness of unit}$

$\beta_{wy} \geq 25 \text{ N/mm}^2 + 2.5\text{-fold min. thickness of unit}$

$\beta_{wy} \geq 35 \text{ N/mm}^2 + 2\text{-fold min. thickness of unit}$

(minimum thickness of unit:  $e = 2 \times e_y$ )

⊚ Where concrete strength  $\beta_{wy} \geq 23 \text{ N/mm}^2$   $F_{allow}$  can be taken as 100%.

⊛ Angle of  $\beta > 60^\circ$  due to cable spread are inadmissible!

**Table 9: Load Bearing Capacities, Edge and Axis Distances PLA-ZA, Concrete Strength  $\beta_{wy}=15\text{N/mm}^2$**

Designation	Load Group	Anchor Length d	Anchor Center Distance min $e_y$	min. Unit Thickness $2 \times e_y$	100% $F_{allow}$ Tension $\beta \leq 30^\circ$	80% $F_{allow}$ Diagonal Tension $\beta > 30^\circ$
		[mm]	[mm]	[mm]	[kN]	[kN]
PLA-ZA 1.4-9	2.5	90	500	80	14	11.2
PLA-ZA 2.0-9		90	600	90	20	16.0
PLA-ZA 2.5-9		90	600	100	25	20.0
PLA-ZA 3.0-12	5.0	120	650	100	30	24.0
PLA-ZA 4.0-12		120	700	110	40	32.0
PLA-ZA 5.0-12		120	750	120	50	40.0
PLA-ZA 7.5-16	10.0	160	1200	130	75	60.0
PLA-ZA 10.0-17		165	1200	140	100	80.0
PLA-ZA 14.0-24		240	1500	160	140	112.0
PLA-ZA 22.0-30	26.0	300	1500	180	220	176.0
PLA-ZA 26.0-30		300	1500	200	260	208.0

The reinforcement data of the Tables 10 and 15 have to be taken into account.

## 3.2.3 Reinforcement in the Anchor Zone

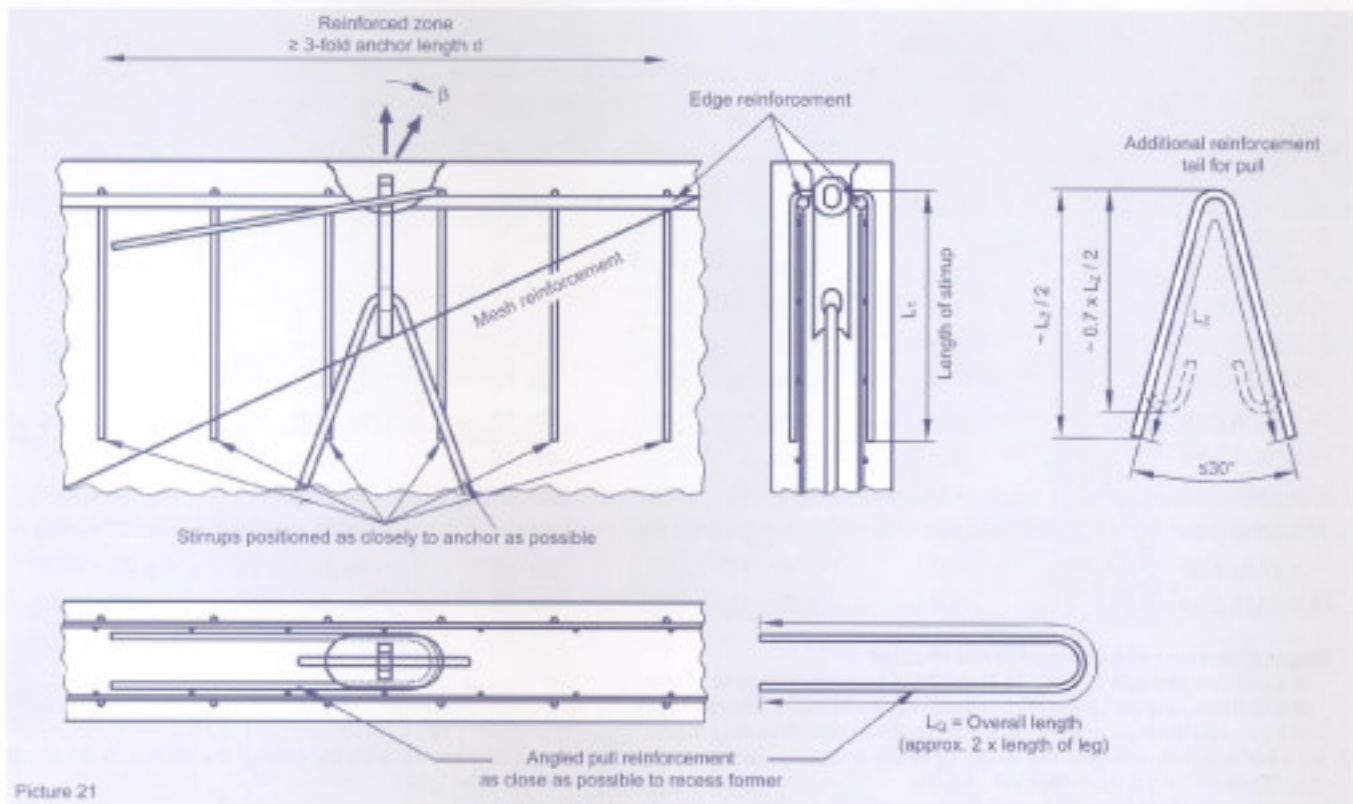


Figure 21

**Table 10:** Reinforcement, Concrete Strength  $\beta_{WV} \geq 15 \text{ N/mm}^2$ , Tension  $\beta \leq 30^\circ$

Designation	Load Group	Tension $\beta \leq 30^\circ$			
		Crosswise Reinforcement double sided	Stirrups BSt 500 S n dia. $\times L_1$	Edge Reinforcement 500 S	③ Additional Reinforcement BSt 500 S n dia. $\times L_1$ double sided
		[mm <sup>2</sup> /m]	[mm]	[mm]	
PLA-ZA 1.4-9	2.5	131	2 dia. 6 $\times$ 400	constructive	1 dia. 10 $\times$ 650
PLA-ZA 2.0-9		131	2 dia. 6 $\times$ 500	constructive	1 dia. 12 $\times$ 800
PLA-ZA 2.5-9		131	2 dia. 8 $\times$ 600	constructive	1 dia. 12 $\times$ 1000
PLA-ZA 3.0-12	5.0	131	2 dia. 8 $\times$ 700	constructive	1 dia. 14 $\times$ 1000
PLA-ZA 4.0-12		131	2 dia. 8 $\times$ 700	constructive	1 dia. 16 $\times$ 1200
PLA-ZA 5.0-12		131	2 dia. 8 $\times$ 800	constructive	1 dia. 16 $\times$ 1500
PLA-ZA 7.5-16	10.0	131	2 dia. 10 $\times$ 800	dia. 10	1 dia. 20 $\times$ 1750
PLA-ZA 10.0-17		131	4 dia. 10 $\times$ 800	dia. 12	1 dia. 25 $\times$ 1850
PLA-ZA 14.0-24		131	4 dia. 10 $\times$ 1000	dia. 14	1 dia. 28 $\times$ 2350
PLA-ZA 22.0-30	26.0	131	4 dia. 12 $\times$ 1200	dia. 14	1 dia. 28 $\times$ 3000
PLA-ZA 26.0-30		131	6 dia. 12 $\times$ 1200	dia. 14	2 dia. 28 $\times$ 3050

③ for other concrete strengths the length  $L_2$  of the additional reinforcement can be reduced depending on the ratio of the allowed bond stresses ( $\beta_W = 25 \text{ N/mm}^2 : \times 0.8$ ;  $\beta_V = 35 \text{ N/mm}^2 : \times 0.65$ ).

At lower concrete strength or light weight concrete please contact us.

**Table 11:** Reinforcement, Concrete Strength  $\beta_W \geq 15 \text{ N/mm}^2$ ; Tension  $\beta > 30^\circ$

Designation	Load Group	Crosswise Reinforcement double sided	Stirrups BSt 500 S n dia. $\times L_1$	Tension $\beta > 30^\circ$		
				Edge Reinforcement BSt 500 S	② Additional Reinforcement BSt 500 S n dia. $\times L_1$	① Diagonal Reinforcement BSt 500 S n dia. $\times L_D$
		[mm <sup>2</sup> /m]	[mm]	[mm]		[mm]
PLA-ZA 1.4- 9	2.5	131	4 dia. 6 $\times$ 400	dia. 8	1 dia. 10 $\times$ 650	dia. 6 $\times$ 900
PLA-ZA 2.0- 9		131	4 dia. 6 $\times$ 500	dia. 8	1 dia. 10 $\times$ 800	dia. 8 $\times$ 950
PLA-ZA 2.5- 9		131	4 dia. 8 $\times$ 600	dia. 10	1 dia. 12 $\times$ 1000	dia. 8 $\times$ 1200
PLA-ZA 3.0-12	5.0	131	4 dia. 8 $\times$ 700	dia. 10	1 dia. 14 $\times$ 1000	dia. 10 $\times$ 1150
PLA-ZA 4.0-12		131	4 dia. 8 $\times$ 800	dia. 12	1 dia. 16 $\times$ 1200	dia. 10 $\times$ 1500
PLA-ZA 5.0-12		131	4 dia. 10 $\times$ 800	dia. 12	1 dia. 16 $\times$ 1500	dia. 12 $\times$ 1550
PLA-ZA 7.5-16	10.0	131	4 dia. 10 $\times$ 800	dia. 12	1 dia. 20 $\times$ 1750	dia. 14 $\times$ 2000
PLA-ZA10.0-17		131	6 dia. 10 $\times$ 1000	dia. 14	1 dia. 25 $\times$ 1850	dia. 16 $\times$ 2300
PLA-ZA14.0-24	26.0	131	8 dia. 10 $\times$ 1000	dia. 14	1 dia. 28 $\times$ 2350	dia. 20 $\times$ 2600
PLA-ZA22.0-30		131	8 dia. 10 $\times$ 1200	dia. 16	1 dia. 28 $\times$ 3000	dia. 25 $\times$ 3000
PLA-ZA26.0-30		131	8 dia. 12 $\times$ 1200	dia. 16	2 dia. 28 $\times$ 3050	dia. 28 $\times$ 3450

① Diagonal tension reinforcement is not required

- at a concrete strength of  $\beta_W \geq 15 \text{ N/mm}^2$  + 3-fold min. thickness of unit
- at a concrete strength of  $\beta_W \geq 25 \text{ N/mm}^2$  + 2.5-fold min. thickness of unit
- at a concrete strength of  $\beta_W \geq 35 \text{ N/mm}^2$  + 2-fold min. thickness of unit

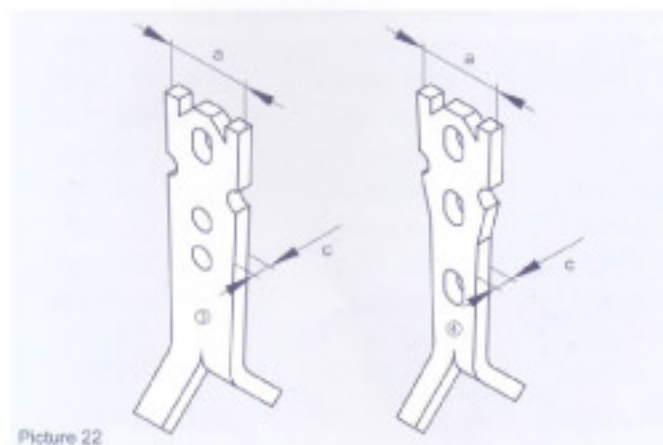
② for other concrete strengths the length  $L_2$  of the additional reinforcement can be reduced depending on the ratio of the allowed bond stress ( $\beta_W=25\text{N/mm}^2 : \times 0.8$ ;  $\beta_W=35\text{N/mm}^2 : \times 0.65$ )

At lower concrete strength or light weight concrete please contact us.

### 3.3 Erection Anchor PLA-AB-double sided/ Erection Anchor PLA-AE-one sided

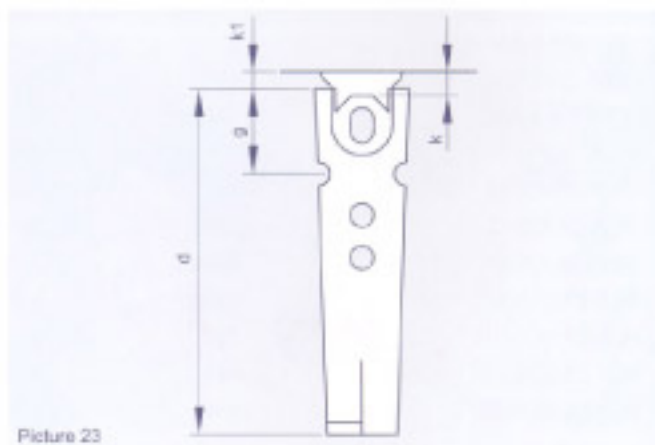
#### 3.3.1 Anchor Dimensions Erection Anchor PLA-AB-double sided

The special shaped anchor head means that the pitching/turning loads are taken by the anchor and are not transferred through the concrete. This helps to prevent spalling of the concrete. The anchors are notched to assist with the placement of additional reinforcement required in the pitching/turning operation.



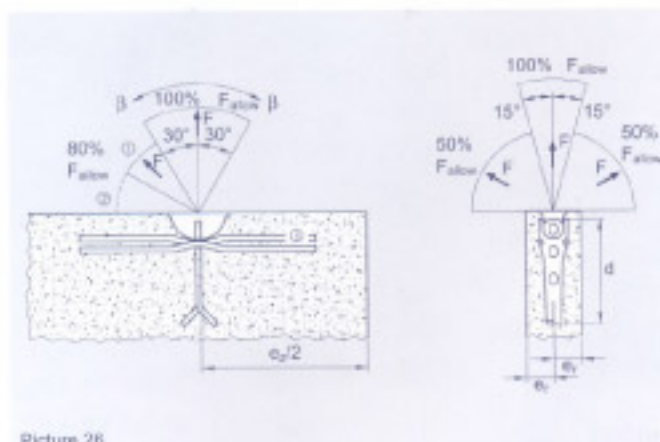
Picture 22

- ① Load Rate 1.4t - 17.0t
- ② Load Rate 22.0t

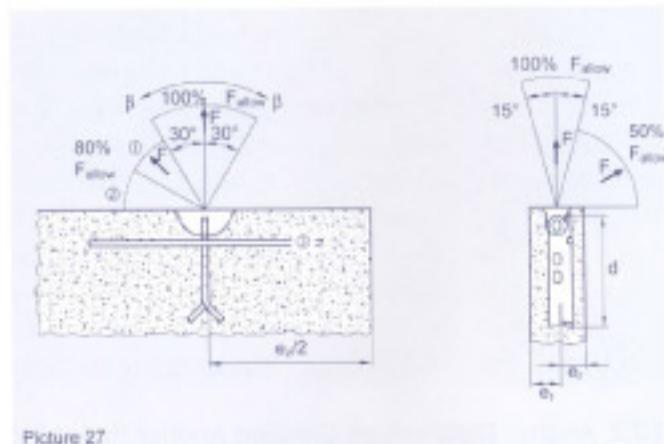


Picture 23

### 3.3.3 Allowed Loads, Edge and Axis Distance



Picture 26



Picture 27

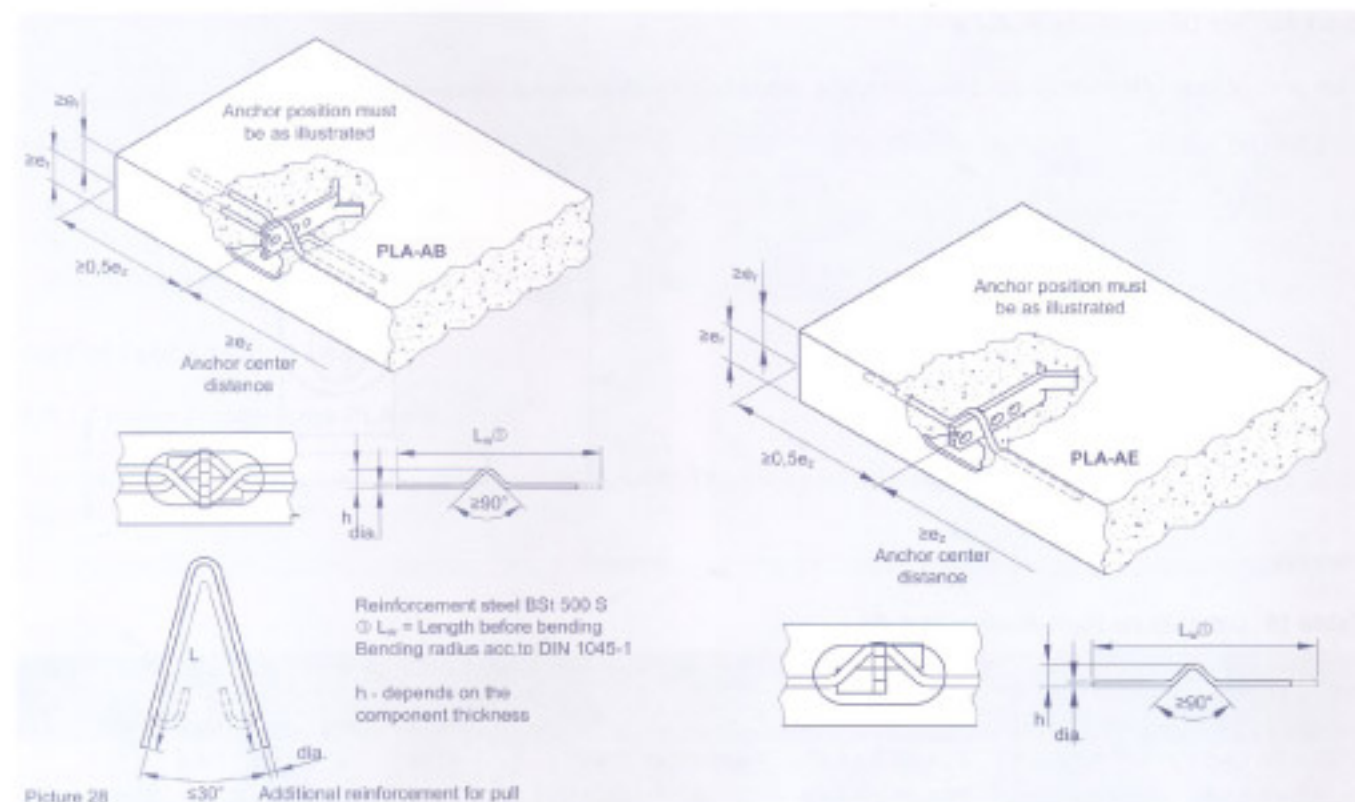
- ① At a concrete strength of  $\beta_w \geq 23\text{N/mm}^2$  100% of the load is admissible.
- ② Angle of  $\beta > 60^\circ$  due to cable spread is not allowed!
- ③ Insert the erection reinforcement in the anchor notches.

**Table 14:** Load Bearing Capacity, Edge and Center Distances, Concrete Strength  $\beta_w \geq 15\text{N/mm}^2$

Load Group	Load Rate	Anchor Length	Anchor Center Distance	Minimum Unit Thickness ( $2 \times e_1$ )				Lifting ↑ Tension $(\beta \leq 30^\circ)$ 100% $F_{allow}$ [kN]	Lifting ↗ Diagonal Tension $(\beta > 30^\circ)$ 80% $F_{allow}$ [kN]	Tilting ↘ 50% $F_{allow}$ [kN]
				with Additional Reinforcement		without Additional Reinforcement				
		d	$e_2$	PLA-AE	PLA-AB	PLA-AE	PLA-AB			
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]			
2.5	1.4	200	700	90	100	90	100	14	11	7
	2.5	230	800	120	120	120	120	25	20	13
5.0	4.0	270	950	140	150	150	150	40	32	20
	5.0	290	1000	140	160	180	180	50	40	25
10.0	7.5	320	1200	160	175	200	200	75	60	38
	10.0	390	1500	200	200	250	250	100	80	50
26.0	12.5	500	1500	240	240	320	320	140	112	70
	17.0	500	1500	300	300	380	380	170	136	85
	22.0	500	1500	360	360	450	450	220	176	110

Please consider reinforcement details on Page 21, Table 15.

## 3.3.4 Reinforcement in the Anchor Zone



Picture 28

The horizontal legs of the tilting and turning reinforcement are located directly within the outermost position of the reinforced area. Tilting reinforcement on both sides also acts as angled pull reinforcement. No additional angled pull reinforcement is required.

### Without additional reinforcement for tension:

Meshes, stirrups and edge reinforcement as for PLA-SA.

### With additional reinforcement for tension:

Meshes, stirrups and edge reinforcement as for PLA-ZA.

Table 15: Reinforcement for Thin-Walled Concrete Units; Concrete Strength  $\beta_W \geq 15\text{N/mm}^2$

Load Group	Load Rate	Tilting Reinforcement BSt 500 dia. $\times$ $L_w/2$ [mm]	Additional Reinforcement for Tension BSt 500 dia. $\times$ L
2.5	1.4	dia. 10 $\times$ 700	dia. 10 $\times$ 650
	2.5	dia. 12 $\times$ 800	dia. 12 $\times$ 1000
5.0	4.0	dia. 14 $\times$ 950	dia. 16 $\times$ 1200
	5.0	dia. 16 $\times$ 1000	dia. 16 $\times$ 1500
10.0	7.5	dia. 20 $\times$ 1200	dia. 20 $\times$ 1750
	10.0	dia. 20 $\times$ 1500	dia. 20 $\times$ 1900
26.0	12.5	dia. 25 $\times$ 1500	dia. 25 $\times$ 2200
	17.0	dia. 25 $\times$ 1800	dia. 28 $\times$ 2500
	22.0	dia. 25 $\times$ 1800	dia. 28 $\times$ 3000

② For other concrete strengths the length  $L_2$  of the additional reinforcement can be reduced depending on the ratio of the allowed bond stresses ( $\beta_W=25\text{N/mm}^2$ :  $\times 0.8$ ;  $\beta_W=35\text{N/mm}^2$ :  $\times 0.65$ )

For lower concrete strengths or light weight concrete please contact us.