PHILIPP GROUP

PHILIPP Spherical head anchor

Installation and Application Instruction

PHILIPP Spherical head anchor

Picture 1

Picture 2
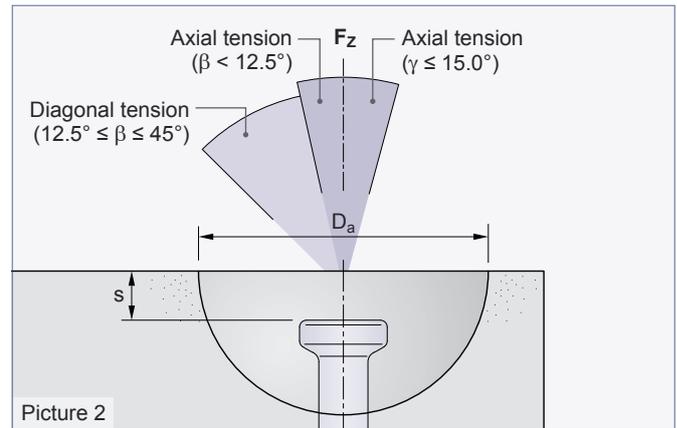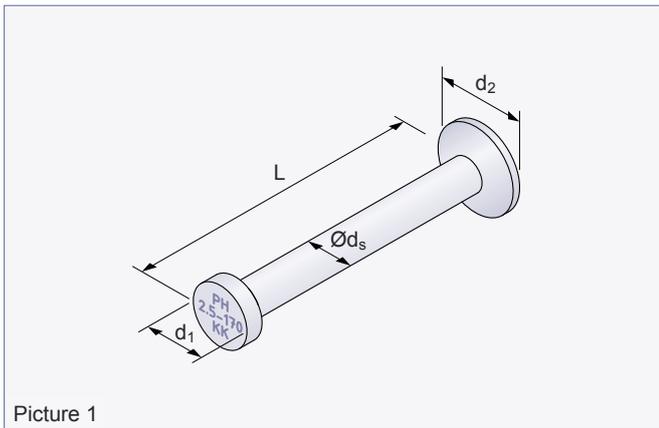
The Spherical head anchor is part of the PHILIPP Transport anchor system and complies with the VDI/BV-BS Guideline "Lifting inserts and lifting insert systems for precast concrete elements" (VDI/BV-BS 6205). The use of Spherical head anchors requires the compliance with this Installation Instruction as well as the General Installation Instruction. The Installation and Application Instruction for the belonging PHILIPP lifting device (Spherical head lifting clutch) as well as the data sheets of the belonging PHILIPP accessories (rubber, steel or magnetic recess formers) must be followed also.

The anchor may only be used in combination with the mentioned PHILIPP lifting devices.
Spherical head anchors are designed for the transport of precast concrete units only. Multiple use within the transport chain (from production to installation of the unit) means no repeated usage. This Installation and Application Instruction does not specify a repeated usage (e.g. ballasts for cranes) or a permanent fixation.

Table 1: Load classes and dimensions								
Ref.-No.	Type	Dimensions						Weight
		L [mm]	Øds [mm]	Ød1 [mm]	Ød2 [mm]	s [mm]	Da [mm]	[kg/100 pcs.]
81 -013-120	KK 1.3	120	10	18	25	10	60	10.0
81 -013-240	KK 1.3	240	10	18	25	10	60	17.0
81 -025-170	KK 2.5	170	14	25	35	11	74	26.0
81 -025-280	KK 2.5	280	14	25	35	11	74	40.0
81 -040-210	KK 4.0	210	18	36	45	15	94	54.0
81 -040-240	KK 4.0	240	18	36	45	15	94	61.0
81 -040-340	KK 4.0	340	18	36	45	15	94	81.0
81 -040-420	KK 4.0	420	18	36	45	15	94	108.0
81 -050-240	KK 5.0	240	20	36	50	15	94	75.0
81 -050-340	KK 5.0	340	20	36	50	15	94	99.0
81 -050-480	KK 5.0	480	20	36	50	15	94	135.0
81 -075-300	KK 7.5	300	24	46	60	15	118	136.0
81 -075-540	KK 7.5	540	24	46	60	15	118	221.0
81 -075-680	KK 7.5	680	24	46	60	15	118	273.0
81 -100-340	KK 10.0	340	28	46	70	15	118	201.0
81 -100-680	KK 10.0	680	28	46	70	15	118	365.0
81 -150-400	KK 15.0	400	34	69	85	15	160	369.0
81 -150-840	KK 15.0	840	34	69	85	15	160	700.0
81 -200-500	KK 20.0	500	38	69	98	15	160	548.0
81 -200-1000	KK 20.0	1000	38	69	98	15	160	1092.0
81 -320-700	KK 32.0	700	50	88	135	23	214	1326.0

To determine the correct type please refer also to our General Installation Instruction.

General notes

Materials

Spherical head anchors consist of a conforming to standards round steel bar with a forged head at both ends. The anchor can be supplied also in electro-galvanised, hot-dip galvanised and stainless steel material.

Application

According to this instruction Spherical head anchors can be used to lift panels and beams. Table 2 shows the bearing capacities of the Spherical head anchors in panels and beams.

Concrete

Concrete strengths f_{cc} given in table 2 and 4 are based on concrete cube strengths at the time of first lifting.

Corrosion

If concrete elements with installed Spherical head anchors are stored outside for a longer time (contact with rain or humidity causes moisture insight the recesses) corrosion may reduce the bearing capacity of the Spherical head anchor. Therefore the anchor may fail under load. In addition, marks on the concrete surface caused by corrosion may appear.

Marking

In order to distinguish the different sizes of Spherical head anchors a marking with load class and length is given on the head of the anchor.
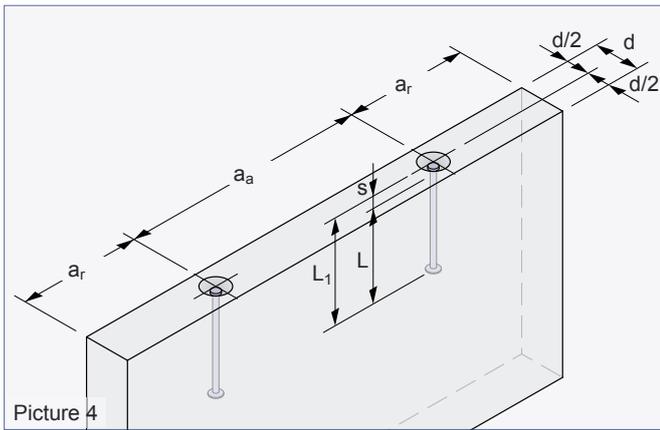
- Marking on anchor head
    - Manufacturer (PH)
    - Load class (e.g. 2.5)
    - Anchor length (e.g. 170)
    - System (KK)
- Marking on anchor foot
    - CE marking ①
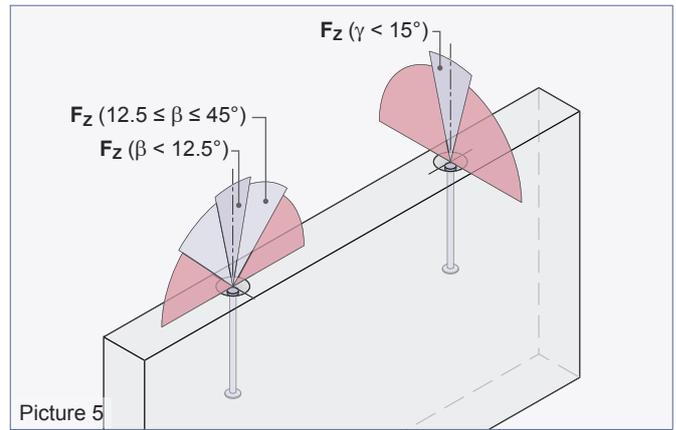   - Material (e.g. A4 for stainless steel SS316)

> ① The EC Declaration of Conformity (DoC) of the Spherical head anchor is available on request or can be downloaded from our website www.philipp-gruppe.de.
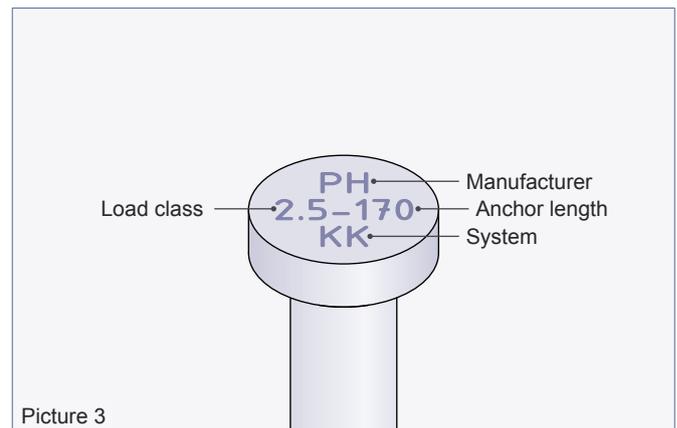
Picture 3

Bearing capacities

Picture 4

Picture 5

Element thicknesses, centre and edge distances

The position and installation of Spherical head anchors in precast concrete units require minimum element dimensions and centre distances for a safe load transfer. Table 2 shows the minimum thickness d of a unit to cover the load directions axial and diagonal tension (β = 0° up to 45°).

Lateral tension is not allowed. The minimum edge distance of the Spherical head transport anchor a_r is min. 1.5 × L_1 (L_1 = L + s) and the minimum distance between each Spherical head transport anchor a_a mind. 3.0 × L_1.

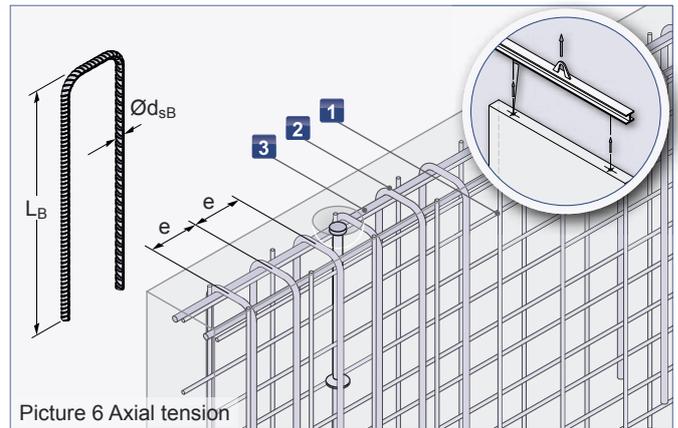| Table 2: Permissible bearing capacities in panels and beams										
Ref.-No.	Load class	Element thicknesses and edge distances			perm.F if f_{cc} is **15 N/mm²**		perm.F if f_{cc} is **25 N/mm²**		perm.F if f_{cc} is **35 N/mm²**	
					Axial tension	**Diagonal tension**	**Axial tension**	**Diagonal tension**	**Axial tension**	**Diagonal tension**
		d [mm]	a_r [mm]	a_a [mm]	0°- 12.5° [kN]	12.5°- 45° [kN]	0°- 12.5° [kN]	12.5°- 45° [kN]	0°- 12.5° [kN]	12.5°- 45° [kN]
81-013-120	1.3	100	195	390	13.0	13.0	13.0	13.0	13.0	13.0
81-013-240			375	750	13.0	13.0	13.0	13.0	13.0	13.0
81-025-170	2.5	120	275	550	25.0	25.0	25.0	25.0	25.0	25.0
81-025-280			440	880	25.0	25.0	25.0	25.0	25.0	25.0
81-040-210	4.0	160	340	680	40.0	40.0	40.0	40.0	40.0	40.0
81-040-240			385	770	40.0	40.0	40.0	40.0	40.0	40.0
81-040-340			835	1070	40.0	40.0	40.0	40.0	40.0	40.0
81-040-420			655	1310	40.0	40.0	40.0	40.0	40.0	40.0
81-050-240	5.0	180	385	770	50.0	50.0	50.0	50.0	50.0	50.0
81-050-340			535	1070	50.0	50.0	50.0	50.0	50.0	50.0
81-050-480			745	1490	50.0	50.0	50.0	50.0	50.0	50.0
81-075-300	7.5	240	475	950	75.0	75.0	75.0	75.0	75.0	75.0
81-075-540			835	1670	75.0	75.0	75.0	75.0	75.0	75.0
81-075-680			1045	2090	75.0	75.0	75.0	75.0	75.0	75.0
81-100-340	10.0	260	535	1070	100.0	100.0	100.0	100.0	100.0	100.0
81-100-680			1045	2090	100.0	100.0	100.0	100.0	100.0	100.0
81-150-400	15.0	280	625	1250	150.0	150.0	150.0	150.0	150.0	150.0
81-150-840			1285	2570	150.0	150.0	150.0	150.0	150.0	150.0
81-200-500	20.0	280	775	1550	200.0	200.0	200.0	200.0	200.0	200.0
81-200-1000			1525	3050	200.0	200.0	200.0	200.0	200.0	200.0
81-320-700	32.0	300	1085	2170	216.1	206.1	310.0	295.7	320.0	320.0
		320			231.1	216.0	320.0	309.8	320.0	320.0
		340			246.2	225.8	320.0	320.0	320.0	320.0
		360			261.2	235.6	320.0	320.0	320.0	320.0
		380			276.2	245.4	320.0	320.0	320.0	320.0
		400			291.3	255.3	320.0	320.0	320.0	320.0

For smaller element thicknesses please contact our technical department at +49 (0) 60 21 / 40 27-318 or technik@philipp-gruppe.de
The weight of 1.0 t corresponds to 10.0 kN.

Reinforcement

Basic reinforcement

For the usage of Spherical head anchors a minimum reinforcement in the concrete elements is required (Picture 6). This minimum reinforcement can be replaced by a comparable steel bar reinforcement. At the first time of lifting the concrete must have a minimum strength f_{cc} of **15 N/mm²**. Should it be necessary to cut single bars for the installation of Spherical head anchors these have to be replaced by bars of the same diameter, strength and lap length according to EC 2. The user is personally responsible for further transmission of load into the concrete unit.


Picture 6 Axial tension

Load class	Mesh reinforcement (square) [1]	U-bar ① (B500B) [2]						Longitudinal reinforcement (B500B) [3]
		if **axial tension** ≤ 12.5°			if **diagonal tension** > 12.5°			
		Quantity and Ød_{sB}	L_B	e	Quantity and Ød_{sB}	L_B	e	Quantity and Ø
	[mm²/m]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
1.3	131	6 Ø 8	600	100	6 Ø 8	600	100	2 Ø 10
2.5	131	6 Ø 8	600	100	6 Ø 8	600	100	2 Ø 10
4.0	131	6 Ø 8	600	100	6 Ø 8	600	100	2 Ø 10
5.0	131	6 Ø 8	600	125	6 Ø 8	600	125	2 Ø 10
7.5	221	6 Ø 8	600	125	6 Ø 8	600	125	2 Ø 10
10.0	257	6 Ø 10	1000	125	6 Ø 10	1000	125	2 Ø 14
15.0	378	6 Ø 10	1000	125	6 Ø 10	1000	125	2 Ø 14
20.0	513	6 Ø 10	1000	125	6 Ø 10	1000	125	2 Ø 14
32.0	524	8 Ø 12	1400	125	10 Ø 12	1400	125	2 Ø 16

Table 3: Minimum reinforcement in panels and beams

① The first U-bar in the anchor area should be placed as close as possible to the anchor.

Additional reinforcement for diagonal tension

If the Spherical head transport anchor is used under diagonal tension (β ≥ 12.5°) an additional reinforcement according to Table 4 is required. The reinforcement for diagonal tension is placed contrarily to the tensile direction and must have direct pressure contact to the anchor shaft in the peak of its bending (Picture 7).
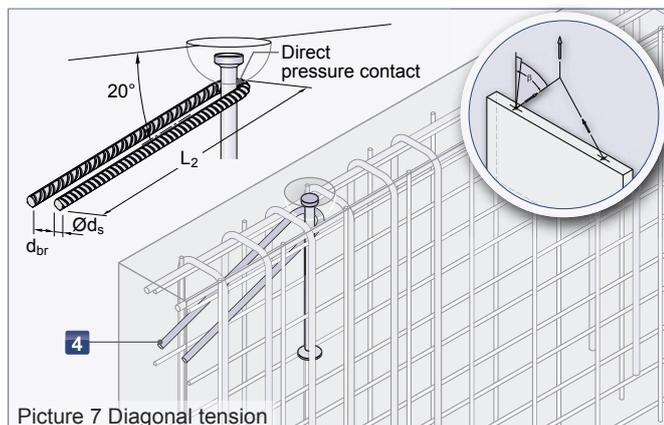
Picture 7 Diagonal tension

Load class	Reinforcement for diagonal tension [4]			
	Number [pcs.]	Ød_s [mm]	L_2 [mm]	d_{br} [mm]
1.3 ①	1	Ø8	200	32
2.5 ①	1	Ø10	320	40
4.0 ①	1	Ø14	350	56
5.0 ①	1	Ø16	400	64
7.5 ①	1	Ø20	500	140
10.0 ①	1	Ø20	650	140
15.0 ①	1	Ø25	750	175
20.0 ①	1	Ø25	950	175
32.0	2	Ø25	1200	200

Table 4: Additional reinforcement for diagonal tension (material B500B) (required if β ≥ 12.5°)

① A reinforcement for diagonal tension is not necessary, if the concrete strength at the first lift is at least f_{cc} = 30 N/mm² and the minimum thicknesses and edge distances given in table 2 are met.

Notes: