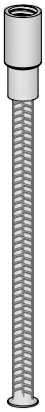
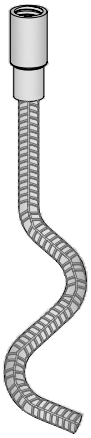
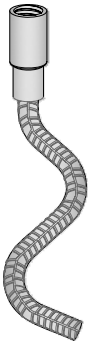
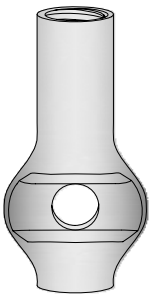
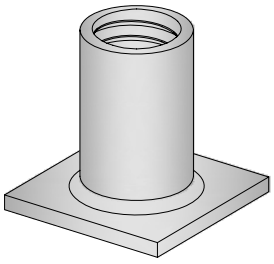
Threaded Lifting Anchors

SALON TUKITUOTE

Instructions of use

			
Bar Anchor SNA (pages 2-6)	**Bar Anchor SNA-T** (pages 7-13)	**Waved Anchor DWL** (pages 14-18)	**Waved Anchor DWK** (pages 19-21)

		
Lifting Socket HA (pages 22-26)	**Lifting Socket HAL** (pages 27-31)	**Lifting Socket HLA** (pages 32-36)

Bar Anchor SNA

Bar Anchors are supplied factory finished and consist of a socket swaged to a reinforcement bar. The construction of the anchor is specially designed for thin panels and walls.

Bar Anchors can be used in concrete with a compressive strength ≥ 15 N/mm^2 and the minimum necessary surface reinforcement (for Rd 12, Rd 14, Rd 16 ≥ 130mm^2/m; for the other types ≥ 188mm^2/m).

Care is to be taken if there is the possibility of cracks in the total tension zone. In this case a Waved Anchor would be more suitable.

Anchor with internal thread is set into the concrete before the casting and serves a basis for wire Lifting Loops, Lifting Loops "Goliath", Lifting Loops with Pressure Plate and Swivel Eye. There is the half-round metric thread Rd in the socket of the anchors, which should be greased before the installation into the precast concrete unit. The fastening details equipped with normal metric standard thread can be fastened to Rd thread.

For fastening to a steel formwork, Magnetic Holders models HM4 are recommended. To prevent dirt and concrete from penetrating into the thread of the socket, external caps or Holding Discs are used. Holding Discs are used to fasten anchors to a wooden formwork.

Bar Anchor length can be changed according to certain conditions of installation. But it should be noted that in this case the change of length also affects the value of the maximum permissible load.

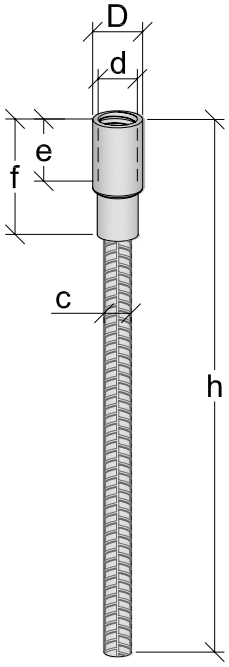


Fig.1: *Standard bar formatting*

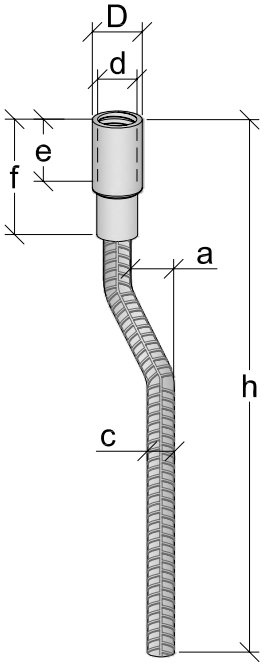


Fig.2: *Version of bar formatting (for multilayer construction lifting). Price on request*

Materials:

Socket – • zinc-plated or
• stainless steel

Bar – • untreated steel

Table 1: Bar Anchor SNA (zinc-plated) (Fig.1)

Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	c [mm]	f [mm]
0100	0.5	Rd 12x190	12	190	16	22	8	40
0102	0.8	Rd 14x230	14	230	20	25	10	48
0104	1.2	Rd 16x250	16	250	22	27	12	58
0106	1.6	Rd 18x300	18	300	25	34	14	65
0108	2.0	Rd 20x350	20	350	27	35	16	70
0112	2.5	Rd 24x400	24	400	31	43	16	80
0116	4.0	Rd 30x500	30	500	38	56	20	101
0118	4.0	Rd 30x900	30	900	38	56	20	101
0120	6.3	Rd 36x650	36	650	48	69	25	110
0122	6.3	Rd 36x900	36	900	48	69	25	110
0124	8.0	Rd 42x800	42	800	54	80	28	140
0126	12.5	Rd 52x900	52	900	70	90	28	170

Table 2: Bar Anchor SNA (stainless steel) (Fig.1)

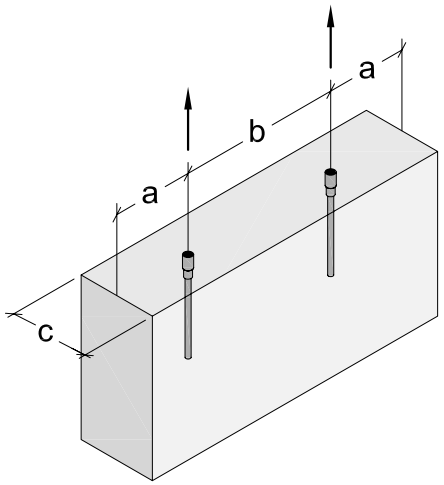
Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	c [mm]	f [mm]
0100E	0.5	Rd 12x190	12	190	16	22	8	40
0102E	0.8	Rd 14x230	14	230	20	25	10	48
0104E	1.2	Rd 16x250	16	250	22	27	12	58
0106E	1.6	Rd 18x300	18	300	25	34	14	65
0108E	2.0	Rd 20x350	20	350	27	35	16	70
0112E	2.5	Rd 24x400	24	400	31	43	16	80
0116E	4.0	Rd 30x500	30	500	38	56	20	101
0118E	4.0	Rd 30x900	30	900	38	56	20	101
0181	6.3	Rd 36x650	36	650	48	69	25	110
0181-900	6.3	Rd 36x900	36	900	48	69	25	110
0124E	8.0	Rd 42x800	42	800	54	80	28	140
0126E	12.5	Rd 52x900	52	900	70	90	28	170

Installation Instructions for Bar Anchors SNA

1. Spacing of Bar Anchors SNA and edge distances

Table 3: Minimal dimensions

Type	a [mm]	b_{min} [mm]	c_{min} [mm]	c_{red}* [mm]
Rd 12	150	300	60	55
Rd 14	200	400	70	60
Rd 16	200	400	80	65
Rd 18	250	500	95	80
Rd 20	275	550	110	90
Rd 24	300	600	125	100
Rd 30	350	650	140	120
Rd 36	400	800	200	160
Rd 42	500	1000	240	180
Rd 52	600	1200	280	200



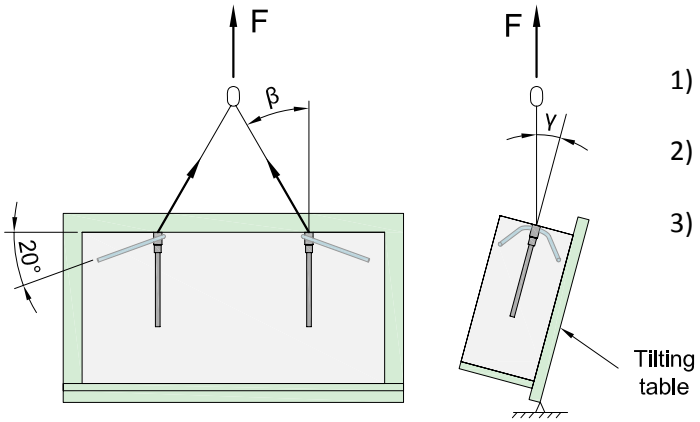
*the reduced panel thickness can be used, when the anchor is stressed by straight pull or parallel shear pull $\beta < 30^{o}$

2. Anchorage reinforcement

Bar Anchors are manufactured completely with anchorage reinforcement. Bar Anchors can be installed with **straight pull** without any additional reinforcement. In case of **parallel shear pull** or **transversal pull** further reinforcement according next pages is necessary.

3. Further Reinforcement (Parallel shear pull and Transversal pull)

Parallel shear pull at vertical lifting:



1) β < 12.5° - **straight pull**: without any additional reinforcement
2) β > 12.5° - **parallel shear pull**: parallel shear pull reinforcement
3) γ > 15° - **transversal pull**: transversal pull reinforcements

A reinforcement bar (BSt500S):

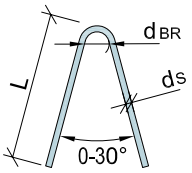
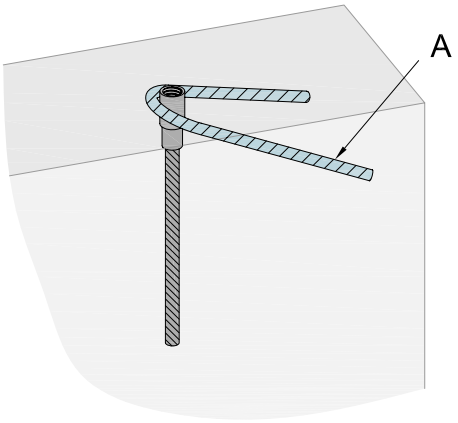


Table 4: Parallel shear pull reinforcement bar A
(BSt500S / according to DIN 1045-1)

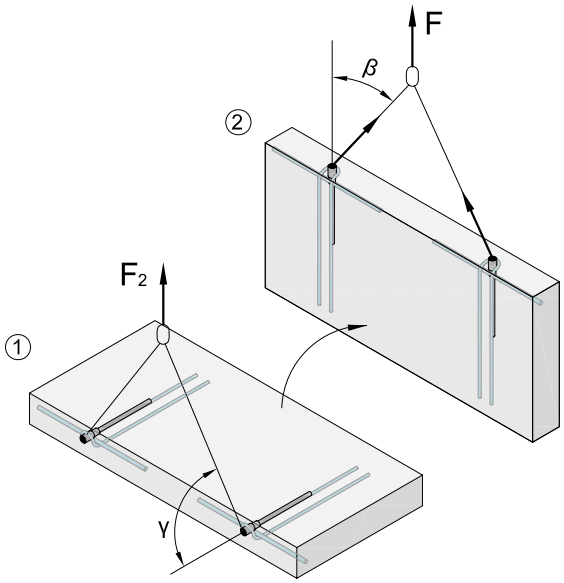
Type	F [kN]	d_S [mm]	d_{BR} [mm]	L [mm]
Rd 12	5	6	24	150
Rd 14	8	6	24	200
Rd 16	12	8	32	200
Rd 18	16	8	32	250
Rd 20	20	8	32	300
Rd 24	25	10	40	300
Rd 30	40	12	48	400
Rd 36	63	14	56	550
Rd 42	80	16	64	600
Rd 52	125	20	140	750

Parallel shear pull reinforcement:



The parallel shear pull reinforcement must be installed in opposite direction to the horizontal force components. The reinforcement must be fixed to the Bar Anchor with a tying wire. Close contact is important!

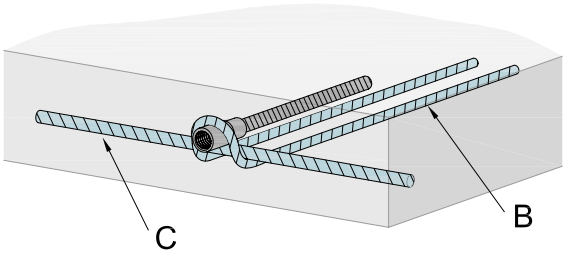
Transversal pull while lifting up a lying panel:



F – force in the plane of the precast concrete unit

$F_2 = 0.5 \cdot F$ – force in the plane perpendicular to the precast concrete unit

Transversal pull reinforcement:



The transversal pull reinforcement must be fixed to the Bar Anchor with a tying wire. Close contact is important!

B; C reinforcement bars (BSt500S):

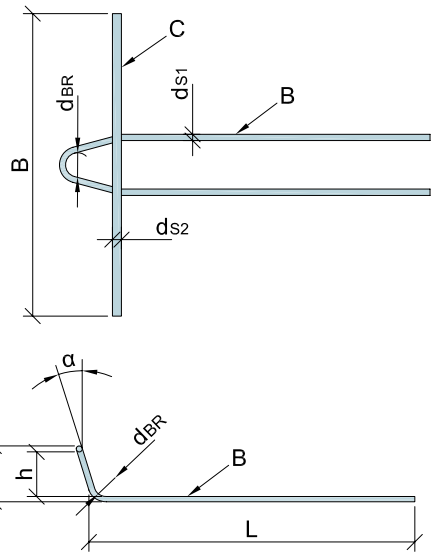
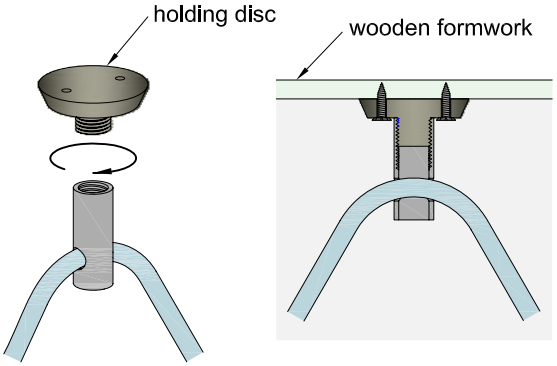


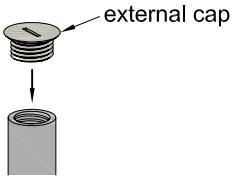
Table 5: Transversal pull reinforcement bars B; C (according to DIN 1045-1)

Type	F [kN]	F_2 [kN]	d_{S1} [mm]	L [mm]	h [mm]	H [mm]	d_{BR} [mm]	α°	B [mm]	d_{S2} [mm]
Rd 12	5	2.5	6	270	23	35	24	15	280	8
Rd 14	8	4	6	350	30	42	24	15	350	12
Rd 16	12	6	8	420	33	49	32	15	400	12
Rd 18	16	8	8	460	39	55	32	15	450	12
Rd 20	20	10	10	490	44	64	40	15	490	14
Rd 24	25	12.5	12	520	51	75	48	15	550	14
Rd 30	40	20	12	570	68	92	48	15	580	16
Rd 36	63	31.5	14	690	90	118	56	15	700	16
Rd 42	80	40	16	830	111	143	64	15	850	20
Rd 52	125	62.5	20	930	134	174	140	15	1000	20

4. Accessories of Installation



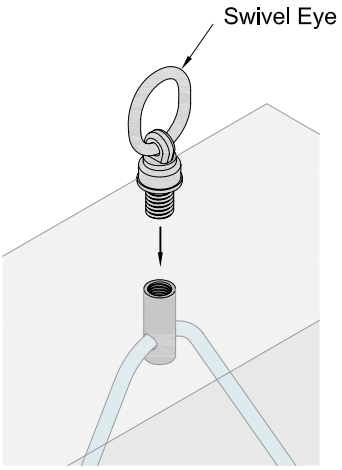
Holding Discs (for more information, look at brochure "Threaded System Accessories" page 5) are used when it's necessary to fasten Bar Anchors to wooden formwork. They eliminate the possibility of getting concrete or pollution into the Sockets.

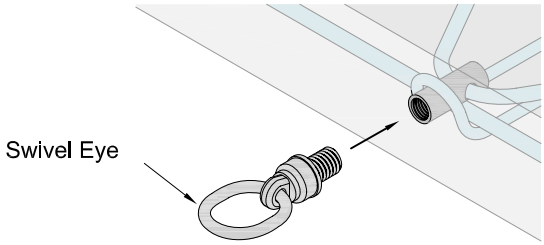


External Caps (for more information, look at brochure "Threaded System Accessories" page 6) are used to seal Bar Anchor and prevent various substances such as residual concrete, dust, snow etc. from penetrating into the socket, protecting the anchor thread from clogging up.

5. Lifting Devices

Swivel Eye, Treaded Lifting Loop, **Threaded Lifting Loop with pressure plate and Lifting Loop "Goliath"** (for more information, look at brochure "Threaded System Accessories" pages 8-15) are to be used as lifting anchors of the Thread System. They must be completely screwed into the Bar Anchor.





Bar Anchor SNA-T

Bar Anchor SNA-T, designed as Bar Anchor SNA, but with a forged foot, are by mean of their construction specially suitable for slender concrete units and for the installation in thin walls, like as garages, transformer stations, shaft rings, etc.

Bar Anchors are supplied factory finished and consist of a socket swaged to a reinforcement bar. The construction of the anchor is specially designed for thin panels and walls.

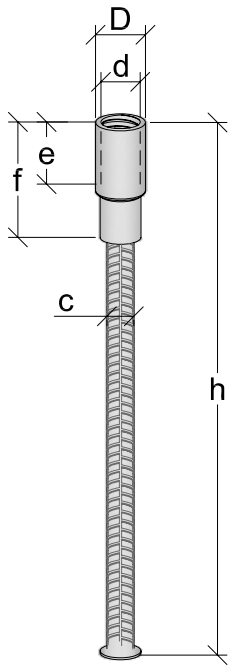
Bar Anchors can be used in concrete with a compressive strength ≥ 15 N/mm^2 and the minimum necessary surface reinforcement (for Rd 12, Rd 14, Rd 16 ≥ 130mm^2/m; for the other types ≥ 188mm^2/m).

Care is to be taken if there is the possibility of cracks in the total tension zone. In this case a Waved Anchor would be more suitable.

Anchor with internal thread is set into the concrete before the casting and serves a basis for Lifting Loops LL, Lifting Loops "Goliath", Lifting Loops with Pressure Plate and Lifting Eye. There is the half-round metric thread Rd in the socket of the anchors, which should be greased before the installation into the precast concrete unit. The fastening details equipped with normal metric standard thread can be fastened to Rd thread.

For fastening to a steel formwork, Magnetic Holders models HM4 are recommended. To prevent dirt and concrete from penetrating into the thread of the socket, external caps or Holding Discs are used. Holding Discs are used to fasten anchors to a wooden formwork.

Bar Anchor length can be changed according to certain conditions of installation. But it should be noted that in this case the change of length also affects the value of the maximum permissible load.



Materials:

Socket – • zinc-plated or
• stainless steel

Bar – • untreated steel

Table 1(1): Bar Anchor SNA-T (zinc-plated)

Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	c [mm]	f [mm]
0402	0.5	Rd12×100	12	100	16	22	8	40
0404	0.5	Rd12×136	12	136	16	22	8	40
0406	0.5	Rd12×174	12	174	16	22	8	40
0405	0.5	Rd12×250	12	250	16	22	8	40
0407	0.5	Rd12×295	12	295	16	22	8	40
0409	0.8	Rd14×105	14	105	20	25	10	48
0410	0.8	Rd14×135	14	135	20	25	10	48
0412	0.8	Rd14×167	14	167	20	25	10	48
0414	0.8	Rd14×220	14	220	20	25	10	48

Table 1(2): Bar Anchor SNA-T (zinc-plated)

Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	c [mm]	f [mm]
0417	1.2	Rd16×130	16	130	22	27	12	58
049	1.2	Rd16×140	16	140	22	27	12	58
0418	1.2	Rd16×150	16	150	22	27	12	58
0420	1.2	Rd16×195	16	195	22	27	12	58
0422	1.2	Rd16×260	16	260	22	27	12	58
0423	1.6	Rd18×150	18	150	25	34	14	65
0426	1.6	Rd18×170	18	170	25	34	14	65
0428	1.6	Rd18×205	18	205	25	34	14	65
0430	1.6	Rd18×275	18	275	25	34	14	65
0439	2.0	Rd20×180	20	180	27	35	16	70
0434	2.0	Rd20×190	20	190	27	35	16	70
0436	2.0	Rd20×235	20	235	27	35	16	70
0438	2.0	Rd20×300	20	300	27	35	16	70
0442	2.5	Rd24×210	24	210	31	43	16	80
0444	2.5	Rd24×260	24	260	31	43	16	80
0445	2.5	Rd24×275	24	275	31	43	16	80
0446	2.5	Rd24×335	24	335	31	43	16	80
0447	2.5	Rd24×380	24	380	31	43	16	80
0450	4.0	Rd30×270	30	270	38	56	20	101
0452	4.0	Rd30×390	30	390	38	56	20	101
0454	4.0	Rd30×510	30	510	38	56	20	101
0456	6.3	Rd36×330	36	330	48	69	25	110
0457	6.3	Rd36×440	36	440	48	69	25	110
0458	6.3	Rd36×490	36	490	48	69	25	110
0460	6.3	Rd36×640	36	640	48	69	25	110
0462	8.0	Rd42×450	42	450	54	80	28	140
0464	8.0	Rd42×590	42	590	54	80	28	140
0466	8.0	Rd42×770	42	770	54	80	28	140
0468	12.5	Rd52×730	52	730	70	90	28	170
0470	12.5	Rd52×960	52	960	70	90	28	170

Table 2(1): Bar Anchor SNA-T (stainless steel)

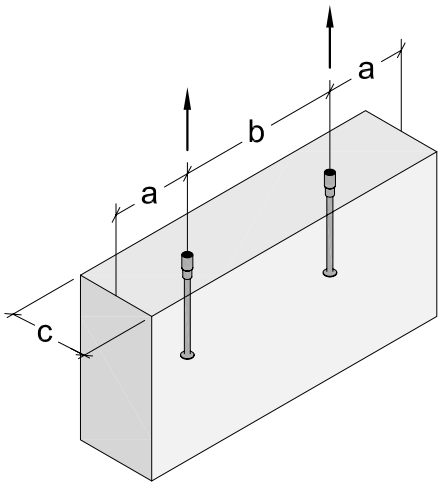
Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	c [mm]	f [mm]
0402E	0.5	Rd12×100	12	100	16	22	8	40
0404E	0.5	Rd12×135	12	135	16	22	8	40
0406E	0.5	Rd12×174	12	174	16	22	8	40
0405E	0.5	Rd12×250	12	250	16	22	8	40
0407E	0.5	Rd12×295	12	295	16	22	8	40
0409E	0.8	Rd14×105	14	105	20	25	10	48
0410E	0.8	Rd14×135	14	135	20	25	10	48
0412E	0.8	Rd14×167	14	167	20	25	10	48
0414E	0.8	Rd14×220	14	220	20	25	10	48
0417E	1.2	Rd16×130	16	130	22	27	12	58
0419E	1.2	Rd16×140	16	140	22	27	12	58
0418E	1.2	Rd16×150	16	150	22	27	12	58
0420E	1.2	Rd16×195	16	195	22	27	12	58
0422E	1.2	Rd16×260	16	260	22	27	12	58
0423E	1.6	Rd18×150	18	150	25	34	14	65
0426E	1.6	Rd18×170	18	170	25	34	14	65
0428E	1.6	Rd18×205	18	205	25	34	14	65
0430E	1.6	Rd18×275	18	275	25	34	14	65
0439E	2.0	Rd20×180	20	180	27	35	16	70
0434E	2.0	Rd20×190	20	190	27	35	16	70
0436E	2.0	Rd20×235	20	235	27	35	16	70
0438E	2.0	Rd20×300	20	300	27	35	16	70
0442E	2.5	Rd24×210	24	210	31	43	16	80
0444E	2.5	Rd24×260	24	260	31	43	16	80
0445E	2.5	Rd24×275	24	275	31	43	16	80
0446E	2.5	Rd24×335	24	335	31	43	16	80
0447E	2.5	Rd24×380	24	380	31	43	16	80
0450E	4.0	Rd30×270	30	270	38	56	20	101
0452E	4.0	Rd30×390	30	390	38	56	20	101
0454E	4.0	Rd30×510	30	510	38	56	20	101
0456E	6.3	Rd36×330	36	330	48	69	25	110
0457E	6.3	Rd36×440	36	440	48	69	25	110
0458E	6.3	Rd36×490	36	490	48	69	25	110
0460E	6.3	Rd36×640	36	640	48	69	25	110
0462E	8.0	Rd42×450	42	450	54	80	28	140
0464E	8.0	Rd42×590	42	590	54	80	28	140
0466E	8.0	Rd42×770	42	770	54	80	28	140
0468E	12.5	Rd52×730	52	730	70	90	28	170
0470E	12.5	Rd52×960	52	960	70	90	28	170

Installation Instructions for Bar Anchors SNA-T

1. Spacing of Bar Anchors SNA-T and edge distances

Table 3: Minimal dimensions

Type	a [mm]	b_{min} [mm]	c_{min} [mm]	c_{red}* [mm]
Rd 12	150	300	60	55
Rd 14	200	400	70	60
Rd 16	200	400	80	65
Rd 18	250	500	95	80
Rd 20	275	550	110	90
Rd 24	300	600	125	100
Rd 30	350	650	140	120
Rd 36	400	800	200	160
Rd 42	500	1000	240	180
Rd 52	600	1200	280	200



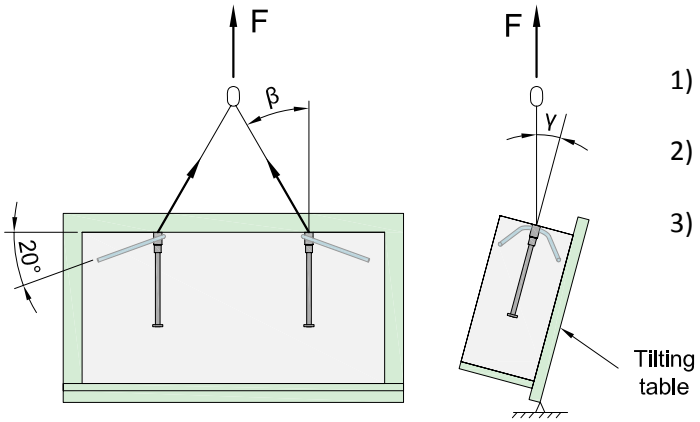
*the reduced panel thickness can be used, when the anchor is stressed by straight pull or parallel shear pull β < 30°

2. Anchorage reinforcement

Bar Anchors are manufactured completely with anchorage reinforcement. Bar Anchors can be installed with **straight pull** without any additional reinforcement. In case of **parallel shear pull** or **transversal pull** further reinforcement according next pages is necessary.

3. Further Reinforcement (Parallel shear pull and Transversal pull)

Parallel shear pull at vertical lifting:



1) β < 12.5° - **straight pull**: without any additional reinforcement
2) β > 12.5° - **parallel shear pull**: parallel shear pull reinforcement
3) γ > 15° - **transversal pull**: transversal pull reinforcements

A reinforcement bar (BSt500S):

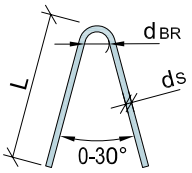
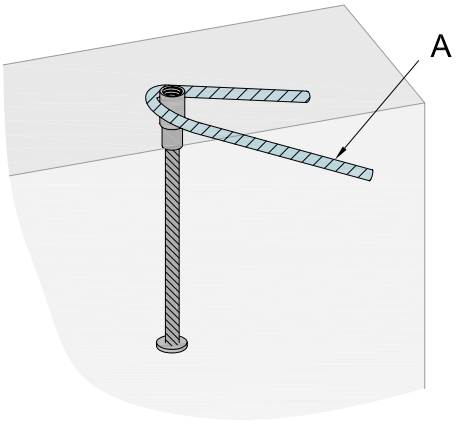


Table 4: Parallel shear pull reinforcement bar A
(BSt500S / according to DIN 1045-1)

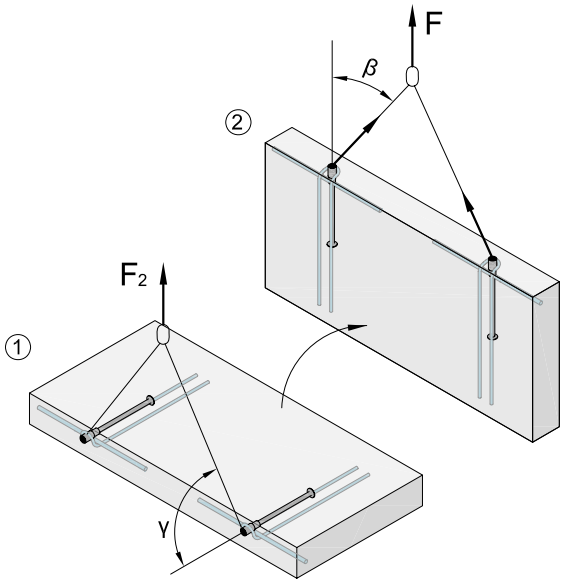
Type	F [kN]	d_S [mm]	d_{BR} [mm]	L [mm]
Rd 12	5	6	24	150
Rd 14	8	6	24	200
Rd 16	12	8	32	200
Rd 18	16	8	32	250
Rd 20	20	8	32	300
Rd 24	25	10	40	300
Rd 30	40	12	48	400
Rd 36	63	14	56	550
Rd 42	80	16	64	600
Rd 52	125	20	140	750

Parallel shear pull reinforcement:



The parallel shear pull reinforcement must be installed in opposite direction to the horizontal force components. The reinforcement must be fixed to the Bar Anchor with a tying wire. Close contact is important!

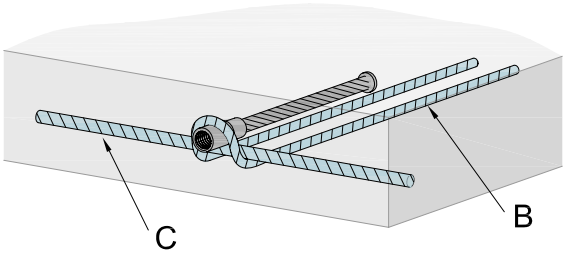
Transversal pull while lifting up a lying panel:



F – force in the plane of the precast concrete unit

$F_2 = 0.5 \cdot F$ – force in the plane perpendicular to the precast concrete unit

Transversal pull reinforcement:



The transversal pull reinforcement must be fixed to the Bar Anchor with a tying wire. Close contact is important!

B; C reinforcement bars (BSt500S):

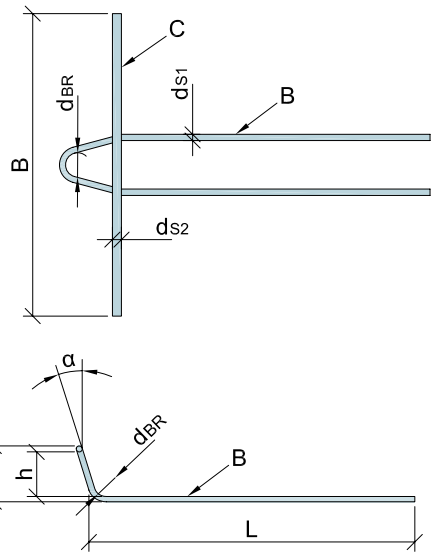
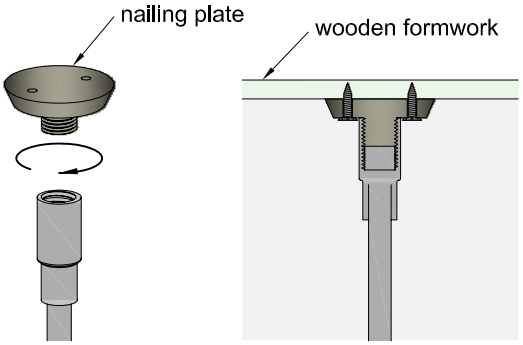


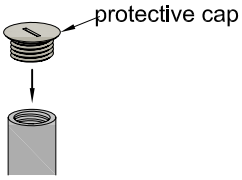
Table 5: Transversal pull reinforcement bars B; C (according to DIN 1045-1)

Type	F [kN]	F_2 [kN]	d_{S1} [mm]	L [mm]	h [mm]	H [mm]	d_{BR} [mm]	α°	B [mm]	d_{S2} [mm]
Rd 12	5	2.5	6	270	23	35	24	15	280	8
Rd 14	8	4	6	350	30	42	24	15	350	12
Rd 16	12	6	8	420	33	49	32	15	400	12
Rd 18	16	8	8	460	39	55	32	15	450	12
Rd 20	20	10	10	490	44	64	40	15	490	14
Rd 24	25	12.5	12	520	51	75	48	15	550	14
Rd 30	40	20	12	570	68	92	48	15	580	16
Rd 36	63	31.5	14	690	90	118	56	15	700	16
Rd 42	80	40	16	830	111	143	64	15	850	20
Rd 52	125	62.5	20	930	134	174	140	15	1000	20

4. Accessories of Installation



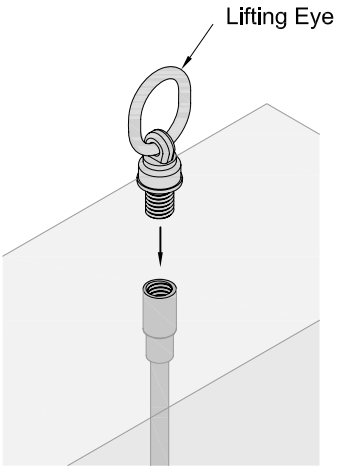
Nailing Plates (for more information, look at brochure “Threaded System Accessories” page 5) are used when it’s necessary to fasten Bar Anchors to wooden formwork. They eliminate the possibility of getting concrete or pollution into the Sockets.

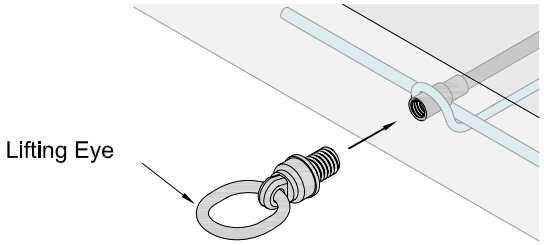


Protective Caps (for more information, look at brochure “Threaded System Accessories” page 6) are used to seal Bar Anchor and prevent various substances such as residual concrete, dust, snow etc. from penetrating into the socket, protecting the anchor thread from clogging up.

5. Lifting Devices

Lifting Eye, Lifting Loop LL, Lifting Loop with pressure plate and Lifting Loop “Goliath” (for more information, look at brochure “Threaded System Accessories” pages 8-15) are to be used as lifting anchors of the Thread System. They must be completely screwed into the Bar Anchor.





Waved Anchor DWL

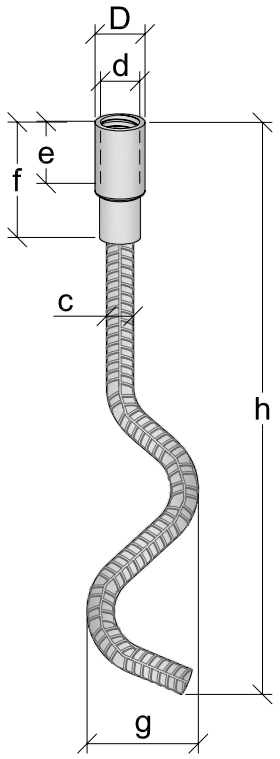
Waved Anchors are mainly applied as lifting anchors for precast concrete products. Waved end lifting anchors can be short (DWK) and long (DWL) according to the length of reinforcement bar. The length of the anchor can be chosen in accordance with specific concrete product.

Waved Anchors are supplied factory finished and consist of a socket swaged to a reinforcement bar. The construction of the anchor is specially designed for thin panels and walls. The wave of the anchor guarantees a safe transmission of forces into the concrete.

Waved Anchors can be used in concrete with a compressive strength ≥ 15 N/mm^2 and the minimum necessary surface reinforcement (for Rd 12, Rd 14, Rd 16 ≥ 130mm^2/m; for the other types ≥ 188mm^2/m).

Anchor with internal thread is set into the concrete before the casting and serves a basis for wire lifting loops, lifting loops “Goliath”, lifting loops with pressure plate and swivel eye. There is the half-round metric thread Rd in the socket of the anchors, which should be greased before the installation into the precast concrete unit. The fastening details equipped with normal metric standard thread can be fastened to Rd thread.

For fastening to a steel formwork, magnetic holders models HM4 are recommended. To prevent dirt and concrete from penetrating into the thread of the socket, external caps or holding discs are used. Holding discs are used to fasten anchors to a wooden formwork



Materials:

Socket

- zinc-plated or
- stainless steel

Bar

- untreated steel

Table 1: Waved Anchor DWL, long (zinc-plated)

Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	c [mm]	f [mm]	g [mm]
0200	0.5	Rd 12x137	12	137	16	22	8	40	20
0202	0.8	Rd 14x170	14	170	20	25	10	48	25
0204	1.2	Rd 16x216	16	216	21.5	27	12	58	30
0206	1.6	Rd 18x235	18	235	25	34	14	65	30
0208	2.0	Rd 20x257	20	257	27	35	16	70	35
0210	2.5	Rd 24x360	24	360	32	43	16	80	40
0212	4.0	Rd 30x450	30	450	38	56	20	101	50
0214	6.3	Rd 36x570	36	570	48	69	25	110	62
0216	8	Rd 42x620	42	620	54	80	28	140	70
0218	12.5	Rd 52x880	52	880	70	90	28	170	80
0273	15	Rd 56x1200	56	1200	70	80	36	170	90
0218-60	20	Rd 60x1400	60	1400	76	85	40	170	100
0218-48	22	Rd 48x1300	48	1300	70	60	40	140	100

Table 2: Waved Anchor DWL, long (stainless steel)

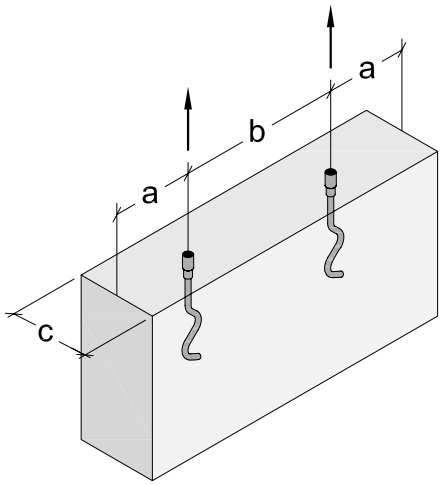
Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	c [mm]	f [mm]	g [mm]
0238E	0.5	Rd 12x137	12	137	16	22	8	40	20
0202E	0.8	Rd 14x170	14	170	20	25	10	48	25
0204E	1.2	Rd 16x216	16	216	21.5	27	12	58	30
0223E	1.6	Rd 18x235	18	235	25	34	14	65	30
0209E	2.0	Rd 20x257	20	257	27	35	16	70	35
0210E	2.5	Rd 24x360	24	360	32	43	16	80	40
0231E	4.0	Rd 30x450	30	450	38	56	20	101	60
0214E	6.3	Rd 36x570	36	570	48	69	25	110	62
0237E	8.0	Rd 42x620	42	620	54	80	28	140	70
0269E	12.5	Rd 52x880	52	880	70	90	28	170	80

Installation Instructions for Waved Anchors DWL

1. Spacing of Waved Anchors DWL and edge distances

Table 3: Minimal dimensions

Type	a [mm]	b_{min} [mm]	c_{min} [mm]	c_{red}* [mm]
Rd 12	150	300	60	55
Rd 14	200	400	70	60
Rd 16	200	400	80	65
Rd 18	250	500	95	80
Rd 20	275	550	110	90
Rd 24	300	600	125	100
Rd 30	350	650	140	120
Rd 36	400	800	200	160
Rd 42	500	1000	240	180
Rd 52	600	1200	280	200
Rd 56	on request			
Rd 60	on request			
Rd 48	on request			



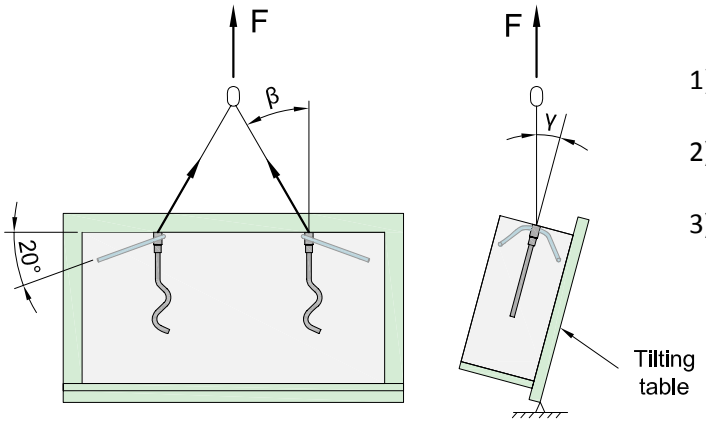
*the reduced panel thickness can be used, when the anchor is stressed by straight pull or parallel shear pull $\beta < 30^{o}$

2. Anchorage reinforcement

Waved Anchors DWL are manufactured completely with anchorage reinforcement. Waved Anchors DWL can be installed with **straight pull** without any additional reinforcement. In case of **parallel shear pull** or **transversal pull** further reinforcement according next pages is necessary.

3. Further Reinforcement (Parallel shear pull and Transversal pull)

Parallel shear pull at vertical lifting:



1) β < 12.5° - **straight pull**: without any additional reinforcement
2) β > 12.5° - **parallel shear pull**: parallel shear pull reinforcement
3) γ > 15° - **transversal pull**: transversal pull reinforcements

A reinforcement bar (BSt500S):

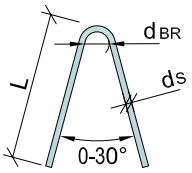
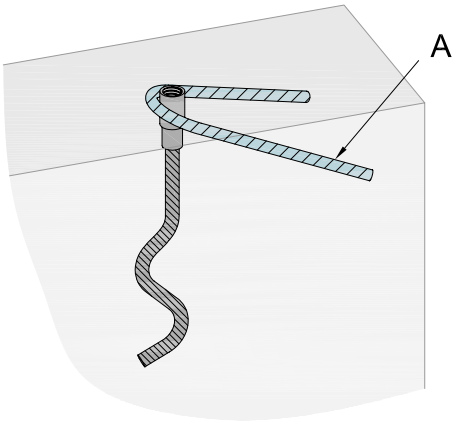


Table 4: Parallel shear pull reinforcement bar A
(BSt500S / according to DIN 1045-1)

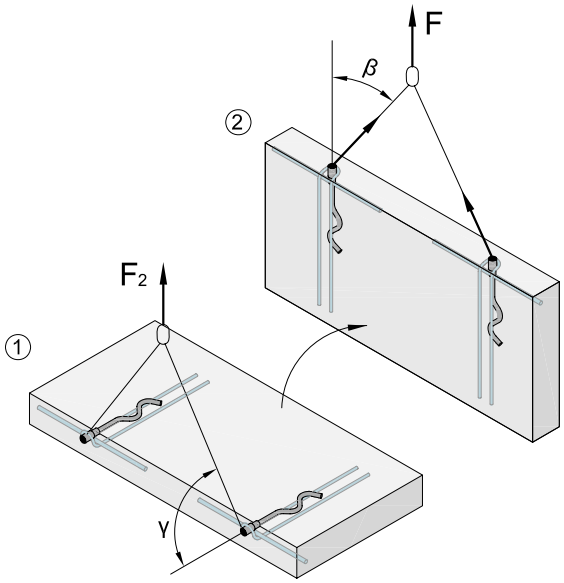
Type	F [kN]	d_S [mm]	d_{BR} [mm]	L [mm]
Rd 12	5	6	24	150
Rd 14	8	6	24	200
Rd 16	12	8	32	200
Rd 18	16	8	32	250
Rd 20	20	8	32	300
Rd 24	25	10	40	300
Rd 30	40	12	48	400
Rd 36	63	14	56	550
Rd 42	80	16	64	600
Rd 52	125	20	140	750
Rd 56	150	on request		
Rd 60	200	on request		
Rd 48	220	on request		

Parallel shear pull reinforcement:



The parallel shear pull reinforcement must be installed in opposite direction to the horizontal force components. The reinforcement must be fixed to the Waved Anchor DWL with a tying wire. Close contact is important!

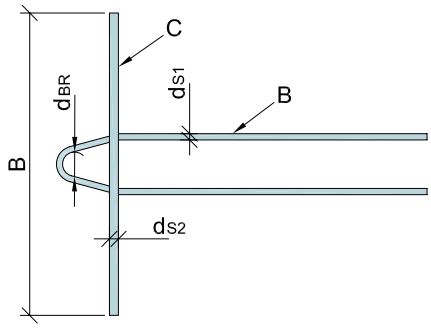
Transversal pull while lifting up a lying panel:



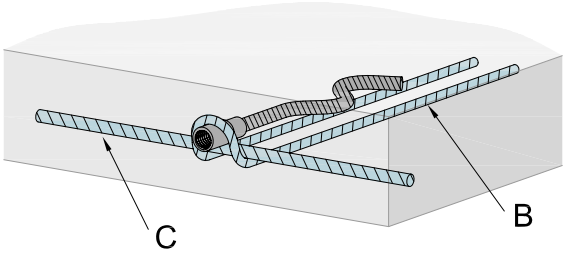
F – force in the plane of the precast concrete unit

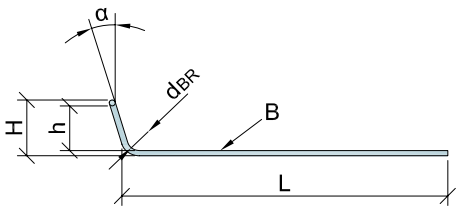
$F_2 = 0.5 \cdot F$ – force in the plane perpendicular to the precast concrete unit

B; C reinforcement bars (BSt500S):



Transversal pull reinforcement:



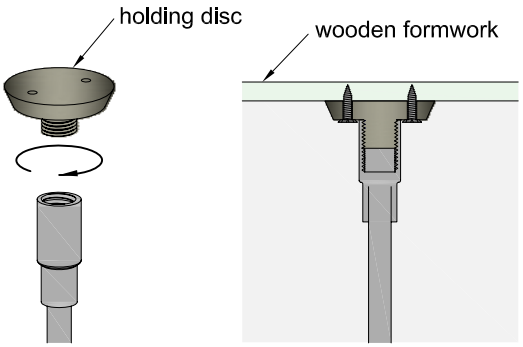


The transversal pull reinforcement must be fixed to the Waved Anchor DWL with a tying wire. Close contact is important!

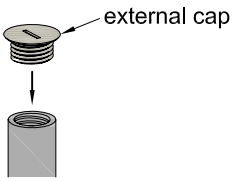
Table 5: Transversal pull reinforcement bars B; C (according to DIN 1045-1)

Type	F [kN]	F_2 [kN]	d_{S1} [mm]	L [mm]	h [mm]	H [mm]	d_{BR} [mm]	α°	B [mm]	d_{S2} [mm]
Rd 12	5	2.5	6	270	23	35	24	15	280	8
Rd 14	8	4	6	350	30	42	24	15	350	12
Rd 16	12	6	8	420	33	49	32	15	400	12
Rd 18	16	8	8	460	39	55	32	15	450	12
Rd 20	20	10	10	490	44	64	40	15	490	14
Rd 24	25	12.5	12	520	51	75	48	15	550	14
Rd 30	40	20	12	570	68	92	48	15	580	16
Rd 36	63	31.5	14	690	90	118	56	15	700	16
Rd 42	80	40	16	830	111	143	64	15	850	20
Rd 52	125	62.5	20	930	134	174	140	15	1000	20
Rd 56	150	75	on request							
Rd 60	200	100	on request							
Rd 48	220	110	on request							

4. Accessories of Installation



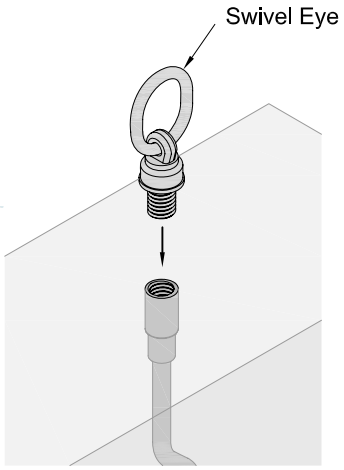
Holding Discs (for more information, look at brochure "Threaded System Accessories" page 5) are used when it's necessary to fasten Bar Anchors to wooden formwork. They eliminate the possibility of getting concrete or pollution into the Sockets.

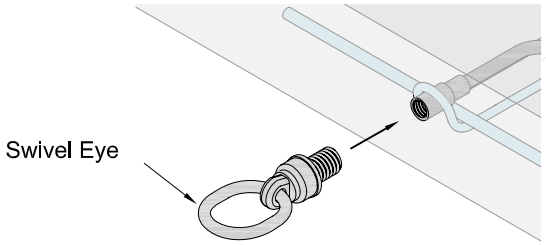


External Caps (for more information, look at brochure "Threaded System Accessories" page 6) are used to seal Bar Anchor and prevent various substances such as residual concrete, dust, snow etc. from penetrating into the socket, protecting the anchor thread from clogging up.

5. Lifting Devices

Swivel Eye, Treaded Lifting Loop, **Threaded Lifting Loop with pressure plate and Lifting Loop "Goliath"** (for more information, look at brochure "Threaded System Accessories" page 8-15) are to be used as lifting anchors of the Thread System. They must be completely screwed into the Bar Anchor.





Waved Anchor DWK

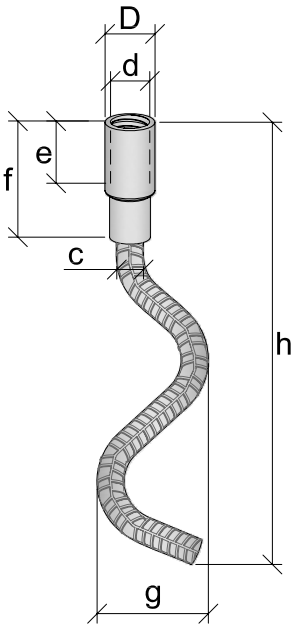
Waved end lifting anchors can be short (DWK) and long (DWL) according to the length of reinforcement bar. The length of the anchor can be chosen in accordance with specific concrete product.

Waved Anchors are supplied factory finished and consist of a socket swaged to a reinforcement bar. The construction of the anchor is specially designed for vertical installation into precast concrete units with large surface and average panel thickness. The wave of the anchor guarantees a safe transmission of forces into the concrete.

Waved Anchors can be used in concrete with a compressive strength ≥ 15 N/mm^2 and the minimum necessary surface reinforcement (for Rd 12, Rd 14, Rd 16 ≥ 130mm^2/m; for the other types ≥ 188mm^2/m).

Anchor with internal thread is set into the concrete before the casting and serves a basis for wire lifting loops, lifting loops “Goliath”, lifting loops with pressure plate and swivel eye. There is the half-round metric thread Rd in the socket of the anchors, which should be greased before the installation into the precast concrete unit. The fastening details equipped with normal metric standard thread can be fastened to Rd thread.

For fastening to a steel formwork, magnetic holders models HM4 are recommended. To prevent dirt and concrete from penetrating into the thread of the socket, external caps or holding discs are used. Holding discs are used to fasten anchors to a wooden formwork.



Materials:

Socket

- zinc-plated or
- stainless steel

Bar

- untreated steel

Table 1: Waved Anchor DWK, short (zinc-plated)

Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	c [mm]	f [mm]	g [mm]
0250	0.5	Rd 12x108	12	108	16	22	8	40	20
0254	1.2	Rd 16x167	16	167	21.5	27	12	58	30
0258	2.0	Rd 20x187	20	187	27	35	14	70	35
0260	2.5	Rd 24x240	24	240	32	43	16	80	40
0262	4.0	Rd 30x300	30	300	38	56	20	101	50
0264	6.3	Rd 36x380	36	380	48	69	25	110	62
0266	8.0	Rd 42x450	42	450	54	80	28	140	70

Table 2: Waved Anchor DWK, short (stainless steel)

Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	c [mm]	f [mm]	g [mm]
0250E	0.5	Rd 12x108	12	108	16	22	8	40	20
0254E	1.2	Rd 16x167	16	167	21.5	27	12	58	30
0257E	2.0	Rd 20x187	20	187	27	35	14	70	35
0260E	2.5	Rd 24x240	24	240	32	43	16	80	40
0261E	4.0	Rd 30x300	30	300	38	56	20	101	50
0263E	6.3	Rd 36x380	36	380	48	69	25	110	62
0266E	8.0	Rd 42x450	42	450	54	80	28	140	70

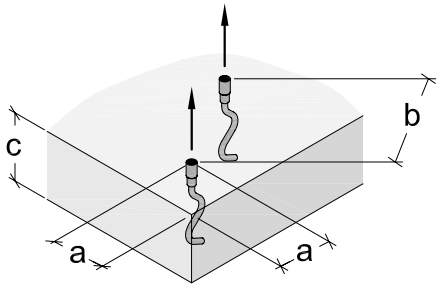
Installation Instructions for Waved Anchors DWK

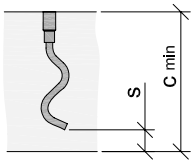
1. Spacing of Waved Anchors DWK and edge distances

Table 3: Minimal dimensions

Type	a_{min} [mm]	b_{min} [mm]	c_{min}* [mm]
Rd 12	95	200	130
Rd 16	135	260	190
Rd 20	170	350	210
Rd 24	220	440	260
Rd 30	275	550	320
Rd 36	300	600	400
Rd 42	400	800	470

*the minimum panel thickness was determined by taking the concrete cover *s* to 20 mm to section *(h+20)*. For other uses and environmental conditions, the concrete cover must be increased so enlarging the panel thickness



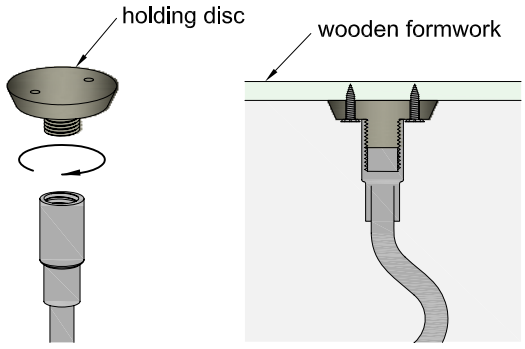


2. Anchorage reinforcement

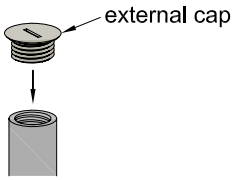
Waved Anchors DWK are manufactured completely with anchorage reinforcement. They can be installed with **straight pull** without any additional reinforcement. In case of **parallel shear pull** or **transversal pull** further reinforcement according next pages is necessary.

3. Accessories of Installation

Holding Discs (for more information, look at brochure “Threaded System Accessories” page 5) are used when is necessary to fasten Waved Anchors DWK to wooden formwork. They eliminate the possibility of getting concrete or pollution into the Sockets.

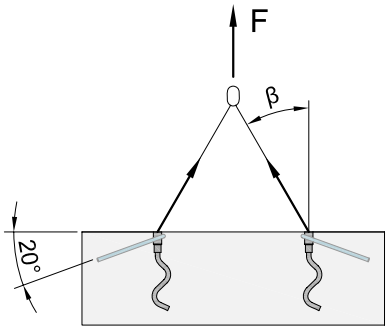


External Caps (for more information, look at brochure “Threaded System Accessories” page 6) are used to seal Waved Anchor DWK and prevent various substances such as residual concrete, dust, snow etc. from penetrating into the socket, protecting the anchor thread from clogging up.



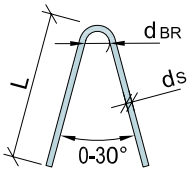
4. Further Reinforcement (Parallel shear pull and Transversal pull)

Parallel shear pull at vertical lifting:



1) β < 12.5° - **straight pull**: without any additional reinforcement
2) β > 12.5° - **parallel shear pull**: parallel shear pull reinforcement

A reinforcement bar (BSt500S):



Parallel shear pull reinforcement:

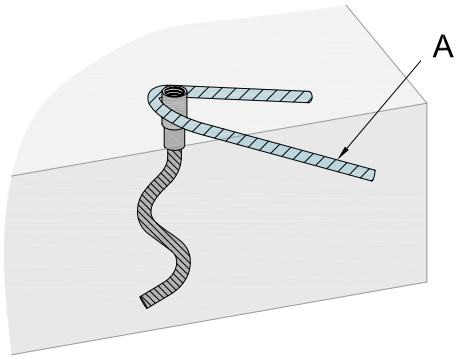


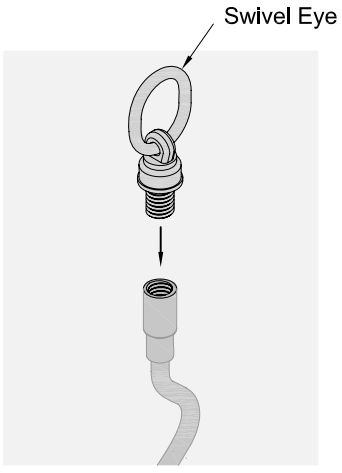
Table 4: Parallel shear pull reinforcement bar A (according to DIN 1045-1)

Type	F [kN]	d_S [mm]	d_{BR} [mm]	L [mm]
Rd 12	5	6	24	150
Rd 16	12	8	32	200
Rd 20	20	8	32	300
Rd 24	25	10	40	300
Rd 30	40	12	48	400
Rd 36	63	14	56	550
Rd 42	80	16	64	600

The parallel shear pull reinforcement must be installed in opposite direction to the horizontal force components. The reinforcement must be fixed to the Waved Anchor DWK with a tying wire. Close contact is important!

5. Lifting Devices

Swivel Eye, Treaded Lifting Loop, **Threaded Lifting Loop with pressure plate and Lifting Loop Goliath"** (for more information, look at brochure "Threaded System Accessories" page 8-15) are to be used as lifting anchors of the Thread System. They must be completely screwed into the Waved Anchor DWK.



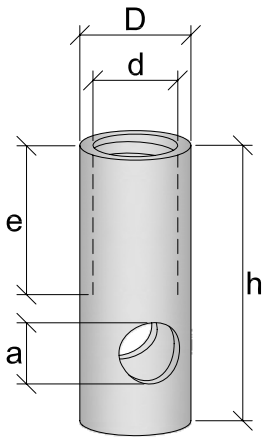
Lifting Socket HA

The Lifting Sockets HA are by mean of their low height and the individual fixing possibilities suitable for transporting all types ofprecast concrete products. The sockets are specially made for lifting are not to be confused with fixing sockets.

Sockets can be used in concrete with a compressive strength ≥ 15 N/mm^2 and the minimum necessary surface reinforcement (for Rd 12, Rd 14, Rd 16 ≥ 130mm^2/m; for the other types ≥ 188mm^2/m).

Anchor with anchorage reinforcement (point 2) is set into the concrete before the casting and serves a basis for wire lifting loops, lifting loops “Goliath”, lifting loops with pressure plate and swivel eye. There is the half-round metric thread Rd in the socket, which should be greased before the installation into the precast concrete unit. The fastening details equipped with normal metric standard thread can be fastened to Rd thread.

For fastening to a steel formwork, magnetic holders models HM4 are recommended. To prevent dirt and concrete from penetrating into the thread of the socket, external caps or holding discs are used. Holding discs are used to fasten anchors to a wooden formwork.



Materials:
- zinc-plated or
- stainless steel

Table 1: Lifting Socket HA (zinc-plated)

Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]
0050	0.5	Rd 12x40	12	40	16	22	8
0052	0.8	Rd 14x48	14	48	18	25	10.5
0054	1.2	Rd 16x54	16	54	21	27	13
0056	1.6	Rd 18x65	18	65	25	34	13
0058	2.0	Rd 20x70	20	70	27	35	15.5
0060	2.5	Rd 24x80	24	80	32	43	18
0062	4.0	Rd 30x100	30	100	38	56	22.5
0064	6.3	Rd 36x125	36	125	48	69	27.5
0066	8.0	Rd 42x140	42	140	54	80	32
0068	12.5	Rd 52x170	52	170	70	107	40

Table2: Lifting Socket HA (stainless steel)

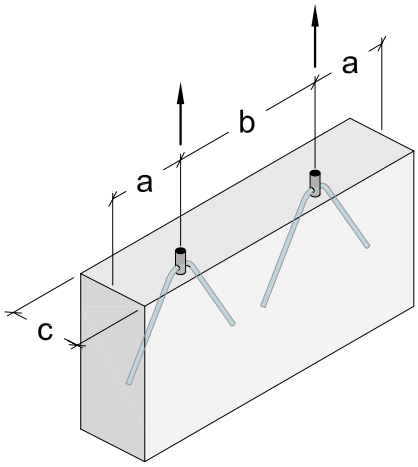
Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]
0070	0.5	Rd 12x40	12	40	16	22	8
0072	0.8	Rd 14x48	14	48	18	25	10.5
0074	1.2	Rd 16x54	16	54	21	27	13
0076	1.6	Rd 18x65	18	65	25	34	13
0078	2.0	Rd 20x70	20	70	27	35	15.5
0080	2.5	Rd 24x80	24	80	32	43	18
0082	4.0	Rd 30x100	30	100	38	56	22.5
0084	6.3	Rd 36x125	36	125	48	69	27.5
0086	8.0	Rd 42x140	42	140	54	80	32
0088	12.5	Rd 52x170	52	170	70	107	40

Installation Instructions for Lifting Sockets HA

1. Spacing of Lifting Sockets HA and edge distances

Table 3: Minimal dimensions

Type	a [mm]	b_{min} [mm]	c_{min} [mm]	c_{red}* [mm]
Rd 12	150	300	60	55
Rd 14	200	400	70	60
Rd 16	200	400	80	65
Rd 18	250	500	95	80
Rd 20	275	550	110	90
Rd 24	300	600	125	100
Rd 30	350	650	140	120
Rd 36	400	800	200	160
Rd 42	500	1000	240	180
Rd 52	600	1200	280	200

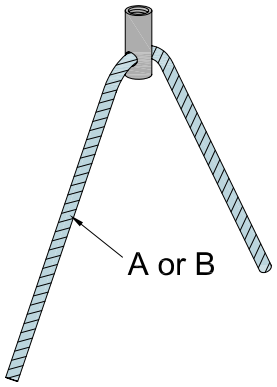


*the reduced panel thickness can be used, when the anchor is stressed by straight pull or parallel shear pull β < 30°

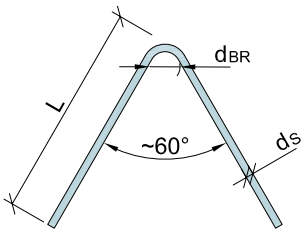
2. Anchorage reinforcement

Table 4: Reinforcement bars A; B (according to DIN 1045-1)

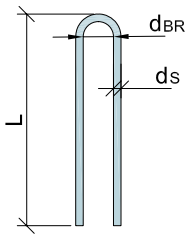
Type	F [kN]	d_S [mm]	d_{BR} [mm]	L [mm]	
				A	B
Rd 12	5	6	24	220	190
Rd 14	8	8	32	260	230
Rd 16	12	10	40	310	280
Rd 18	16	10	40	420	360
Rd 20	20	12	48	430	380
Rd 24	25	14	56	470	410
Rd 30	40	16	64	650	570
Rd 36	63	20	140	820	720
Rd 42	80	25	175	840	730
Rd 52	125	28	196	1190	1020



A reinforcement bar spread (BSt500S):



B reinforcement bar parallel (BSt500S):

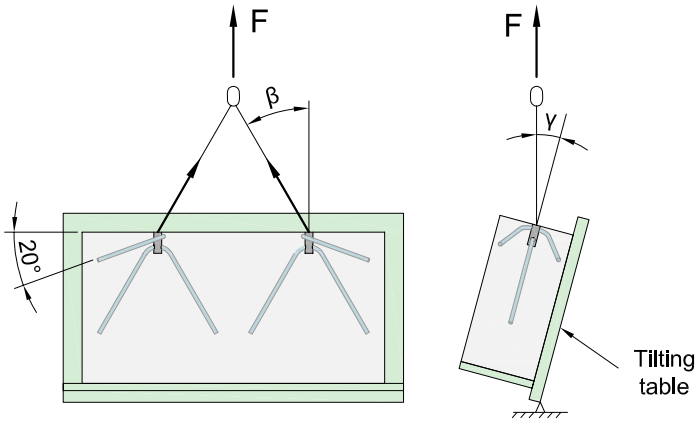


The reinforcement bar must be tightly pressed!

Lifting Sockets with reinforcement bars can be used with **straight pull** without any further reinforcement. In case of **parallel shear pull** or **transversal pull** reinforcement according next pages is necessary.

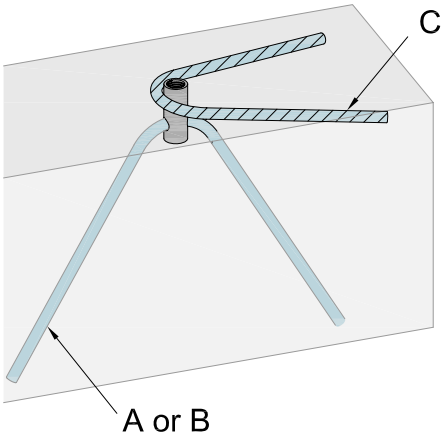
3. Further Reinforcement (Parallel shear pull and Transversal pull)

Parallel shear pull at vertical lifting:



1) β < 12.5° - **straight pull**: anchorage reinforcement without any additional reinforcement
2) β > 12.5° - **parallel shear pull**: anchorage reinforcement + parallel shear pull reinforcement
3) γ > 15° - **transversal pull**: anchorage reinforcement + transversal pull reinforcements

Parallel shear pull reinforcement:



The parallel shear pull reinforcement must be installed in opposite direction to the horizontal force components. The reinforcement must be fixed to the Socket with a tying wire. Close contact is important!

C reinforcement bar (BSt500S):

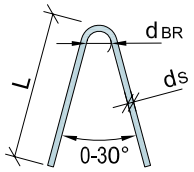
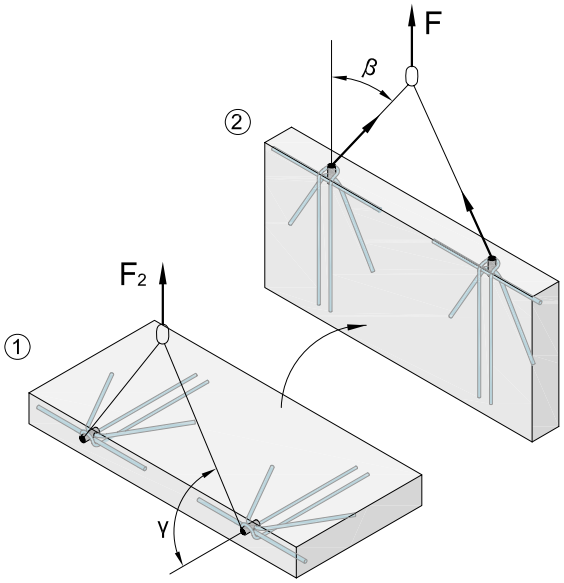


Table 5: Parallel shear pull reinforcement bar C
(according to DIN 1045-1)

Type	F [kN]	d_S [mm]	d_{BR} [mm]	L [mm]
Rd 12	5	6	24	150
Rd 14	8	6	24	200
Rd 16	12	8	32	200
Rd 18	16	8	32	250
Rd 20	20	8	32	300
Rd 24	25	10	40	300
Rd 30	40	12	48	400
Rd 36	63	14	56	550
Rd 42	80	16	64	600
Rd 52	125	20	140	750

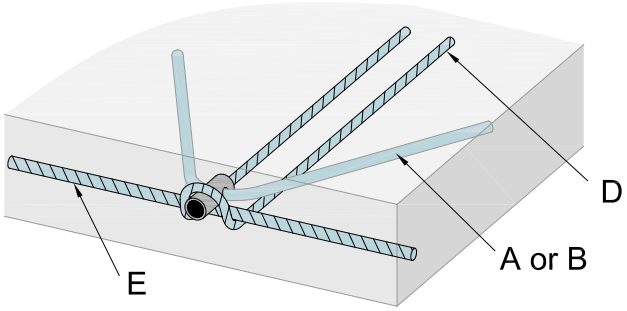
Transversal pull while lifting up a lying panel:



F – force in the plane of the precast concrete unit

$F_2 = 0.5 \cdot F$ – force in the plane perpendicular to the precast concrete unit

Transversal pull reinforcement:



The transversal pull reinforcement must be fixed to the Lifting Socket with a tying wire. Close contact is important!

D; E reinforcement bars (BSt500S):

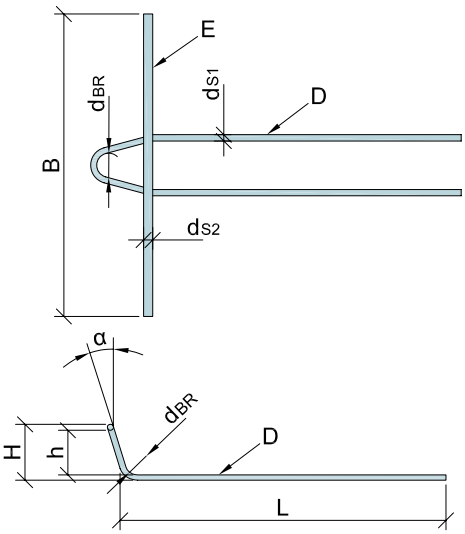
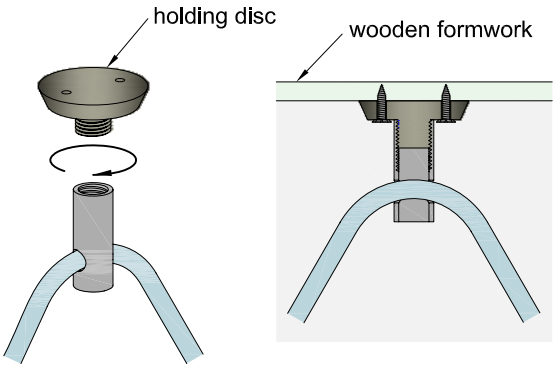


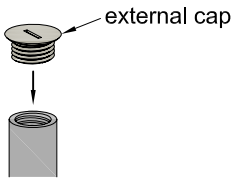
Table 6: Transversal pull reinforcement bars D; E (according to DIN 1045-1)

Type	F [kN]	F_2 [kN]	d_{S1} [mm]	L [mm]	h [mm]	H [mm]	d_{BR} [mm]	α°	B [mm]	d_{S2} [mm]
Rd 12	5	2.5	6	270	23	35	24	15	280	8
Rd 14	8	4	6	350	28	40	24	15	350	12
Rd 16	12	6	8	420	33	49	32	15	400	12
Rd 18	16	8	8	460	39	55	32	15	450	12
Rd 20	20	10	10	490	44	64	40	15	490	14
Rd 24	25	12.5	12	520	51	75	48	15	550	14
Rd 30	40	20	12	570	68	92	48	15	580	16
Rd 36	63	31.5	14	690	90	118	56	15	700	16
Rd 42	80	40	16	830	111	143	64	15	850	20
Rd 52	125	62.5	20	930	134	174	140	15	1000	20

4. Accessories of Installation



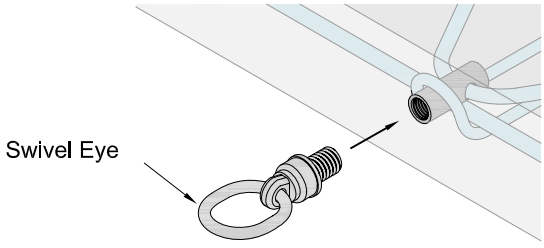
Holding Discs (for more information, look at brochure “Threaded System Accessories” page 5) are used when is necessary to fasten Lifting Sockets to wooden formwork. They eliminate the possibility of getting concrete or pollution into the Sockets.

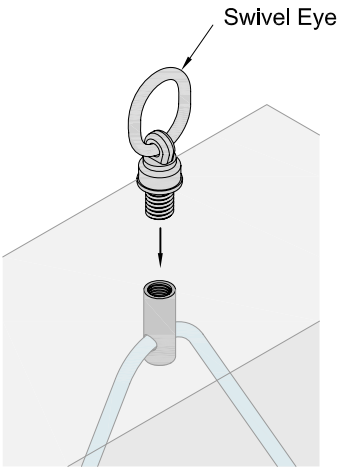


External Caps (for more information, look at brochure “Threaded System Accessories” page 6) are used to seal Lifting Socket and prevent various substances such as residual concrete, dust, snow etc. from penetrating into the socket, protecting the anchor thread from clogging up.

5. Lifting Devices

Swivel Eye, Treaded Lifting Loop, **Threaded Lifting Loop with pressure plate and Lifting Loop “Goliath”** (for more information, look at brochure “Threaded System Accessories” page 8-15) are to be used as lifting anchors of the Thread System. They must be completely screwed into the Lifting Socket.





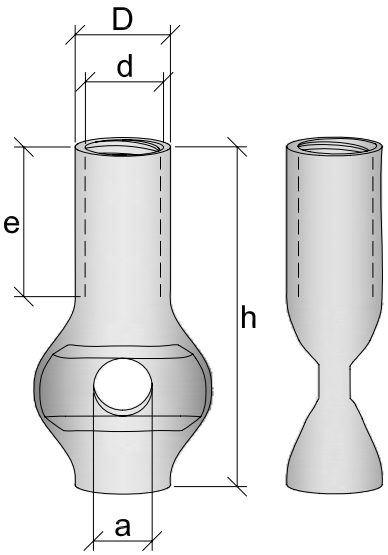
Lifting Socket HAL

The Lifting Sockets HAL are by mean of their low height and the individual fixing possibilities suitable for transporting all types of precast concrete products. The Lifting Sockets HAL are specially made for lifting are not to be confused with fixing sockets.

Lifting Sockets HAL can be used in concrete with a compressive strength ≥ 15 N/mm^2 and the minimum necessary surface reinforcement (for Rd 12, Rd 14, Rd 16 ≥ 130mm^2/m; for the other types ≥ 188mm^2/m).

Anchor with anchorage reinforcement (point 2) is set into the concrete before the casting and serves a basis for wire lifting loops, lifting loops "Goliath", lifting loops with pressure plate and swivel eye. There is the half-round metric thread Rd in the socket, which should be greased before the installation into the precast concrete unit. The fastening details equipped with normal metric standard thread can be fastened to Rd thread.

For fastening to a steel formwork, magnetic holders models HM4 are recommended. To prevent dirt and concrete from penetrating into the thread of the socket, external caps or holding discs are used. Holding discs are used to fasten anchors to a wooden formwork.



Materials:

- zinc-plated or
- stainless steel

Table 1: Lifting Socket HAL (zinc-plated)

Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]
0850	0.5	Rd 12x60	12	60	16	22	8
0869	0.5	Rd 12x80	12	80	16	22	8
0852	1.2	Rd 16x80	16	80	21	27	13
08521	1.2	Rd 16x100	16	100	21	27	13
0854	2.0	Rd 20x95	20	95	27	35	15
0855	2.5	Rd 24x100	24	100	32	43	15
0856	2.5	Rd 24x120	24	120	32	43	17
0864	4.0	Rd 30x135	30	135	38	56	21
0858	4.0	Rd 30x150	30	150	38	56	21

Table 2: Lifting Socket HAL (stainless steel)

Article	Maximum working load [t]	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]
0850E	0.5	Rd 12x60	12	60	16	22	8
0869E	0.5	Rd 12x80	12	80	16	22	8
0852E	1.2	Rd 16x80	16	80	21	27	13
08521E	1.2	Rd 16x100	16	100	21	27	13
0854E	2.0	Rd 20x95	20	95	27	35	15
0855E	2.5	Rd 24x100	24	100	32	43	15
0856E	2.5	Rd 24x120	24	120	32	43	17
0864E	4.0	Rd 30x135	30	135	38	56	21
0858E	4.0	Rd 30x150	30	150	38	56	21

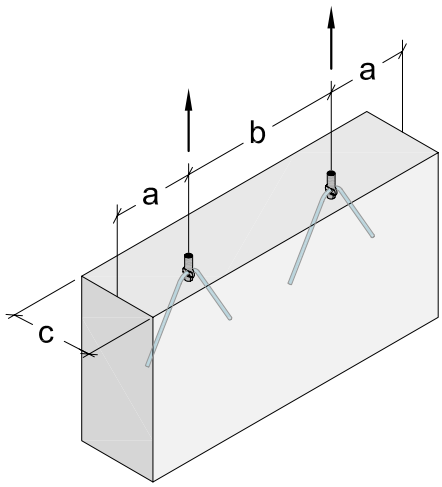
Installation Instructions for Lifting Sockets HAL

1. Spacing of Lifting Sockets HAL and edge distances

Table 3: Minimal dimensions

Type	a [mm]	b_{min} [mm]	c_{min} [mm]	c_{red}* [mm]
Rd 12	150	300	60	55
Rd 16	200	400	80	65
Rd 20	275	550	110	90
Rd 24	300	600	125	100
Rd 30	350	650	140	120

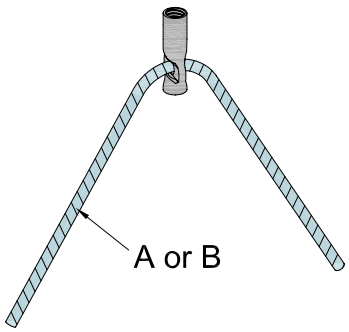
*the reduced panel thickness can be used, when the anchor is stressed by straight pull or parallel shear pull β < 30°



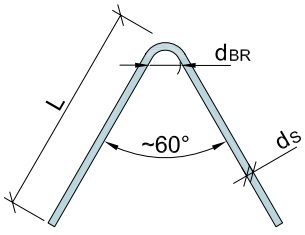
2. Anchorage reinforcement

Table 4: Reinforcement bars A; B (according to DIN 1045-1)

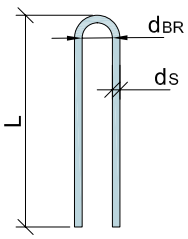
Type	F [kN]	d_S [mm]	d_{BR} [mm]	L [mm]	
				A	B
Rd 12	5	6	24	220	190
Rd 16	12	10	40	310	280
Rd 20	20	12	48	430	380
Rd 24	25	14	56	470	410
Rd 30	40	16	64	650	570



A reinforcement bar - spread (BSt500S):



B reinforcement bar – parallel (BSt500S):

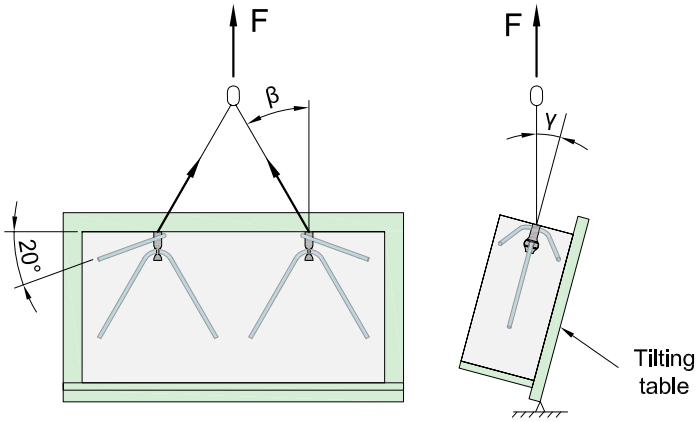


The reinforcement bar must be tightly pressed!

Lifting Sockets HAL with reinforcement bars can be used with **straight pull** without any further reinforcement. In case of **parallel shear pull** or **transversal pull** reinforcement according next pages is necessary.

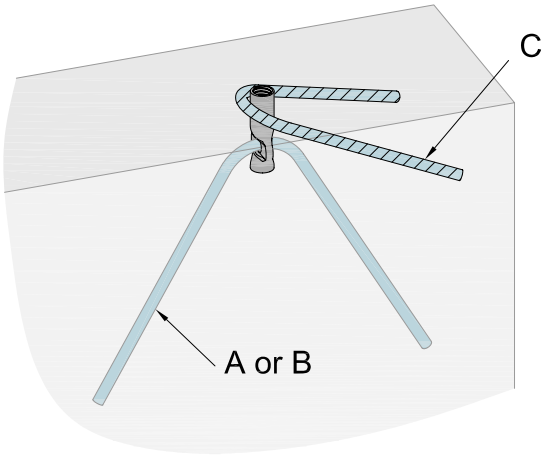
3. Further Reinforcement (Parallel shear pull and Transversal pull)

Parallel shear pull at vertical lifting:



1) β < 12.5° - **straight pull**: anchorage reinforcement without any additional reinforcement
2) β > 12.5° - **parallel shear pull**: anchorage reinforcement + parallel shear pull reinforcement
3) γ > 15° - **transversal pull**: anchorage reinforcement + transversal pull reinforcements

Parallel shear pull reinforcement:



The parallel shear pull reinforcement must be installed in opposite direction to the horizontal force components. The reinforcement must be fixed to the Lifting Socket HAL with a tying wire. Close contact is important!

C reinforcement bar (BSt500S):

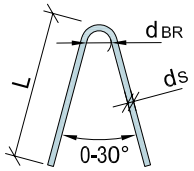
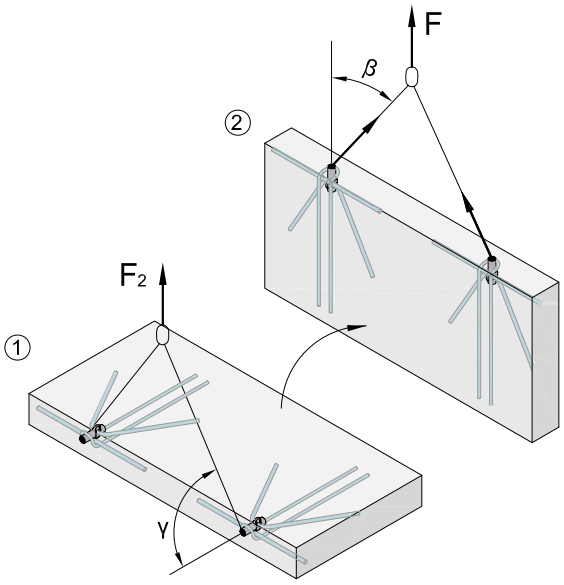


Table 5: Parallel shear pull reinforcement bar C
(according to DIN 1045-1)

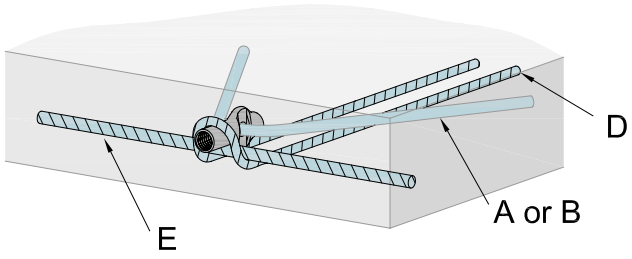
Type	F [kN]	d_S [mm]	d_{BR} [mm]	L [mm]
Rd 12	5	6	24	150
Rd 16	12	8	32	200
Rd 20	20	8	32	300
Rd 24	25	10	40	300
Rd 30	40	12	48	400

Transversal pull while lifting up a lying panel:



F – force in the plane of the precast concrete unit
$F_2 = 0.5 \cdot F$ – force in the plane perpendicular to the precast concrete unit

Transversal pull reinforcement:



The transversal pull reinforcement must be fixed to the Lifting Socket HAL with a tying wire. Close contact is important!

D; E reinforcement bars (BSt500S):

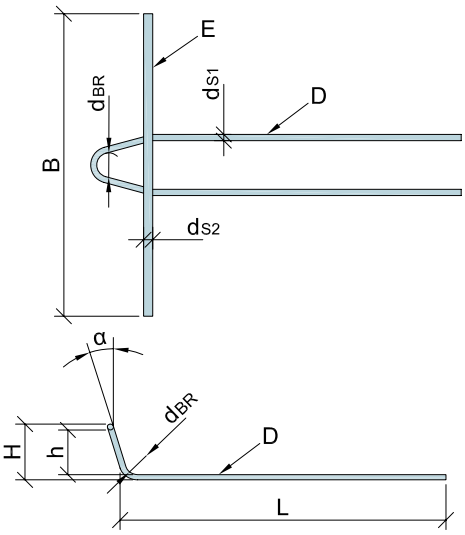
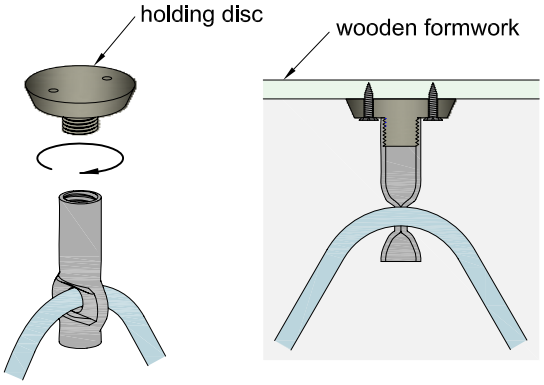


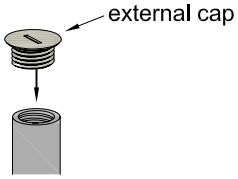
Table 6: Transversal pull reinforcement bars D; E (according to DIN 1045-1)

Type	F [kN]	F_2 [kN]	d_{S1} [mm]	L [mm]	h [mm]	H [mm]	d_{BR} [mm]	α^o	B [mm]	d_{S2} [mm]
Rd 12	5	2.5	6	270	23	35	24	15	280	8
Rd 16	12	6	8	420	33	49	32	15	400	12
Rd 20	20	10	10	490	44	64	40	15	490	14
Rd 24	25	12.5	12	520	51	75	48	15	550	14
Rd 30	40	20	12	570	68	92	48	15	580	16

4. Accessories of Installation



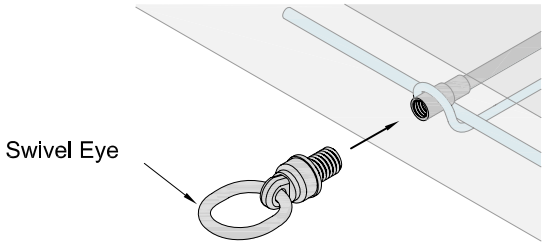
Holding Discs (for more information, look at brochure "Threaded System Accessories" page 5) are used when is necessary to fasten Lifting Sockets HAL to wooden formwork. They eliminate the possibility of getting concrete or pollution into the Sockets.

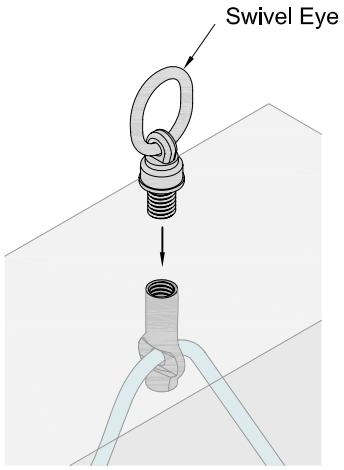


External Caps (for more information, look at brochure "Threaded System Accessories" page 6) are used to seal Lifting Socket HAL and prevent various substances such as residual concrete, dust, snow etc. from penetrating into the socket, protecting the anchor thread from clogging up.

5. Lifting Devices

Swivel Eye, Treaded Lifting Loop, **Threaded Lifting Loop with pressure plate and Lifting Loop "Goliath"** (for more information, look at brochure "Threaded System Accessories" page 8-15) are to be used as lifting anchors of the Thread System. They must be completely screwed into the Socket.





Lifting Socket HLA

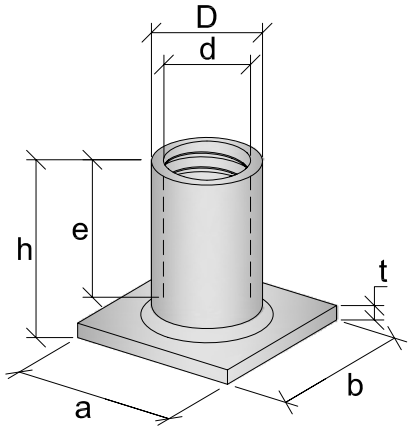
Because of their construction, Lifting Socket HLA can be used into precast concrete units of minimal height. Lifting Sockets HLA are ideal for the face of thin panels or top of slabs. The socket and cap are fully welded so the socket is effectively sealed.

Lifting Sockets HLA can be used in concrete with a compressive strength ≥ 15 N/mm^2 and the minimum necessary surface reinforcement (for Rd 12, Rd 14, Rd 16 ≥ 130mm^2/m; for Rd 18, Rd 20, Rd 24 ≥ 188mm^2/m; for Rd30, Rd36 ≥ 220mm^2/m; for Rd42, Rd52 ≥ 510mm^2/m).

Anchor with anchorage reinforcement (point 2) is set into the concrete before the casting and serves a basis for wire lifting loops, lifting loops "Goliath", lifting loops with pressure plate and swivel eye. There is the half-round metric thread Rd in the socket, which should be greased before the installation into the precast concrete unit. The fastening details equipped with normal metric standard thread can be fastened to Rd thread.

For fastening to a steel formwork, magnetic holders models HM4 are recommended. To prevent dirt and concrete from penetrating into the thread of the socket, external caps or holding discs are used. Holding discs are used to fasten anchors to a wooden formwork.

Anchor length can be changed according to certain conditions of installation.



Materials:

- zinc-plated or
- stainless steel

Table 1: Lifting Socket HLA (zinc-plated)

Article	Maximum working load [t]	Type	a×b×t [mm]	d [mm]	D [mm]	e [mm]	h [mm]
0350	0.5	Rd 12x30	35x35x3	12	16	22	30
0352	0.8	Rd 14x33	35x35x3	14	18	25	33
0354	1.2	Rd 16x35	35x35x3	16	21	27	35
0356	1.6	Rd 18x44	60x60x5	18	25	34	44
0358	2.0	Rd 20x47	60x60x5	20	27	35	47
0360	2.5	Rd 24x54	60x60x5	24	32	43	54
0362	4.0	Rd 30x72	130x130x8	30	38	56	72
0364	6.3	Rd 36x80	130x130x8	36	48	69	80
0366	8.0	Rd 42x98	130x130x8	42	54	80	98
0368	12.5	Rd 52x120	130x130x8	52	70	97	120

Table 2: Lifting Socket HLA (stainless steel)

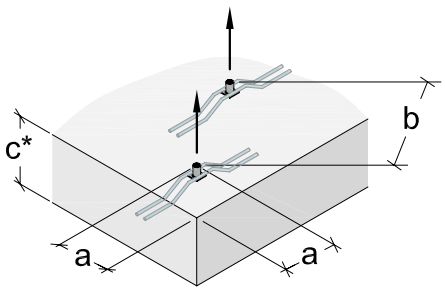
Article	Maximum working load [t]	Type dxh [mm]	a×b×t [mm]	d [mm]	D [mm]	e [mm]	h [mm]
0350E	0.5	Rd 12x30	35x35x3	12	16	22	30
0352E	0.8	Rd 14x33	35x35x3	14	18	25	33
0354E	1.2	Rd 16x35	35x35x3	16	21	27	35
0356E	1.6	Rd 18x44	60x60x5	18	25	34	44
0358E	2.0	Rd 20x47	60x60x5	20	27	35	47
0360E	2.5	Rd 24x54	60x60x5	24	32	43	54
0362E	4.0	Rd 30x72	130x130x8	30	38	56	72
0364E	6.3	Rd 36x80	130x130x8	36	48	69	80

Installation Instructions for Lifting Sockets HLA

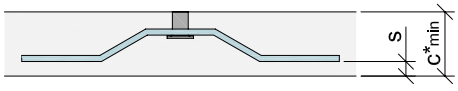
1. Spacing of Lifting Sockets HLA and edge distances

Table 3: Minimal dimensions

Type	a_{min} [mm]	b_{min} [mm]
Rd 12	180	350
Rd 14	180	350
Rd 16	250	500
Rd 18	300	600
Rd 20	300	600
Rd 24	400	800
Rd 30	500	1000
Rd 36	650	1300
Rd 42	650	1300
Rd 52	750	1500



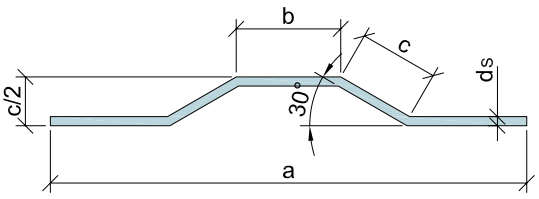
*the minimum panel thickness was determined by taking the concrete cover *s* to 20 mm to section. For other uses and environmental conditions, the concrete cover must be increased so enlarging the panel thickness.



2. Anchorage reinforcement

As from size Rd 24 the installation should be in pairs, crossed!

A reinforcement (BSt500S):



Number of bars 2:

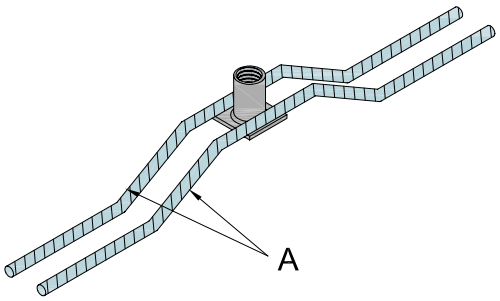
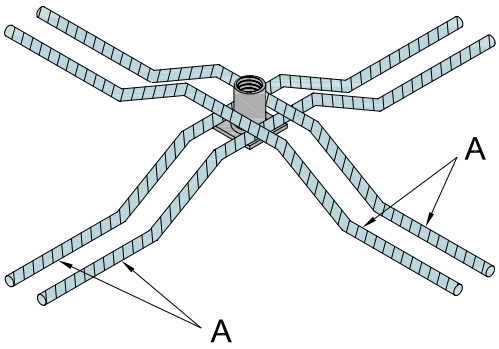


Table 4: Reinforcement bars A (according to DIN 1045-1)

Type	F [kN]	d_S [mm]	a [mm]	b [mm]	c [mm]
Rd 12	5	6	250	60	60
Rd 14	8	6	360	60	70
Rd 16	12	8	420	90	70
Rd 18	16	8	530	90	80
Rd 20	20	8	640	90	80

Number of bars 4:

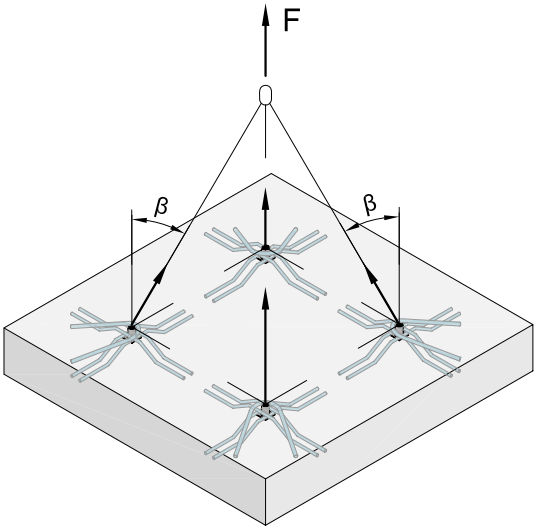


Type	F [kN]	d_S [mm]	a [mm]	b [mm]	c [mm]
Rd 24	25	10	640	90	100
Rd 30	40	12	830	90	110
Rd 36	63	14	1140	140	120
Rd 42	80	16	1250	140	120
Rd 52	125	20	1530	140	150

Lifting Socket HLA with reinforcement bars can be used with **straight pull** without any further reinforcement. In case of **parallel shear pull** or **transversal pull** reinforcement according next pages is necessary.

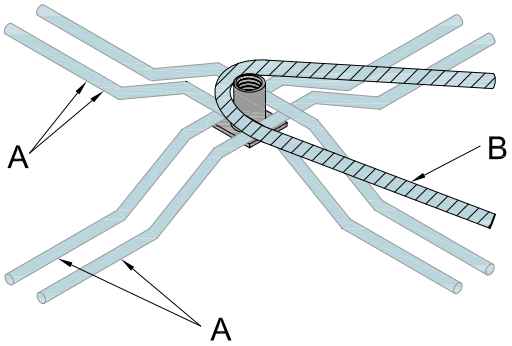
3. Further Reinforcement (Parallel shear pull and Transversal pull)

Parallel shear pull at vertical lifting:



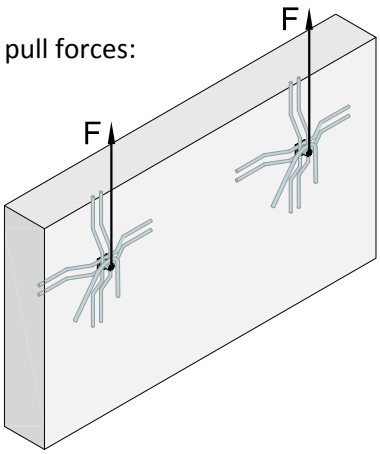
1) β < 12.5° - **straight pull**: anchorage reinforcement without any additional reinforcement
2) β > 12.5° - **parallel shear pull**: anchorage reinforcement + parallel shear pull reinforcement
3) **transversal pull**: anchorage reinforcement + parallel shear pull reinforcement

Parallel shear pull reinforcement:



The parallel shear pull reinforcement must be installed in opposite direction to the horizontal force components. The reinforcement must be fixed to the Lifting Socket HLA with a tying wire. Close contact is important!

Transversal pull forces:



B reinforcement bar (BSt500S):

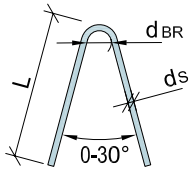
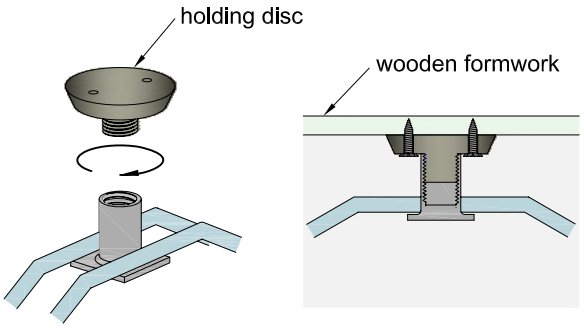


Table 5: Parallel shear pull reinforcement bar B

Type	F [kN]	d_S [mm]	d_{BR} [mm]	L [mm]
Rd 12	5	6	24	150
Rd 14	8	6	24	250
Rd 16	12	8	32	200
Rd18	16	8	32	340
Rd 20	20	8	32	300
Rd 24	25	10	40	300
Rd 30	40	12	48	400
Rd 36	63	14	56	550
Rd 42	80	16	64	600
Rd 52	125	20	140	1000

When the Lifting Socket HLA is stressed by traversal pull, the parallel shear reinforcement B must be positioned in the direction of the forces.

4. Accessories of Installation



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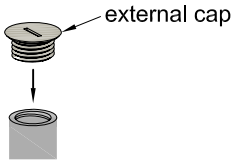

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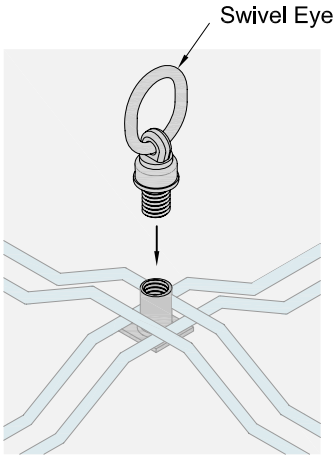
5. Lifting Devices



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