Lifting and Fixing Tools

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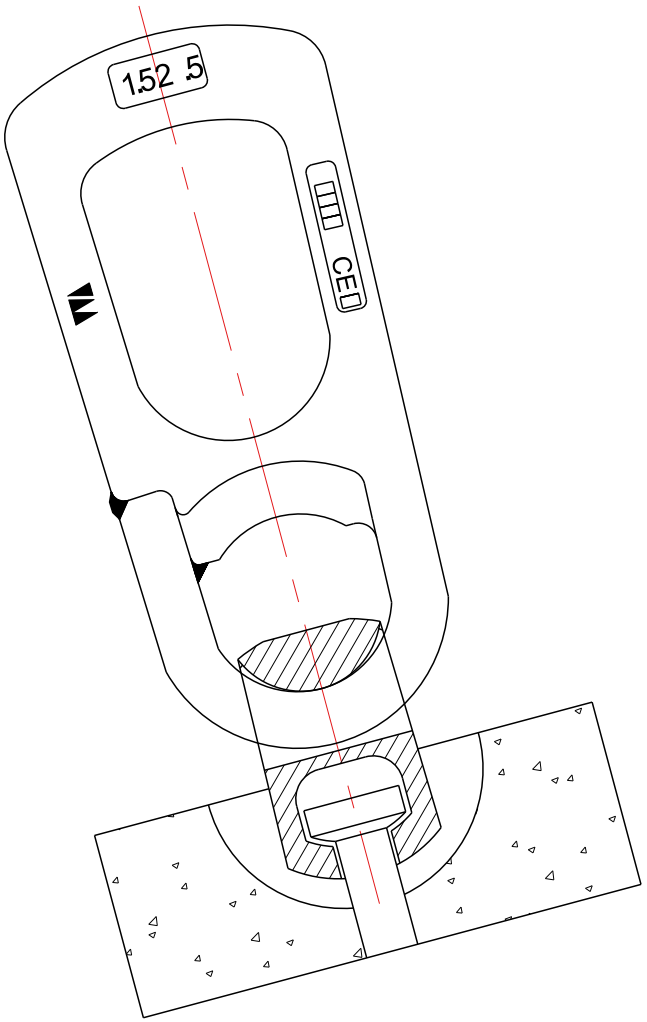
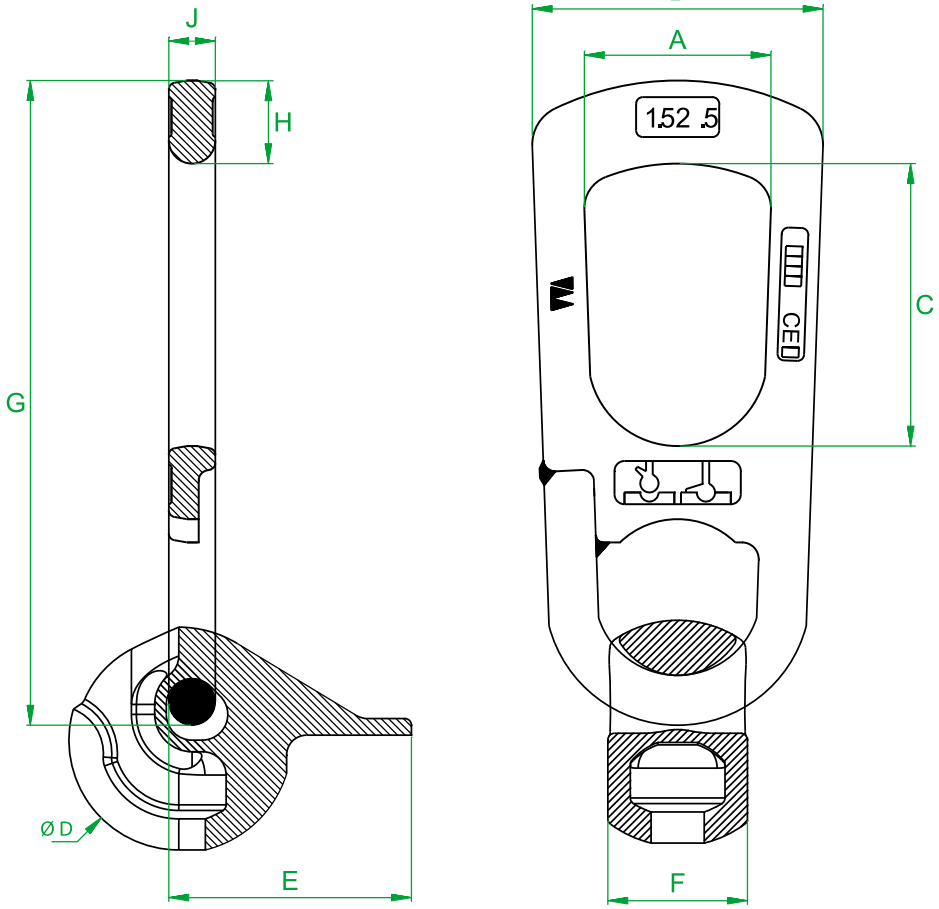


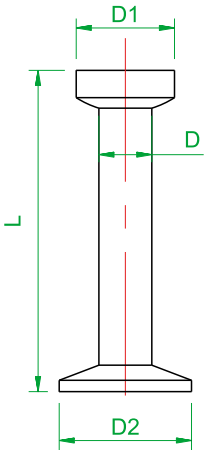
Range		1.3 T	2.5 T	5 T	7.5 T - 10 T	15 T - 20 T	32 T
Ref.		100327	100328	100329	100330	100331	100332
A	[mm]	44	56	68	82	113	175
B	[mm]	74	88	118	160	191	269
C	[mm]	70	85	88	112	135	189
ØD	[mm]	56	68	88	112	152	195
E	[mm]	54	66	83	113	151	214
F	[mm]	32	42	57	73	110	153
G	[mm]	162	196	237	339	447	584
H	[mm]	20	25	37	50	75	100
J	[mm]	12	14	16	26	30	45

Lifting eyes are provided with CE certificates and usage and safety instructions.



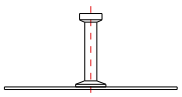
Spherical Head Anchor

Spherical Head Anchor



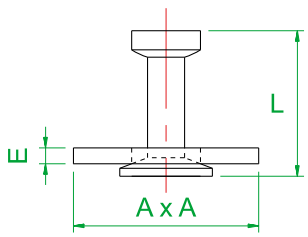
Ref.	Strength	Lg. [mm]	Weight [kg]	Qty /bag
100626	1T3	35	0.042	300
100627		40	0.045	300
100628		50	0.051	300
100629		55	0.054	300
100630		65	0.060	300
100631		85	0.073	300
100632		120	0.100	200
100633		170	0.130	100
100634	2T5	240	0.170	100
100635		45	0.110	200
100636		55	0.120	200
100637		65	0.130	100
100638		75	0.140	100
100639		85	0.150	100
100640		120	0.200	100
100642		170	0.260	100
100643		210	0.310	100
100644		240	0.345	50
100645		280	0.390	50
100647	5T	75	0.350	50
100649		85	0.370	50
100650		95	0.440	50
100651		120	0.580	50
100654		180	0.730	25
100656		240	0.980	25
100657		340	1.330	25
100660		100	0.670	25
100661		120	0.740	25
100662		140	0.810	25

Ref.	Strength	Lg. [mm]	Weight [kg]	Qty /bag
100664	7T5	165	0.900	25
100665		200	1.020	25
100666		240	1.170	10
100667		300	1.380	10
100670	10T	115	0.890	25
100672		135	0.990	25
100673		150	1.060	10
100674		170	1.160	10
100675		200	1.310	10
100677		250	1.550	10
100678		340	1.980	10
100679		680	3.620	1
100680	15T	140	1.870	10
100681		165	2.050	10
100682		200	2.300	1
100683		300	3.000	1
100684		400	3.730	1
100685	20T	200	2.850	1
100686		240	3.210	1
100688		340	4.100	1
100689		500	5.552	1
100690		1,000	9.970	1
100691	32T	200	5.550	1
100692		250	6.320	1
100693		280	6.780	1
100694		320	7.400	1
100695		500	10.010	1
100696		700	13.260	1
100697		1,200	20.960	1



Spherical head anchors are provided with CE certificate. Other lengths can be provided on request. Foot anchors are in black carbon steel. They are also available with zinc plated and hot dip galvanised steel. They can be provided also in stainless steel (on request). To get the full compression cone, the distance from the concrete edge must be higher than 3L and the distance between anchors must be higher than 6L. However, even in that case, the load capacity of the anchorage (concrete failure) has to be checked by qualified people. On request, DSI-ARTÉON can provide anchors welded on a steel plate 20 x 3mm. This system is an easy, quick and safe solution for placing anchors in concrete elements by spot welding the steel plate to the reinforcing steels of the precast element (pipe, …). Dimensions are defined on a case by case basis with the customer.

Plate Anchor

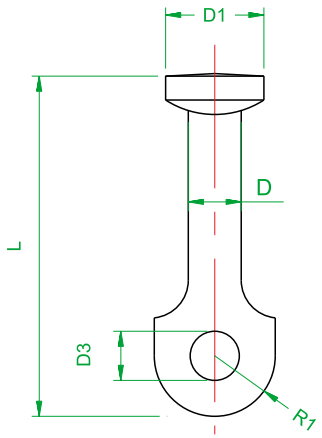


Range		2.5 T	5 T	10 T
Ref.		**100711**	**100713**	**On request**
A	[mm]	70	90	90
E	[mm]	6	8	10
L	[mm]	55	65	115

On request. Please send us an inquiry if you wish to know which reinforcing steel you should use and which working load the system accommodates.

Eye Anchor

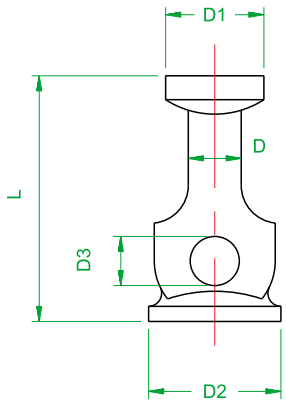
Range		1.3 T	2.5 T	5 T	10 T	20 T	32 T
Ref.		100698	100699	100700 100701	100702 100703	100704	100705
D	[mm]	10	14	20	28	38	50
D1	[mm]	18	25	36	46	69	88
D3	[mm]	10	13	20	25	38	47
R1	[mm]	11	16	21.5	27.5	41.5	50
Lnormal	[mm]	65	90	90	115	250	300
L short	[mm]			120	180		



Eye anchors are provided with CE certificate.
Eye anchors must always be used with ribbed reinforcing steel, grade FeE500.
Eye anchors are available in black carbon steel or hot dip galvanized steel.

Foot & Eye Anchor

Range		1.3 T	2.5 T	5 T
Ref.		100706	100707	100708
D	[mm]	10	14	20
D1	[mm]	18	25	36
D2	[mm]	22	35	47
D3	[mm]	10	13	20
L	[mm]	53	65	80



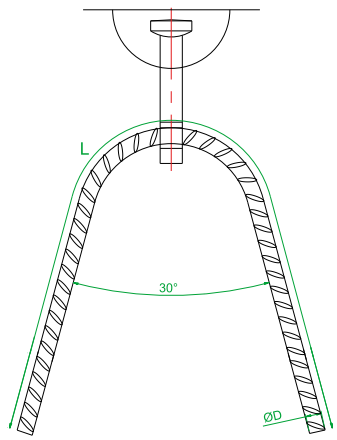
Foot & eye anchors are provided with CE certificate.
Foot & eye anchors must always be used with ribbed reinforcing steel, grade FeE500.
Foot & eye anchors are available in black carbon steel or hot dip galvanized steel.

Ribbed Reinforcing Steel FeE500

To use with eye anchors and with foot & eye anchors.

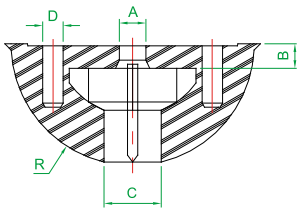
Total length L (mm) of ribbed reinforcing steel is to be placed in in the eye of the anchor, depending on the concrete strength.

Range		1.3 T	2.5 T	5 T	10 T	20 T	32 T
Rebar diameter							
D	[mm]	8	10	16	20	32	40
Length for Concrete							
10MPa	[mm]	700	1,100	1,600	2,000	3,000	3,800
20MPa	[mm]	600	700	1,100	1,400	2,000	2,700
10MPa	[mm]	450	600	900	1,100	1,700	2,100



Rubber Recess Former and Accessories

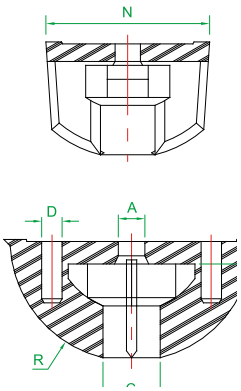
Round Rubber Recess Former
Round Rubber Recess Former + Fixing Set



Range		1.3 T	2.5 T	5 T	7.5 T	10 T	15 T	20 T	32 T
Ref.		100357	100358	100359	100360	100361	100362	100363	100364
R	[mm]	30	37	47	59	59	80	80	102
A	[mm]	9	11	11	13	13	13	13	15
B	[mm]	6	10	11.5	14	14	16	16	16
C	[mm]	10	14	20	24	28	34	38	50
D	[mm]	6.5	6.5	8.5	10.5	10.5	10.5	10.5	10.5

Rubber recess formers can be used 30 to 40 times.

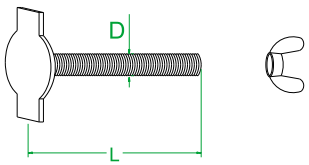
Narrow Rubber Recess Former
Narrow Rubber Recess Former + Fixing Set



Range		1.3 T	2.5 T	5 T	7.5 T	10 T	15 T	20 T
Ref.		100343	100344	100345	100346	100347	100348	100349
R	[mm]	30	37	47	59	59	80	80
A	[mm]	9	11	11	13	13	13	13
B	[mm]	6	10	11.5	14	14	16	16
C	[mm]	10	14	20	24	28	34	38
D	[mm]	6.5	6.5	8.5	10.5	10.5	10.5	10.5
N	[mm]	43	53	69	85	85	124	124

Rubber recess formers can be used 30 to 40 times.

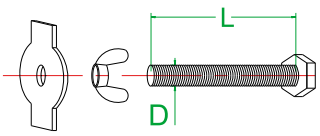
Fixing Set for Rubber Recess Former



Range		1.3 T	2.5 T	5 T	10 T	20 T	32 T
Ref.		100373	100374	100375	100376	100377	100378
D	[mm]	M8	M10	M10	M12	M12	M12
L	[mm]	80	80	100	100	100	100

Fixing sets are composed of a plate with welded threadbar and the wing nut.

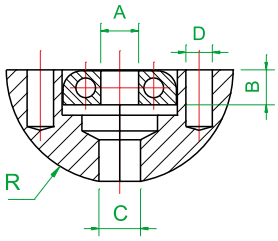
Threaded Plate
Wing Nut
Screw



Range		1.3 T	2.5 T	5 T	10 T	20 T
Plate Wing nut Screw		100379 100384 100387	100380 100385 100388	100381 100385 100388	100382 100386 100389	100383 100386 100389
D	[mm]	M8	M10	M10	M12	M12
L	[mm]	60	80	80	80	80

Articulated Steel Former (Round)

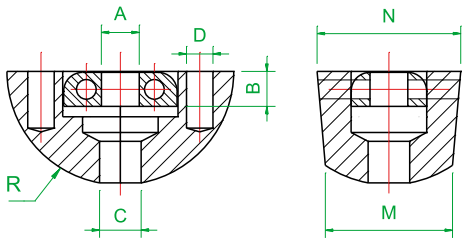
Range		1.3 T	2.5 T	5 T	10 T
Ref.		100336	100337	100338	100340
R	[mm]	30	37	14	59
A	[mm]	M10	M10	M10	M12
B	[mm]	10	10	10	10
C	[mm]	11	15	21	29
D	[mm]	7	7	10	9



Formers can also be supplied in 7.5 T on request

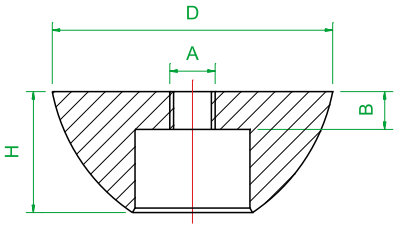
Narrow Articulated Steel Former

Range		1.3 T	2.5 T
Ref.		102224 (on request)	100333 (on request)
R	[mm]	30	37
N	[mm]	42	48
M	[mm]	37	43
A	[mm]	M12	M10
B	[mm]	12	10
C	[mm]	11	15
D	[mm]	No hole	7



Recess Former with Rubber Ring

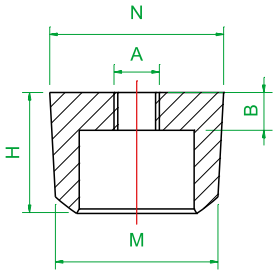
Steel Recess Former (hemispherical)



Range		1.3 T	2.5 T	5 T
Ref.		**100390**	**100391**	**100392**
D	[mm]	58	74	94
A	[mm]	M8	M12	M12
B	[mm]	10	10	10
H	[mm]	25	32	39

Steel recess formers must be used with rubber ring.

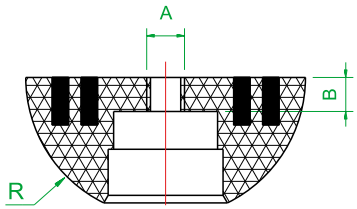
Narrow Steel Recess Former



Range		1.3 T	2.5 T	5 T
Ref.		**100398** (on request)	**100399** (on request)	**100400** (on request)
D	[mm]	58	74	94
A	[mm]	M8	M12	M12
B	[mm]	10	10	10
H	[mm]	25	32	39
N	[mm]	42	46	69
M	[mm]	34	43	58

Steel recess formers must be used with rubber ring.

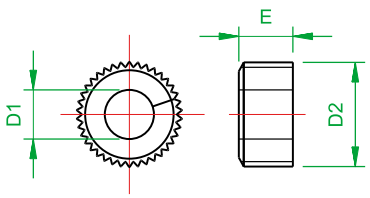
Magnetic Recess Former



Range		1.3 T	2.5 T	5 T	10 T
Ref.		**102242**	**102245**	**102248**	**102250**
R	[mm]	30	37	47	59
A	[mm]	M10	M10	M10	M10
B	[mm]	6	9	12	12
Magnetic load installed		60 kg	75 kg	100 kg	150 kg

Magnetic recess formers must be used with rubber ring.

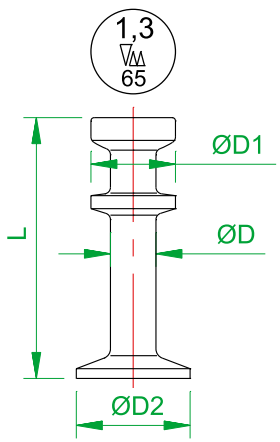
Rubber Ring



Range		1.3 T	2.5 T	5 T	10 T
Ref.		**102232**	**102234**	**102236**	**102237**
D2	[mm]	22	32	38.7	49.4
D1	[mm]	10	14	21	28.5
E	[mm]	11	12	14	20

Double Head Anchor

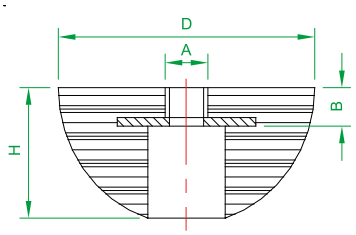
Range		1.3 T		2.5 T		5 T	
Ref.							
D	[mm]	10		14		20	
D1	[mm]	18		25		36	
D2	[mm]	25		35		50	
L	[mm]	55	**Ref. 102181**	55	**Ref. 102189**	120	**Ref. 102200**
		65	**Ref. 102183**	65	**Ref. 102190**	180	**Ref. 102201**
		85	**Ref. 102186**	85	**Ref. 102191**		
				120	**Ref. 102192**		



Double head anchors are provided with CE certificate.
Other length can be provided on request.
Double head anchors are zinc plated.

Tightening Former

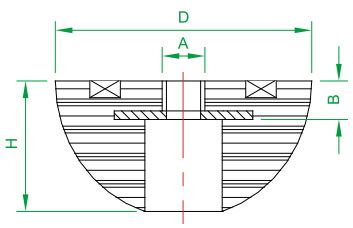
Range		1.3 T	2.5 T
Ref.		**100411**	**100412**
D	[mm]	60	74
A	[mm]	M8	M10
B	[mm]	9	11
H	[mm]	32.7	42.6



Double head anchors are attached to the former by tightening.

Magnetic Tightening Former

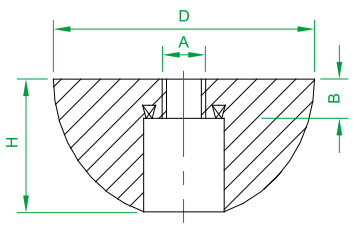
Range		1.3 T	2.5 T
Ref.		**102258**	**102259**
D	[mm]	60	74
A	[mm]	M8	M10
B	[mm]	9	11
H	[mm]	32.7	42.6
Magnetic load installed		60kg	60kg



Double head anchors are attached to the former by tightening.

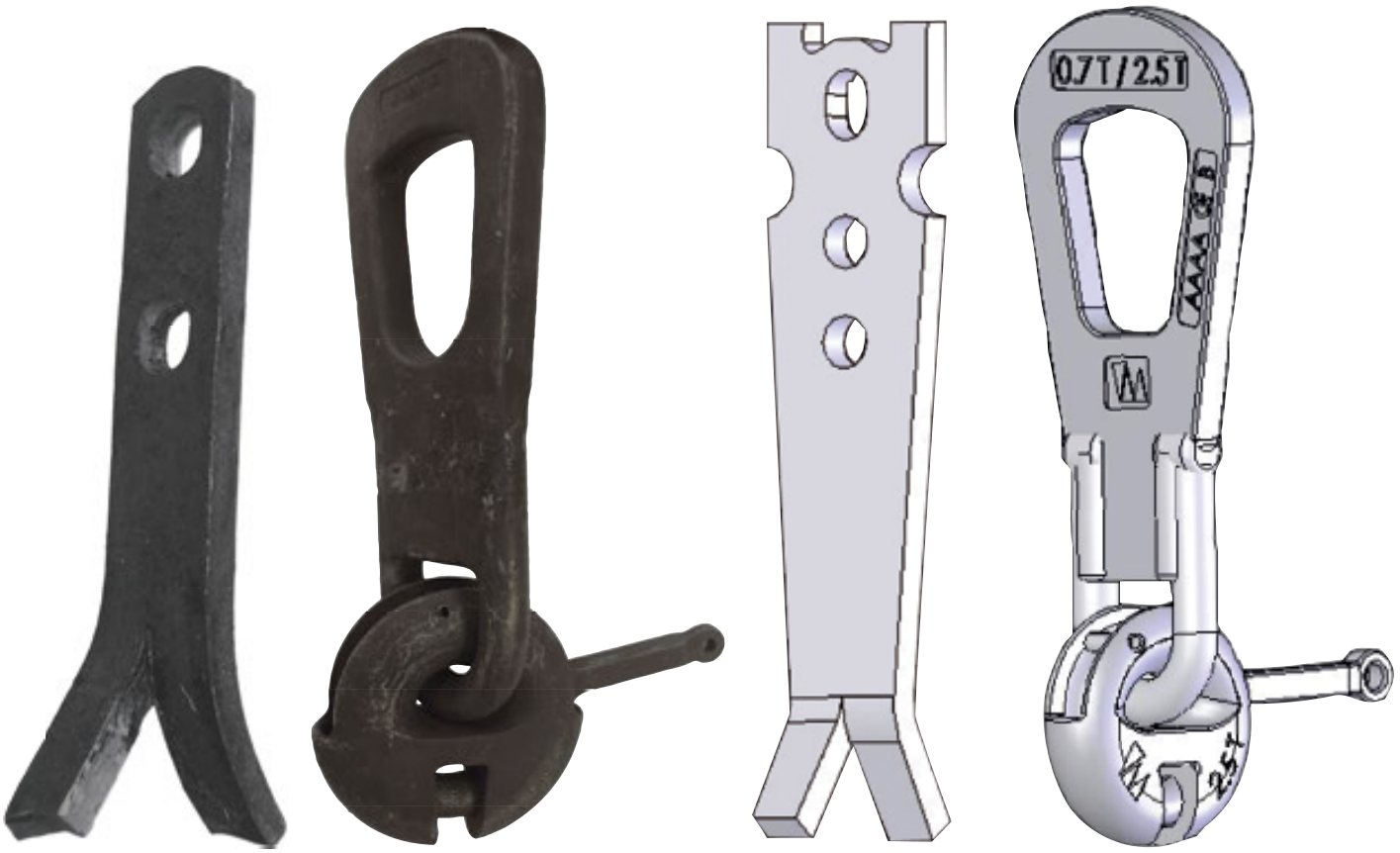
Magnetgrip Former

Range		1.3 T	2.5 T
Ref.		**102251**	**102254**
D	[mm]	60	74
A	[mm]	M8	M10
B	[mm]	9	11
H	[mm]	32.7	42.6



Double head anchors are attached to the former by internal magnets.

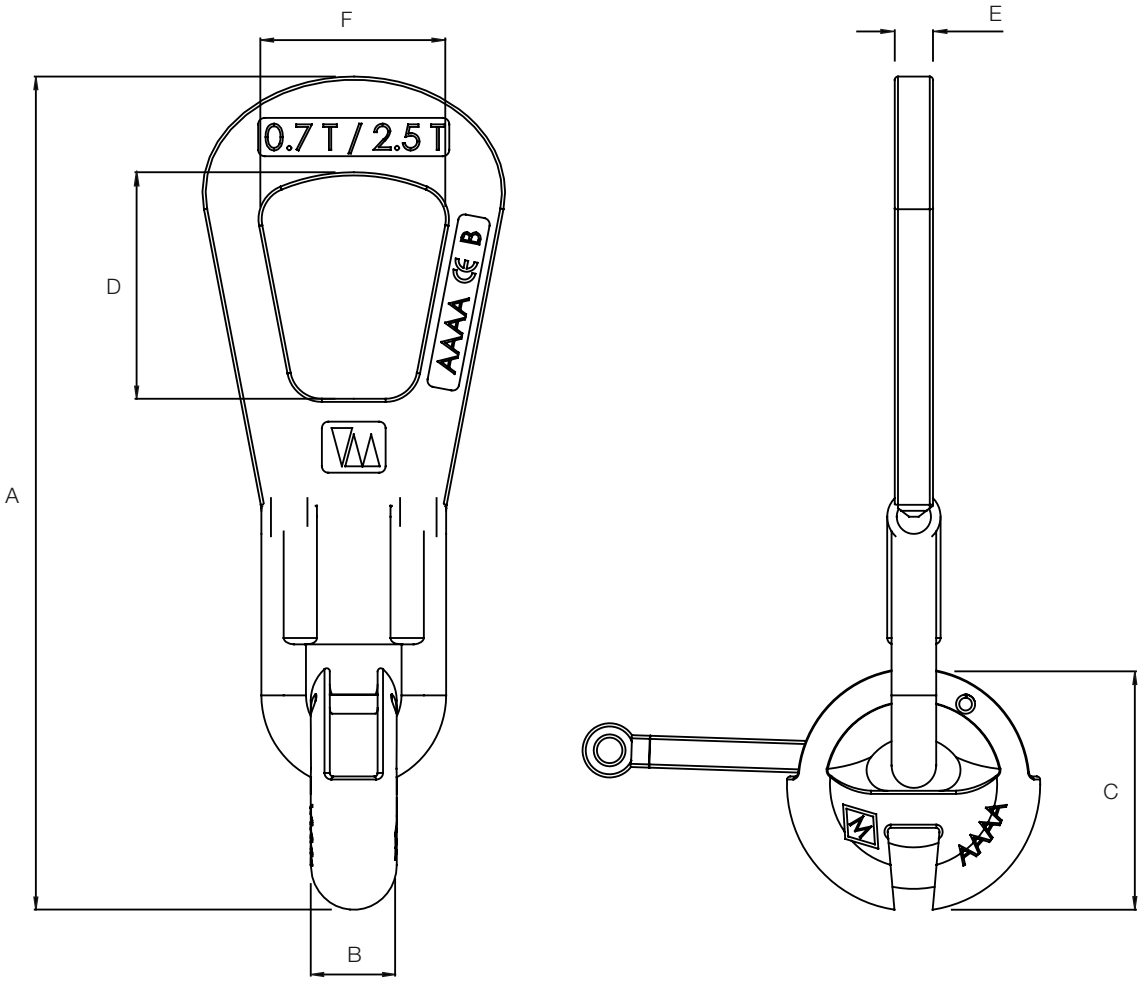
Lifting System with Flat Anchors



Lifting Hook

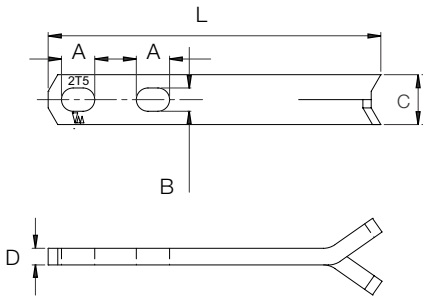
Class	Reference	A	B	C	D	E	F
2T5	**100523**	261	27	80	70	50	48
5T	**100524**	330	36	100	86	71	
10T	**100525**	425	50	140	112	90	
26T	**100526**	605	72	209	160	120	

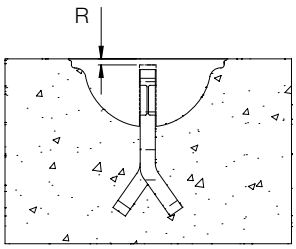
Lifting hooks are provided with a CE certificate and usage and safety instruction.
They must be checked once a year by a qualified person.



Lifting System with Flat Anchors

Spread Anchor





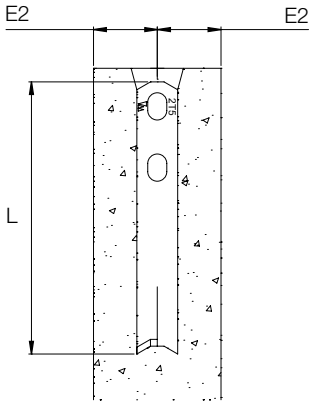
Class	R [mm]
2T5	10
5T	10
10T	15
26T	15

Class	Reference	Working Load	A	B	C	D	L
2T5	**100751**	0T7	20	14	30	5	110
	100752	1T4	20	14	30	6	110
	100753	1T4	20	14	30	6	160
	100754	2T	20	14	30	8	130
	100755	2T	20	14	30	8	160
	100756	2T	20	14	30	8	210
	100757	2T5	20	14	30	10	150
	100758	2T5	20	14	30	10	200
	100759	2T5	20	14	30	10	250
5T	**100760**	3T	22	18	40	10	160
	100761	3T	22	18	40	10	200
	100762	3T	22	18	40	10	280
	100763	4T	22	18	40	12	180
	100764	4T	22	18	40	12	240
	100765	4T	22	18	40	12	320
	100766	5T	22	18	40	15	180
	100767	5T	22	18	40	15	240
	100768	5T	22	18	40	15	400
10T	**100769**	5T3	31	26	60	12	220
	100770	5T3	31	26	60	12	260
	100771	5T3	31	26	60	12	340
	100772	7T5	31	26	60	16	260
	100773	7T5	31	26	60	16	300
	100774	7T5	31	26	60	16	420
	100775	10T	31	26	60	20	300
	100776	10T	31	26	60	20	370
	100777	10T	31	26	60	20	520
26T	**100778**	14T	45	35	80	20	370
	100779	14T	45	35	80	20	460
	100780	22T	45	35	90	26	500
	100781	22T	45	35	90	26	620

Anchors are in black carbon steel. They are also available with hot dip galvanized steel.
Spread anchors can be used for tilt up.
The following conditions must be met:
- add recommanded reinforcement for the tilt up anchor,
- use the longer anchor of each classes,
- divide the working load by 2,
- respect minimal edge distances for the tilt up anchor.

Minimum Center Distance, Edge Distance for Spread Anchor

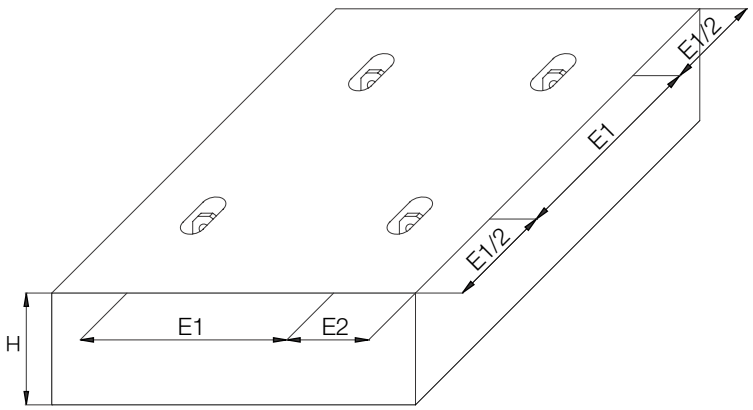
Class	Working Load	Length [mm]	Minimum Center Distance E1 [mm]	Minimum Thickness 2 x E2 [mm]		
				15MPa	25MPa	35MPa
2T5	0T7	110	385	70	60	50
	1T4	110	385	90	70	70
	1T4	160	560	80	60	60
	2T	130	455	110	90	90
	2T	160	660	100	80	80
	2T	210	735	90	70	70
	2T5	150	525	120	80	80
	2T5	200	730	110	80	70
	2T5	250	875	100	80	70
5T	3T	160	560	120	100	100
	3T	200	700	110	90	90
	3T	280	980	100	80	80
	4T	180	630	140	120	100
	4T	240	840	130	110	100
	4T	320	1120	120	100	100
	5T	180	630	180	140	140
	5T	240	840	160	120	120
	5T	400	1,400	140	100	100
10T	5T3	220	770	180	140	100
	5T3	260	910	160	130	100
	5T3	340	1,190	140	100	100
	7T5	260	910	240	160	120
	7T5	300	1,050	200	160	120
	7T5	420	1,470	160	120	120
	10T	300	1,050	280	200	160
	10T	370	1,295	240	160	160
	10T	520	1,820	200	140	120
26T	14T	370	1,295	300	250	200
	14T	460	1,610	240	200	160
	22T	500	1,750	400	300	250
	22T	620	2,170	300	250	250



Minimum thickness of unit H

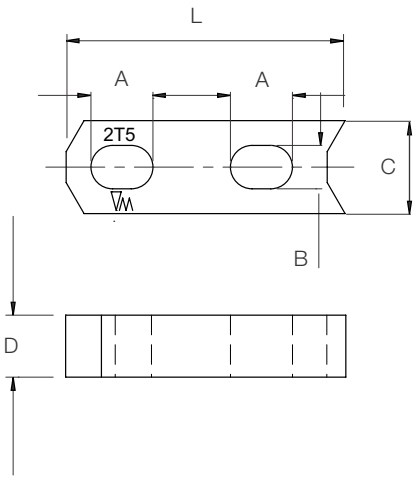
H = L + R + e

L : length of the anchor
R : cover of anchor head
e : concrete cover



Lifting System with Flat Anchors

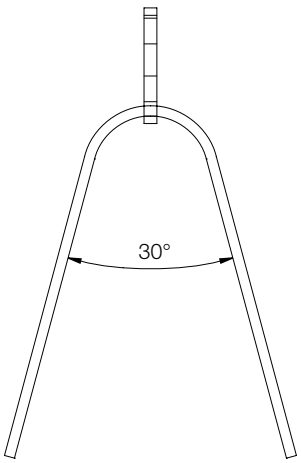
Two Hole Anchor



Class	Reference	Working Load	A	B	C	D	L
2T5	**100782**	0T7	20	14	30	5	90
	100783	1T4	20	14	30	6	90
	100784	2T	20	14	30	8	90
	100785	2T5	20	14	30	10	90
5T	**100786**	3T	22	18	40	10	120
	100787	4T	22	18	40	12	120
	100788	5T	22	18	40	15	120
10T	**100789**	5T3	31	26	60	12	160
	100790	7T5	31	26	60	16	160
	100791	10T	31	26	60	20	160
26T	**100792**	14T	45	35	80	20	240

Anchors are in black carbon steel.
They are also available with hot dip galvanised steel.

The anchor must always be used with a ribbed reinforcing steel, grade FeE500.
The table below indicates the diameter (mm) and the total length (mm) of the ribbed reinforcing steel that has to be used according to the concrete strength fc.

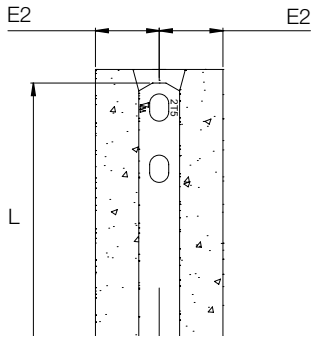


Concrete Strength fc	Class 2T5				Class 5T			Class 10T			Class 26T
	0T7	1T4	2T	2T5	3T	4T	5T	5T3	7T5	10T	14T
15MPa	Ø8 400	Ø10 650	Ø12 800	Ø12 1000	Ø14 1000	Ø16 1200	Ø16 1500	Ø20 1250	Ø20 1750	Ø25 1850	Ø32 2350
25MPa	Ø8 320	Ø10 520	Ø12 640	Ø12 800	Ø14 800	Ø16 960	Ø16 1200	Ø20 1000	Ø20 1400	Ø25 1480	Ø32 1880
35MPa	Ø8 260	Ø10 425	Ø12 520	Ø12 650	Ø14 650	Ø16 780	Ø16 975	Ø20 815	Ø20 1140	Ø25 1200	Ø32 1530

Minimum Center Distance, Edge Distance for Two Hole Anchor

Concrete strength > 15 MPa

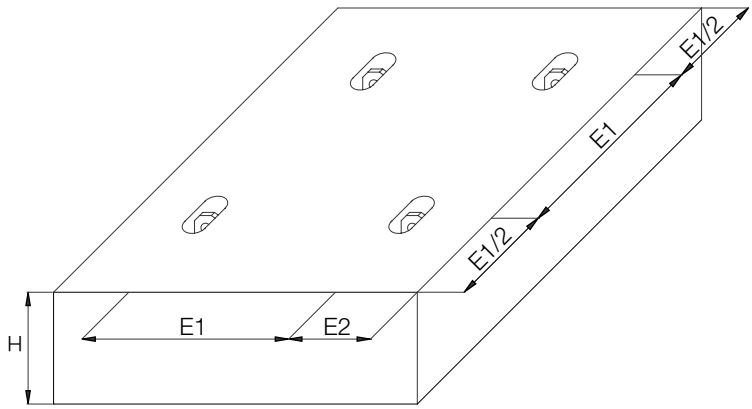
Class	Working Load	Length [mm]	Min. Center Distance E1 [mm]	Minimum Thickness 2 x E2 [mm]
2T5	0T7	90	500	70
	1T4	90	500	80
	2T	90	600	90
	2T5	90	600	100
5T	3T	120	650	100
	4T	120	700	110
	5T	120	750	120
10T	5T3	160	800	120
	7T5	160	1,200	130
	10T	170	1,200	140
26T	14T	240	1,500	160



Minimum thickness H

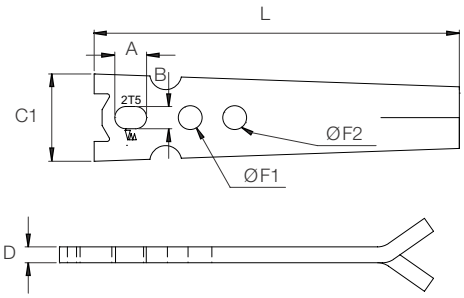
H = L + R + e

L : length of the anchor
R : cover of anchor head
e : concrete cover



Lifting System with Flat Anchors

Tilt up Anchor

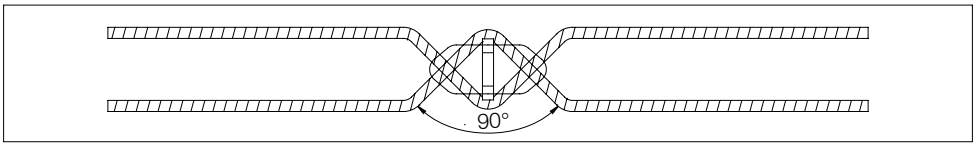


Class	Reference	Working Load	A	B	C1	D	ØF1	ØF2	L
2T5	**100797**	1T4	20	14	55	6	15	15	200
	100798	2T5	20	14	55	10	15	15	230
5T	**100799**	4T	22	18	70	12	18	20	270
	100800	5T	22	18	70	15	18	20	290
10T	**100801**	7T5	31	26	95	15	25	25	320
	100802	10T	31	26	95	20	25	25	390

Ribbed reinforcing steel Fe500 must be put into the notch of the tilt up anchor to avoid concrete splitting at the time of tilt up.
The table below indicates the diameter (mm) and the total length (mm) of the ribbed reinforcing steel that has to be used according to the concrete strength fc.

Concrete Strength fc	Class 2T5		Class 5T		Class 10T	
	1T4	2T5	4T	5T	7T5	10T
15MPa	Ø10 700	Ø12 800	Ø14 950	Ø16 1,000	Ø20 1,200	Ø20 1,500
25MPa	Ø10 560	Ø12 640	Ø16 760	Ø16 800	Ø20 960	Ø25 1200
35MPa	Ø10 455	Ø12 520	Ø16 620	Ø16 650	Ø20 780	Ø25 975

Installation sketch of the reinforcement :

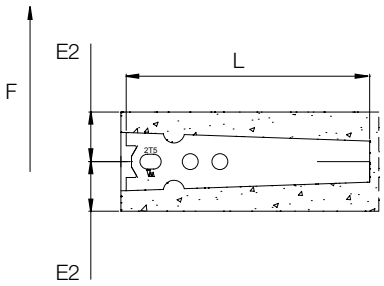


The bending radius of the reinforcement must respect the rules of BAEL 91.

Minimum Center Distance, Edge Distance for Tilt Up Anchor

Concrete strength > 15 MPa

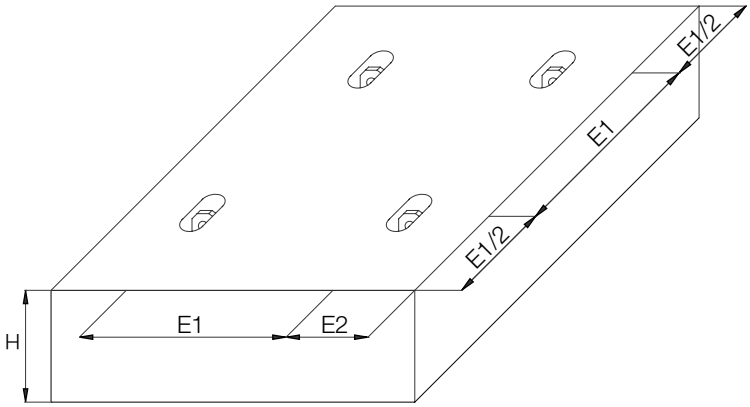
Class	Working Load	Length [mm]	Min. Center Distance E1 [mm]	Minimum Thickness 2 x E2 [mm]
2T5	1T4	200	700	100
	2T5	300	800	120
5T	4T	270	950	140
	5T	290	1,000	140
10T	7T5	320	1,200	160
	10T	390	1,200	200



Minimum thickness H

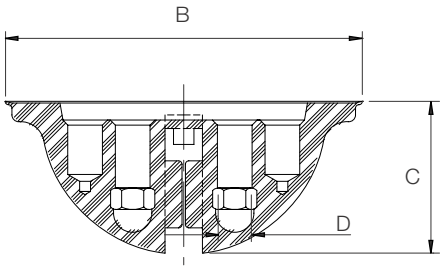
H = L + R + e

L : length of the anchor
R : cover of anchor head
e : concrete cover



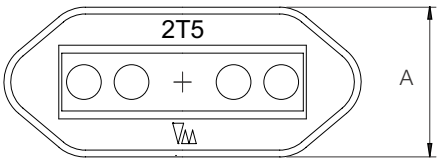
Lifting System with Flat Anchors

Flat Anchor Former

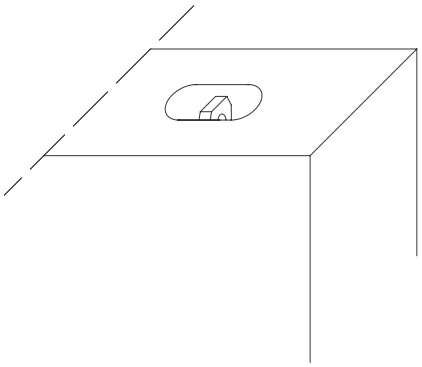


Class	Reference	A	B	C	D
2T5	**100527**	44	105	45	M8
5T	**100528**	49	126	59	M8
10T	**100529**	67	188	85	M12
26T	**100530**	112	234	118	M16

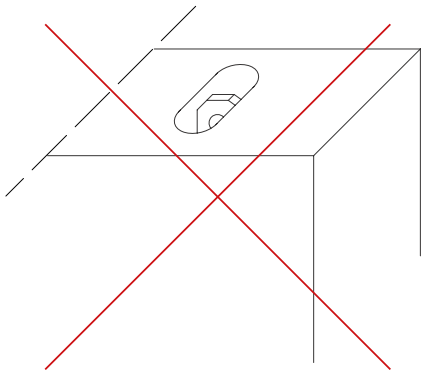
Plastic former.
Fixing by nails or screw.



Right



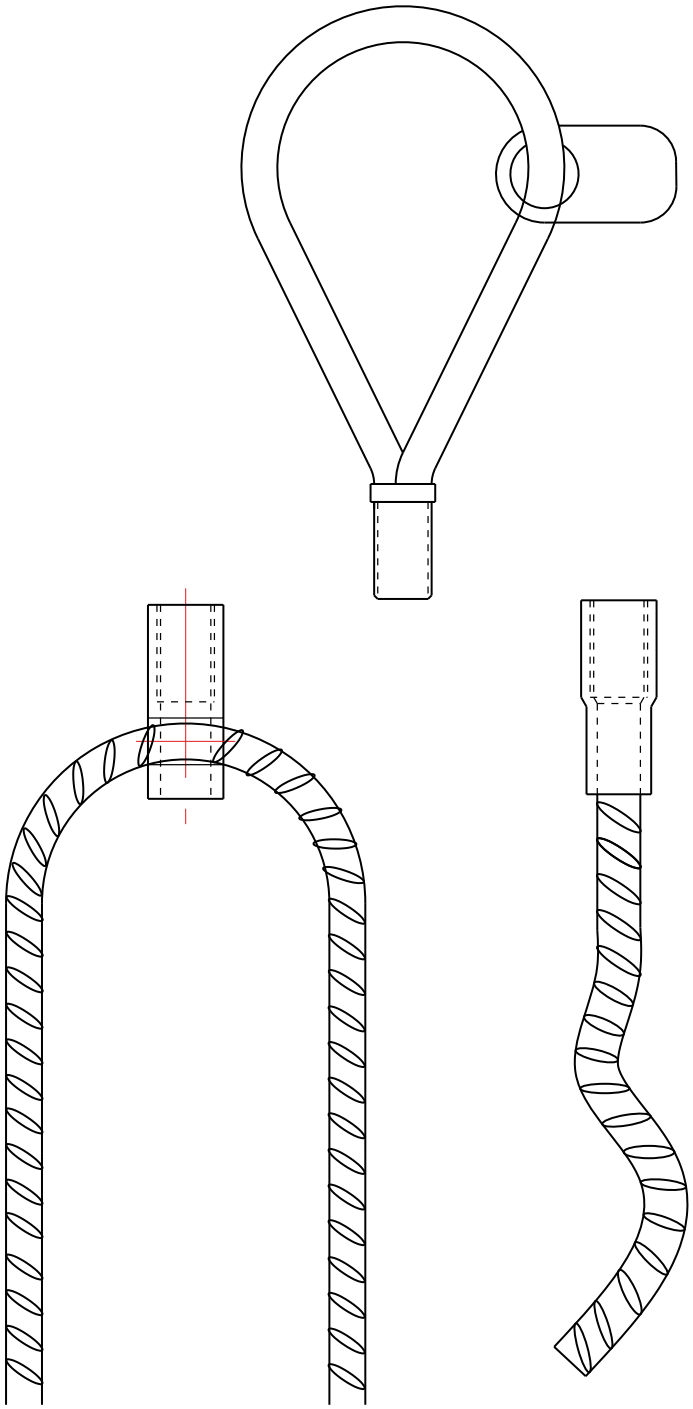
Wrong



To ensure the correct setting of the anchor in a thin unit, the former must be placed as shown in the drawing (the wide part of the former must be placed in the thick part of the unit).


Werk Nievenheim

Lifting System with Sockets

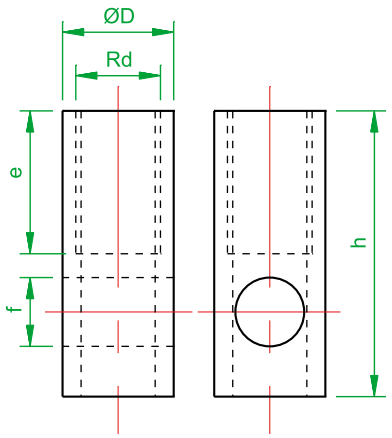


Lifting Socket with Cross Hole

Lifting sockets with cross hole comply with the safety rules for transport anchors used for precast concrete units. Lifting sockets may only be used in combination with a lifting loop or Special Lifting Device.
The insert shows an internal thread and cross hole. The reinforcement steel stirrup inserted through this cross hole takes over transmission of power into the unit.

Load Bearing Capacities and Dimensions

Reference	Thread Rd	Load Bearing Capacities [kg]		Dimensions [mm]				Weight [kg/100p]
		0° - 45°	Lateral tension	D	h	e	f	
100451	12	500	250	15.0	40	22	8.0	3.3
100452	14	800	400	18.0	47	25	10.5	5.0
100453	16	1,200	600	21.0	54	27	13.0	8.0
100454	18	1,600	800	24.0	65	34	13.0	15.5
100455	20	2,000	1,000	27.0	69	35	15.5	18.0
100456	24	2,500	1,250	31.0	78	43	18.0	22.0
100457	30	4,000	2,000	39.5	103	56	22.5	70.0
100458	36	6,300	3,150	47.0	125	68	27.5	80.0
100459	42	8,000	4,000	54.0	145	80	32.0	105.0
100460	52	12,500	6,250	70.0	195	100	40.0	300.0

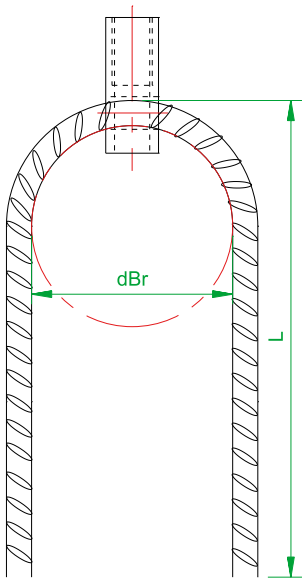


On lateral tension, lifting sockets with cross hole have only half the load-bearing capacity as on axial tension.
Lifting sockets are manufactured of precision steel in special quality.
They are also available in stainless steel.
Sockets are zinc plated and manufactured with Rd thread.

Lifting sockets with cross hole must always be used with a steel rebar as follows:

Diameter and Dimensions of Reinforcement Stirrups

Reference	Rebar Ø FeE500	Bending diameter d_{Br}	Parallel	
			Length of stirrup L	Cutting length
	[mm]	[mm]	[mm]	[mm]
100451	6	24	240	490
100452	8	32	280	570
100453	10	40	330	670
100454	10	40	420	850
100455	12	48	440	890
100456	14	56	480	970
100457	16	64	650	1,320
100458	20	140	820	1,670
100459	25	175	860	1,750
100460	28	196	1,200	2,440

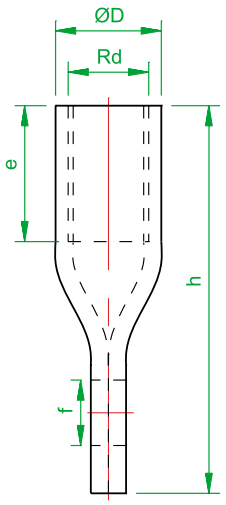


Lengths of the stirrups are defined for a minimum concrete strength of 15MPa.

Lifting Socket with Flat End

Lifting sockets with flat end complies with safety rules for transport anchors used for precast concrete units. The lifting socket may only be used in combination with a lifting loop or Special Lifting Device.
The insert shows an internal thread, a flat end and cross hole. The reinforcement steel stirrup inserted through this cross hole takes over transmission of power into the unit.

Load Bearing Capacities and Dimensions

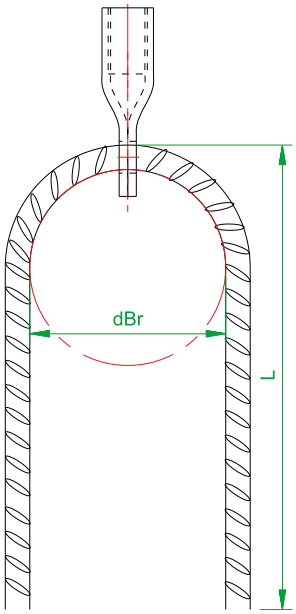


Reference	Thread Rd	Load bearing capacities [kg]		Dimensions [mm]				Weight [kg/100 p]
		0° - 45°	Lateral tension	D	h	e	f	
100469	12	500	250	15.0	60	22	8.0	5.0
100470	14	800	400	18.0	70	25	10.5	6.0
100471	16	1,200	600	21.0	77	27	13.0	10.0
100472	18	1,600	800	24.0	85	34	13.0	18.0
100473	20	2,000	1,000	27.0	92	35	15.5	21.0
100475	24	2,500	1,250	31.0	100	43	18.0	29.0

On lateral tension, lifting sockets with flat end have only half the load-bearing capacity as on axial tension.
Lifting sockets are manufactured of precision steel in special quality.
They are also available in stainless steel.
Sockets are zinc plated and manufactured with Rd thread.

Lifting sockets with flat end must always be used with a steel rebar as follows:

Diameter and Dimensions of Reinforcement Stirrups



Reference	Rebar Ø FeE500 [mm]	Bending Diameter d_{Br} [mm]	Parallel	
			Length of Stirrup L [mm]	Cutting Length [mm]
100469	6	24	240	490
100470	8	32	280	570
100471	10	40	330	670
100472	10	40	420	850
100473	12	48	440	890
100475	14	56	480	970

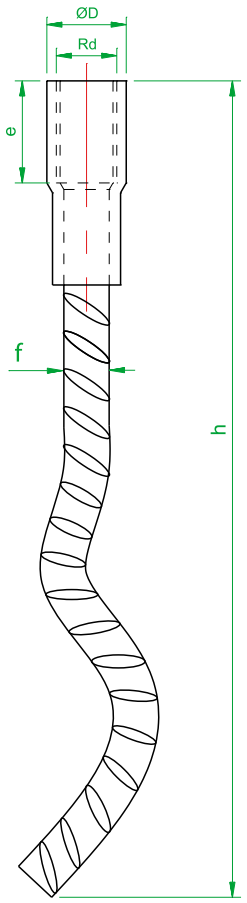
Lengths of the stirrups are defined for a concrete strength of minimum 15MPa.

Lifting Socket with Long Wavy Rebar

Lifting sockets with long wavy rebar comply with the safety rules for transport anchors used for precast concrete units. Lifting sockets may only be used in combination with a lifting loop or Special Lifting Device.

Load bearing capacities and dimensions

Reference	Thread Rd	Load Bearing Capacities [kg]		Dimensions [mm]				Weight [kg/100p]
		0° - 45°	Lateral Tension	ØD	h	e	f	
100497	12	500	250	15.0	137	22	8	7.4
100498	14	800	400	18.0	170	25	10	14.2
100499	16	1,200	600	21.0	216	27	12	24.6
100500	18	1,600	800	24.0	235	34	14	39.0
100501	20	2,000	1,000	27.0	257	35	16	53.1
100502	24	2,500	1,250	31.0	350	43	16	73.0
100503	30	4,000	2,000	39.5	450	56	20	145.0
100504	36	6,300	3,150	47.0	570	68	25	281.0
100505	42	8,000	4,000	54.0	620	80	28	389.0
100506	52	12,500	6,250	70.0	880	100	32	765.0



On lateral tension, lifting sockets with long wavy rebar have only half the load-bearing capacity as on axial tension.
Lifting sockets with short wavy rebar or straight rebar can also be provided.
Lifting sockets are manufactured of precision steel in special quality.
Sockets are zinc plated and manufactured with Rd thread.

Reinforcement and Minimum Thickness for Sockets...

When using lifting inserts, precast units must be reinforced with a minimum surface reinforcement (according to table 1), and concrete must have a strength of minimum 15MPa at the first time of lifting. An already existing static-structural reinforcement may be taken into account. The user is personally responsible for further transmission of load into the unit.

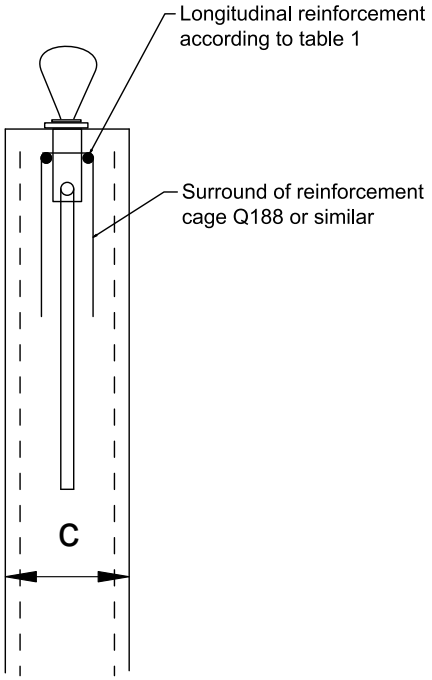


Table 1: Minimum Reinforcement

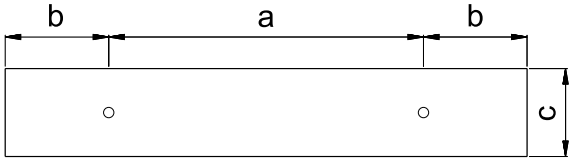
Reference	Longitudinal Reinforcement FeE500		Surface Reinforcement FeE500
	[mm]	[mm]	[cm²/m]
100451	Ø 10	850	1.31
100452	Ø 10	850	1.31
100453	Ø 10	850	1.31
100454	Ø 12	850	1.88
100455	Ø 12	850	1.88
100456	Ø 12	850	1.88
100457	Ø 16	1,000	1.88
100458	Ø 16	1,000	1.88
100459	Ø 16	1,000	1.88
100460	Ø 20	1,200	1.88

This minimum reinforcement can be replaced by comparable stirrups with longitudinal reinforcement. Diagonal tension requests additional reinforcement (table 3).
For transmission of load into the concrete, a reinforcement stirrup of FeE500 is inserted through the cross hole of the lifting socket. Contact of reinforcement and insert has to be ensured in a suitable manner (binding wire, but no welding).

Lifting sockets must be used in units with minimum dimensions according to table 2.

Table 2: Minimum Axis Distance, Edge Distance, Minimum Thickness of Unit

Reference	Minimum Axis Distance (a) [mm]	Minimum Edge Distance (b) [mm]	Minimum Thickness of Unit (c) [mm]
100451	300	150	60
100452	400	200	60
100453	400	300	80
100454	500	350	100
100455	550	400	100
100456	600	450	120
100457	650	550	140
100458	800	700	200
100459	1,000	800	240
100460	1,200	900	275



In cases of lateral and diagonal tension, reinforcement as shown in Tables 3 and 4 must be installed in addition to the minimum reinforcement provided in table 1. The additional reinforcement must have pressure contact with the insert. Diagonal tension reinforcement is arranged opposite to the direction of tensile force.

Table 3: Additional Reinforcement on Diagonal Tension (Necessary if β ≥ 12.5°)

Reference	rebar Ø FeE500 [mm]	L [mm]	Bending diameter d_{Br} [mm]
100451	6	150	24
100452	6	200	24
100453	8	200	32
100454	8	250	32
100455	8	300	32
100456	10	300	40
100457	12	400	48
100458	14	550	56
100459	16	600	64
100460	20	750	140

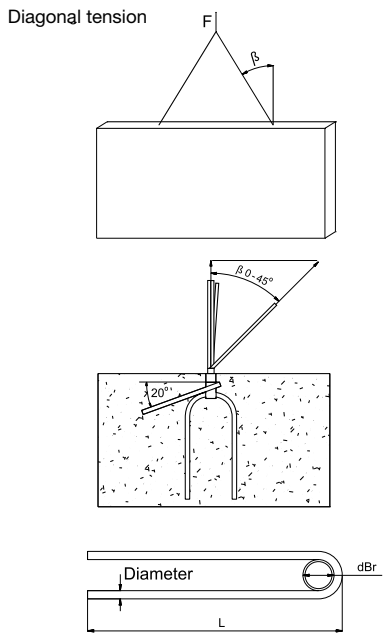
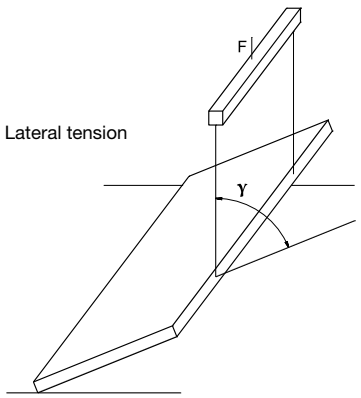
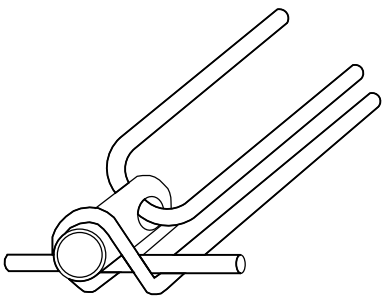


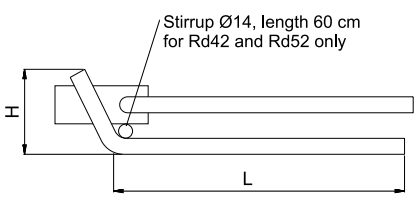
Table 4: Additional Reinforcement on Lateral Rension (Necessary if γ ≥ 7°)

Reference	rebar Ø FeE500 [mm]	L [mm]	H [mm]	Bending diameter d_{Br} [mm]
100451	6	270	35	24
100452	8	350	42	32
100453	8	420	49	32
100454	12	460	55	48
100455	12	490	64	48
100456	12	520	75	48
100457	16	570	92	64
100458	16	690	118	64
100459	16	830	143	64
100460	20	930	174	140



The tilt-up of slabs can lead to simultaneaous diagonal and lateral tension. Those cases request only lateral reinforcement and cover cases of diagonal tension as well.
If the unit is repeatedly tilted up or down during installation, lateral reinforcement must be considered.

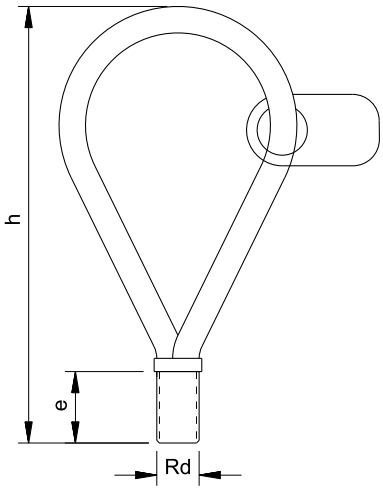




Lifting Loops

Lifting loops can be used with lifting sockets. When using lifting loops, the present instruction for use must be taken into account in addition to instructions for the installation and use of lifting sockets.
Lifting loops are available with Rd thread.

Load Bearing Capacity and Dimensions



Reference	Rd Thread	Load Bearing Capacity [kg] 0 - 45°	h [mm]	e [mm]
100432	Rd 12	500	155	22
100433	Rd 14	800	155	25
100434	Rd 16	1,200	165	27
100435	Rd 18	1,600	190	34
100436	Rd 20	2,000	215	35
100437	Rd 24	2,500	255	44
100438	Rd 30	4,000	300	55
100439	Rd 36	6,300	360	68
100440	Rd 42	8,000	425	75
100441	Rd 52	12,500	530	95

Lifting loops consist of a special steel wire rope in galvanized quality.
Threaded components are made of bright precision steel.

When in use, the following things must be taken into account:

- Lateral tension of lifting loop is inadmissible. Only axial tension or diagonal tension up to 45° is permissible.
- Threads must be totally driven in.
- Clean dirty threads of transport anchors and lifting loops.

In case of lateral tension, which is inadmissible for lifting loops, we recommend using Special Lifting Devices.

As any other lifting equipment, lifting loops must be inspected once a year by an expert.

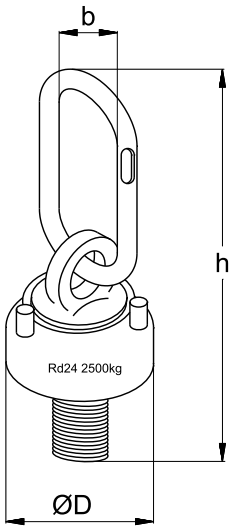
To prevent a premature state of wear, the vertical curve radius of the load hooks must be at least the same as the wire diameter of the lifting loop.

Special Lifting Devices can be used with lifting sockets. When using this Special Lifting Device, the present instruction for use must be taken into account in addition to instructions for the installation and use of lifting sockets.

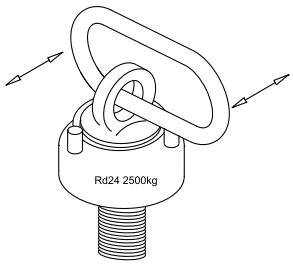
Special Lifting Devices are available with Rd thread.

Load Bearing Capacity and Dimensions

Reference	Rd Thread	Load Bearing Capacity [kg] 0 - 90°	ØD [mm]	h [mm]	b [mm]
100476	12	500	47	125	35
100477	14	800	52	126	35
100478	16	1,200	56	151	35
100479	18	1,600	59	152	60
100480	20	2,000	70	158	60
100481	24	2,500	74	187	75
100482	30	4,000	90	219	90
100483	36	6,300	101	255	100
100484	42	8,000	110	256	100
100485	52	12,500	130	344	140



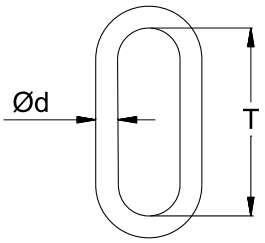
Special Lifting Devices are especially suitable for lateral and diagonal tension and are therefore particularly convenient for tilting up flat manufactured panels.
Special Lifting Devices must be driven in a way which ensures that the bottom plate has throughout contact with the concrete surface. This is particularly important because, on lifting the Special Lifting Device, a deviation is initiated and spalling is largely prevented. This way, bending and damage to the thread can be avoided.



The Special Lifting Device can be used like a conventional screw and can be driven in or out of the threaded insert. The chainlink can be used to tighten or loosen the Special Lifting Device. It must be pulled through the chainlink and its recesses fit the three pins located at the circumference of the Special Lifting Device.
This efficient lever arm enables convenient tightening and removing without any tool.

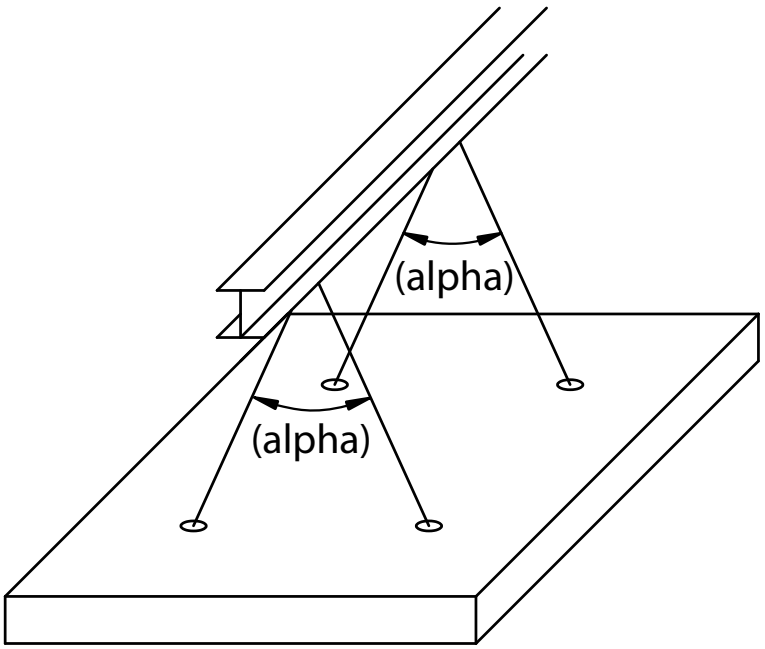
Ring Dimensions

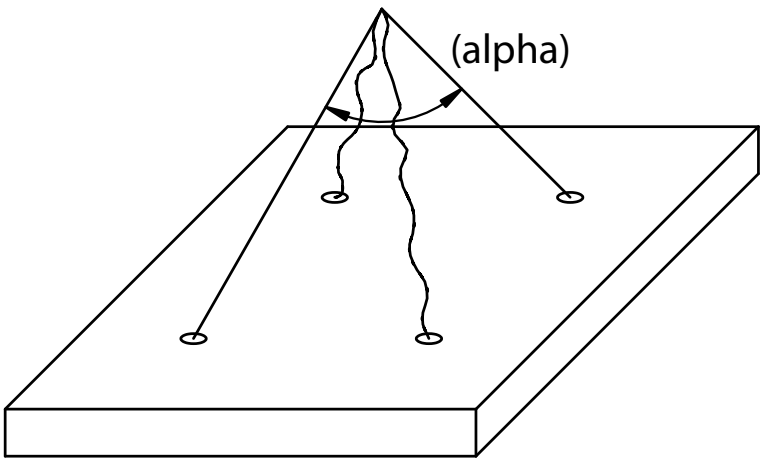
Reference	Load bearing capacity [kg] 0 - 90°	Ød [mm]	T [mm]	T_{max} = 1.05 x T [mm]
100476	500	10	85	89
100477	800	10	85	89
100478	1,200	10	110	116
100479	1,600	16	95	100
100480	2,000	16	102	107
100481	2,500	18	125	131
100482	4,000	22	148	155
100483	6,300	26	160	168
100484	8,000	26	160	168
100485	12,500	36	220	231



As any other lifting equipment, lifting loops must be inspected once a year by an expert.

Calculation of Actions on Lifting Inserts





The forces acting on a lifting insert should be calculated taking into account:

- The precast unit weight.
- The adhesion to the mould.
- The lifting machinery (dynamic coefficient).
- The sling angle.
- The number and position of inserts (number of efficient points).

Precast unit weight

The weight to lift has to be calculated taking into consideration the weight of the precast element, but also all the other parts lifted with the precast unit (formworks, preassembled parts).

Actions from adhesion to the mould

Adhesion and form friction will occur when the precast element is removed from the formwork. For practical reasons, the two effects are combined in one value designated q_{adh}. The values for q_{adh} given in the table below may be considered.

Formwork and Condition	q_{adh}
Oiled steel mould, oiled plastic coated plywood	1kN/m^2
Varnished wooden mould	2kN/m^2
Rough wooden mould	3kN/m^2

The area to be used in calculations is the total contact area between the concrete and the form. For some types of uneven form surfaces (structured matrixes, reliefs, structured timber etc.), forces may be much larger than given in the table, and should be considered separately. Force may be zero if the concrete does not come in contact with the form at all, for example if the concrete is poured on a layer of bricks that has been laid out on the form bottom. Large vertical form surfaces may create extensive friction forces due to undulations in the form. Prestressed components will usually have a camber caused by the prestressing force, and will therefore have lower friction against the vertical sides of the form.

Dynamic Actions

During lifting and handling, lifting devices are subjected to dynamic actions. The magnitude of the dynamic actions depends on the type of lifting machinery. Dynamic effects should be taken into account by the dynamic coefficient ψ_{dyn} provided in the table below.

Lifting Machinery	Dynamic Coefficient (ψ_{dyn})
Stationary crane, rail-mounted crane, speed < 1m/s	1.15
Stationary crane, rail-mounted crane, speed > 1m/s	1.30
Bridge crane, speed < 1m/s	1.15
Bridge crane, speed > 1m/s	1.60
Lifting and moving on flat terrain	2
Lifting and moving on rough terrain	4

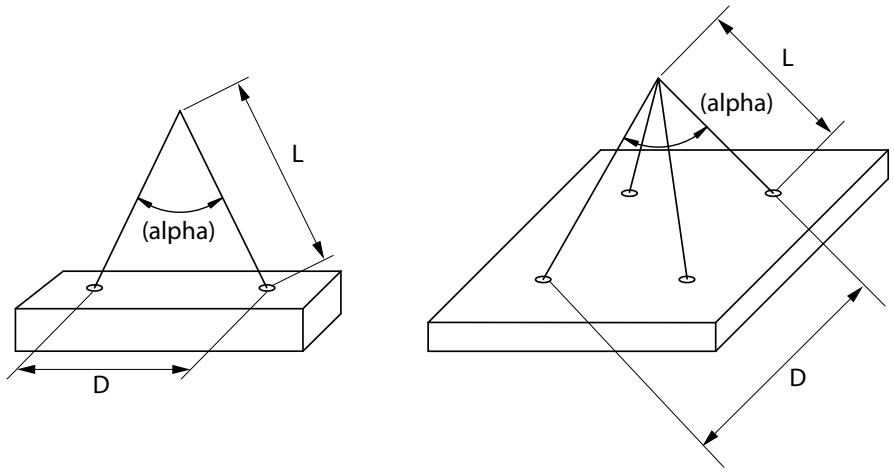
Dynamic influences that are not covered in this table should be subject to special provisions or the judgment of engineers.

Sling Angle

If the ropes, chains or slings are not perfectly vertical when lifting, this will create a sling coefficient provided in the table below, depending on the angle α which is the angle at the top of the slings.

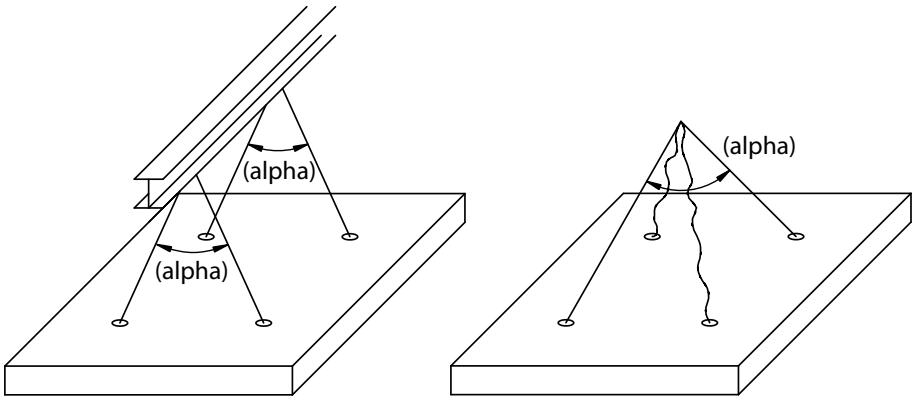
Angle α	Sling Length L	Sling Coefficient (ψ_{sling})
0°	-	1
30°	2 D	1.04
45°	1.3 D	1.08
60°	D	1.16
90°	0.7 D	1.42
120°	0.6 D	2

With D = distance between 2 opposite lifting inserts



Number of Efficient Lifting Points

In most cases, in a statically indeterminate system, the load distribution on inserts depends on the unknown stiffness of the ropes and the inserts itself. Therefore in most cases, a maximum of 2 efficient lifting points should be used in the calculation of the actions on inserts.
The number of efficient points should only be equal to the total number of lifting points if suitable means such as beams ensure that the load is equally distributed on all lifting inserts.



4 efficient points

2 efficient points

Calculation of actions on lifting inserts

The actions, E_d, should be determined from Equation

$$E_d = \frac{(G + q_{adh} \cdot A_f) \times \psi_{dyn} \times \psi_{sling}}{N_{eff}}$$

with:

G	=	weight of the precast concrete element (kN)
q_{adh}	=	mould adhesion (kN/m²)
A_f	=	form area in contact with concrete (m²)
ψ_{dyn}	=	dynamic coefficient
ψ_{sling}	=	sling coefficient
N_{eff}	=	number of efficient lifting points

Conclusion and other considerations

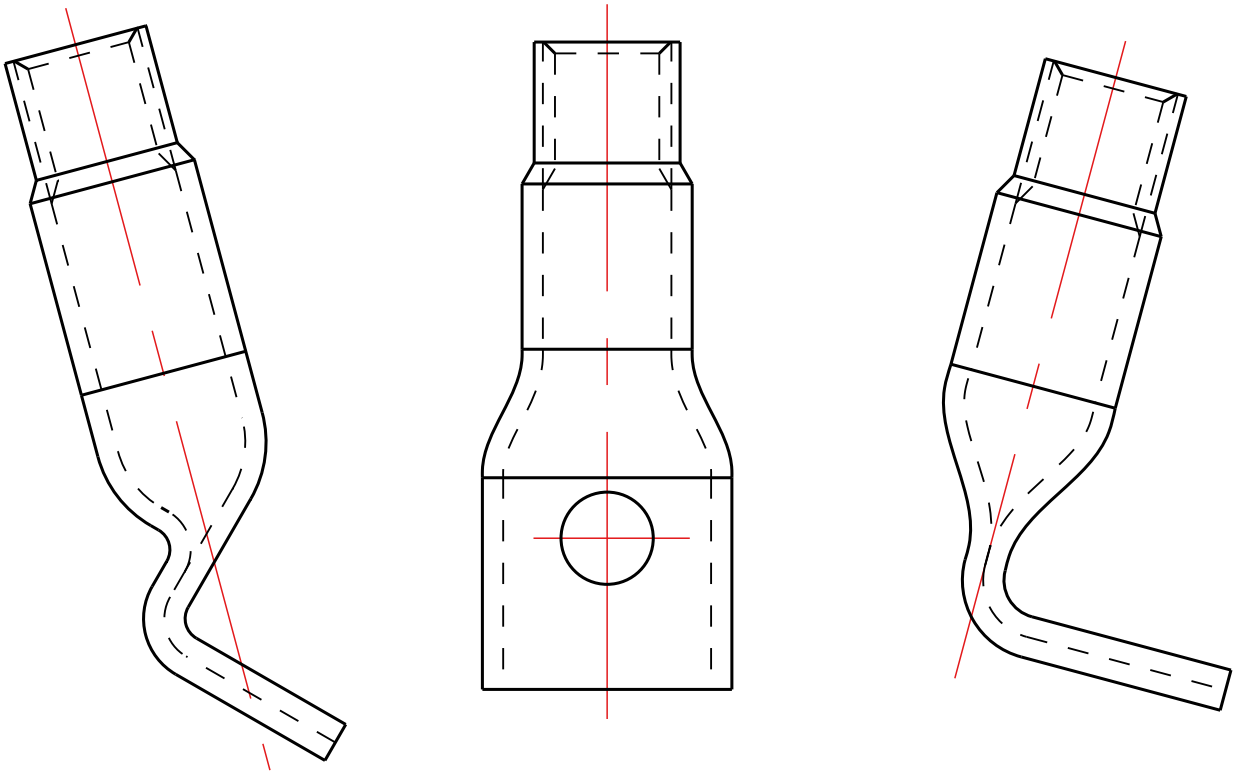
The Safe Working Load of the lifting insert must be higher than E_d.

In some cases, it can be necessary to calculate the action on inserts at different stages of the life of a precast unit (at the precast factory and on site for example).

The concrete strength needs to be clearly defined when lifting at the precast factory and on site to select and design the type and the size of the inserts.

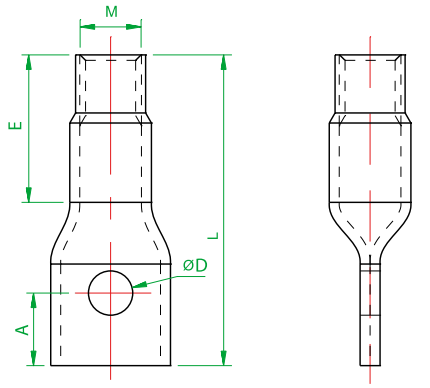
The load capacity of the anchorage (concrete failure and steel failure) has to be checked by qualified people.

Fixing System with Sockets

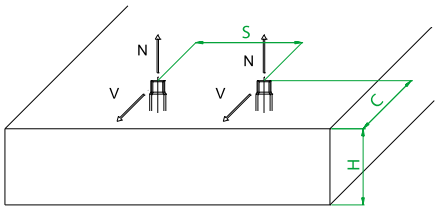


Fixing Socket with Cross Hole

Reference	Thread x L	A [mm]	ØD [mm]	E [mm]	F [daN]
102302	M6 x 35	8.5	6.2	15	120
102306	M8 x 40	8.5	8.2	15	200
102310	M10 x 50	11	8.2	20	350
102313	M12 x 60	15	10.2	25	500
102319	M16 x 70	20	12.2	25	700
102317	M16 x 100	20	12.2	45	1,000
102322	M20 x 100	27	14.2	40	1,250
102326	M24 x 120	30	14.2	50	1,800
102328	M30 x 150	38	17.2	65	2,750



Reference	Thread x L	C_N [mm]	C_V [mm]	S [mm]	H [mm]
102302	M6 x 35	55	70	105	80
102306	M8 x 40	60	80	120	95
102310	M10 x 50	75	100	150	85
102313	M12 x 60	90	120	180	125
102319	M16 x 70	105	140	210	95
102317	M16 x 100	150	200	300	130
102322	M20 x 100	150	200	300	125
102326	M24 x 120	180	240	360	155
102328	M30 x 150	225	300	450	175



Fixing sockets with cross hole are not self-anchoring sockets.
The largest bar diameter must be chosen that passes through the cross hole ØD.
The bar must be a ribbed reinforcement bar grade FeE500 with a length of 9 times the diameter.

Fixing sockets must not be used for lifting but exclusively for fixing.
Fixing sockets are electro-galvanised and bichromated.

Permissible loads F are defined for a concrete compressive strength of 25MPa.

To avoid premature failure of the socket by blow-out of the concrete, the socket has to be placed with minimum distances from the edge and between sockets.
For straight pulling N, the minimum edge distance is C_N and the minimum distance between 2 sockets is S.
For shear force V, the minimum edge distance is C_V and the minimum distance between 2 sockets is S.
The minimum thickness of the panel should be H (minimum concrete cover of 25mm).

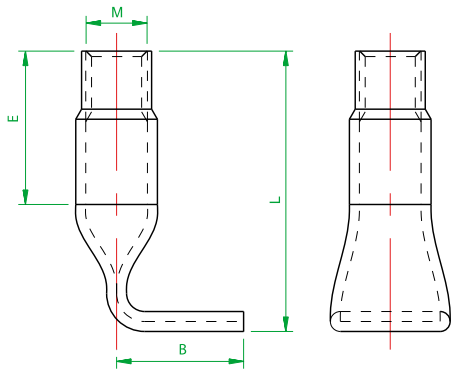
When the force is a combination of shear force V and straight pull N, the permissible load F should respect the following formula:

$$\sqrt{V^2 + N^2} \leq \text{perm.F}$$

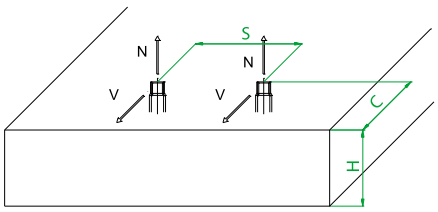
Fixing sockets must be used with metric thread screw. They must be screwed on at least one time the diameter and no more than E.

Fixing Socket with Bent End

Fixing Socket with Bent End



Reference	Thread x L	E [mm]	B [mm]	F [daN]
102269	M8 x 35	15	25	180
102270	M8 x 45	15	25	230
102272	M10 x 40	15	25	240
102273	M10 x 60	30	25	400
102274	M12 x 45	25	25	350
102276	M12 x 70	40	25	600
102278	M16 x 60	25	35	600
102280	M16 x 100	45	35	1,000
102282	M20 x 70	30	35	1,000
102283	M20 x 100	45	35	1,250



Reference	Thread x L	C_N [mm]	C_V [mm]	S [mm]	H [mm]
102269	M8 x 35	55	70	105	60
102270	M8 x 45	70	90	135	70
102272	M10 x 40	60	80	120	65
102273	M10 x 60	90	120	180	85
102274	M12 x 45	70	90	135	70
102276	M12 x 70	105	140	210	95
102278	M16 x 60	90	120	180	85
102280	M16 x 100	150	200	300	125
102282	M20 x 70	105	140	210	95
102283	M20 x 100	150	200	300	125

Fixing sockets with bent end are self-anchoring sockets.

Fixing sockets must not be used for lifting but exclusively for fixing.
Fixing sockets consist of dichromate zinc plated steel.

Permissible loads F are defined for a concrete compressive strength of 25MPa.

To avoid premature failure of the socket by blow-out of the concrete, the socket has to be placed with minimum distances from the edge and between sockets.
For straight pulling N, the minimum edge distance is C_N and the minimum distance between 2 sockets is S.
For shear force V, the minimum edge distance is C_V and the minimum distance between 2 sockets is S.
The minimum thickness of the panel should be H (minimum concrete cover of 25 mm).

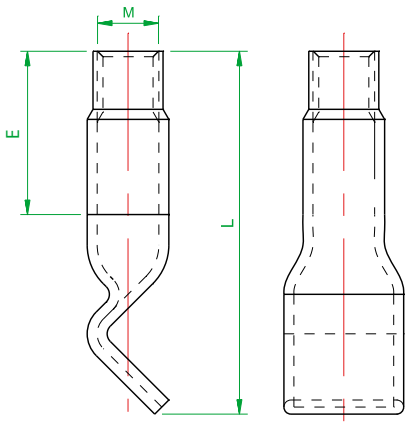
When the force is a combination of shear force V and straight pull N, the permissible load F should respect the following formula:

$$\sqrt{V^2 + N^2} \leq \text{perm.F}$$

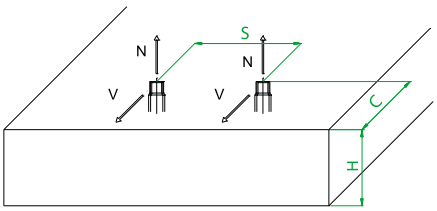
Fixing sockets must be used with metric thread screw. They must be screwed on at least one time the diameter and no more than E.

Fixing Socket with Waved End

Reference	Thread x L	E [mm]	F [daN]
102329	M6 x 30	10	80
On request	M6 x 50	30	150
102330	M8 x 40	15	200
102331	M8 x 50	20	250
On request	M10 x 40	15	300
102332	M10 x 50	20	350
102334	M12 x 60	25	500
102338	M16 x 100	45	1,000
On request	M20 x 100	65	1,250



Reference	Thread x L	C_N [mm]	C_V [mm]	S [mm]	H [mm]
102329	M6 x 30	45	60	90	55
On request	M6 x 50	75	100	150	75
102330	M8 x 40	60	80	120	65
102331	M8 x 50	75	100	150	75
On request	M10 x 40	60	80	120	65
102332	M10 x 50	75	100	150	75
102334	M12 x 60	90	120	180	85
102338	M16 x 100	150	200	300	125
On request	M20 x 100	150	200	300	125



Fixing sockets with waved end are self-anchoring sockets.

Fixing sockets must not be used for lifting but exclusively for fixing.
Fixing sockets consist of dichromate zinc plated steel.

Permissible loads F are defined for a concrete compressive strength of 25MPa.

To avoid premature failure of the socket by blow-out of the concrete, the socket has to be placed with minimum distances from the edge and between sockets.
For straight pulling N, the minimum edge distance is C_N and the minimum distance between 2 sockets is S.
For shear force V, the minimum edge distance is C_V and the minimum distance between 2 sockets is S.
The minimum thickness of the panel should be H (minimum concrete cover of 25mm).

When the force is a combination of shear force V and straight pull N, the permissible load F should respect the following formula:

$$\sqrt{V^2 + N^2} \leq \text{perm.F}$$

Fixing sockets must be used with metric thread screw. They must be screwed on at least one time the diameter and no more than E.