SDG

**STRONGER
TOGETHER**

Product
Catalogue

Welcome to SDG.

Your essential
construction partner.

Stronger, together.

We work with manufacturers, contractors, engineers and designers, supplying essential components that improve safety, enhance quality and drive efficiency at every stage of construction.

At SDG we are trusted suppliers, and experts in construction solutions. We are planners, collaborators and designers; fixers, thinkers and expert problem solvers. We're an end-to-end construction project partner, bespoke and best in class. By working closely with our customers; by adding value at every stage; by doing everything they expect and so much more, we share their success and become stronger, together.

- TECHNICAL INNOVATION
- PRECAST ACCESSORIES
- CONSTRUCTION ACCESSORIES
- WATERPROOFING
- ACOUSTICS

Precast Accessories

SECTION CONTENTS

Contact our sales team:

wearesdg.com

+44 (0) 28 3752 8999

SDG are BT Innovation GmbH distribution partner for the UK and Ireland. Together we provide a range of specialist shuttering magnets, formwork and connecting systems for the Precast Industry.

BT innovation

Magnetic Formwork Systems

Multi Form

MultiForm is a robust and flexible shuttering support system for producing the various precast elements including:

– Manufacturing solid and sandwich walls

– Manufacturing landing slabs, beams and joists

– Use on tilting table, formwork table, circulation palettes and wooden surfaces.

Using MagFly® magnets, MulitForm can be moved easily on the formwork table and positioned precisely. As the MagFly® AP presses the MultiForm onto the formwork

table, the joints are sealed as soon as the magnets are activated when a PE chamfer profile is used. Additional sealing with silicone is therefore unnecessary.

A window and door opening suitable for MultiForm offers a clever solution for enclosed openings in concrete elements. Using elements that can be taken out from the inside of the structure, the shuttering can be removed non-destructively for reuse. The built-in socket for the MagFly® magnets enables fast and precise assembly and disassembly of the shuttering.

The advantages of the MultiForm formwork include:

– Can be used quickly and ergonomically

– No sealing with silicone between the formwork shell and the formwork table

– Stable and robust system - designed for use in precast plants

– The window and door openings can be disassembled from the inside

MULTIFORM **TYPE 1**
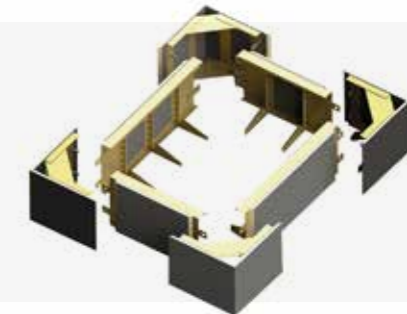
small column for short shuttering e.g. recesses

MULTIFORM **TYPE 2**

column for long shuttering
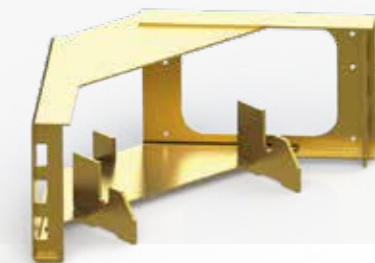Up to 80cm tall & 3,025m long

WINDOW & DOOR OPENING

MULTIFORM **MFE (CORNER JOINT)**

shuttering element for window and door corners

Multi Form

PRODUCT CODE	DESCRIPTION	WEIGHT [KG]	DIMENSIONS (MM)		
			L	B	H
8101050	MultiForm Type 1 – formwork angle H70	1.39	280	110	70
8101139	MultiForm Type 1 – formwork angle H90	1.75	280	110	90
8101155	MultiForm Type 1 – formwork angle H148	1.83	280	115	148
8101144	MultiForm Type 1 – formwork angle H190	2.11	280	115	190
8101165	MultiForm Type 1 – formwork angle H248	2.47	280	115	248
8101207	MultiForm Type 1 – formwork angle H290	3.43	280	205	290
8101471	MultiForm Type 1 – formwork angle H350	4.06	280	255	350
8101208	MultiForm Type 1 – formwork angle H390	4.35	280	266	390
8101470	MultiForm Type 1 – formwork angle H440	6.36	280	255	440
8101469	MultiForm Type 1 – formwork angle H490	6.96	280	255	490
8101468	MultiForm Type 1 – formwork angle H540	7.4	280	255	540
8101467	MultiForm Type 1 – formwork angle H590	7.96	280	255	590
8101466	MultiForm Type 1 – formwork angle H640	8.58	280	255	640
8101451	MultiForm Type 1 – formwork angle H690	9.56	280	255	690
8101063	MultiForm Type 2 – 98/3025	12.2	3,025	150	98
8101085	MultiForm Type 2 – 148/3025	16.4	3,025	150	148
8101096	MultiForm Type 2 – 198/3025	19.4	3,025	150	198
8101107	MultiForm Type 2 – 248/3025	23.3	3,025	200	248
8101118	MultiForm Type 2 – 298/3025	25	3,025	200	298
8101122	MultiForm Type 2 – 348/3025	30	3,025	200	348
8101123	MultiForm Type 2 – 398/3025	34.1	3,025	250	398
8101125	MultiForm Type 2 – 448/3025	36.1	3,025	250	448
8101127	MultiForm Type 2 – 498/3025	38	3,025	250	498
8101379	MultiForm Type 2 – 548/3025	44.5	3,025	250	548
8101290	MultiForm Type 2 – 598/3025	47	3,025	250	598
8101205	MultiForm Type 2 – 698/3025	51.6	3,025	300	698
8101063100	MultiForm Type 2 – 98/3000 double	25.5	3,000	350	98
8101085200	MultiForm Type 2 – 148/3000 double	33	3,000	350	148
8101096200	MultiForm Type 2 – 198/3000 double	43	3,000	400	198
8101107200	MultiForm Type 2 – 248/3000 double	46	3,000	400	248
8101118200	MultiForm Type 2 – 298/3000 double	49.83	3,000	400	298
8101118300	MultiForm Type 2 – 298/3000 double	49.7	3,000	350	298
8101122300	MultiForm Type 2 – 348/3000 double	56.22	3,000	350	348

Magfly® AP

Shuttering magnets featuring patented foot/spring system for positioning and detaching

The MagFly® AP is a patented shuttering magnet and a component of the BT shuttering formwork system. Unique features include the magnetic force-to-weight ratio, plus the unique foot/spring system, which allows the magnet to slide easily over the formwork table.

The magnet is activated by a firm pressure from above and adheres to the formwork table by its magnetic force. The MagFly® AP can be detached and realigned simply and quickly using the integrated lever. It does not require any additional tools or adapters.

The ultra-light aluminium casing makes ergonomic work with the magnets possible and saves effort by the user. In combination with the MultiForm formwork girders and an additional plastic chamfer profile, the formwork girder and chamfer profile are pressed firmly to the formwork table when the magnets are activated. An additional sealing for the edge is not neccessary. These effective technologies are matched perfectly to each other and substantially speed up the production of precast concrete elements.

Applications:

– Shuttering magnets for pallet circulation systems and tilting tables

– Shuttering for walls, beams, etc.

Benefits:

– Patented shuttering fastening provides increased retention pressure for shuttering at the formwork table

– No silicone sealant required

– Light and ergonomic handling thanks to the foot/spring system

– Magnet and formwork girder perfectly matched

– Unbeatable adhesive force-to-weight ratio

PRODUCT CODE	DESCRIPTION	SIZE
BTI055	Magfly AP (Adhesive Power) 2200Kg	Each

KU Magnetic Steel Formers

The KU magnet is used for holding ball-headed anchors. Depending on the size of the ball-headed anchor, we offer the magnets to fit with the optimum magnetic force in our range of products.

In order to attach the ball-headed anchor to the magnet, the appropriate rubber holding band is supplied in each case. The steel body is turned from high quality solid material and forms a homogeneous unit with the high performance core of the magnet. The attachment surface is completely sealed and therefore protects the core of the magnet against corrosion and damage. This increases the working life of the magnetic force considerably. The integrated internal thread allows the magnet to be smoothly released from the steel table.

Benefits:

– Combined recess former with magnet

– Internal thread for releasing the magnet

– Solid and stable construction due to steel base body, thus long service life

– Environmentally friendly and cost-effective due to reusability.

PRODUCT CODE	DESCRIPTION	SIZE
BTI001	Magnetic Former 2.5T KU25 Complete With O Ring	Each
BTI002	Magnetic Former 5T KU50 Complete with O Ring	Each
BTI005	Magnetic Former 10T KU100	Each
BTI003	O Ring for Magnetic Former 2.5T KU25	Each
BTI004	O Ring for Magnetic Former 5T KU50	Each

GB Magnetic Nailing Plate

The GB magnet is used for fixing threaded sleeves, wavytail anchors etc., on both horizontal and vertical surfaces. It is available with different diameters and magnetic forces.

Its conical housing means that the GB is easy to release from the hardened concrete. The GB magnet is made entirely of high-grade steel, it has a fully enclosed magnetic core and so guarantees a long working life. The associated threaded rods are available in thread sizes from M 10 to M 36 and can be combined with all designs of the GB magnet. Other thread sizes are also available on request.

Benefits:

– Extremely high magnetic force

– Conical construction for easy release from the hardened concrete

– High flexibility with exchangeable threaded rods

– Their ability to be reused means that they are environmentally friendly and cost effective.

PRODUCT CODE	DESCRIPTION	SIZE
BTI024	GB54 Magnetic Nailing Plate 30mm (64mm Dia)	Each
BTI020	GB64 Magnetic Nailing Plate 12mm (64mm Dia)	Each
BTI021	GB64 Magnetic Nailing Plate 16mm (64mm Dia)	Each
BTI022	GB64 Magnetic Nailing Plate 20mm (64mm Dia)	Each
BTI023	GB64 Magnetic Nailing Plate 24mm (64mm Dia)	Each
BTI025	GB64 Magnetic Nailing Plate 36mm (64mm Dia)	Each
BTI026	GB80 24mm Magnetic Nailing Plate (80mm Dia)	Each
BTI030	GB106 Magnetic Nailing Plate 30mm (106mm Dia)	Each
BTI030B	GB106 36mm Magnetic Nailing Plate (106mm Dia)	Each

Magnetic Chamfer

Steel chamfer profiles are outstanding for manufacturing chamfers. The profiles are available with or without magnets.

Sizes available on request.
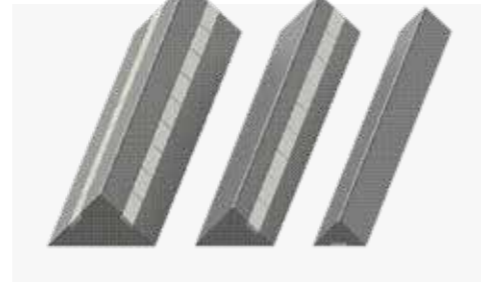
Double Wall Anchor

Double Wall Anchors are used for transporting and relocating precast concrete sandwich panels.

PRODUCT CODE	DESCRIPTION	SIZE
DWA050	Double Wall Anchor 130mm	Each – 500 / Pallet
DWA051	Double Wall Anchor 150mm	Each – 500 / Pallet
DWA053	Double Wall Anchor 180mm	Each – 500 / Pallet
DWA055	Double Wall Anchor 230mm	Each – 500 / Pallet
DWA056	Double Wall Anchor 250mm	Each – 250 / Pallet
DWA059	Double Wall Anchor 270mm	Each – 250 / Pallet
DWA060	Double Wall Anchor 280mm	Each – 250 / Pallet
DWA061	Double Wall Anchor 300mm	Each – 250 / Pallet

ThermoPin®

The ThermoPin® securing anchor system is a glass fibre reinforced plastic (GFRP) connecting anchor for sandwich walls and core-insulated double walls.

The ThermoPin® securing anchor system is used to connect facing and load-bearing layers for core-insulated concrete parts. The GFRP material is suitable for use in narrow structural elements. Thanks to the attached cap, the bar slides smoothly into the fresh concrete, enabling particularly fast assembly. The fixed plastic ring guarantees correct installation and ensures that the fastening point in the insulation is sealed and concrete cannot flow into the opening. As a result, the bar ultimately disappears in the concrete and is not visible on the surface.

The result is perfect surfaces without visible flaws. ThermoPins® feature conical openings at the ends to increase resistance to pulling out. A particularly high tensile strength is achieved by using exclusively complete and intact glass fibres along the axis rod.

The ThermoPin® securing anchor system is available in 2 designs: horizontal or diagonal anchor type.

Applications:

– sandwich walls

– core-insulated double walls.

Advantages:

– Cost-effective - low installation costs due to quick and easy installation

– Durable - tested resistance, even in alkaline media

– Slim - constructions with low layer thicknesses possible.

DESCRIPTION	SIZE
ThermoPin® H180_60	Ll: 180 mm; L2: 60 mm; horizontal
ThermoPin® Hl80_80	Ll: 180 mm; L2: 80 mm; horizontal
ThermoPin® H190_80	Ll: 190 mm; L2: 80 mm; horizontal
ThermoPin® H210_80	Ll: 210 mm; L2: 80 mm; horizontal
ThermoPin® H230_80	Ll: 230 mm; L2: 80 mm; horizontal
ThermoPin® H240_80	Ll: 240 mm; L2: 80 mm; horizontal
ThermoPin® H250_80	Ll: 250 mm; L2: 80 mm; horizontal
ThermoPin® H270_80	Ll: 270 mm; L2: 80 mm; horizontal
ThermoPin® H280_140	Ll: 280 mm; L2: 140 mm; horizontal
ThermoPin® H280_160	Ll: 280 mm; L2: 160 mm; horizontal
ThermoPin® H290_80	Ll: 290 mm; L2: 80 mm; horizontal
ThermoPin® H310_80	Ll: 310 mm; L2: 80 mm; horizontal
ThermoPin® H340_160	Ll: 340 mm; L2: 160 mm; horizontal
ThermoPin® H340_180	Ll: 340 mm; L2: 180 mm; horizontal
ThermoPin® H340_200	Ll: 340 mm; L2: 200 mm; horizontal
ThermoPin® H340_220	Ll: 340 mm; L2: 220 mm; horizontal
ThermoPin® H340_80	Ll: 340 mm; L2: 80 mm; horizontal
ThermoPin® H380_180	Ll: 380 mm; L2: 180 mm; horizontal
ThermoPin® H380_200	Ll: 380 mm; L2: 200 mm; horizontal
ThermoPin® H380_220	Ll: 380 mm; L2: 220 mm; horizontal
ThermoPin® H380_240	Ll: 380 mm; L2: 240 mm; horizontal
ThermoPin® D250_110	Ll: 250 mm; L2: ll0 mm; diagonal
ThermoPin® D295_110	Ll: 295 mm; L2: ll0 mm; diagonal
ThermoPin® D325_110	Ll: 325 mm; L2: ll0 mm; diagonal
ThermoPin® D340_110	Ll: 340 mm; L2: ll0 mm; diagonal
ThermoPin® D350_110	Ll: 350 mm; L2: ll0 mm; diagonal
ThermoPin® D410_110	Ll: 410 mm; L2: ll0 mm; diagonal
ThermoPin® D445_225	Ll: 445 mm; L2: 225 mm; diagonal
ThermoPin® D465_100	Ll: 465 mm; L2: 100 mm; diagonal
ThermoPin® D485_80	Ll: 485 mm; L2: 80 mm; diagonal

DWAK Rocket

A stable steel spacer used in the production of precast double walls.

PRODUCT CODE	DESCRIPTION	SIZE
DWA001	200-08 DWA K Rocket	100 No
DWA001A	220-08 DWA K Rocket	100 No
DWA002	225-08 DWA K Rocket	100 No
DWA003	250-08 DWA K Rocket	100 No
DWA004	300-08 DWA K Rocket	100 No
DWA009	325-08 DWA K Rocket	100 No
DWA005	350-08 DWA K Rocket	100 No
DWA006	400-08 DWA K Rocket	100 No

Double Wall Dowel

Double-wall dowel for attaching braces for precast concrete during construction. Made from high quality plastic. The double-wall dowel will be glued on the formwork. A screw with diameter 12x70mm is needed for fixation of the braces on the double-wall dowel.

PRODUCT CODE	PRODUCT DESCRIPTION	PRODUCT SIZE
FWK204	Double Wall Dowel	250 per Bag

PVL Loopbox

Wire Loop boxes are installed to the formwork according to spacing needed to bear the shear loads, before the panel is cast. After removing the formwork, protective tape is removed and the loop is opened with for example a hammer or a pin.

Pair of boxes and the vertical rebar installed into loops form a joint which resists vertical shear forces, together with the concrete grout in the joint.

PRODUCT CODE	DESCRIPTION	SIZE
LFT198	PVL80 Loopbox	300 / Box
LFT197	PVL100 Loopbox	300 / Box
LFT199	PVL120 Loopbox	300 / Box

Turnbuckle

BT-Spannschloss®

The BT-Spannschloss® (turnbuckle) is part of an easy to use connection system – without additional materials and tools.

The BT-Spannschloss® (turnbuckle) enables efficient and precise assembly and durable connections for precast concrete elements. By using BT-Spannschloss® (turnbuckle) and corresponding connection materials, precast elements can be joined together without using mineral grouting. This means no curing or standstill times due to low temperatures. The BT-Spannschloss® (turnbuckle) can be fully loaded straight away. You can view the application of BT-Spannschloss® in our product video.

The building inspection approval (Z-14.4-599) certifies the reliability of the product. The BT-Spannschloss®

(turnbuckle) is offered in three sizes – M12, M16 and M20 – and is available in galvanised or stainless steel.

Applications:

– Angle support walls in flood protection

– Residential and commercial construction

– Agricultural systems

– Sewer and civil engineering

– Temporary structures.

Benefits:
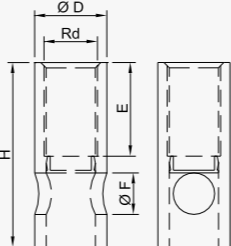
– Dry screw connection

– No joint grouting, no special tools

– Can be loaded immediately, no curing times

– Assembly regardless of weather, even in low temperatures or precipitation

– Able to be disassembled – removal of temporarily installed structures

– Three-point connection possible.

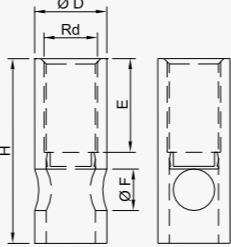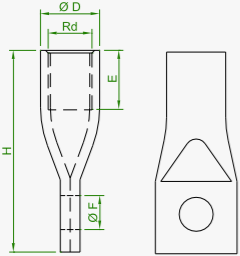| PRODUCT CODE	DESCRIPTION	SIZE
BTI099	BT Turnbuckle Spannschloss M12 Set Galv	Each
BTI100	BT Turnbuckle Spannschloss M16 Set Galv	Each
BTI101	BT Turnbuckle Spannchloss M20 Set Galv	Each
BTI149	Magnetic Former for BT Turnbuckle Spannschloss M12	Each
BTI150	Magnetic Former for BT Turnbuckle Spannschloss M16	Each
BTI151	Magnetic Former for BT Turnbuckle Spannschloss M20	Each

Lifting Sockets Systems

SAFE WORKING LOAD		0.5T	1.2T	2.0T	2.5T	4.0T	6.3T	8.0T
TUBULAR LIFTING SOCKET		RD 12MM	RD 16MM	RD 20MM	RD 24MM	RD 30MM	RD 36MM	RD 42MM
	D (MM)	15	21	27	31	39.5	47	54
	H (MM)	40	54	69	78	103	125	145
	F (MM)	8	13	15.5	18	22.5	27.5	32
	E (MM)	22	27	35	43	56	68	80

The lifting sockets are provided electro zinc plated.
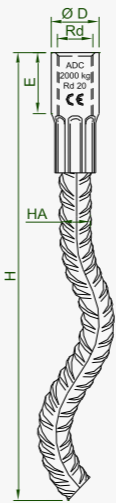
SAFE WORKING LOAD		0.5T	1.2T	2.0T	2.5T	4.0T
STAINLESS STEEL TUBULAR SOCKET		RD 121MM	RD 161MM	RD 201MM	RD 241MM	RD 301MM
	D (MM)	15	21	27	31	39.5
	H (MM)	40	54	59	78	103
	F (MM)	8	13	15.5	18	22.5
	E (MM)	22	27	35	43	56
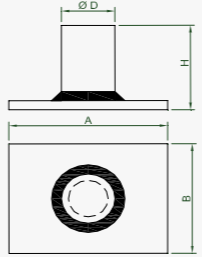
SAFE WORKING LOAD		0.5T	1.2T	2.0T	2.5T	4.0T
LIFTING INSERT		RD 12MM	RD 16MM	RD 20MM	RD 24MM	RD 30MM
	D (MM)	15	21	27	31	39.5
	H (MM)	60	80	95	100	135
	F (MM)	10	13	15	18	22.5
	E (MM)	22	27	35	43	56

The lifting sockets are provided electro zinc plated.
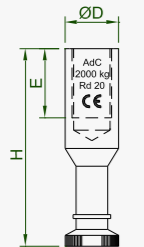
SAFE WORKING LOAD		0.5T	1.2T	2.0T	2.5T	4.0T	6.3T
STRAIGHT REBAR ANCHOR		RD 12x190	RD 16x250	RD 20x350	RD 24x400	RD 30x500	RD 36x650
	D (MM)	15	21	27	31	39.5	47
	H (MM)	190	250	350	400	500	650
	HA (MM)	10	12	16	16	20	25
	E (MM)	22	27	35	43	56	68

The lifting sockets are provided electro zinc plated, the rebar is black.
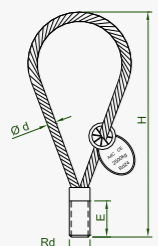
SAFE WORKING LOAD		0.5T	1.2T	2.0T	2.5T	4.0T	6.3T	8.0T
WAVY TAIL ANCHOR		12x108	16x167	20x187	24x250	30x300	36x380	42x450
	D (MM)	15	21	27	31	39.5	47	54
	H (MM)	108	167	187	250	300	380	450
	HA (MM)	8	12	16	16	20	25	28
	E (MM)	22	27	35	43	56	68	80
		12x137	16x216	20x257	24x360	30x450	36x570	
	D (MM)	15	21	27	31	39.5	47	
	H (MM)	137	216	257	360	450	570	
	HA (MM)	10	12	16	16	20	25	
	E (MM)	22	27	35	43	56	68	
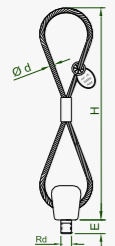
SAFE WORKING LOAD		0.5T	1.2T	2.0T	2.5T	4.0T
FLAT PLATE SOCKET		RD12	RD16	RD20	RD24	RD30
	D (MM)	15	21	27	31	39.5
	H (MM)	30	35	47	54	72
	A (MM)	35	50	60	80	100
	B (MM)	25	35	60	60	80
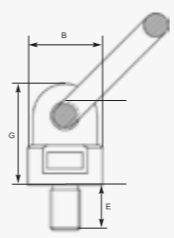
The lifting sockets are provided electro zinc plated.
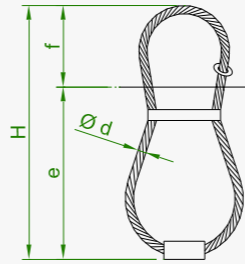
SAFE WORKING LOAD		0.5T	1.2T
LIFTING SOCKET WITH FOOT		RD12060	RD16080
	D (MM)	15	21
	H (MM)	60	80
	E (MM)	22	27

The lifting sockets are provided electro zinc plated, the foot is black.
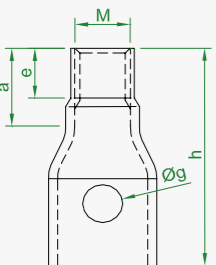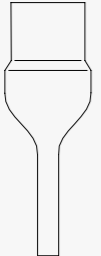
SAFE WORKING LOAD		0.5T	1.2T	2.0T	2.5T	4.0T	6.3T	8.0T
LIFTING LOOP		RD/M12	RD/M16	RD/M20	RD/M24	RD/M30	RD/M36	RD/M42
	A (MM)	6	8	10	11	14	16	20
	C (MM)	155	155	215	255	303	340	425
	E (MM)	22	27	35	43	56	68	80

SAFE WORKING LOAD		0.5T	1.2T	2.0T	2.5T	4.0T	6.3T	8.0T
ARTICULATED LIFTING LOOP		RD/M12	RD/M16	RD/M20	RD/M24	RD/M30	RD/M36	RD/M42
	H (MM)	335	385	470	550	590	780	860
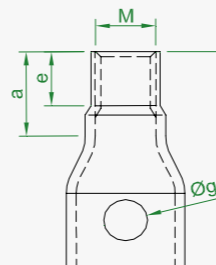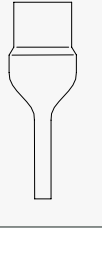
SAFE WORKING LOAD		0.5T	1.2T	2.0T	2.5T	4.0T	6.3T	8.0T
SWIVEL EYE			16MM	20MM	24MM	30MM	36MM	42MM
	B (MM)		36	49.5	57	66	80	80
	E (MM)		20	30	30	35	50	50
	G (MM)		52	68	78	96.5	109	109
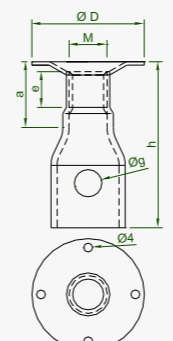
SAFE WORKING LOAD		0.8T	1.2T	1.6T	2.0T	2.5T	4.0T	5.2T	6.3T	10T
CAST IN LOOPS	D (MM)	6	7	8	9	10	12	14	16	20
	H (MM)	210	225	235	280	315	340	360	390	510

Other sizes on request.

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67
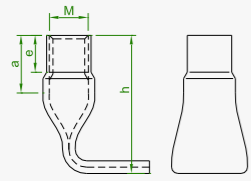
THREAD		M6	M8	M10	M12	M16	M20	M24	M30
FLAT END FIXING SOCKET		6x35 MM	8x40 MM	10x45 MM	12x60 MM	16x70 MM	20x100 MM	24x120 MM	30x150 MM
	H (MM)	35	40	45	60	70	100	120	150
	G (MM)	6	8	8	10	12	14	14	17
	E (MM)	8	8	10	12	16	20	24	30
	A (MM)	11	15	12	23	20	40	40	65
			8x50 MM	10x50 MM	12x70 MM	16x80 MM	20x120 MM		
	H (MM)		50	50	70	80	120		
	G (MM)		8	8	10	12	14		
	E (MM)		8	10	12	16	20		
	A (MM)		25	17	33	30	60		
						16x100 MM			
	H (MM)					100			
	G (MM)					12			
	E (MM)					16			
Sockets provided electro zinc plated	A (MM)					50			
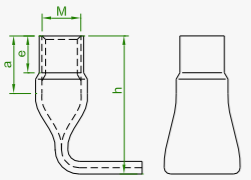
THREAD		M6	M8	M10	M12	M16	M20
STAINLESS FLAT END FIXING SOCKET		6x35 MM	8x40 MM	10x451 MM	12x601 MM	16x801 MM	20x1001 MM
	H (MM)	35	40	45	60	80	100
	G (MM)	6	8	8	10	12	14
	E (MM)	8	8	10	12	16	20
	A (MM)	11	15	12	23	30	40
			8x501 MM	10x501 MM			
	H (MM)		50	50			
	G (MM)		8	8			
	E (MM)		8	10			
	A (MM)		25	17			
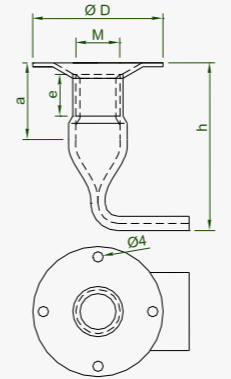
THREAD		M6	M8	M10	M12	M16	M20	M24
FIXING SOCKET WITH NAILING PLATE				10x50C MM	12x70C MM	16x100C MM	20x100C MM	24x120C MM
	H (MM)			50	70	100	100	120
	G (MM)			8	10	12	14	14
	E (MM)			10	12	16	20	24
	A (MM)			20	30	32	40	50
	D (MM)			40	40	50	60	60

Sockets provided electro zinc plated.
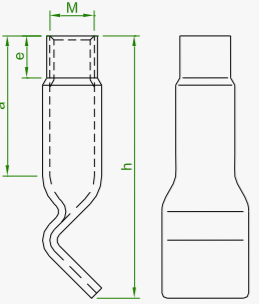
THREAD		M8	M10	M12	M16	M20
BENDED FIXING SOCKET		8X30 MM	10X35 MM	12X45 MM	16X60 MM	20X100 MM
	H(MM)	30	35	45	60	100
	E(MM)	8	10	12	16	20
	A(MM)	15	13	18	20	60
			10X60 MM	12X70 MM	16X100 MM	
	H(MM)		60	70	100	
	E(MM)		10	12	16	
	A(MM)		35	40	60	

Sockets provided electro zinc plated.

THREAD		M10	M12	M16
BENDED FIXING SOCKET WITH NAILING PLATE		10X60C MM	12X70C MM	16X100C MM
	H (MM)	60	70	100
	E (MM)	10	12	16
	A (MM)	35	40	60
	D (MM)	40	40	50

Sockets provided electro zinc plated.
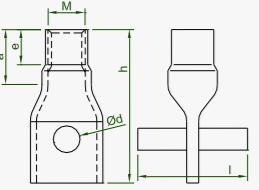
THREAD		M6	M8	M10	M12	M16	M20	M24	M30
STAINLESS BENDED FIXING SOCKET					12x701 MM	16x1001 MM			
	H (MM)				70	100			
	E (MM)				12	16			
	A (MM)				40	60			
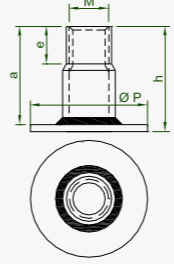
THREAD		M8	M10
WAVED FIXING SOCKET		8x40MM	10x40MM
	H (MM)	40	40
	E (MM)	10	10
	A (MM)	15	15
			10x60MM
	H (MM)		60
	E (MM)		10
	A (MM)		30
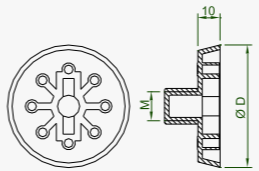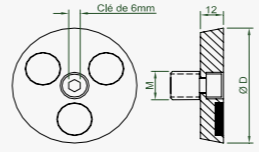
Sockets provided electro zinc plated.

THREAD		M16	
FIXING SOCKET WITH CROSSPIN		16x70MM	
	H (MM)	70	
	E (MM)	16	
	A (MM)	26	
	AXE		
	D (MM)	10	
	I (MM)	50	
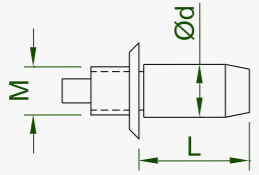
Sockets provided electro zinc plated.
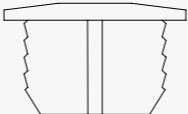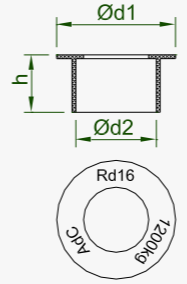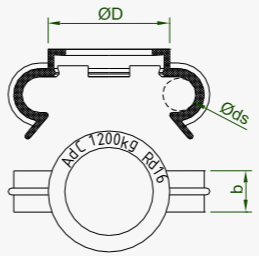
FIXING SOCKET WITH PLATE		16x45MM	
	H (MM)	45	
	E (MM)	16	
	A (MM)	42	
	P (MM)	50	

Sockets provided electro zinc plated.

THREAD		M10	M/RD12	M/RD16	M/RD20	M/RD24	M/RD30	M/RD36	M/RD42
PLASTIC NAILING PLATE	REF	10MM	12MM	16MM	20MM	24MM	30MM	36MM	42MM
	D(MM)	40	40	55	55	55	70	70	96
MAGNETIC NAILING PLATE			12MM	16MM	20MM	24MM	30MM		
	D(MM)		65	65	65	65	65		

PRECAST ACCESSORIES

THREAD			M 10	M/ RD 12	M/ RD 16	M/ RD 20	M/ RD 24	M/ RD 30	M/ RD 36	M/ RD 42
FIXING STUD			TC08	TC10	TC12	TC16				
	D (MM)		11	11	11	17				
	L (MM)		23	23	23	23				
	COLOUR		Light Blue	Yellow						

THREAD		M/RD12	M/RD16	M/RD20	M/RD24	M/RD30
SEALING CAP		BP12	BP16	BP20	BP24	BP30
DATA CLIP		BI12	BI16	BI20	BI24	
	D1 (MM)	26	31	37	41	
	D2 (MM)	15	21	27	31	
	H (MM)	15	15	15	15	
DATA CLIP WITH EARS		BIO12	BIO16	BIO20	BIO24	
	D (MM)	26	32	36	44	
	B (MM)	8	10	12	15	
	DS (MM)	8	8	10	12	

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1. Design Method

The aim of this design method is to evaluate the load on cemented sockets of a reinforced precast concrete element in order to select the appropriate socket.

This method is based on the most common applications. If you have any doubt on the application, the assumptions or any point mentioned in this document, you should contact SDG Precast Technical Department.

It is also essential that the assumptions are clearly communicated to the companies in charge of the handling and lifting operations, in order to ensure that the assumptions are corresponding to the actual handling and lifting conditions.

1.1 Calculation assumptions

In order to define the force on the lifting sockets, all the following points have to be taken into account:

– The technical drawing of the precast element and the kinetics of handling
– The weight of the element (and of the formwork and other accessories lifted with the element)
– The formwork adhesion at the removal from the mould
– The number of efficient lifting points (and not the number of actual lifting points)
– The sling angle
– The dynamic coefficient (lifting machinery)

To define the correct anchor to use (type, length, size) it is also necessary to know:

– The concrete strength when the element is lifted

It is also necessary to distinguish between the handling of the element in the precast factory and on the construction site. All the calculations have to be done for both cases.

All these points are detailed in the following paragraphs.

1.2 Drawing of the precast element and foreseen lifting method

At first, the technical drawing of the element has to be considered, then the means by which it is to be handled. It is necessary to distinguish between the handling in the precast factory and on site.

1.3 Weight of the Element (P)

The actual weight of the element must be considered. It includes in particular:

– The weight of the concrete element (volume x density). The reinforced concrete density is equal to 2500 daN/m^3 (or 25 kN/m^3) in general.

– The weight of the formwork and accessories lifted with the element.

1.4 Formwork adhesion at the removal from the mould (A)

The adhesion will depend on 2 factors:

– The surface area of the element in contact with the formwork (S in m²). All the surfaces in contact with the formwork need to be considered, included inclined surfaces.

– The surface condition of the mould. This surface condition is defined by an adhesion factor (q_{adh} in daN/m²)

This force is to be considered at the removal of the element from the mould.

Type of mould	Adhesion factor q_{adh}
Oiled steel mould, Plywood coated with oiled plastic	100 daN/m²
Varnished oiled wooden mould	200 daN/m²
Oiled rough wooden mould	300 daN/m²
Polyurethane matrix	Consult the matrix supplier

The adhesion force is:

$$A = q_{adh} \times S$$

This adhesion force must be added to the weight of the element in order to calculate the force required to lift it.

In some cases, the adhesion force can be zero if the concrete is not in contact with the mould (pre-stressed beam for example).

1.5 Position and determination of the number of efficient lifting points (n)

Set up the lifting points symmetrically to the center of gravity.

Here are some examples of lifting point positions:

SLAB

BEAM

PANEL

PIPE

ROTATION PIECE

In the case of asymmetric loads relative to the centre of gravity, traction efforts must be calculated for each lifting point taking into account distances to the centre of gravity.

Example for a beam:

$$F1 = F \times \frac{B}{A + B} \qquad F2 = F \times \frac{A}{A + B}$$

Depending on the type of socket that will be chosen (see §2), the position of some lifting points may not be suitable. It is essential to take into account in particular the minimum distances between lifting points, and the minimum distances at the concrete edge. A minimum coating may also be required.

Based on the number of apparent lifting points and the use or not of a balanced lifting system (such as a lifting beam), the number of efficient lifting points is defined as follows:

APPARENT LIFTING POINTS	EFFICIENT LIFTING POINTS NUMBER (N)	
	WITH A BALANCED SYSTEM	OTHERS LIFTING MEANS
4	4	2
3	3	2
2	2	2

Some examples:

Balanced system

Apparent lifting points = 4

Efficient lifting points = 4

Unbalanced System

Apparent lifting points = 4

Efficient lifting points = 2

1.6 Sling angle and multiplication coefficient (Ce)

A multiplication coefficient Ce is generated by vertical forces (weight) on the slings.
For the calculation, angle β is to be considered as the angle between the vertical and the most inclined sling.

SLAB

BEAM

PIPE

ROTATION PIECE

β	0	15°	22,5°	30°	45°	60°
α = 2 β	0	30°	45°	60°	90°	120°
Ce	1	1,035	1,082	1,155	1,414	2
L	-	2 D	1,3 D	D	0,7 D	0,6 D

Other angle:

$$Ce = \frac{1}{\cos(\beta)} = \frac{1}{\cos\left(\frac{a}{2}\right)}$$

β = angle between the vertical and the most inclined sling.
It is necessary to consider the worst-case scenario with the largest angle β.

1.7 Lifting and handling dynamic coefficient (Ψ_{dyn})

The values given in the table below are derived from the" Design and use of inserts for lifting and handling of precast concrete - Elements", CEN/TR 15728:2008.

The foreseen lifting system and the estimated values must be notified to the users (factory and site).

LIFTING AND HANDLING MACHINE	DYNAMIC COEFFICIENT Ψ_{DYN}
Tower crane, overhead crane and portal crane	1,2
Mobile crane	1,4
Lifting and moving on flat terrain	2-2,5
Lifting and moving on rough terrain	3-4

Dynamic coefficient required by type of element:

TYPE OF ELEMENT	DYNAMIC COEFFICIENT Ψ_{DYN}
Pipe and sewer	2
Frame below 12T	1,6
Frame between 12 and 20T	1,4
Frame above 20T	1,2
Wall	1,4
Beam below 12T	1,6
Beam between 12 and 20T	1,4
Beam above 20T	1,2

1.8 Resultant load by lifting point (F)

The resultant load for each lifting point is equal to:

$$F = \frac{(P + A) \times Ce \times \Psi_{dyn}}{n}$$

This calculation must be done for the lifting activity in the precast factory, on site, and for any other handling activity of the precast element.

NOTE: **Sockets used more than 10 times**, must not to be subject to a force more than 0.6 times their safety working load (SWL). It is necessary to check in this case that F < 0.6* SWL (Anchor).

1.9 Concrete strength (f_{ck})

The concrete strength has to be determined:

– When lifting the element from the mould in the Precast factory

– When transporting and installing on site

The minimum allowed resistance of the concrete is 10 MPa.

2. Lifting Sockets

This choice can be made according to the resultant load values by lifting point at the factory (Fu), and on site (Fc), and from the concrete strength during the first lifting at the precast factory and on site. The worst calculation (worst case scenario) should be used to ensure the socket is suitable for all uses.

If you have any doubt about your calculation, you should contact SDG Technical Department.

The socket load capacity must be at least equal to the highest calculated load value (Fu and Fc).

Various socket types are available, and the choice of type of socket to be used is made according to each individual set up.

Be careful during installation of the socket: Never weld the socket.

There are different types of lifting sockets:

Tubular Socket: Socket with Cross Hole	Lifting Socket	Wavy Tail Anchor: Socket with waved rebar	Socket with straight rebar
Flat Plate Socket	Lifting socket with foot	Crown Foot Anchor	Crownfoot Anchor Bolt Type: Lifting Socket with Bolt
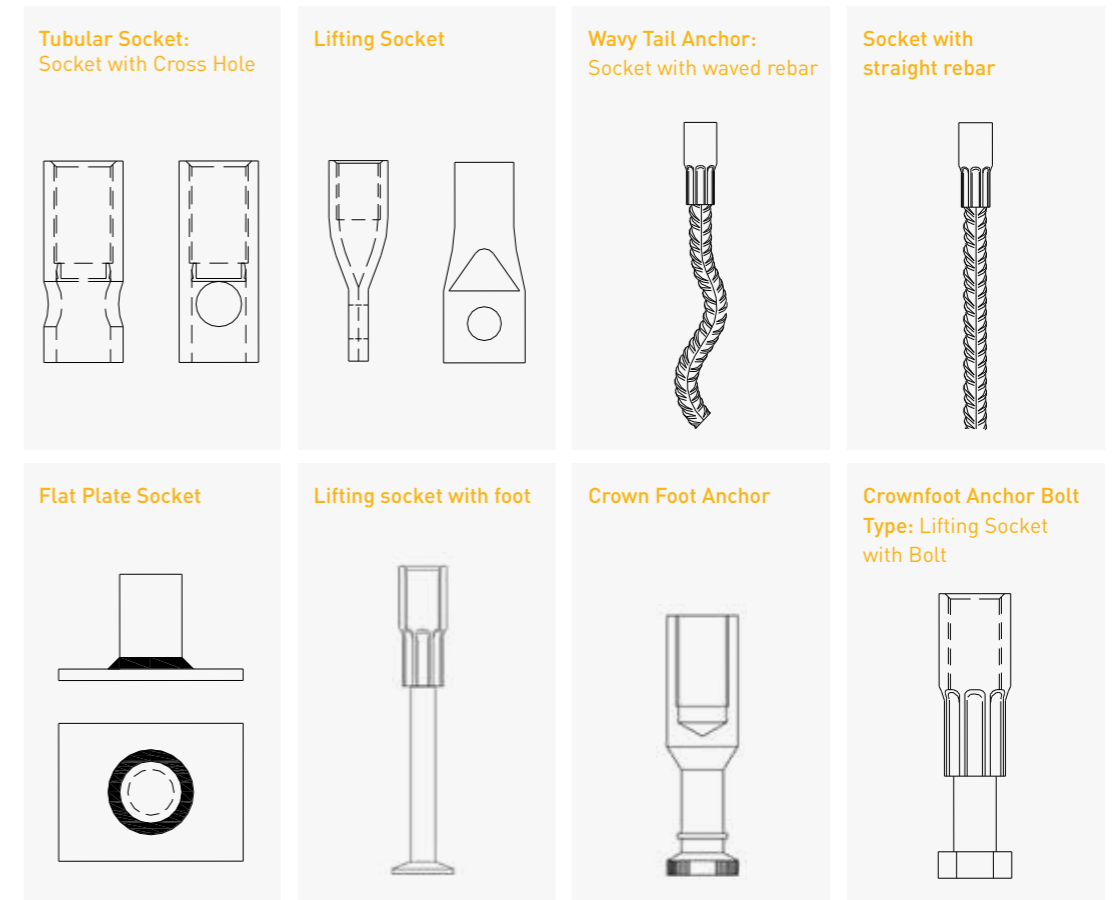
2.1 Tubular Socket: Lifting Socket with Cross Hole
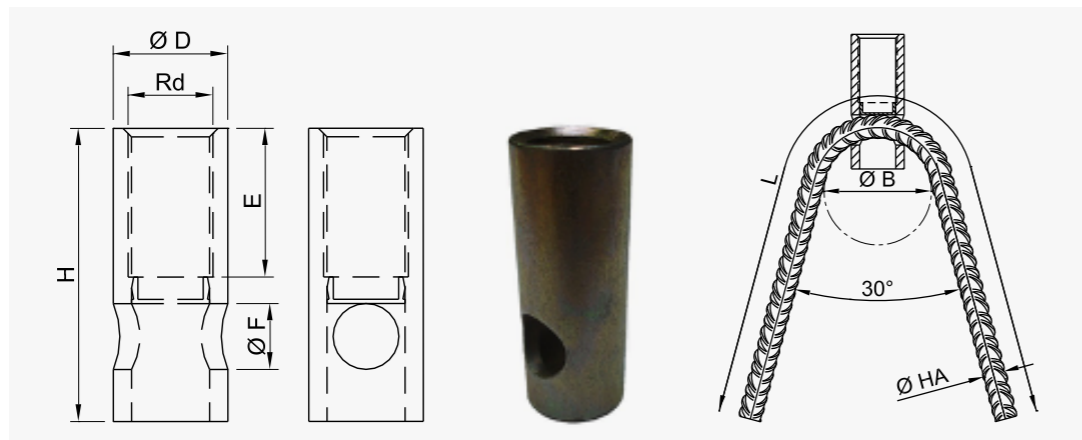
REFERENCE	THREAD RD	SAFE WORKING LOAD [KG]		DIMENSIONS [MM]				WEIGHT [KG]
		0°-45°	45° - 90°	ØD	H	E	ØF	
DT 12	12	500	250	15	40	22	8	0,025
DT 16	16	1200	600	21	54	27	13	0,070
DT 20	20	2000	1000	27	69	35	15,5	0,155
DT 24	24	2500	1250	31	78	43	18	0,206
DT 30	30	4000	2000	39,5	103	56	22,5	0,450
DT 36	36	6300	3150	47	125	68	27,5	0,725
DT 42	42	8000	4000	54	145	80	32	1,100
DT 52	52	12500	6250	67	195	100	40	2,255

Sockets are provided electro zinc plated. They can also be made in stainless steel.

A bent reinforced ribbed steel has to be put into the hole of the lifting socket.

Total length of the reinforced ribbed steel, depending of the concrete strength

REFERENCE	Ø HA B500B [MM]	BENDING ROLL ØB	CONCRETE STRENGTH (MPA)							
			10	15	20	25	30	35	40	45
DT 12	6	60	510	430	380	340	310	290	270	250
DT 16	10	100	760	640	560	510	470	430	410	390
DT 20	12	120	1020	850	750	670	610	570	530	500
DT 24	14	140	1110	940	820	740	680	630	590	560
DT 30	16	160	1490	1250	1080	970	880	820	760	720
DT 36	20	200	1870	1560	1360	1220	1110	1030	960	900
DT 42	25	250	1980	1670	1460	1320	1210	1120	1050	1000
DT 52	28	280	2640	2210	1920	1720	1560	1440	1350	1270

Minimum edge distances have to be respected.
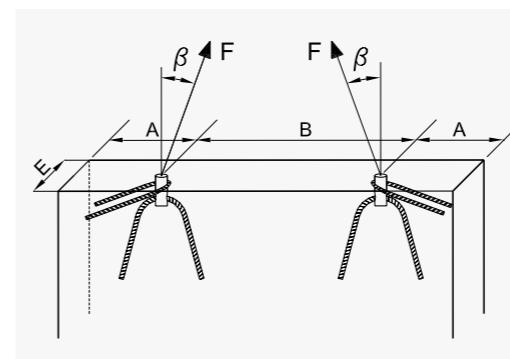
REFERENCE	THICKNESS MINI E [MM]	A MINI [MM]	B MINI [MM]
DT 12	60	150	300
DT 16	80	200	400
DT 20	100	275	550
DT 24	120	300	600
DT 30	140	350	650
DT 36	200	400	800
DT 42	240	500	1000
DT 52	275	600	1200

In case of an inclined tension b≥ 15°, an additional stirrup has to be added.

Dimension of the additional shear pull stirrup

SOCKET	Ø HA B500B [MM]	LENGTH OF THE STIRRUP L [MM]	BENDING ROLL ØB [MM]
RD 12	6	150	24
RD 16	8	200	32
RD 20	8	300	32
RD 24	10	300	40
RD 30	12	400	48
RD 36	14	550	56
RD 42	16	600	64
RD 52	20	750	140

In case of a transversal pull (till up) with an inclination ⬚ ≥ 15°, additional reinforcements have to be added.

Dimension of the additional transversal pull reinforced ribbed steel

SOCKET	REBAR 1			REBAR 2	
	Ø HA1 (MM)	L1 (MM)	H (MM)	Ø HA2 (MM)	L2 (MM)
RD 12	6	270	35	8	280
RD 16	8	420	49	12	400
RD 20	10	490	64	14	490
RD 24	12	520	75	14	550
RD 30	12	570	92	16	580
RD 36	14	690	118	16	700
RD 42	16	830	143	20	850
RD 52	20	930	174	20	1000
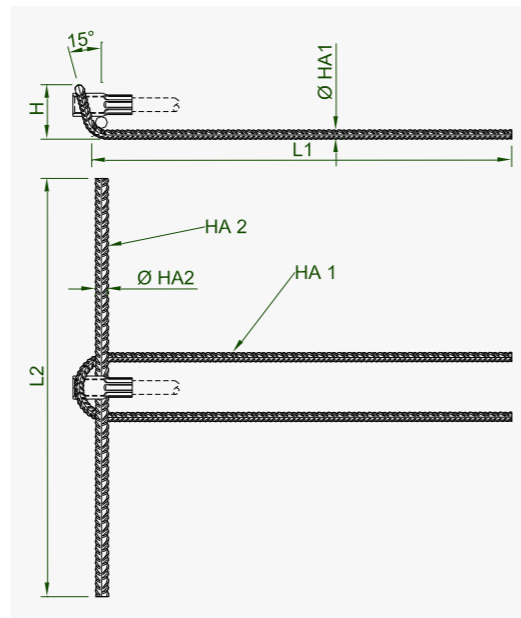
The rebar HA1 can be fixed to the socket with the data clips with ears (see §7.3)

2.2 Flat End Lifting Socket

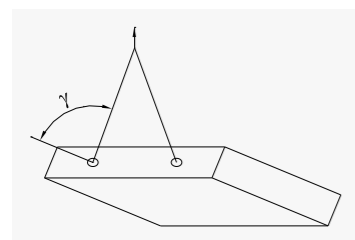| REFERENCE	THREAD RD	SAFE WORKING LOAD [KG]			DIMENSIONS [MM]			WEIGHT [KG]
		0°- 45°	45° - 90°	ØD	H	E	ØF	
DTP 12	12	500	250	15	60	22	10	0,031
DTP 16	16	1200	600	21	80	27	13	0,110
DTP 20	20	2000	1000	27	95	35	15	0,200
DTP 24	24	2500	1250	31	100	43	18	0,270
DTP 30	30	4000	2000	39,5	135	56	22,5	0,600

Sockets are provided electro zinc plated.

The reinforced ribbed steel are the same than for the lifting socket with cross hole (see § 2.1):

– bent reinforced ribbed steel must be put into the hole of the lifting socket

– additional shear pull stirrup, In case of an inclined tension b ≥ 15°

– additional transversal pull reinforced ribbed steels, in case of a transversal pull (till up) with an inclination ≥ ≥ 15°.

2.3 Lifting Socket with Straight Rebar
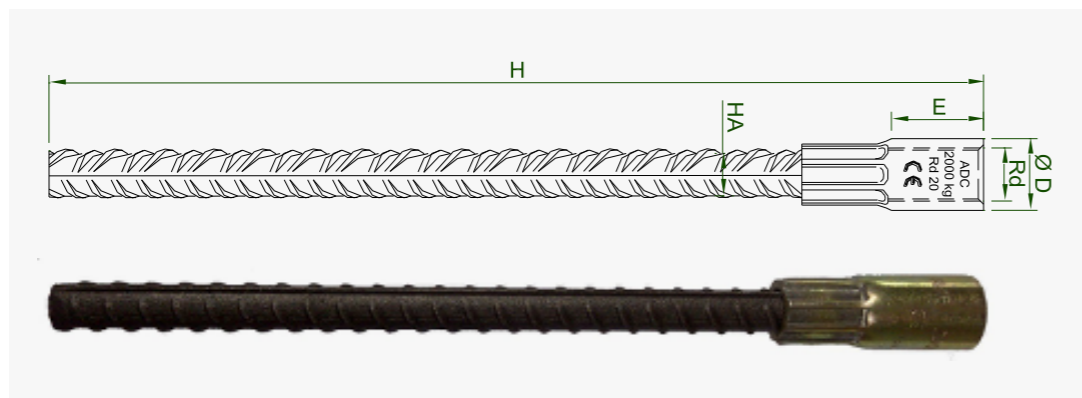
Dimension of the lifting sockets with straight rebar

REFERENCE	THREAD RD	SAFE WORKING LOAD [KG]		DIMENSIONS [MM]				WEIGHT [KG]
		0°-45°	45° - 90°	ØD	H	E	ØF	
DA 12 190	12	500	250	15	190	22	10	0,102
DA 16 250	16	1200	600	21	250	27	12	0,280
DA 16 270	16	1200	600	21	270	27	10	0,350
DA 20 350	20	2000	1000	27	350	35	16	0,540
DA 24 400	24	2500	1250	31	400	43	16	0,830
DA 24 720	24	2500	1250	31	720	43	16	1,225
DA 30 500	30	4000	2000	39,5	500	56	20	1,520
DA 36 650	36	6300	3150	47	650	68	25	3,120
DA 42 800	42	8000	4000	54	800	80	28	4,77
DA 52 900	52	12500	6250	67	900	100	32	7,30

Sockets are provided electro zinc plated; rebar is black.

The Safe Working Load is given for a minimum concrete strength of 15 MPa

REFERENCE	THICKNESS MINI E [MM]	A MINI [MM]	B MINI [MM]
DA 12 190	60	150	300
DA 16 250	80	200	400
DA 16 270	80	200	400
DA 20 350	100	275	550
DA 24 400	120	300	600
DA 24 720	120	300	600
DA 30 500	140	350	650
DA 36 650	200	400	800
DA 42 800	240	500	1000
DA 52 900	275	600	1200

In case of an inclined tension b ≥ 15°, an additional stirrup has to be added.
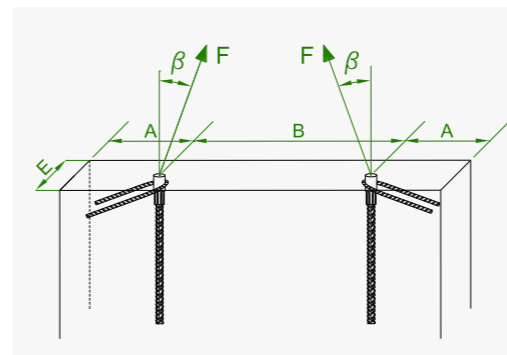
Dimension of the additional shear pull stirrup

SOCKET	Ø HA B500B [MM]	LENGTH OF THE STIRRUP L [MM]	BENDING ROLL ØB [MM]
RD 12	6	150	24
RD 16	8	200	32
RD 20	8	300	32
RD 24	10	300	40
RD 30	12	400	48
RD 36	14	550	56
RD 42	16	600	64
RD 52	20	750	140

In case of a transversal pull (till up) with an inclination ≥ 15°, additional reinforcements have to be added.

See § 2.1 for more information concerning the additional reinforcements.

2.4 Wavy Tail Lifting Anchor: Lifting Socket with Short Wavy Tail
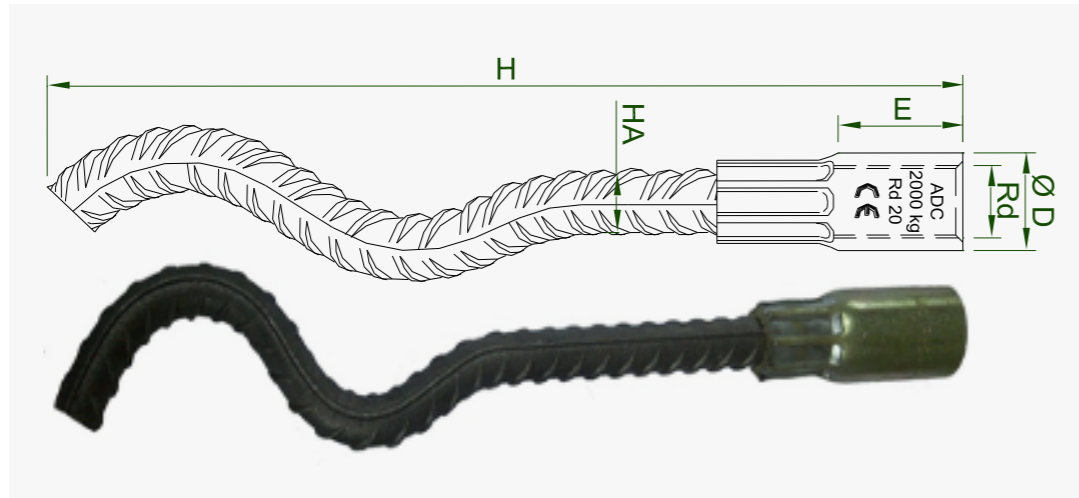
Dimension of the lifting sockets with short wavy tail

REFERENCE	THREAD RD	SAFE WORKING LOAD [KG]		DIMENSIONS [MM]				WEIGHT [KG]
		0°-45°	45° - 90°	ØD	H	E	HA	
DAS 12 108	12	500	250	15	108	22	8	0,058
DAS 16 167	16	1200	600	21	167	27	12	0,210
DAS 20 187	20	2000	1000	27	187	35	16	0,340
DAS 24 250	24	2500	1250	31	250	43	16	0,532
DAS 30 300	30	4000	2000	39,5	300	56	20	1,004
DAS 36 380	36	6300	3150	47	380	68	25	2,120
DAS 42 450	42	8000	4000	54	450	80	28	3,000

Sockets are provided electro zinc plated; rebar is black.

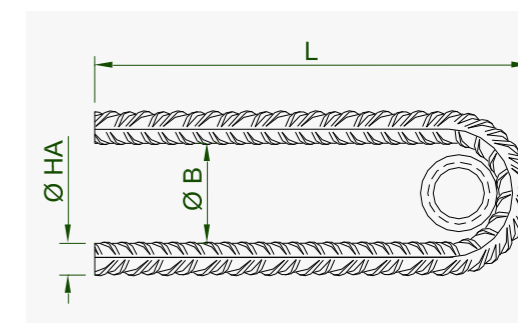The Safe Working Load is given for a minimum concrete strength of 15 MPa
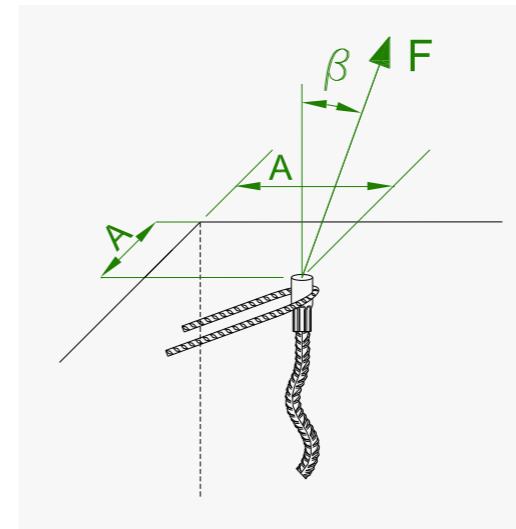
REFERENCE	A MINI [MM]
DAS 12 108	95
DAS 16 167	135
DAS 20 187	170
DAS 24 250	220
DAS 30 300	275
DAS 36 380	300
DAS 42 450	400

In case of an inclined tension b ≥ 15°, an additional stirrup has to be added.

Dimension of the additional shear pull stirrup

SOCKET	Ø HA B500B [MM]	LENGTH OF THE STIRRUP L [MM]	BENDING ROLL ØB [MM]
RD 12	6	150	24
RD 16	8	200	32
RD 20	8	300	32
RD 24	10	300	40
RD 30	12	400	48
RD 36	14	550	56
RD 42	16	600	64

2.5 Wavy Tail Lifting Anchor: Lifting socket with Long Wavy Tail
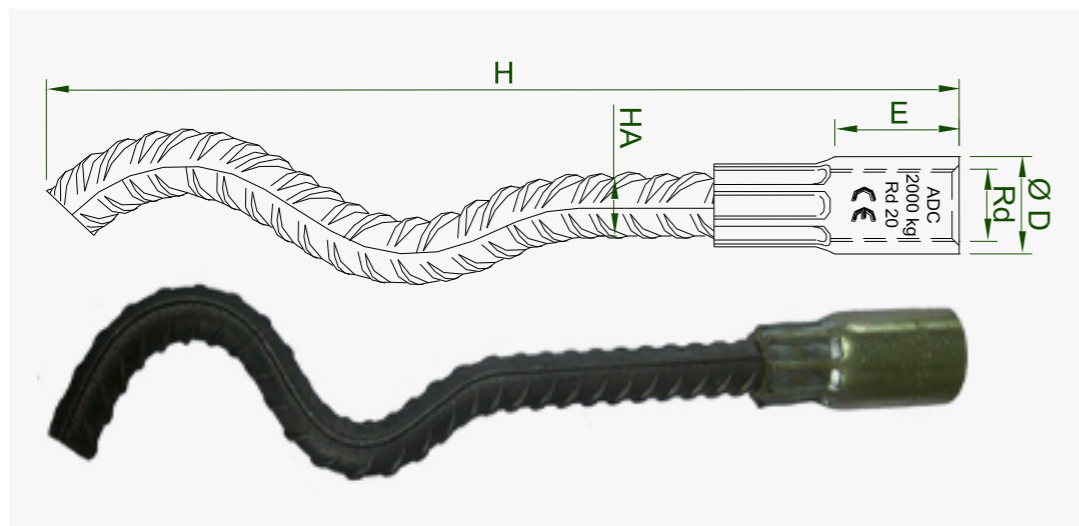
Dimension of the lifting sockets with long wavy tail

REFERENCE	THREAD RD	SAFE WORKING LOAD [KG]		DIMENSIONS [MM]				WEIGHT [KG]
		0°-45°	45° - 90°	ØD	H	E	HA	
DAS 12 137	12	500	250	15	137	22	10	0,076
DAS 12 300	12	500	250	15	300	22	8	0,151
DAS 16 216	16	1200	600	21	216	27	12	0,250
DAS 20 257	20	2000	1000	27	257	35	16	0,520
DAS 20 300	20	2000	1000	27	300	35	16	0,550
DAS 24 360	24	2500	1250	31	360	43	16	0,740
DAS 30 450	30	4000	2000	39,5	450	56	20	1,470
DAS 36 570	36	6300	3150	47	570	68	25	2,850
DAS 42 620	42	8000	4000	54	620	80	28	3,870
DAS 52 880	52	12500	6250	67	880	100	32	7,200

Sockets are provided electro zinc plated; rebar is black.

The Safe Working Load is given for a minimum concrete strength of 15 MPa

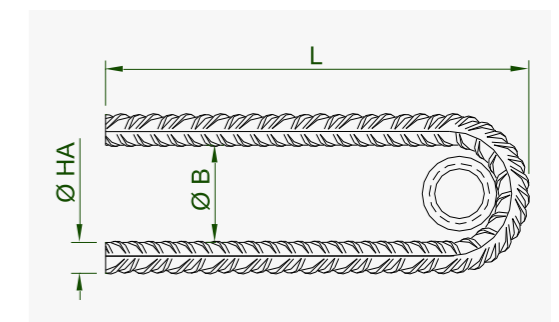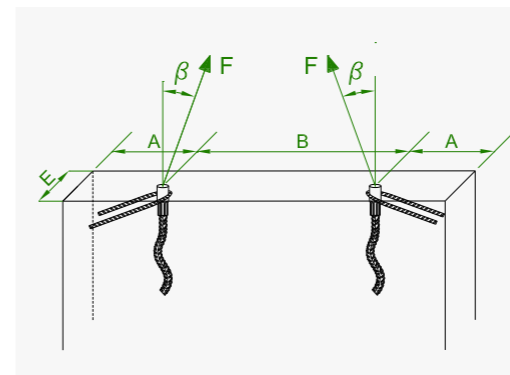| REFERENCE	THICKNESS MINI E [MM]	A MINI [MM]	B MINI [MM]
DAS 12 137	60	150	300
DAS 12 300	60	150	300
DAS 16 216	80	200	400
DAS 20 257	100	275	550
DAS 20 300	100	275	550
DAS 24 360	120	300	600
DAS 30 450	140	350	650
DAS 36 570	200	400	800
DAS 42 620	240	500	1000
DAS 52 880	275	600	1200

In case of an inclined tension b ≥ 15°, an additional stirrup has to be added.

Dimension of the additional shear pull stirrup

SOCKET	Ø HA B500B [MM]	LENGTH OF THE STIRRUP L [MM]	BENDING ROLL ØB [MM]
RD 12	6	150	24
RD 16	8	200	32
RD 20	8	300	32
RD 24	10	300	40
RD 30	12	400	48
RD 36	14	550	56
RD 42	16	600	64
RD 52	20	750	140

In case of a transversal pull (till up) with an inclination   ≥ 15°, additional reinforcements have to be added.

See § 2.1 for more information concerning the additional reinforcements.

2.6 Flat Plate Socket
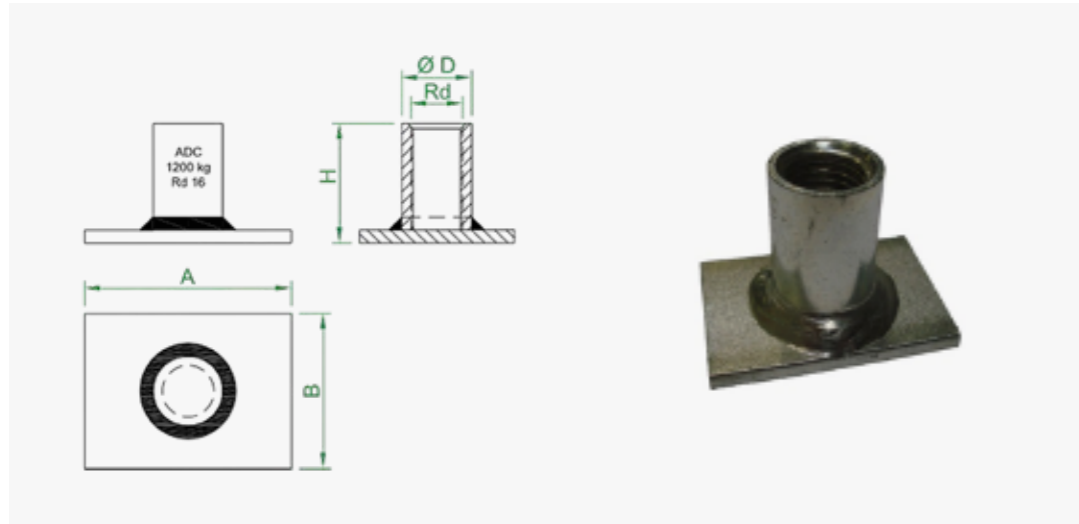
Dimension of the flat plate socket

REFERENCE	THREAD RD	SAFE WORKING LOAD [KG]	DIMENSIONS [MM]				WEIGHT [KG]
		0°-45°	ØD	H	A	B	
DAP 12	12	500	15	30	35	25	0,045
DAP 16	16	1200	21	35	50	35	0,110
DAP 20	20	2000	27	47	60	60	0,250
DAP 24	24	2500	31	54	80	60	0,350
DAP 30	30	4000	39,5	72	100	80	0,690
DAP 36	36	6300	47	84	130	100	1,290
DAP 42	42	8000	54	98	130	130	1,780
DAP 52	52	12500	67	120	150	130	2,880

Sockets are provided electro zinc plated.

The Safe Working Load is given for a minimum concrete strength of 15 MPa.

Required reinforcement steel
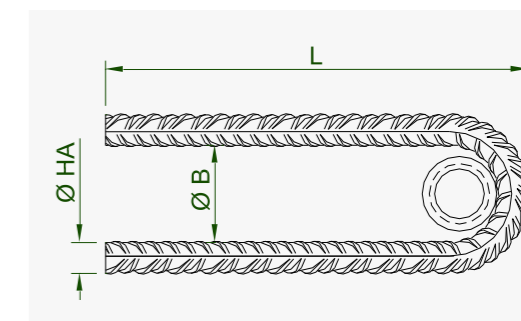
The flat plate socket have to be used with the required reinforcement ribbed steel.
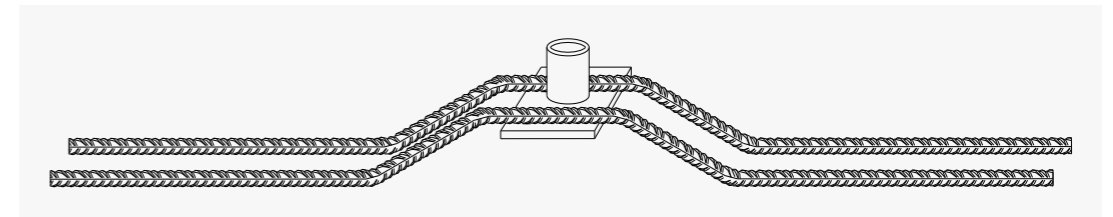
Dimensions of the required reinforcement ribbed steel

REFERENCE SOCKET	THREAD RD	REBAR HA	DIMENSIONS [MM]		
		QTY X Ø	L	A	B
DAP 12	12	2 x Ø 6	250	60	60
DAP 16	16	2 x Ø 8	420	90	70
DAP 20	20	2 x Ø 8	640	90	80
DAP 24	24	2 x Ø 10	640	90	100
DAP 30	30	2 x Ø 12	830	90	110
DAP 36	36	2 x Ø 14	1140	140	120
DAP 42	42	2 x Ø 16	1250	140	120
DAP 52	52	2 x Ø 20	1530	140	150

Minimum edge distance and minimum distance between sockets
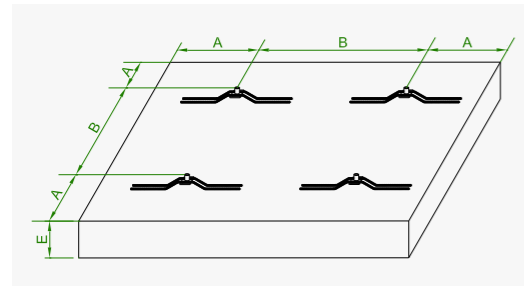
REFERENCE SOCKET	A MINI [MM]	B MINI [MM]	E MINI [MM]
DAP 12	180	350	75
DAP 16	250	500	85
DAP 20	300	600	100
DAP 24	400	800	115
DAP 30	500	1000	140
DAP 36	650	1300	160
DAP 42	650	1300	175
DAP 52	750	1500	215

In case of an inclined tension b ≥ 15°, an additional stirrup has to be added.

Dimension of the additional shear pull stirrup

SOCKET	Ø HA B500B [MM]	LENGTH OF THE STIRRUP L [MM]	BENDING ROLL ØB [MM]
RD 12	6	150	24
RD 16	8	200	32
RD 20	8	300	32
RD 24	10	300	40
RD 30	12	400	48
RD 36	14	550	56
RD 42	16	600	64
RD 52	20	750	140

2.7 Crown Foot Anchor
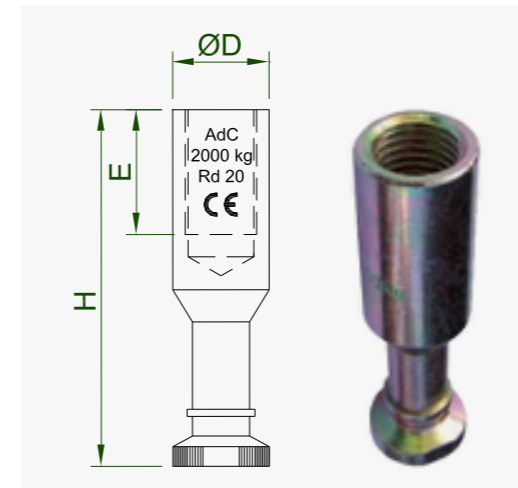
Dimensions of the lifting socket with machined foot

REFERENCE	THREAD RD	SAFE WORKING LOAD [KG]		DIMENSIONS [MM]			WEIGHT [KG]
		0°-45°	45° - 90°	ØD	H	E	
DPU 12 060	12	500	250	17	60	22	0,06
DPU 16 080	16	1200	600	21	80	27	0,14
DPU 20 100	20	2000	1000	27	100	35	0,20
DPU 24 115	24	2500	1250	31	115	43	0,40
DPU 30 150	30	4000	2000	40	150	56	0,70

Sockets are provided electro zinc plated.

The Safe Working Load is given for a minimum concrete strength of 15 MPa.
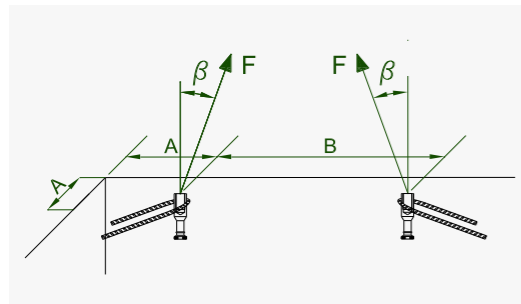
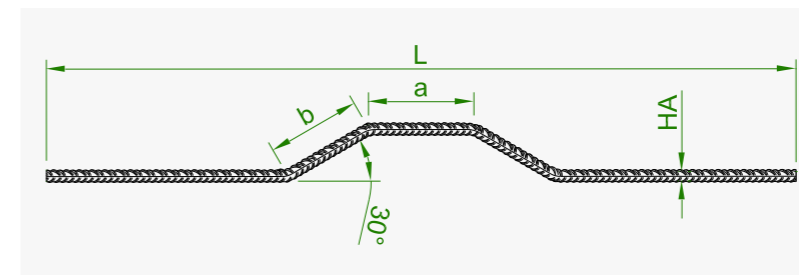| REFERENCE	A MINI [MM]	B MINI [MM]
DPU 12 060	180	360
DPU 16 080	240	480
DPU 20 100	300	600
DPU 24 115	345	690
DPU 30 150	450	900

In case of an inclined tension b ≥ 15°, an additional stirrup has to be added.

Dimension of the additional shear pull stirrup

| SOCKET	Ø HA B500B [MM]	LENGTH OF THE STIRRUP L [MM]	BENDING ROLL ØB [MM]
RD 12	6	150	24
RD 16	8	200	32
RD 20	8	300	32
RD 24	10	300	40
RD 30	12	400	48

2.8 Crown Foot Anchor Bolt Type
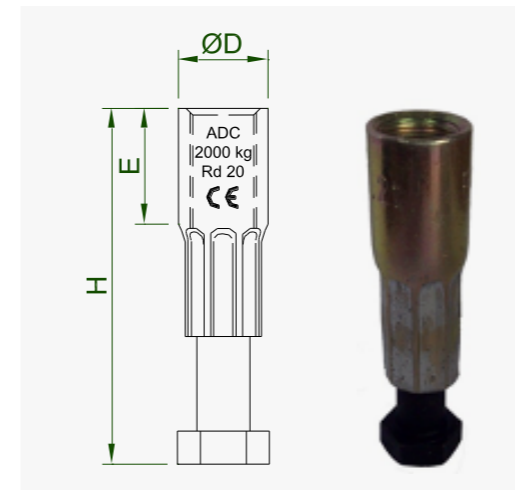
Dimensions of the lifting socket with bolt

REFERENCE	THREAD RD	SAFE WORKING LOAD [KG]		DIMENSIONS [MM]			WEIGHT [KG]
		0°-45°	45° - 90°	ØD	H	E	
DP 12 060	12	500	250	15	60	22	0,060
DP 12 070	12	500	250	15	70	22	0,080
DP 16 080	16	1200	600	21	80	27	0,140
DP 20 100	20	2000	1000	27	100	35	0,200
DP 20 127	20	2000	1000	27	127	35	0,266
DP 24 140	24	2500	1250	31	140	43	0,440
DP 30 170	30	4000	2000	39,5	170	56	0,750

Sockets are provided electro zinc plated.

The Safe Working Load is given for a minimum concrete strength of 15 MPa.
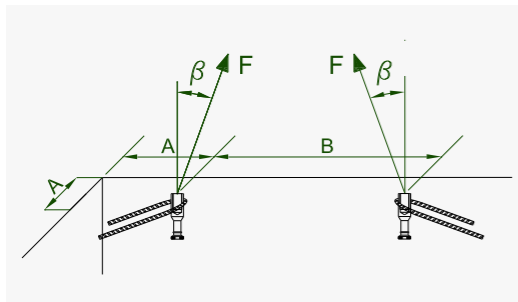
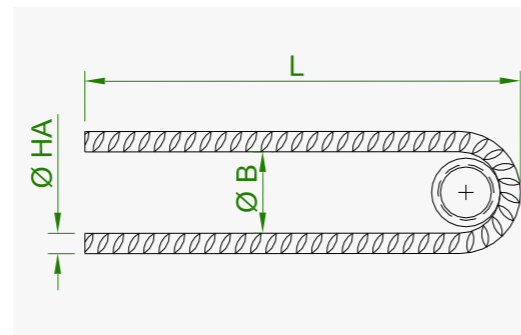| REFERENCE	A MINI [MM]	B MINI [MM]
DP 12 060	180	360
DP 12 070	210	420
DP 16 080	240	480
DP 20 100	300	600
DP 20 127	380	760
DP 24 140	420	840
DP 30 170	510	1020

**In case of an inclined tension b ≥ 15°, an additional stirrup has to be added.**

Dimension of the additional shear pull stirrup

SOCKET	Ø HA B500B [MM]	LENGTH OF THE STIRRUP L [MM]	BENDING ROLL ØB [MM]
RD 12	6	150	24
RD 16	8	200	32
RD 20	8	300	32
RD 24	10	300	40
RD 30	12	400	48

2.9 Lifting Socket with Foot
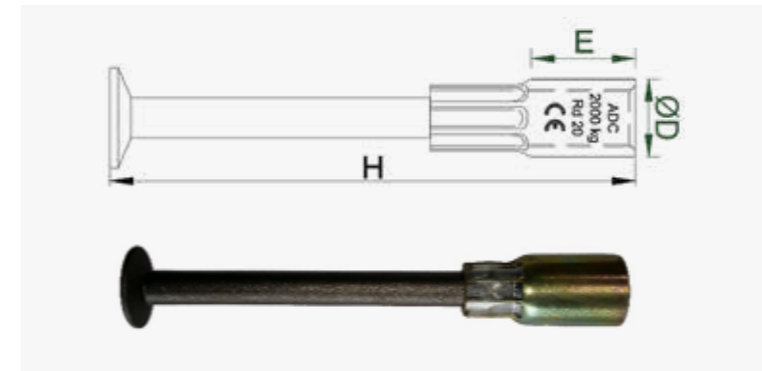
Dimensions of the lifting socket with foot

REFERENCE	THREAD RD	SAFE WORKING LOAD [KG]		DIMENSIONS [MM]			WEIGHT [KG]
		0°-45°	45° - 90°	ØD	H	E	
DP 12 100	12	500	250	15	100	22	0,050
DP 12 150	12	500	250	15	150	22	0,074
DP 16 130	16	1200	600	21	130	27	0,160
DP 16 175	16	1200	600	21	175	27	0,160
DP 20 185	20	2000	1000	27	185	35	0,335
DP 20 250	20	2000	1000	27	250	35	0,410
DP 24 200	24	2500	1250	31	200	43	0,474
DP 24 250	24	2500	1250	31	250	43	0,550
DP 24 275	24	2500	1250	31	275	43	0,580
DP 30 275	30	4000	2000	39,5	275	56	0,923
DP 30 350	30	4000	2000	39,5	350	56	1,251
DP 36 335	36	6300	3150	47	335	68	1,860
DP 36 450	36	6300	3150	47	450	68	2,330

Sockets are provided electro zinc plated.

Depending on the manufacture, the foot may be smooth steel or crenellated steel.

The Safe Working Load is given for a minimum concrete strength of 15 MPa.
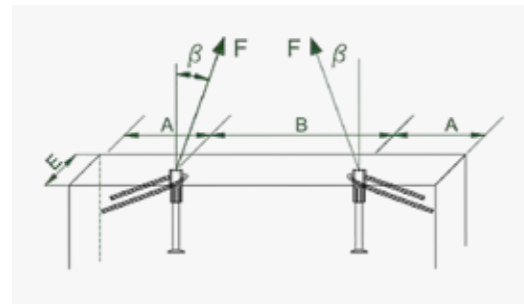
REFERENCE	THICKNESS MINI E [MM]	A MINI [MM]	B MINI [MM]
DP 12 100	120	150	300
DP 12 150	110	150	300
DP 16 130	220	200	400
DP 16 175	200	200	400
DP 20 185	240	300	600
DP 20 250	220	300	600
DP 24 200	260	350	700
DP 24 250	240	350	700
DP 24 275	240	350	700
DP 30 275	300	500	1000
DP 30 350	280	500	1000
DP 36 335	320	770	1540
DP 36 450	300	720	1440

**In case of an inclined tension b ≥ 15°, an additional stirrup has to be added.**

Dimension of the additional shear pull stirrup

SOCKET	Ø HA B500B [MM]	LENGTH OF THE STIRRUP L [MM]	BENDING ROLL ØB [MM]
RD 12	6	150	24
RD 16	8	200	32
RD 20	8	300	32
RD 24	10	300	40
RD 30	12	400	48
RD 36	14	550	56

In case of a transversal pull (till up) with an inclination   ≥ 15°, additional reinforcements have to be added.

See § 2.1 for more information concerning the additional reinforcements.

3. Lifting Loop and Swivel Eye

4 types of lifting loops and lifting eyes are proposed:

LIFTING LOOP

ARTICULATED LIFTING LOOP

LATERAL LIFTING LOOP

SWIVEL EYE

3.1 Lifting Loop

3.1.1 Lifting Loop

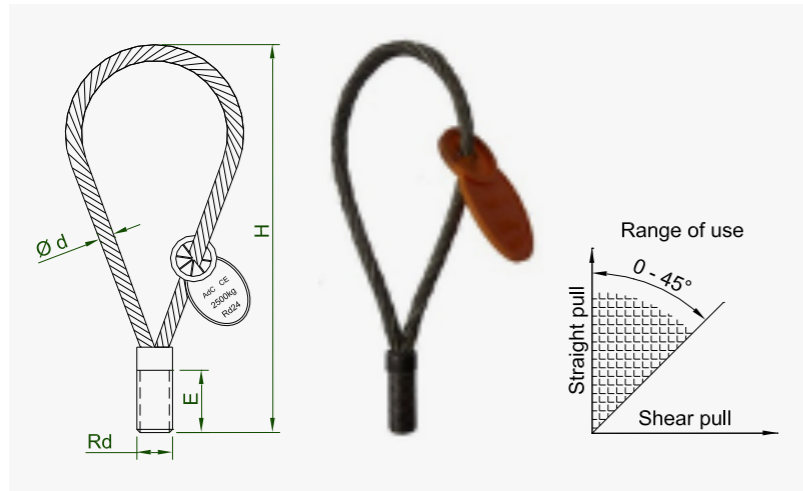| REFERENCE	THREAD RD	SAFE WORKING LOAD [KG]	DIMENSIONS [MM]			LABEL COLOR	
		0°- 45°	H	ØD	E		
EL 12	Rd 12	500	155	6	22	Orange	
EL 16	Rd 16	1 200	165	8	28	Red	
EL 20	Rd 20	2 000	215	10	36	Light green	
EL 24	Rd 24	2 500	255	12	42	Dark grey	
EL 30	Rd 30	4 000	300	16	54	Dark green	
EL 36	Rd 36	6 300	360	18	65	Light blue	
EL 42	Rd 42	8 000	425	20	72	Light grey	
EL 52	Rd 52	12 500	555	26	90	Sulphur yellow	

The lifting loops are supplied with a colored label. This label indicates :
– the manufacturer (ADC)
– the thread (example Rd24)
– the Safe Working Load (example 2500 kg)
On request, slings can also be provided in metric threading.

3.1 Lifting Loop

3.1.2 Articulated Lifting Loop

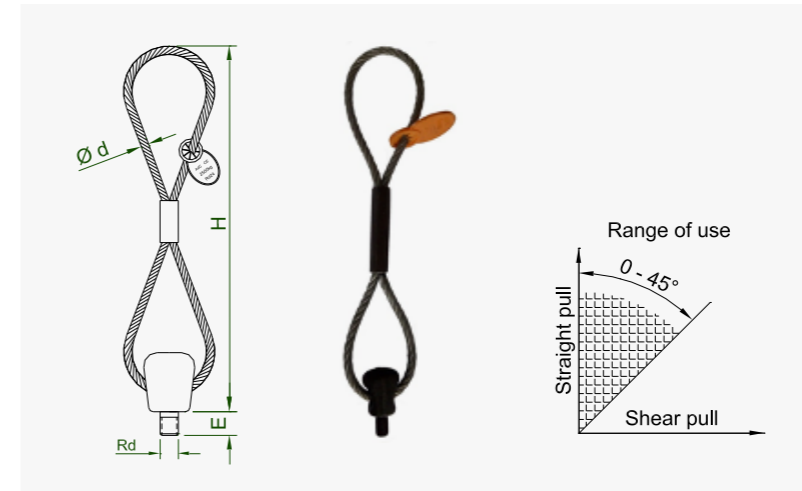| REFERENCE	THREAD RD	SAFE WORKING LOAD [KG]	DIMENSIONS [MM]			LABEL COLOR	
		0°- 45°	H	ØD	E		
EL 12	Rd 12	500	335	8	22	Orange	
EL 16	Rd 16	1 200	385	8	28	Red	
EL 20	Rd 20	2 000	470	10	36	Light green	
EL 24	Rd 24	2 500	550	12	42	Dark grey	
EL 30	Rd 30	4 000	590	16	54	Dark green	
EL 36	Rd 36	6 300	780	18	65	Light blue	
EL 42	Rd 42	8 000	860	20	72	Light grey	
EL 52	Rd 52	12 500	1080	26	70	Sulphur yellow	

The lifting loops are supplied with a colored label. This label indicates :
– the manufacturer (ADC)
– the thread (example Rd24)
– the Safe Working Load (example 2500 kg)
On request, slings can also be provided in metric threading.

3.1 Lifting Loop

3.1.3 Lateral Lifting Loop

Set consisting of a lateral lifting loop and a screw to lift on the sides an element of the type concrete tank.

LIFTING LOOP REFERENCE	FOR SCREW M/RD	SAFE WORKING LOAD [KG]	DIMENSIONS [MM]	
		75°- 90°	HIGHT	Ø HOLE
ELL16	16	2 000	300	16.5
ELL24	24	4 000	330	24.5
ELL30	30	5 200	400	31.0

The Safe Working Load is given for a minimum concrete strength of 15 MPa.

Hexagon Head Screw DIN 933

SCREW REFERENCE	THREAD M	LENGTH UNDER HEAD [MM]	CLASS	ALLEN SCREWS [MM]
10VI16040-88	M 16	40	8.8	24
10VI24050-88	M 24	50	8.8	36
10VI30070-88	M 30	70	8.8	46

The sockets should be positioned at a sufficient distance from the top of the element to prevent the concrete from cracking above the socket. The sockets should be positioned at the level of the concrete. The use of a holding disc that would cause the socket withdrawal is strictly prohibited.

USAGE AND SAFETY CONDITIONS

Do this:

– Make sure the screw is fully screwed into the socket
– Make sure the threading of the socket is clea.
– Ensure that the concrete strength is at least equal to that provided in the sizing of the anchors. A concrete at 25 MPa is the bare minimum
– Make sure the loop is free of defects such as welding trace, cable wire breakage, excessive corrosion
– Make sure the screw thread is clean and undamaged.

Don't do this:

– Never use the lateral lifting loop with an angle of tilt to the vertical above 15 degrees
– Never weld the lifting loop for any reason.

3.1 Lifting Loop

3.1.4 Periodic control of the Lifting Loops

Whatever the frequency of use, each lifting loops must be controlled at least once a year by a competent person. Any physical abnormality, deformation, any sign of welding, must lead to the immediate destruction of the lifting loop.

The points to control are:

– Absence of permanent deformation

– Absence of crushing of the wire rope

– Absence of bends or twists of the wire rope

– Absence of damage due to corrosion

– Maximum 4 broken wires on a rope

The lifting loops cannot be repaired.
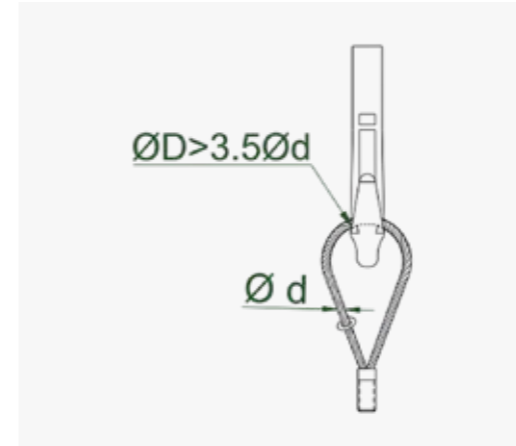
4.1.5 Usage and safety conditions of the Lifting Loops

BEFORE USE

To do:

– For lifting, always use sockets and lifting loops with a round thread (Rd)

– Make sure that the thread diameter of the lifting loop and that the Safe Working Load on the label of the lifting loop are the same than for the socket

– Make sure than the thread of the lifting loop is fully engaged into the thread of the socket

– Make sure that the thread of the socket is clean

– Make sure that the length of the slings is at least twice the distance between the sockets, in order to have an angle of 30° between the slings. It is possible to have a bigger angle only if it has been considered in calculations. It is always better to use a lifting beam

– Make sure that the concrete strength is at least equal to that used in the calculations. The minimum concrete strength is 15 MPa

– Make sure that the lifting loop has no default, such as welding points, broken wires on a rope, clean thread without crushing.

Not to do:

– Never screw a round thread lifting loop (Rd) into a metric thread socket (M). The lifting loop would never be able to screw on a sufficient length, and the load capacity will be dangerously reduced

– **Never use the lifting loops with an angle of more than 45° from the axe of the socket**

– You must not weld the socket nor the lifting loop, for whatever reason

– Under no circumstances should the diameter of the hook or shackle D, attached to the loop, be less than 3.5 times the diameter of the cable of the lifting loop. If possible, we recommend a diameter greater than 5 times the diameter of the cable.

IN USE

– When precast concrete elements are transported by construction companies, they are subject to shocks and impact loads. This factor increases the load on the socket by several times the dead-weight should be taken into account in load calculations. Therefore, care should be taken in transporting the elements on site

– When the sockets are used to lift a unit from a mould, the adhesion between the freshly cast concrete and the mould increase the forces on the sockets. This element needs also to be taken into consideration when calculating the required load.

MAINTENANCE

– All lifting loops must be controlled at least once a year by a competent person. The lifting loops must not show any sign of deformity

– The lifting loops cannot be repaired.

GENERAL

– The lifting loops must be used only for lifting precast concrete elements

– Users of the lifting loops must be familiar with the usage and safety instructions

– All usage and safety instructions must be respected when lifting loops are used.

If you have any question, do not hesitate to contact SDG Technical Department.

3.2 Swivel Eye

Identification label
(AdC/Rdxx/SWL/batch Nb)

Removable ring

Lifting eye with removable ring

Lifting eye without removable ring

Range of use

Straight pull

Shear pull

0 - 90°
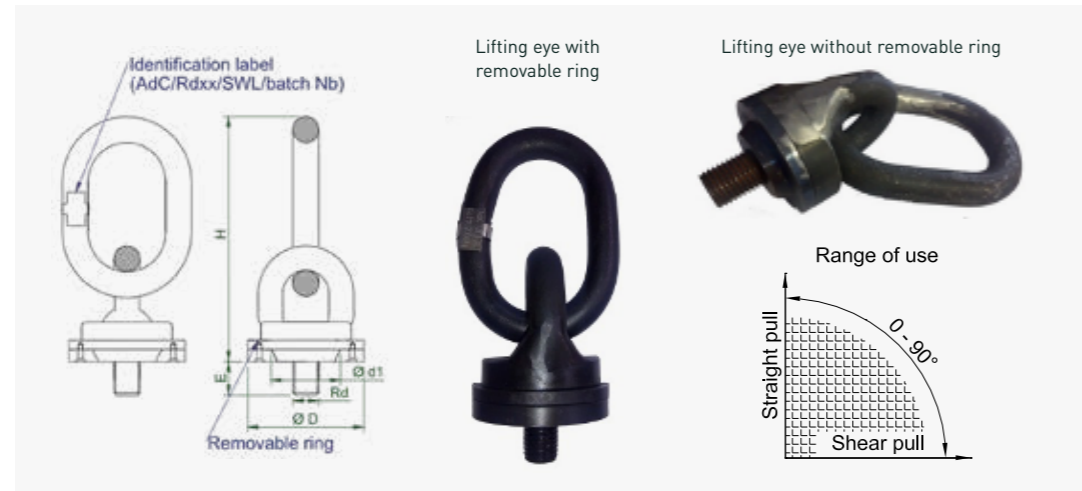
REFERENCE	THREAD RD	SAFE WORKING LOAD [KG]	DIMENSIONS [MM]			
		0°-90°	E	H	ØD	ØD1
AL 16	Rd 16	1 200	21	177	80	55
AL 20	Rd 20	2 000	26	193	80	55
AL 24	Rd 24	2 500	31	226	80	55
AL 30	Rd 30	4 000	39	302	100	70
AL 36	Rd 36	6 300	47	322	110	70

The lifting eyes are supplied with an **identification label**. This label indicates :

– The manufacturer (ADC)

– The thread (example Rd24)

– The Safe Working Load (example 2500 kg)

– The batch number (example 3F100).

The **removable ring** fixed with 4 screws enables the lifting eye to be fully sitting on the concrete, in both case if the socket has been positioned flush with the concrete or offset in the concrete.

When the socket is positioned offset in the concrete, always use the plastic holding disc diameter ØD1.

When the socket has been positioned flush with the concrete, always use the adaptation ring.

When the socket has been positioned offset in the concrete, always remove the adaptation ring.

Be careful, all other combinations are dangerous, and therefore forbidden!

(See the table below).

Socket flush with the concrete

Socket offset in the concrete
(the socket must be positioned exclusively with the AdC plastic holding disc, diameter ØD1)

With removable ring   Without removable ring

With removable ring   Without removable ring

3.3 Swivel Eye

3.3.1 Periodic control of the Swivel Eyes

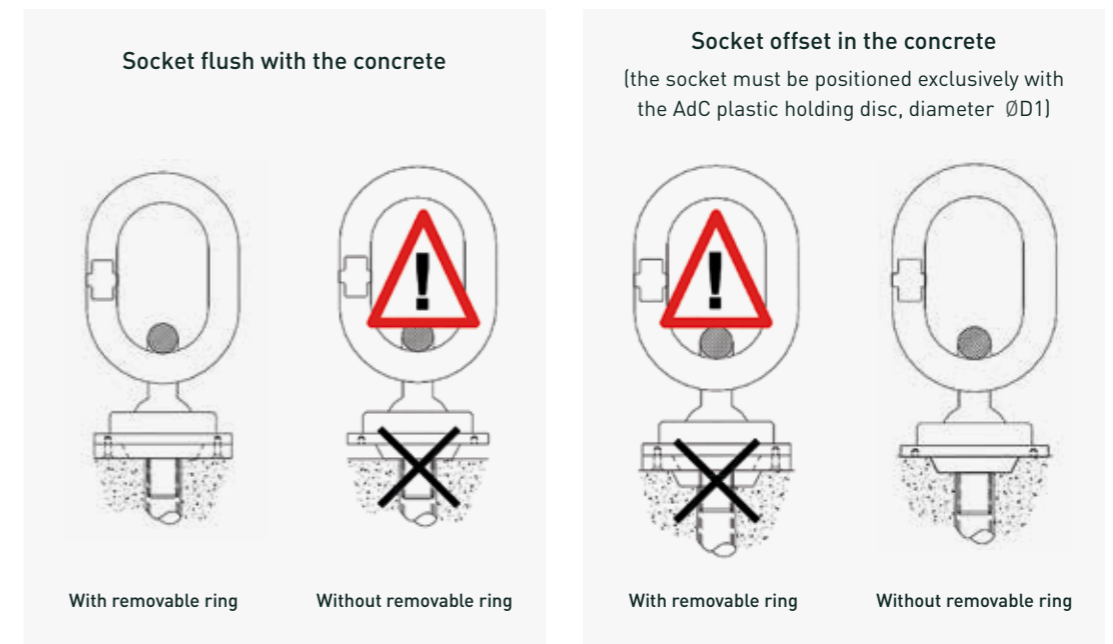Whatever the frequency of use, each lifting eye must be controlled at least once a year by a competent person. Any physical abnormality, deformation, any sign of welding, must lead to the immediate destruction of the lifting eye.

The points to control are:

– Absence of permanent deformation

– Absence of crushing

– Absence of bends or twists

– Absence of damage due to corrosion

– Correct hinge between the head and the handle

– Correct hinge between the head and the handle

The lifting eyes cannot be repaired.

3.3 Swivel Eye

3.3.2 Usage and safety conditions of the Swivel Eyes

BEFORE USE

To do:

– For lifting, always use sockets and lifting eyes with a round thread (Rd)

– Make sure that the thread diameter of the lifting eye and that the Safe Working Load on the label of the lifting eye are the same than for the socket

– **Make sure than the thread of the lifting eye is fully engaged into the thread of the socket.** If the lifting eye is not enough engaged onto the socket, it reduces its load capacity.

– Make sure that the thread of the socket is clean.

– **Make sure that the bottom surface of the lifting eye is fully sitting on the concrete:**
  - **If the socket has been positioned flush with the concrete, use the adaptation ring**
  - **If the socket has been positioned offset in the concrete with a recess holding disc diameter ØD1, remove the adaptation ring**

– Make sure that the length of the slings is at least twice the distance between the sockets, in order to have an angle of 30° between the slings. It is possible to have a bigger angle only if it has been considered in calculations. It is always better to use a lifting beam

– Make sure that the concrete strength is at least equal to that used in the calculations. The minimum concrete strength is 15 MPa

– Make sure that the lifting eye has no default, such as welding points and clean thread without crushing.

Not to do:

– Never screw a round thread lifting eye (Rd) into a metric thread socket (M). The lifting eye would never be able to screw on a sufficient length, and the load capacity will be dangerously reduced

– You must not weld the socket nor the lifting eyes, for whatever reason.

IN USE

– When precast concrete elements are transported by construction companies, they are subject to shocks and impact loads. This factor increases the load on the socket by several times the dead-weight should be taken into account in load calculations. Therefore, care should be taken in transporting the elements on site

– When the sockets are used to lift a unit from a mould, the adhesion between the freshly cast concrete and the mould increase the forces on the sockets. This element needs also to be taken into consideration when calculating the required load.

MAINTENANCE

– All lifting eyes must be controlled at least once a year by a competent person. The lifting eyes must not show any sign of deformity

– The lifting eyes cannot be repaired.

GENERAL

– The lifting eyes must be used only for lifting precast concrete elements

– Users of the lifting eyes must be familiar with the usage and safety instructions

– All usage and safety instructions must be respected when lifting eyes are used.

If you have any question, do not hesitate to contact SDG Technical Department.

4. Cast in Loops

4.1 Steel Wire Concrete Loops
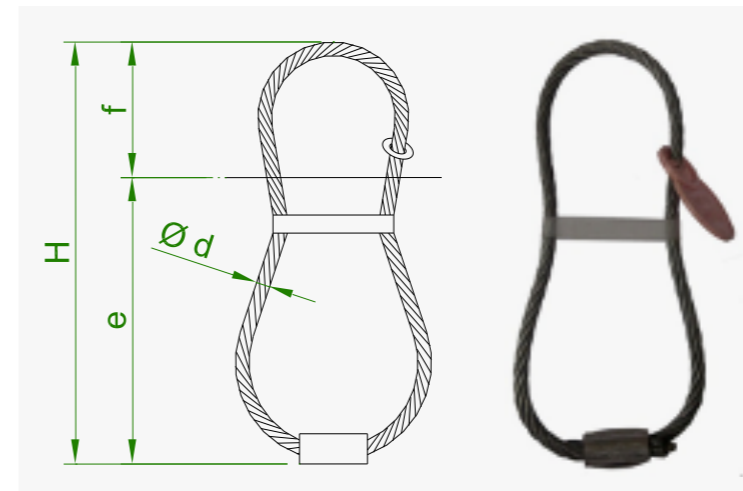
| REFERENCE	SAFE WORKING LOAD [KG]	DIMENSIONS [MM]				LABEL COLOR		WEIGHT [KG]
	0°- 30°	ØD	H	F	E			
BL 08	800	6	210	55	155	Pur white		0,085
BL 12	1200	7	225	60	165	Red		0,108
BL 12/400	1200	7	400	60	165	Red		0,120
BL 16	1600	8	235	60	175	Light Pink		0,143
BL 16/330	1600	8	330	60	270	Light Pink		0,195
BL 16/370	1600	8	370	60	310	Light Pink		0,240
BL 20	2000	9	280	70	210	Light Green		0,200
BL 20/360	2000	9	360	70	290	Light Green		0,300
BL 25	2500	10	315	80	235	Dark Grey		0,304
BL 40	4000	12	340	85	255	Dark Green		0,455
BL 52	5200	14	360	90	270	Curry		0,701
BL 63	6300	16	390	100	290	Light Blue		1,054
BL 80	8000	18	460	120	340	Silver Grey		1,600
BL 100	10000	20	510	130	380	Magenta		2,100

3/4 of the wire loops have to be casted in to the concrete.

The Safe Working Load is given for a minimum concrete strength of 15 MPa.
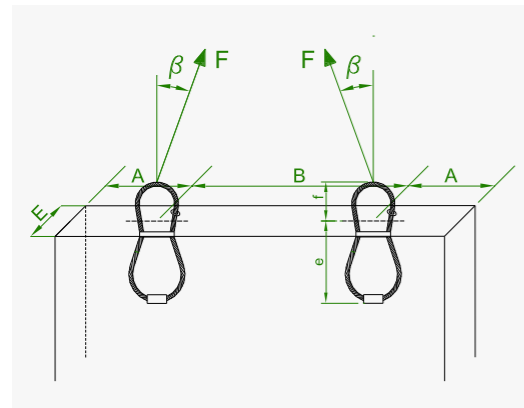
REFERENCE	THICKNESS MINI E [MM]	A MINI [MM]	B MINI [MM]
BL 08	70	270	540
BL 12	90	310	620
BL 16	120	350	700
BL 20	140	420	840
BL 25	160	450	900
BL 40	220	500	1000
BL 52	290	520	1040
BL 63	320	580	1160
BL 80	380	630	1260
BL 100	440	730	1460

The Safe Working Load is given for a minimum concrete strength of 15 MPa.

ØD>3.5Ød

Ø d
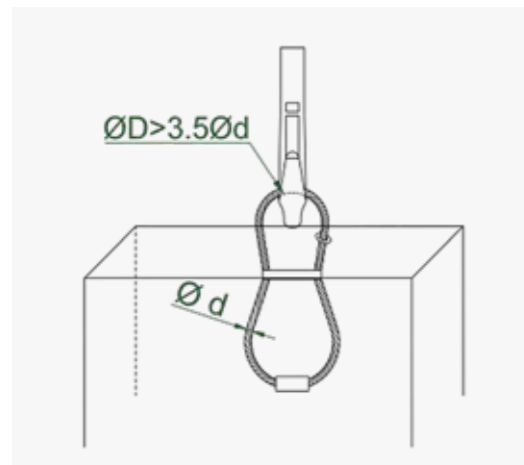
Under no circumstance, the diameter of the hook or the handle ØD, hanged to the loop, should be less than 3.5 times the diameter of the cable of the loop Ød. We recommend, if possible, a diameter ØD which is 5 times the size of the cable's diameter Ød.

A minimum reinforcement is mandatory around the lifting loops. Their minimal section and positioning are given in the table below:
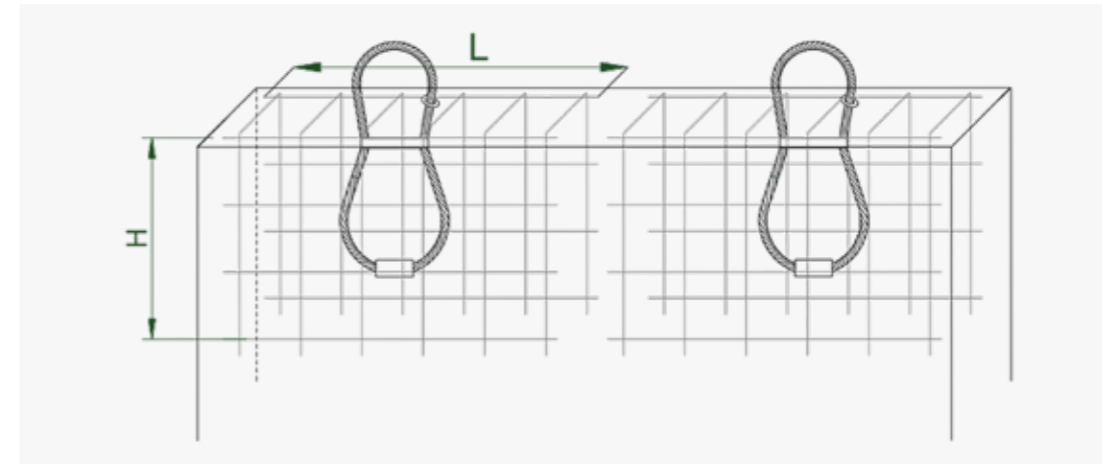
REFERENCE	L MINI [MM]	H MINI [MM]	REINFORCEMENT MINIMAL SECTION [MM²/M]	POSITIONING OF THE REINFORCEMENT
BL 08	600	710	188	1 steel lattice in centre
BL 12	640	720	188	1 steel lattice in centre
BL 16	660	725	188	2 steel lattices
BL 20	800	760	188	2 steel lattices
BL 25	920	790	188	2 steel lattices
BL 40	960	800	188	2 steel lattices
BL 52	1040	820	188	2 steel lattices
BL 63	1120	840	188	2 steel lattices
BL 80	1280	880	188	2 steel lattices
BL 100	1560	950	188	2 steel lattices

4.2 Polypropylene Wire Cable Concrete Loops

REFERENCE	SWL [KG]	DIMENSIONS [MM]				LABEL COLOUR		PACKING [U]	WEIGHT [KG]
	0°- 30°	ØD	H	F	E				
BL 025	250	8	220	55	165	Rose clair		100	0,030
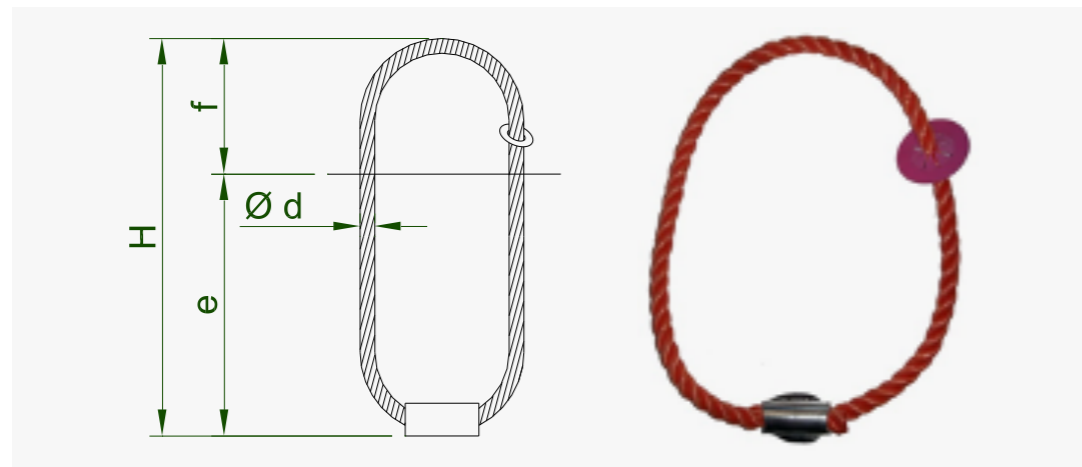
The Polypropylene lifting loop, with its aluminium crimping pod, allows the absence of corrosion. The lifting loops come with a color label. This label indicates the Safe Working Load (example 0.25 Tonne) Lift loops must be linked to an additional reinforcement to ensure the right anchorage in concrete.

The safe Working Loads are given for a minimum compression resistance concrete of 15MPa.
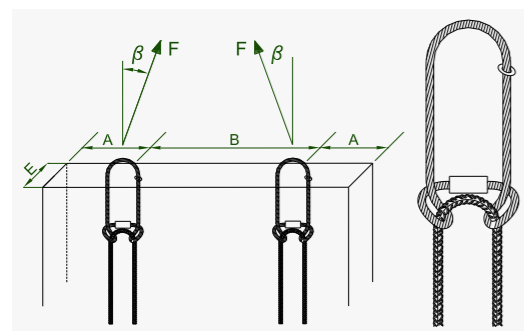
REFERENCE	ADDITIONAL REINFORCEMENT [MM]	TOTAL LENGTH [MM]
BL 025	HA 6	700

REFERENCE	THICKNESS MINI E [MM]	A MINI [MM]	B MINI [MM]
BL 025	100	220	440

Inclined loads must not exceed an angle b of 30° to the lifting loop axis.

Under no circumstances should the diameter of the hook or shackle attached to the loop be less than 3.5 times the diameter of the rope of the lifting loop. If possible, we recommend a diameter greater than 5 times the diameter of the rope.

5. Fixing Sockets

The fixing sockets are designed exclusively for a fixing application. They can under no circumstances be used for lifting.

The fixing sockets are electro zinc plated. They can also be provided in stainless steel.

The fixing sockets have to be used with a metric thread standard screw. It must be screwed on, at least 1 time its diameter.

The Safe Working Load is given for a minimum concrete strength of 25 MPa.

For the fixing sockets, a minimum edge distance of 3 times the length of the socket is required. A minimum distance between the sockets of 6 times the length of the socket is also required.

For any question, you should contact SDG Technical Department.

Never weld the sockets.
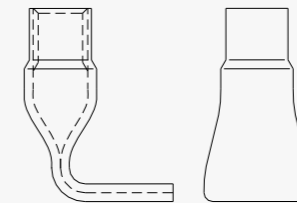
There are different types of fixing sockets:
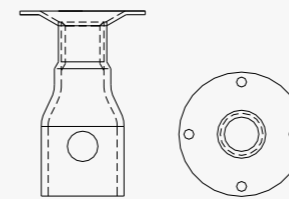
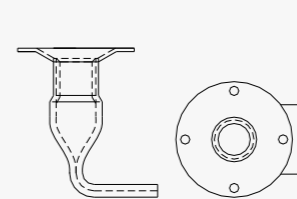**Flat End Fixing Socket**
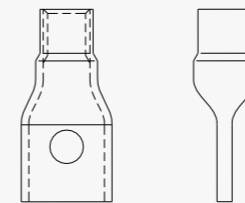
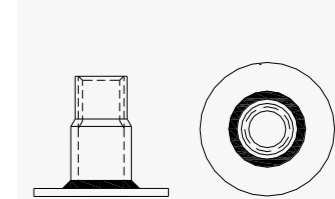**Bended Fixing Socket**

Waved Fixing Socket
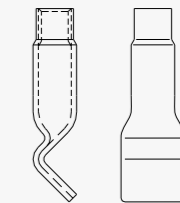
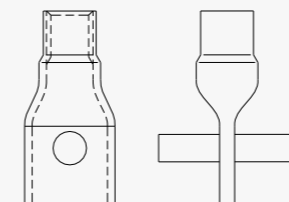**Flat End Fixing Socket with Nailing Plate**

Bended Fixing Socket with Nailing Plate
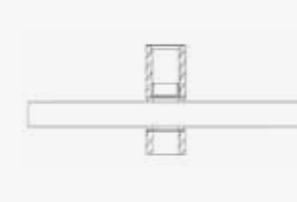

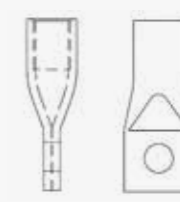**Fixing Socket with Plate**

Fixing Socket With Cross Pin:
Fixing Socket with Transverse Bar

Round Fixing Socket with Bar

Flat End Fixing Socket

5.1 Tightening Torque

Optimal torque allows to put the nets in pressure and cancel the tolerance caused by friction and the tolerance in the thread. Nevertheless, it is essential to avoid an extra effort in the socket created by overtightening. Indeed, this may cause damage to the socket or failure. As a result, to apply maximum torque below for all of the fixing Sockets:

BOLT	MAXIMAL TIGHTENING TORQUE [N.M]	DRIVING DEPTH [MM]
M6	1	9
M8	2	12
M10	4	15
M12	8	18
M16	17	24
M20	25	30
M24	53	36
M30	96	45

The maximum depth of the screwing must be less than the depth "a" of the socket.

5.2 Flat End Fixing Socket
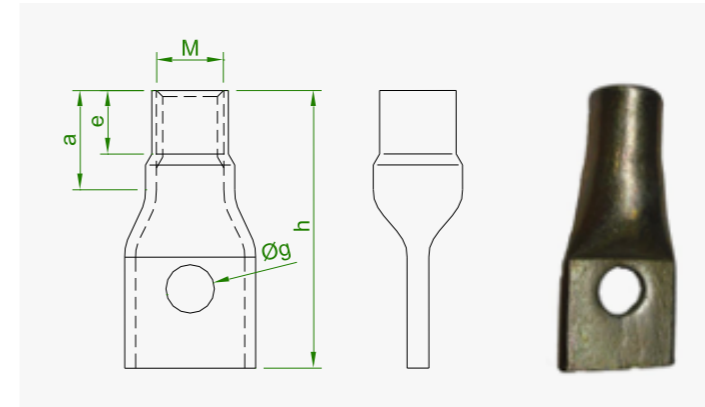
REFERENCE	THREAD M	SWL [KG]	DIMENSIONS [MM]				WEIGHT KG/U
			ØG	H	E	A	
PAT 06 035	6	100	6	35	8	11	0,006
PAT 08 040	8	200	8	40	8	15	0,010
PAT 08 050	8	250	8	50	8	25	0,013
PAT 10 045	10	350	8	45	10	12	0,020
PAT 10 050	10	350	8	50	10	17	0,020
PAT 12 060	12	500	10	60	12	23	0,035
PAT 12 070	12	600	10	70	12	33	0,041
PAT 16 070	16	700	12	70	16	20	0,077
PAT 16 080	16	800	12	80	16	30	0,088
PAT 16 100	16	1000	12	100	16	50	0,120
PAT 20 100	20	1250	14	100	20	40	0,157
PAT 20 120	20	1250	14	120	20	60	0,188
PAT 24 120	24	1800	14	120	24	40	0,234
PAT 30 150	30	2750	17	150	30	65	0,660

The flat end fixing sockets are not self-anchored sockets, and have to be used with a reinforcement ribbed steel B500B.
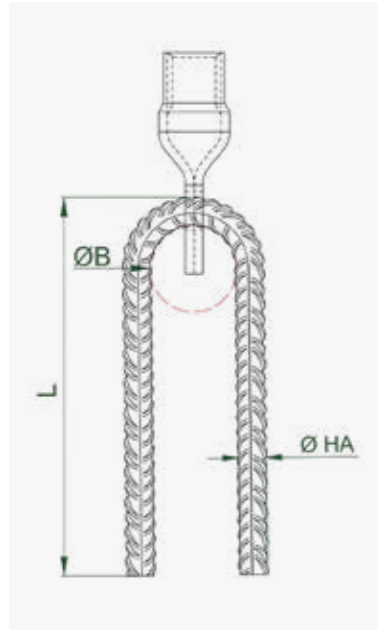
REFERENCE	Ø REINFORCEMENT HA B500B [MM]	LENGTH OF STIRRUP L [MM]	DIAMETER OF BENDING ØB [MM]
PAT 06 035	5	200	50
PAT 08 040	6	250	60
PAT 08 050	6	250	60
PAT 10 045	6	300	60
PAT 10 050	6	300	60
PAT 12 060	8	300	80
PAT 12 070	8	300	80
PAT 16 070	10	350	100
PAT 16 080	10	350	100
PAT 16 100	10	350	100
PAT 20 100	12	400	120
PAT 20 120	12	400	120
PAT 24 120	12	450	120
PAT 30 150	16	550	160

5.3 Flat End Fixing Socket with Nailing Pate
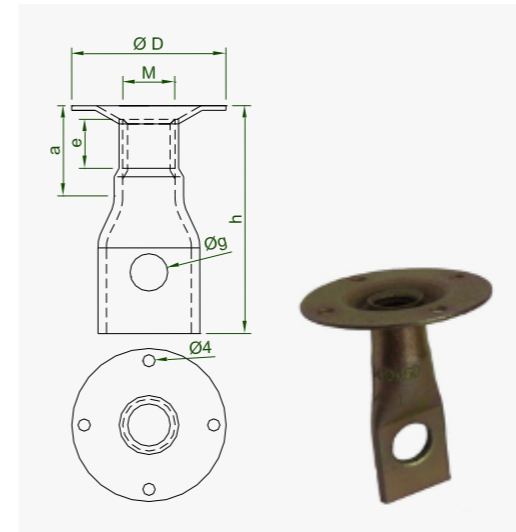
REFERENCE	THREAD M	SWL [KG]	DIMENSIONS [MM]					WEIGHT KG/U
			ØG	H	E	A	ØD	
PAT 10 050 C	10	350	8	50	10	20	40	0,031
PAT 12 070 C	12	600	10	70	12	30	40	0,058
PAT 16 100 C	16	1000	12	100	16	32	50	0,152
PAT 20 100 C	20	1250	14	100	20	40	60	0,200
PAT 24 120 C	24	1800	14	120	24	50	60	0,314

The nailing plate has 4 holes diameter 4mm.

The flat end fixing sockets are not self-anchored sockets, and have to be used with a reinforcement ribbed steel B500B.

5.4 Bended Fixing Socket
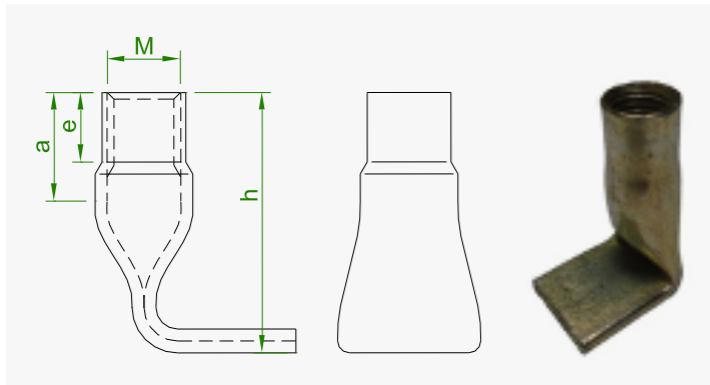
REFERENCE	THREAD M	SWL [KG]	DIMENSIONS [MM]			WEIGHT KG/U
			H	E	A	
DC 08 030	8	150	30	8	15	0,015
DC 08 050	8	300	50	8	30	0,021
DC 10 035	10	200	35	10	13	0,019
DC 10 060	10	400	60	10	35	0,024
DC 12 045	12	350	45	12	18	0,046
DC 12 070	12	600	70	12	40	0,051
DC 16 060	16	600	60	16	20	0,104
DC 16 100	16	1000	100	16	60	0,138
DC 20 100	20	1250	100	20	60	0,240
DC 24 080	24	1000	80	24	40	0,260

The bended fixing sockets are self-anchored sockets.

A minimum edge distance of 3 times the length of the socket is required.

A minimum distance between the sockets of 6 times the length of the socket is also required.

5.5 Bent Fixing Socket with Nailing Plate
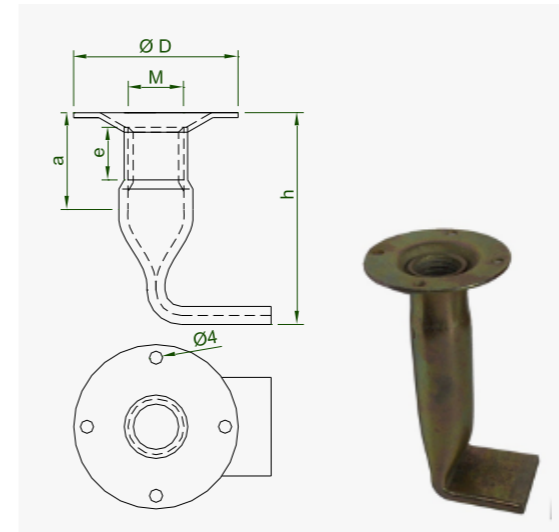
REFERENCE	THREAD M	SWL [KG]	DIMENSIONS [MM]				WEIGHT KG/U
			H	E	A	ØD	
DC 10 060 C	10	400	60	10	35	40	0,035
DC 12 070 C	12	600	70	12	40	40	0,058
DC 16 100 C	16	1000	100	16	60	50	0,152

The nailing plate has 4 holes diameter 4mm.

The bended fixing sockets are self-anchored sockets.

A minimum edge distance of 3 times the length of the socket is required.

A minimum distance between the sockets of 6 times the length of the socket is also required.

5.6 Waved Fixing Socket

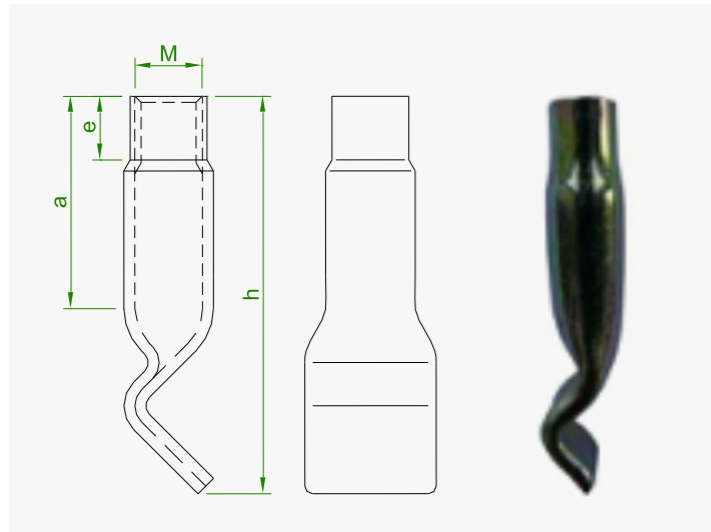| REFERENCE	THREAD M	SWL [KG]	DIMENSIONS [MM]			WEIGHT KG/U
			H	E	A	
OST 06 050	6	150	50	8	28	0,012
OST 08 040	8	200	40	10	15	0,012
OST 10 040	10	300	40	10	15	0,018
OST 10 050	10	350	50	10	20	0,025
OST 10 060	10	400	60	10	30	0,023
OST 12 065	12	500	65	12	25	0,045
OST 16 070	16	700	70	16	30	0,080
OST 16 100	16	1000	100	16	55	0,122
OST 20 100	20	1000	100	20	65	0,180

The waved fixing sockets are self-anchored sockets.

A minimum edge distance of 3 times the length of the socket is required.

A minimum distance between the sockets of 6 times the length of the socket is also required.

5.7 Fixing Socket with Crosspin

REFERENCE	THREAD M	SWL [KG]	DIMENSIONS [MM]				
			H	E	A	ØD	L
PAB 16 070	16	700	70	16	26	10	50
PAB 16 080	16	800	80	16	30	12	50

The fixing sockets with traverse bar are self-anchored sockets.

A minimum edge distance of 3 times the length of the socket is required.

A minimum distance between the sockets of 6 times the length of the socket is also required.
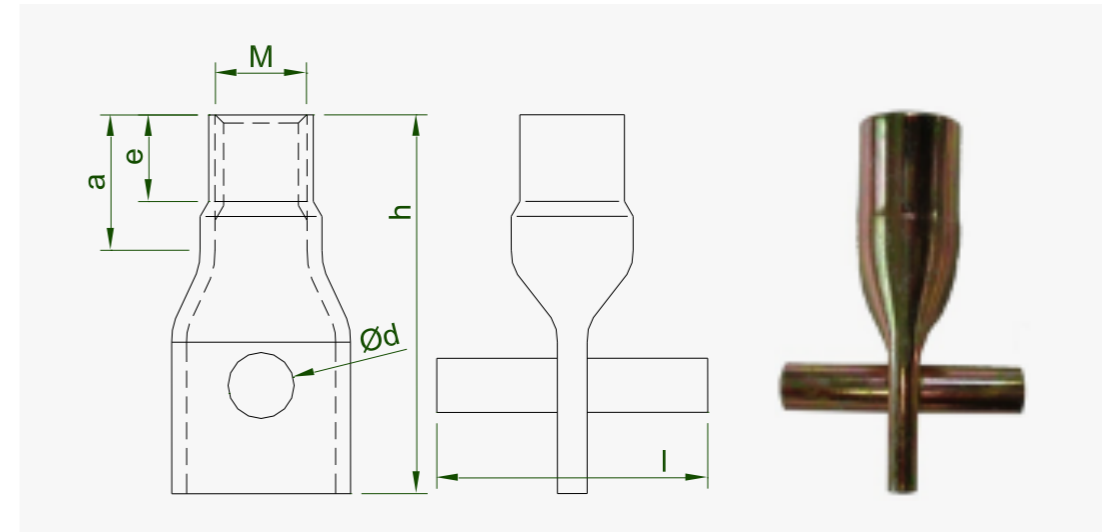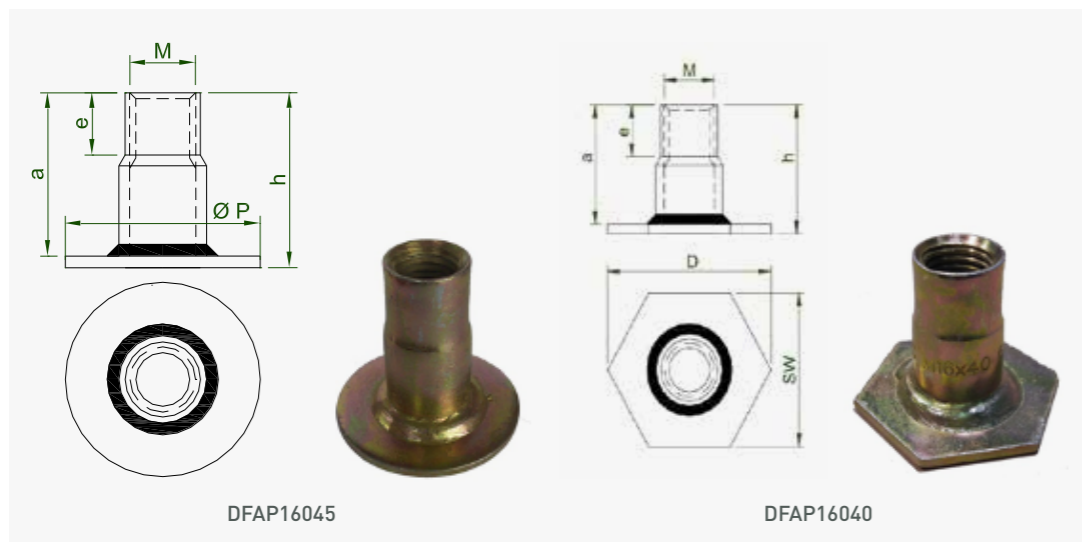
5.8 Fixing Socket with Plate

DFAP16045   DFAP16040

REFERENCE	THREAD M	SWL* [daN]	CONCRETE STRENGTH MIN MPa	DIMENSIONS [MM]						WEIGHT KG/U	TIGHTENING TORQUE MAX Nm
				H	E	A	ØP	D	SW		
DFAP 16 040	16	320	C16/20	40	16	37	-	55	47.6	0.10	17
DFAP 16 040	16	360	C20/25	40	16	37	-	55	47.6	0.10	17
DFAP 16 045	16	390	C16/20	45	16	42	50	-	-	0.10	17

(*) The SWL of the DFAP 16 040 and DFAP 16 045 sockets were validated by the CERIB test reports 013469 / 013732 and 013414. THE SWL are defined for the minimum concrete resistance indicated and for their installation with a PP16 (see §6.1 or PM55/16 holding disc (see §6.2) to place with a 10mm withdrawal in concrete.

Steel = S235. Sockets are provided electro zinc plated.

Settings:

The fixing sockets with plate are self-anchored sockets.

A minimum edge distance of 3 times the length of the socket is required. A minimum distance between the sockets of 6 times the length of the socket is also required.

In order not to cause extra effort in the socket, a maximum tightening torque of 17 Nm shouldn't be exceeded.

Use:

The fastening sockets are designed exclusively for fixing applications and should not be used for lifting under any circumstances.

Fixing sockets should be used with metric screws. These must be screwed to at least 1.5 times the diameter.

Safe Working Loads are given for concrete with minimal concrete strength shown in the table.

The sockets must never be welded.

5.9 Solid Rod Fixing Socket with Crosspin
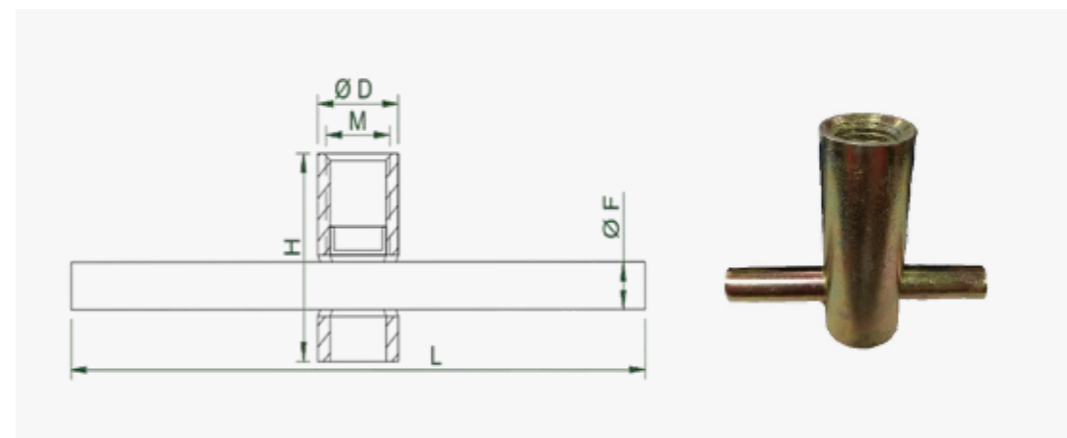
REFERENCE	THREAD M	SAFE WORKING LOAD [KG] 0°- 90°		DIMENSIONS [MM]				WEIGHT [KG]
		$F_{CK} \geq 25$ MPa	$F_{CK} \geq 45$ MPa	ØD	H	L	ØF	
DTB12M	12	700	900	15	75	75	6	0,068
DTB16M	16	700	950	21	75	75	10	0,150
DTB20M	20	700	950	27	75	90	12	0,377
DTB24M	24	1150	1550	31	100	100	16	0,687

Socket exclusively existing in metric thread.

A minimum concrete strength of 25 MPa is required for fixing.

A minimum edge distance of 3 times the length of the socket is required.

A minimum distance between the sockets of 6 times the length of the socket is also required.

5.10 Fixing Socket

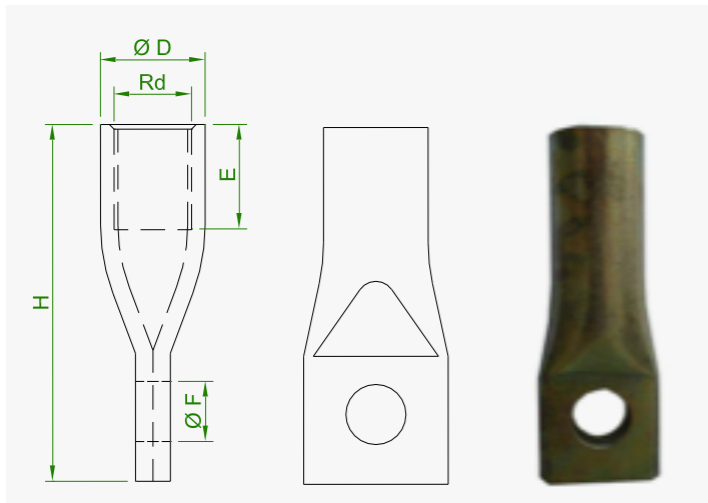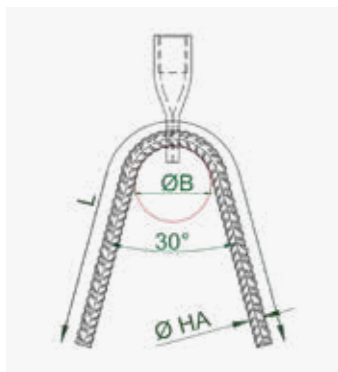| REFERENCE	THREAD M	SAFE WORKING LOAD [KG]		DIMENSIONS [MM]				WEIGHT [KG]
		0°- 45°	45° - 90°	ØD	H	E	ØF	
DTP 12M	12	500	250	15	60	22	10	0,031
DTP 16M	16	1200	600	21	80	27	13	0,110
DTP 20M	20	2000	1000	27	95	35	15	0,200
DTP 24M	24	2500	1250	31	100	38	18	0,270
DTP 30M	30	4000	2000	39,5	135	56	22,5	0,600

A minimum concrete strength of 25 MPa is required for fixing.

A stirrup must be placed in the hole of the socket.

SOCKET	Ø HA B500B [MM]	LENGTH OF THE STIRRUP L [MM]	BENDING ROLL ØB [MM]
DTP 12M	6	340	60
DTP 16M	10	510	100
DTP 20M	12	670	120
DTP 24M	14	740	140
DTP 30M	16	970	160

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6. Holding Device

6.1 Plastic Nailing Plate
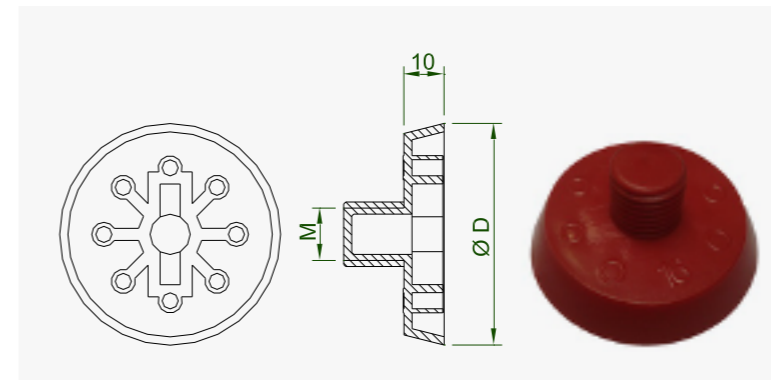
REFERENCE	THREAD M	DIMENSION [MM] ØD	COLOR	
PP 10	10	40	Blue	
PP 12	12	40	Orange	
PP 16	16	55	Red	
PP 20	20	55	Light green	
PP 24	24	55	Dark grey	
PP 30	30	70	Dark green	
PP 36	36	70	Light blue	
PP 42	42	96	Light grey	
PP 52	52	96	Yellow	

The plastic holding discs are designed to be fixed to the mould with nails.

The plastic holding discs are convenient for:

– the lifting sockets (Round thread – Rd)

– the fixing sockets (Metric thread – M).

They can be removed with a flat steel.

6.2 Fixing Stud

REFERENCE	THREAD M	DIMENSION [MM]		COLOR	
		ØD	L		
TC 06	6	11	23	Green	
TC 08	8	11	23	Light blue	
TC 10	10	11	23	Yellow	
TC 12	12	11	23	Red	
TC 16	16	11	23	Black	

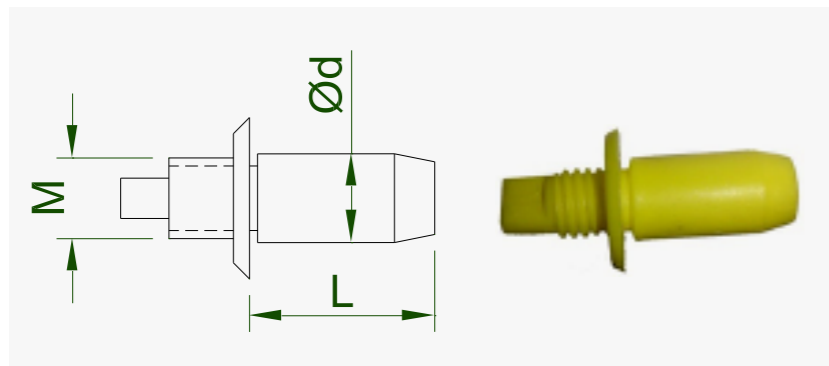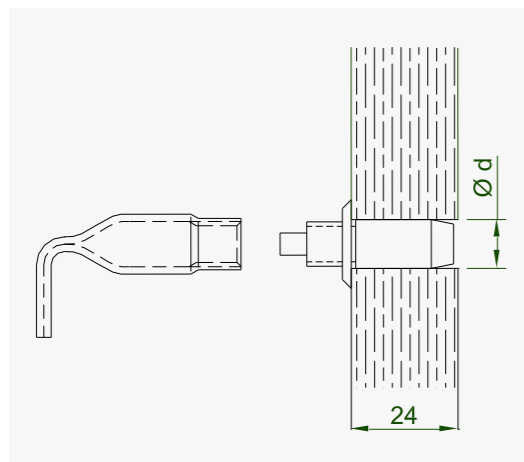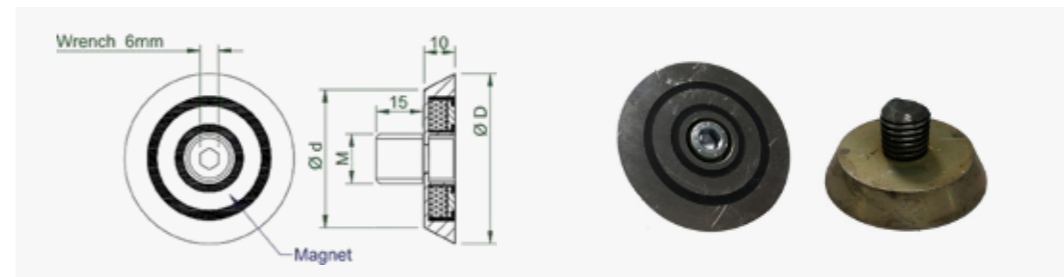The fixing studs are designed to fix the lifting sockets (Round thread – Rd) or the fixing socket (Metric thread – M) on the mould.

6.3 Magnetic Nailing Plate

The magnetic holding discs are convenient for:
- the lifting sockets (Round thread - Rd)
- the fixing sockets (Metric thread - M).

The washer is available in 3 dimensions:

Diameter 40mm

REFERENCE	THREAD M / RD	Ø D [MM]	Ø d [MM]	INSTALLED MAGNETISM [KG]	WEIGHT [KG]
PM40/10	10	40	30	20	0,08
PM40/12	12	40	30	20	0,08
PM40/16	16	40	30	20	0,08

Diameter 55mm

REFERENCE	THREAD M / RD	Ø D [MM]	Ø d [MM]	INSTALLED MAGNETISM [KG]	WEIGHT [KG]
PM55/12	12	55	45	50	0,15
PM55/16	16	55	45	50	0,15
PM55/20	20	55	45	50	0,15
PM55/24	24	55	45	50	0,15

Diameter 70mm

| REFERENCE	THREAD M / RD	Ø D [MM]	Ø d [MM]	INSTALLED MAGNETISM [KG]	WEIGHT [KG]
PM70/30	30	70	60	100	0,30
PM70/36	36	70	60	100	0,30

Smaller threads can be mounted on 70mm Diameter washers to increase grip strength.

Removal key = 6mm BTR hexagonal male key
                         except for the PM40/10: 5mm BTR hexagonal male key.

The dimensions of the Magnetic holding discs are identical to those of the Standard Plastic holding discs (PP reference) so as to fit perfectly in case of use of a lifting eye (AL reference).

7. Cap

7.1 Sealing Cap
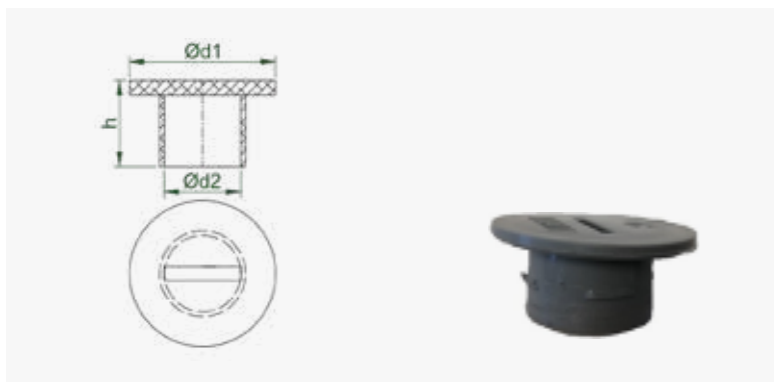
REFERENCE	THREAD M/RD	DIMENSIONS [MM]			COLOUR	
		Ø d1	Ø d2	H		
BP 06	6	9	5	6	White	
BP 08	8	10	7	6	White	
BP 10GRIS	10	11,5	8	8,5	Grey	
BP 12GRIS	12	18,5	8,5	10	Grey	
BP 16GRIS	16	25,5	12	12,5	Grey	
BP 20GRIS	20	30,5	15,5	18	Grey	
BP 20GRIS	20	30,5	15,5	18	Grey	
BP 24GRIS	24	34,5	19	18	Grey	
BP 30GRIS	30	43,5	25	21	Grey	
BP 36GRIS	36	50	30	21.5	Grey	
BP 42	42	50	39	16	White	
BP 52	52	59	52	18	White	

The plastic caps prevent the dirt to go into the socket and create problem when screwing a lifting loops or a screw inside.

The grey colored caps can be screwed. A slot on top allows to screw or unscrew the cap.

7.2 Data Clip
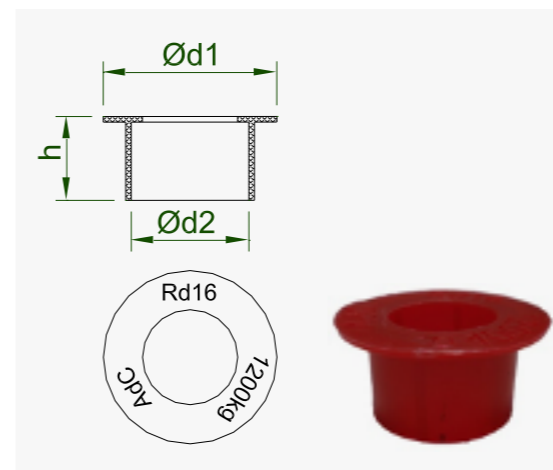
REFERENCE	ADAPTED TO THE SOCKETS WITH A RD THREAD	DIMENSIONS [MM]			COLOUR	
		Ø d1	Ø d2	H		
BI 12	12	26	15	15	Orange	
BI 16	16	31	21	15	Red	
BI 20	20	37	27	15	Light green	
BI 24	24	41	31	15	Dark grey	

The data clip is designed to unable a clear identification of the lifting socket already casted into the concrete because of its color and because of its marking.

7.3 Data Clip with Ears
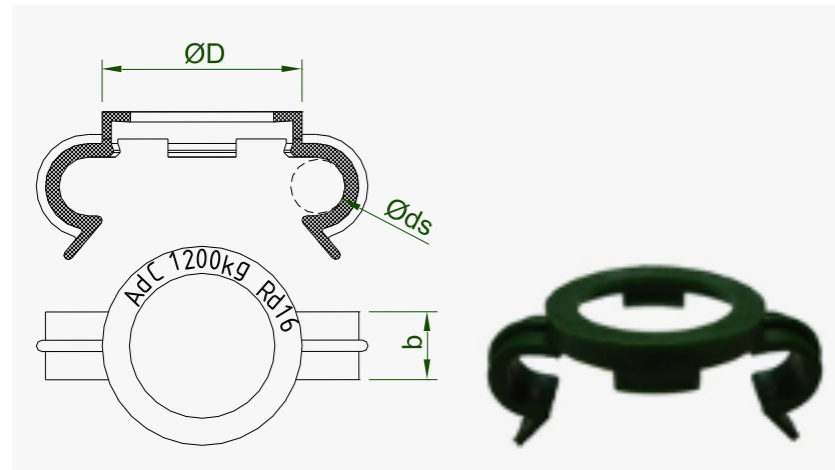
REFERENCE	ADAPTED TO THE SOCKETS WITH A RD THREAD	DIMENSIONS [MM]			COLOUR	
		Ø D	b	Ø ds		
BIO 12	12	26	8	8	Orange	
BIO 16	16	32	10	8	Red	
BIO 20	20	36	12	10	Light green	
BIO 24	24	44	15	12	Dark grey	
BIO 30	30	44	15	12	Dark green	

The data clip with ears is designed to enable a clear identification of the lifting socket already casted into the concrete because of its color and because of its marking. Its ears enable to hold the additional transversal pull rebars when necessary.

Lifting with Spread Anchor Systems

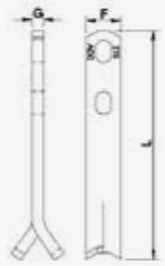| SPREAD ANCHOR		1.4T	2T	2.5T	4T	5T	7.5T	10T
	F (MM)	30	30	30	40	40	60	60
	G (MM)	6	10	10	12	15	16	20
	L (MM)	160	130	150	320	180	260	370
				200		240	420	520

The spread anchors can be provided in black or hot dip galvanized (G)

EYE ANCHOR		1.4T	2.5T	5T	7.5T	10T	7.5T	10T
	F (MM)	30	30	40	60	60	60	60
	G (MM)	6	10	15	15	20	16	20
	L (MM)	90	90	120	160	170	260	370
	G (KG)	0.11	0.18	0.49	1.04	1.40	420	520

The eye anchors can be provided in black or hot dip galvanized (G)
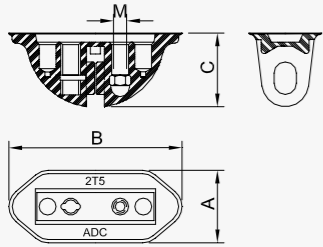
ERECTION ANCHOR		1.4T	2.5T	5T	7.5T	10T
		1.4 x 200	2.5 x 230	5 x 290	7.5 x 320	10 x 390
	F (MM)	55	55	70	95	95
	G (MM)	6	10	15	15	20
	L (MM)	200	230	290	320	390
	G (KG)	0.68	0.80	1.65	3.61	4.40
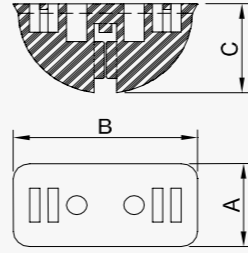
The erection anchors can be provided in black or hot dip galvanized (G)

ERECTION ANCHOR ONE SIDE
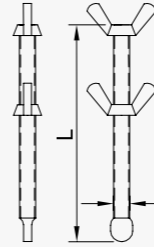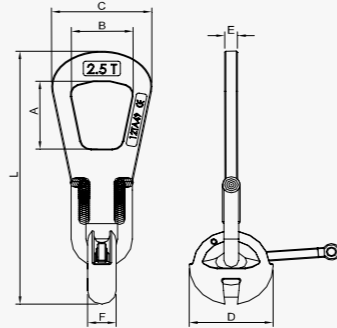
ERECTION ANCHOR ONE SIDE		2.5T
		2.5 x 230
	F (MM)	40
	G (MM)	10
	L (MM)	230
	G (KG)	0.75

The erection anchors can be provided in black or hot dip galvanized (G)

SPREAD ANCHOR RECESS FORMER

SPREAD ANCHOR RECESS FORMER		1.4T	2T	2.5T	4T	5T	7.5T	10T
				2.5T		5T		10T
	A (MM)			43		55		78
	B (MM)			106		134		188
	C (MM)			45		59		81
	M			M8		M8		M12
	G (KG)			0.07		0.20		0.45

MAGNETIC FORMER

MAGNETIC FORMER		1.4T	2T	2.5T	4T	5T	7.5T	10T
	REF		RP025M			RP050M		RP100M
	A (MM)		44			53		70
	B (MM)		90			115		160
	C (MM)		48			62		87
	MAGNET (KG)		30			50		100
	G (KG)		0.07			0.20		0.45

FIXING BOLT

FIXING BOLT		1.4T	2T	2.5T	4T	5T	7.5T	10T
	M		M8			M8		M12
	L (MM)		160			160		160

SPREAD ANCHOR RING CLUTCH

SPREAD ANCHOR RING CLUTCH		1.4T	2T	2.5T	4T	5T	7.5T	10T
				2.5T		5T		10T
	A (MM)			70		85		110
	B (MM)			59		66		85
	C (MM)			95		117		148
	D (MM)			79		102		148
	E (MM)			12		17		25
	F (MM)			27		37		50
	L (MM)			264		333		412
	G (KG)			1.55		3.55		9.09

SDG PRODUCT CATALOGUE

PRECAST ACCESSORIES

1. Design Method

The aim of this design method is to evaluate the load on cemented anchors of a reinforced precast concrete element in order to select the appropriate anchor.

This method is based on the most common applications. If you have any doubt on the application, the assumptions or any point mentioned in this document, you should contact our Technical Department.

It is also essential that the assumptions are clearly communicated to the companies in charge of the handling and lifting operations, in order to ensure that the assumptions are corresponding to the actual handling and lifting conditions.

1.1 Calculation assumptions

In order to define the force on the lifting anchors, all the following points have to be taken into account:

- The technical drawing of the precast element and the kinetics of handling
- The weight of the element (and of the formwork and other accessories lifted with the element)
- The formwork adhesion at the removal from the mould
- The number of efficient lifting points (and not the number of actual lifting points)
- The sling angle
- The dynamic coefficient (lifting machinery)

To define the correct anchor to use (type, length, size) it is also necessary to know:

- The concrete strength when the element is lifted

It is also necessary to distinguish between the handling of the element in the precast factory and on the construction site. All the calculations have to be done for both cases.

All these points are detailed in the following paragraphs.

1.2 Drawing of the precast element and foreseen lifting method

In the first place, the technical drawing of the element has to be considered, then the means by which it is to be handled. It is necessary to distinguish between the handling in the precast factory and on site.

1.3 Weight of the Element (P)

The actual weight of the element must be considered. It includes in particular:

- The weight of the concrete element (volume x density). The reinforced concrete density is equal to 2500 daN/m³ (or 25 kN/m³) in general.

- The weight of the formwork and accessories lifted with the element.

1.4 Formwork adhesion at the removal from the mould (A)

The adhesion will depend on 2 factors:

- The surface area of the element in contact with the formwork (S in m²). All the surfaces in contact with the formwork need to be considered, included inclined surfaces.

- The surface condition of the mould. This surface condition is defined by an adhesion factor (q_{adh} in daN/m²)

This force is to be considered at the removal of the element from the mould.

Type of mould	Adhesion factor q_{adh}
Oiled steel mould, Plywood coated with oiled plastic	100 daN/m²
Varnished oiled wooden mould	200 daN/m²
Oiled rough wooden mould	300 daN/m²
Polyurethane matrix	Consult the matrix supplier

The adhesion force is:

$$A = q_{adh} \times S$$

This adhesion force must be added to the weight of the element in order to calculate the force required to lift it.

In some cases, the adhesion force can be zero if the concrete is not in contact with the mould (pre-stressed beam for example).

1.5 Position and determination of the number of efficient lifting points (n)

Set up the lifting points symmetrically to the center of gravity.

Here are some examples of lifting point positions:

SLAB

BEAM

PANEL

PIPE

ROTATION PIECE

In the case of asymmetric loads relative to the centre of gravity, traction efforts must be calculated for each lifting point taking into account distances to the centre of gravity.

Example for a beam:

$$F1 = F \times \frac{B}{A + B} \qquad F2 = F \times \frac{A}{A + B}$$

It is possible that some lifting positions are not appropriate for selected anchor types (see § 2). In particular, minimum distances between lifting points and minimum distances from the edges of the concrete have to be maintained. A minimum coating may be required.

Based on the number of apparent lifting points and the use or not of a balanced lifting system (such as a lifting beam), the number of efficient lifting points is defined as follows:

APPARENT LIFTING POINTS	EFFICIENT LIFTING POINTS NUMBER (N)	
	WITH A BALANCED SYSTEM	OTHERS LIFTING MEANS
4	4	2
3	3	2
2	2	2

Some examples:

Balanced system

Apparent lifting points = 4

Efficient lifting points = 4

Unbalanced System

Apparent lifting points = 4

Efficient lifting points = 2

1.6 Sling angle and multiplication coefficient (Ce)

A multiplication coefficient Ce is generated by vertical forces (weight) on the slings.
For the calculation, angle β is to be considered as the angle between the vertical and the most inclined sling.

SLAB

BEAM

PIPE

ROTATION PIECE

β	0	15°	22,5°	30°	45°	60°
α = 2 β	0	30°	45°	60°	90°	120°
Ce	1	1,035	1,082	1,155	1,414	2
L	-	2 D	1,3 D	D	0,7 D	0,6 D

Other angle:

$$Ce = \frac{1}{\cos(\beta)} = \frac{1}{\cos(\frac{a}{2})} \qquad L = \frac{D}{2 \times \sin(\beta)} = \frac{D}{2 \times \sin(\frac{a}{2})}$$

β = angle between the vertical and the most inclined sling.
It is necessary to consider the worst-case scenario with the largest angle β.

1.7 Lifting and handling dynamic coefficient (Ψ_{dyn})

The values given in the table below are derived from the" Design and use of inserts for lifting and handling of precast concrete - Elements", CEN/TR 15728:2008.

The foreseen lifting system and the estimated values must be notified to the users (factory and site).

LIFTING AND HANDLING MACHINE	DYNAMIC COEFFICIENT Ψ_{DYN}
Tower crane, overhead crane and portal crane	1,2
Mobile crane	1,4
Lifting and moving on flat terrain	2-2,5
Lifting and moving on rough terrain	3-4

Dynamic coefficient required by type of element:

TYPE OF ELEMENT	DYNAMIC COEFFICIENT Ψ_{DYN}
Pipe and sewer	2
Frame below 12T	1,6
Frame between 12 and 20T	1,4
Frame above 20T	1,2
Wall	1,4
Beam below 12T	1,6
Beam between 12 and 20T	1,4
Beam above 20T	1,2

1.8 Resultant load by lifting point (F)

The resultant load for each lifting point is equal to:

$$F = \frac{(P + A) \times Ce \times \Psi_{dyn}}{n}$$

This calculation must be done for the lifting activity in the precast factory, on site, and for any other handling activity of the precast element.

NOTE: **Anchors used more than 10 times**, must not to be subject to a force more than 0.6 times their safety working load (SWL). It is necessary to check in this case that F < 0.6* SWL (Anchor).

1.9 Concrete strength (f$_{ck}$)

The concrete strength has to be determined:

– When lifting the element from the mould in the Precast factory
– When transporting and installing on site

The minimum allowed resistance of the concrete is 10 MPa.

2. Choice of Anchor

This choice can be made according to the resultant load values by lifting point at the factory (Fu), and on site (Fc), and from the concrete strength during the first lifting at the precast factory and on site. The worst calculation (worst case scenario) should be used to ensure the anchor is suitable for all applications.

If you have any doubt about your calculation, you should contact AdC Technical Department.

The anchor load capacity must be at least equal to the highest calculated load value (Fu and Fc).

Various anchor types are available, and the choice of anchor type to be used is made according to each individual set up.

There are 4 major types of flat lifting anchors:

Spread Anchor	Erection Anchor	Sandwich Panel Anchor	Erection Anchor One Side

Flat Foot Anchor	Eye Anchor	Flat Plate Anchor
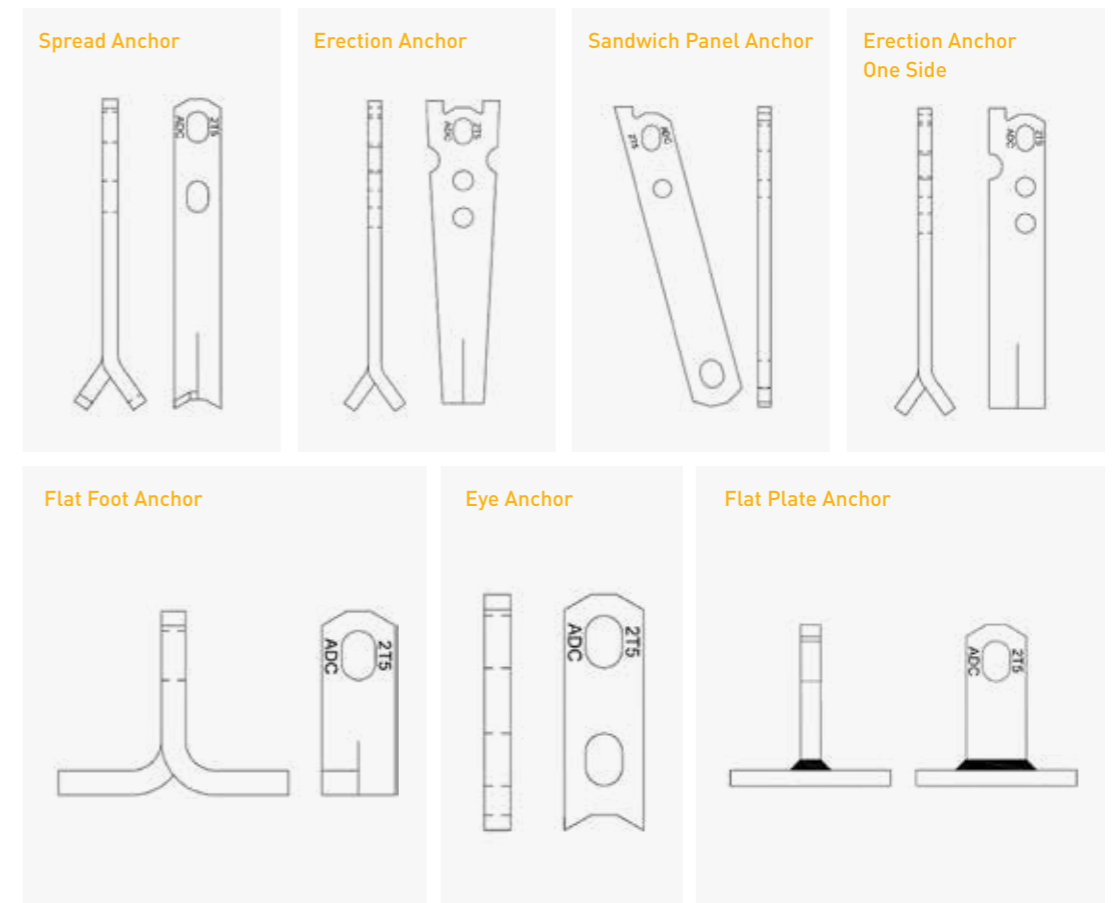
2.1 General consideration on Flat Anchors

PRECAUTIONS TO BE TAKEN WHEN SETTING UP THE ANCHORS

– Never weld the anchors
– Always use the appropriate former for each anchor type
– Anchors have to be slightly recessed from the surface of the concrete (the recess is generated by the appropriate former)
– The concrete element must have a minimum standard reinforcement with FeE500 reinforcing bars.

ANTI-CORROSION PROTECTION

Anchors are provided in black (plain steel).
On request, anchors can be zinc-plated of hot dip galvanized for additional anti-corrosion protection.

Angled Pull Reinforcement Stirrup

The Safe Working Load of the anchors is given for a pulling load with a maximum inclination β of 30°.

In case of a pull load with an inclination β > 30°, an angled pull reinforcement stirrup is necessary. It must be placed as close as possible to the former.
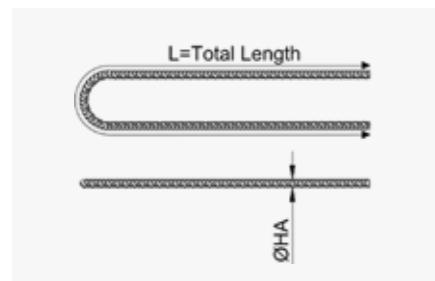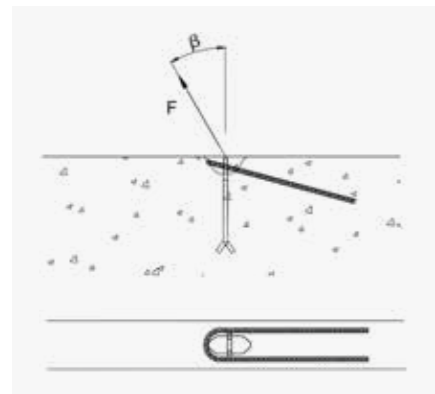
SWL ANCHOR (T)	SWL LIFTING EYE (T)	ØHA BAR (MM)	TOTAL LENGTH L (MM)
1.4	2.5	6	900
2.5	2.5	8	1200
4	5	10	1500
5	5	12	1550
7.5	10	14	2000
10	10	16	2300
14	26	20	2600

Reinforced ribbed steel B500B

2.2 Spread Anchor
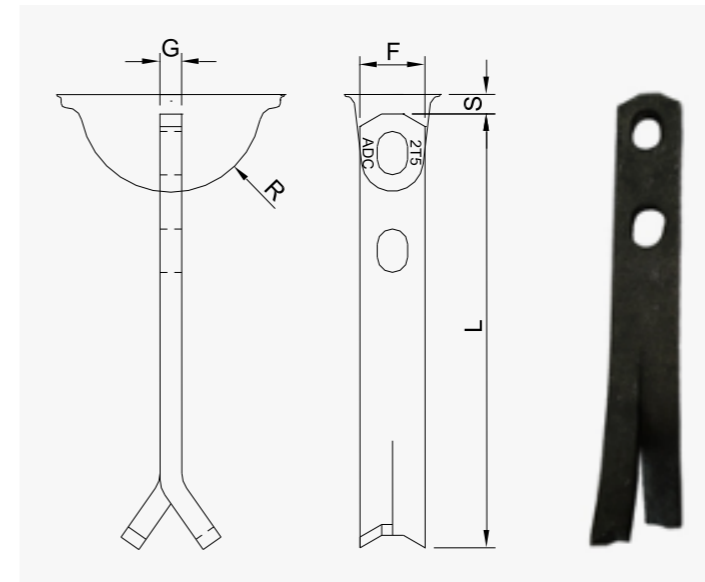
ANCHOR REFERENCE	SWL (T)	LIFTING EYE (T)	F	G	L	R	S
PC014160	1.4	2.5	30	6	160	40	9
PC020130	2			8	130		
PC025200	2.5			10	200		
PC025250					250		
PC040320	4	5	40	12	320	56	11
PC050180	5				180		
PC050240				15	240		
PC050400					400		
PC075260	7.5	10	60	16	260	85	15
PC075300					300		
PC075420					420		
PC100300	10			20	300		
PC100370					370		
PC100520					520		

The anchorage in the concrete is produced by the foot of the spread anchor creating a wrenching cone. The anchorage resistance depends on:

– The concrete strength (f_{ck})
– The length of the spread anchor (L)
– Distances to the edge of the concrete (T_N)
– Distances between each anchor (T_N)
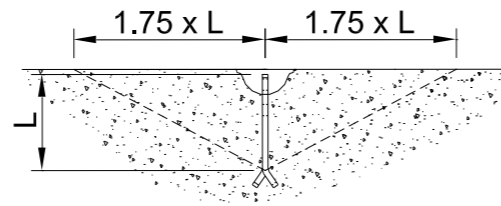
The larger the wrenching cone, the more resistant the anchorage. It is at its maximum when the distance between the 2 anchors is greater than 3.5 times the anchoring length (L) and the distance to the edge of the concrete greater than 1.75 times L.

The following tables indicate minimum spacing between 2 anchors and minimum thickness (Ep) of a beam.
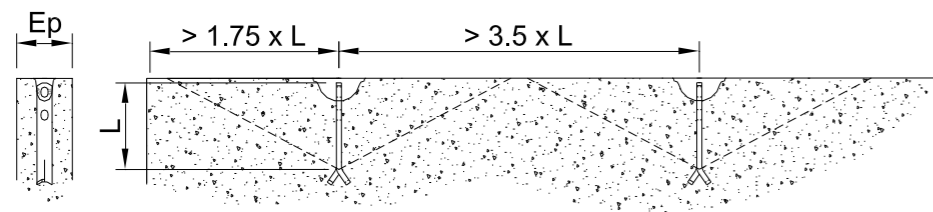
REFERENCE	SWL (TONS)	LENGTH (MM)	MINI SPACING (MM)	MINI THICKNESS EP (MM)		
				AT 15 MPA	AT 25 MPA	AT 25 MPA
PC0140160	1.4	160	560	80	60	60
PC0200130	2	130	455	200	140	110
PC0250150	2.5	150	525	220	160	120
PC0250200	2.5	200	700	150	90	80
PC0250250	2.5	250	875	120	90	80
PC0400320	4	320	1120	150	120	100
PC0500180	5	180	630	320	320	250
PC0500240	5	240	840	230	220	170
PC0500400	5	400	1400	140	140	120
PC0750260	7.5	260	910	480	340	270
PC0750300	7.5	300	1050	400	280	210
PC0750420	7.5	420	1470	240	150	130
PC1000300	10	300	1050	590	420	330
PC1000370	10	370	1295	460	310	240
PC1000520	10	520	1820	260	190	160

The concrete element must have a minimum standard reinforcement with reinforced ribbed steel B500B.

2.3 Erection Anchor
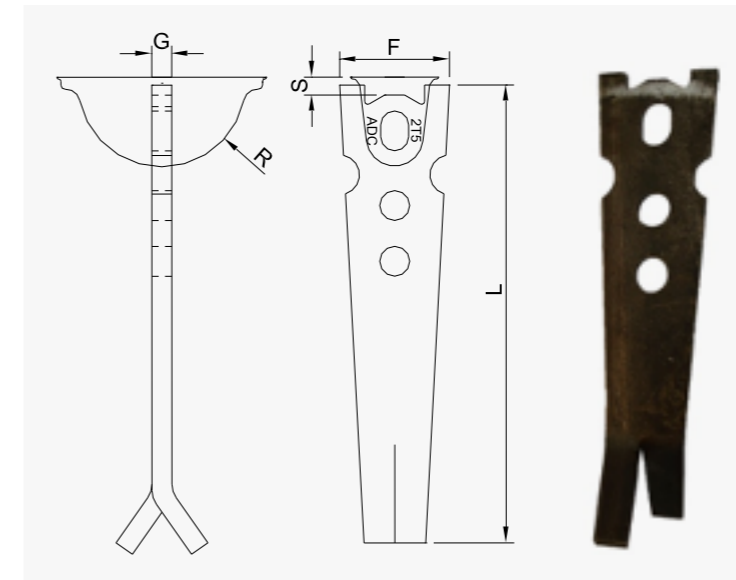
ANCHOR REFERENCE	SWL AXIAL (T)	SWL LATERAL (T)	LIFTING EYE (T)	F	G	L	R	S
PR012120	1.25	0.625	1.25	30	6	120	32	
PR014200	1.4	0.7	2.5	55	6	200	40	9
PR025230	2.5	1.25			10	230		
PR050290	5	2.5	5	70	15	290	56	11
PR075320	7.5	3.75	10	95	15	320	85	15
PR100390	10	5			20	390		

The Safe Working Load for tilting up (=lateral load) is 50% lower than the Safe Working Load for axial lifting.

Tilt Up Reinforcement Stirrup
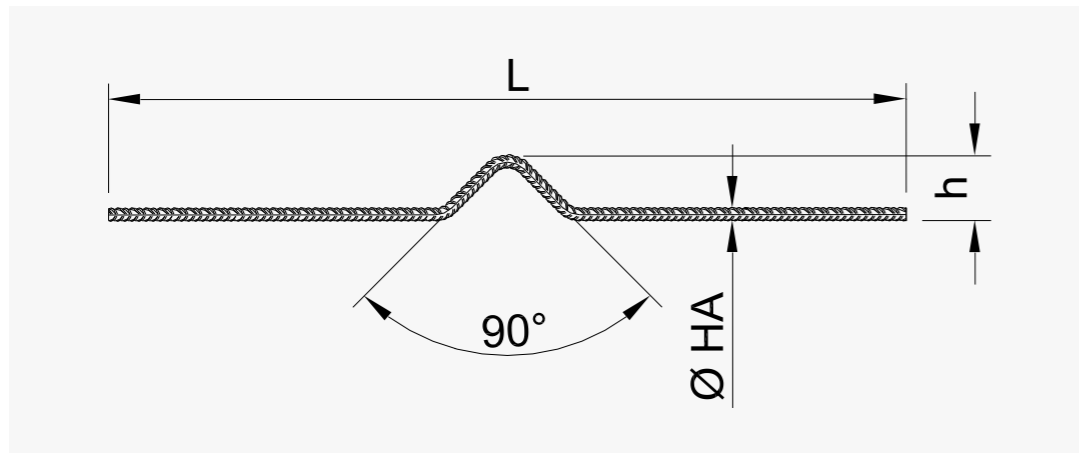
ANCHOR REFERENCE	SWL AXIAL (T)	Ø HA (MM)	L (MM)		
			15 MPa	25 MPa	35 MPa
PR012120	1.25	8	750	600	600
PR014200	1.4	10	700	560	455
PR025230	2.5	12	800	640	520
PR050290	5	16	1000	800	650
PR075320	7.5	20	1200	960	780
PR100390	10	20	1500	1200	975

h = depends on the thickness of the concrete element

Reinforced ribbed steel B500B
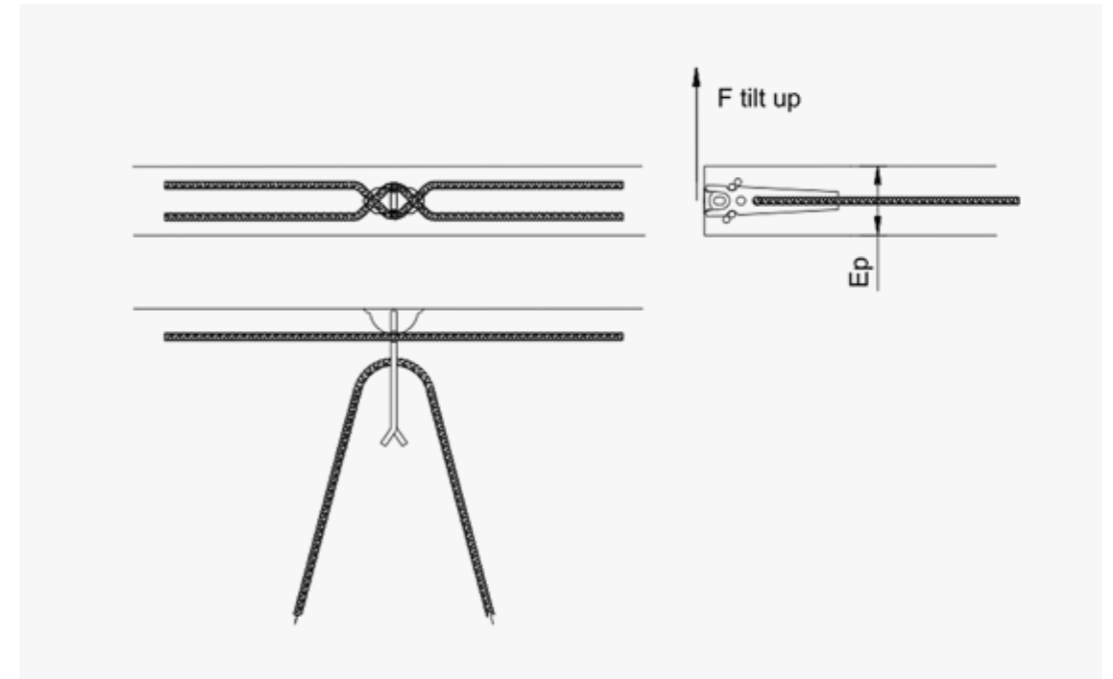
ANCHOR REFERENCE	SWL AXIAL (T)	SWL LATERAL (T)	EP MINI (MM)
PR012120	1.25	0.625	
PR014200	1.4	0.7	115
PR025230	2.5	1.25	120
PR050290	5	2.5	155
PR075320	7.5	3.75	175
PR100390	10	5	200

In all cases, the concrete strength must be more than 15MPa.

When tilting up one side only, one tilt up reinforcement stirrup is enough.

The tilt up reinforcement stirrup must be placed in the grove of the anchor.

SDG PRODUCT CATALOGUE

PRECAST ACCESSORIES

Axial Load Reinforcement Stirrup

To be placed in the bottom hole of the anchor.

30° Ø HA

L = total length
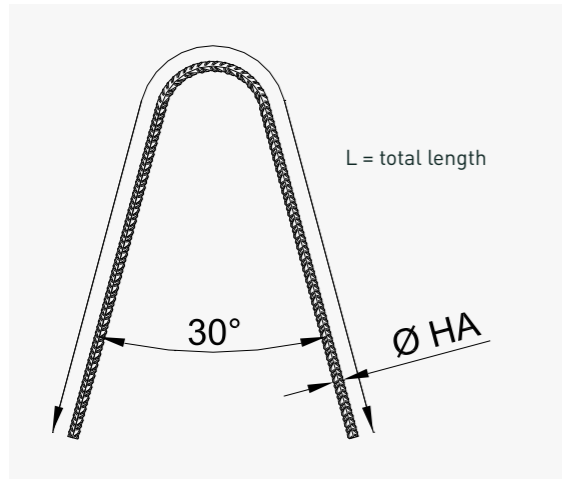
ANCHOR REFERENCE	SWL AXIAL (T)	Ø HA (MM)	L (MM)		
			15 MPa	25 MPa	35 MPa
PR012120	1.25	8	750	570	480
PR014200	1.4	10	720	560	480
PR025230	2.5	12	1020	790	660
PR050290	5	16	1490	1140	950
PR075320	7.5	20	1800	1380	1150
PR100390	10	25	1980	1540	1290

Reinforced ribbed steel B500B

2.4 Erection Anchor One Side
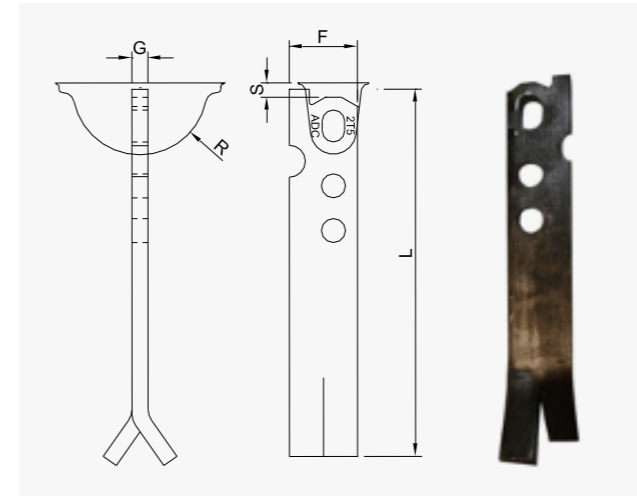
ANCHOR REFERENCE	SWL AXIAL (T)	SWL LATERAL (T)	LIFTING EYE (T)	F	G	L	R	S
PS025230	2.5	1.25	2.5	40	10	230	40	9
PS050290	5	2.5	5	55	15	290	56	10
PS100390	10	5	10	80	20	390	85	15
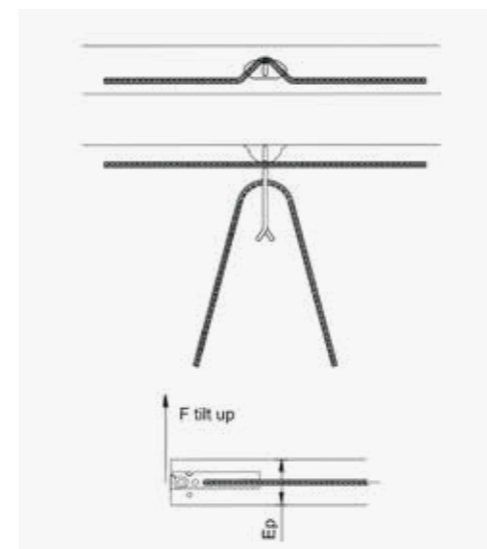
The dimensions of the tilt up reinforcement stirrup and the axial reinforcement stirrup are the same than for the erection anchor PR (refer to §2.2).

F tilt up

2.5 Two Hole Anchor
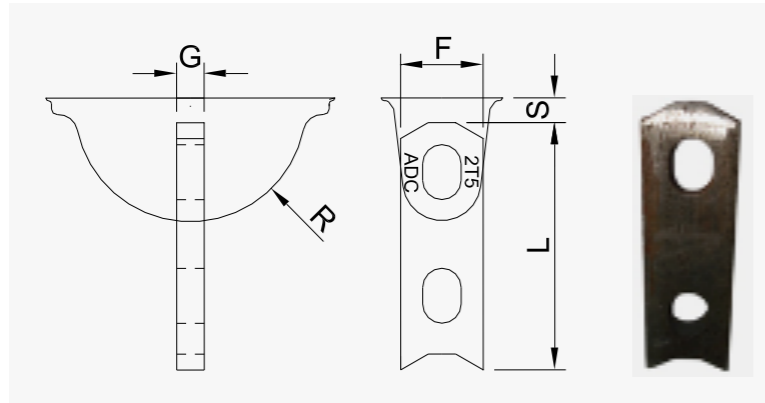
ANCHOR REFERENCE	SWL (T)	LIFTING EYE (T)	F	G	L	R	S
PO014090	1.4	2.5	30	6	90	40	9
PO025090	2.5			10	90		
PO050120	5	5	40	15	120	56	11
PO075160	7.5	10	60	15	160	85	15
PO100170	10			20	170		
PO140240	14	26		80	20	240	120	15
PO220300	22		90	25	300		
PO260300	26		120	30	300		

With its complementary reinforced steel bar, the eye anchor has a universal use.

The anchorage resistance is transmitted to the concrete via the reinforced steel bar.

Thus, the anchorage capacity depends on the diameter and the length of the associated reinforced steel bar.

The longer the bar, the more resistant the anchorage (within the SWL limit of the anchor).

The following table indicates the diameter and the total length of the reinforced steel bar to use.

REINFORCED RIBBED STEEL B500B, (ACCORDING TO NF A 35-080)	1,4 T	2,5 T	5 T	7.5 T	10 T	14 T	22 T	26 T
DIAMETER OF THE REINFORCEMENT (MM)	10	12	16	20	25	28	28	2 x 28
CONCRETE AT 10 MPa	850	1 220	1 790	2 160	2 360	2 900	4 280	4 960
CONCRETE AT 15 MPa	720	1 020	1 490	1 800	1 980	2 420	3 520	4 070
CONCRETE AT 20 MPa	630	880	1 290	1 560	1 720	2 100	3 010	3 470
CONCRETE AT 25 MPa	560	790	1 140	1 380	1 540	1 870	2 650	3 050
CONCRETE AT 30 MPa	520	710	1 030	1 250	1 400	1 690	2 380	2 730
CONCRETE AT 35 MPa	480	660	950	1 150	1 290	1 560	2 170	2 480
CONCRETE AT 40 MPa	450	610	880	1 070	1 210	1 450	2 000	2 280

The eye anchor cannot be used under any circumstances without reinforcing steel.

The eye anchor is particularly adapted to narrow panels.

It is important to respect the diameters of the bending mandrel indicated in the standards covering the reinforcing steel for reinforced concrete, in accordance to the Eurocode standard.

It is advisable to set up the reinforcing steel in a "V" form with a 30 ° angle. If the concrete element does not allow it, it is possible to set up the reinforcing steel horizontally and to tie it to the lower wire mesh.

2.6 Flat Foot Anchor
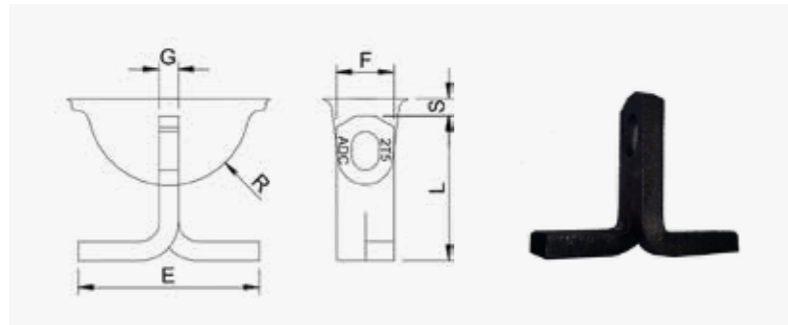
REFERENCE	SWL	LIFTING EYE	F	G	E	L	R	S
PP025075	2.5 T	2.5 T	30	10	94	75	40	10
PP050125	5 T	5 T	40	15	105	125	56	10
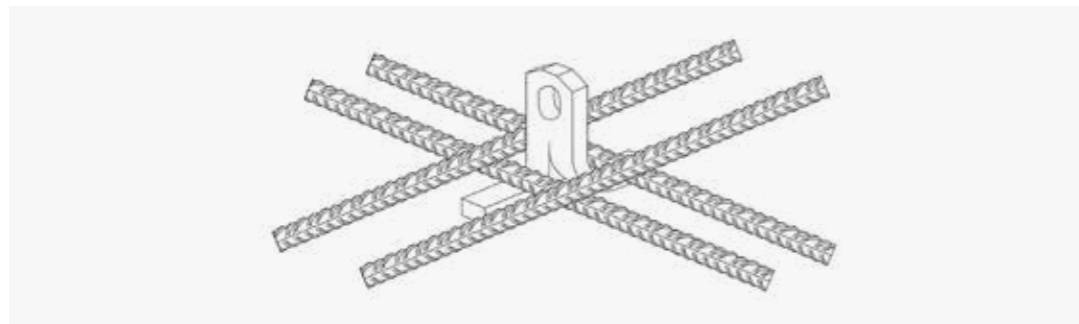
The flat foot anchor is particularly suitable for thin elements. It is used with the additional reinforcement shown in the table below. The anchor's foot and its complementary reinforcing steel must be located under the upper reinforcement layer and ligated to the lower one. In use, the strength of the concrete must be at least 25 MPa. For lower concrete strength, the SWL must be reduced by 20%. However, a minimum resistance of 15MPa is required.

The following table gives the diameter and total length of the necessary complementary reinforcement:

REFERENCE	SWL	ADDITIONAL REINFORCEMENT
PP025075	2.5 T	4 HA Ø8 long 300mm
PP050125	5 T	4 HA Ø12 long 500mm

Reinforced ribbed steel B500B

2.7 Flat Plate Anchor
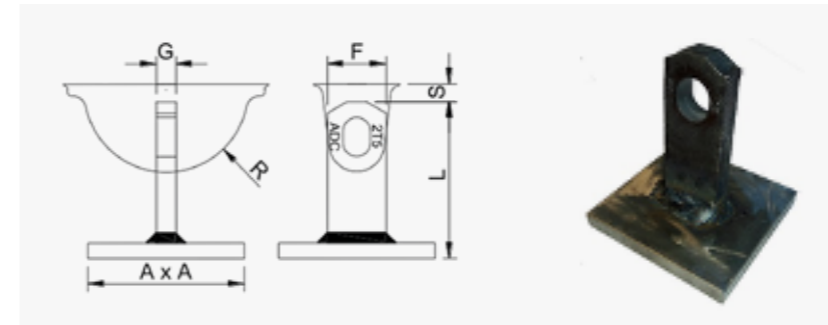
REFERENCE	SWL	LIFTING EYE	F	G	A x A	L	R	S
PAP025080	2.5 T	2.5 T	30	10	80 x 80	80	40	10
PAP050120	5 T	5 T	40	15	100 x 100	120	56	10
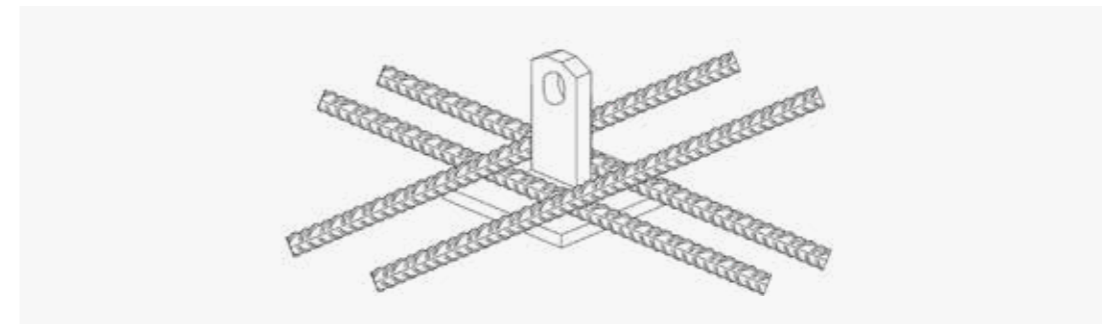
The flat plate anchor is particularly suitable for thin elements. It is used with the additional reinforcement shown in the table below. The anchor's foot and its complementary reinforcing steel must be located under the upper reinforcement layer and ligated to the lower one. In use, the strength of the concrete must be at least 25 MPa. For lower concrete strength, the SWL must be reduced by 20%. However, a minimum resistance of 15MPa is required.

The following table gives the diameter and total length of the necessary complementary reinforcement:

REFERENCE	SWL	ADDITIONAL REINFORCEMENT
PAP025080	2.5 T	4 HA Ø10 long 300mm
PAP050120	5 T	4 HA Ø12 long 450mm

Reinforced ribbed steel B500B

2.8 Sandwich Panel Anchor
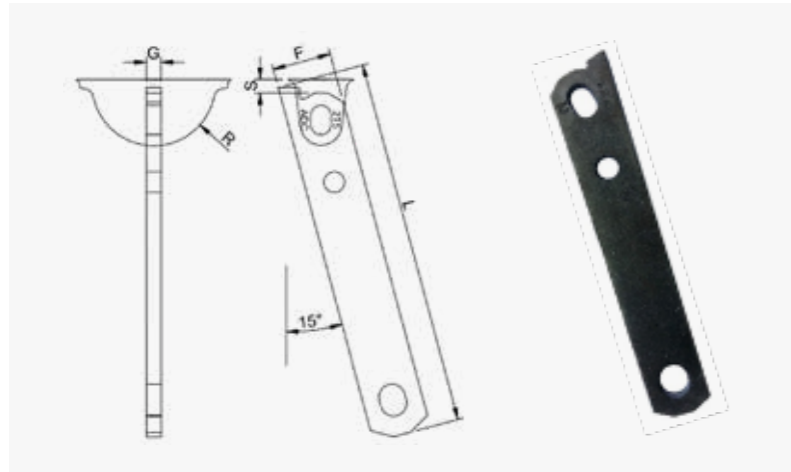
ANCHOR REFERENCE	SWL TENSION	SWL TILTING	LIFTING EYE	F	G	L	R	S
PPS025250	2.5 T	0.8 T	2.5 T	40	10	250	40	10
PPS050300	5 T	1.8 T	5 T	55	15	300	56	10

The shape of the anchor allows use in sandwich panels. The anchor is sealed in the load-bearing panel of the wall (the thickest) while its head is at the gravity axis of the panel allowing vertical lifting. Additional reinforcements are to be expected. A minimum concrete strength of 15 MPa is required.

2 additional reinforcing bars are required: a tension bar and a tilting stirrup.

1. Tension bar

To be placed in the inferior hole.
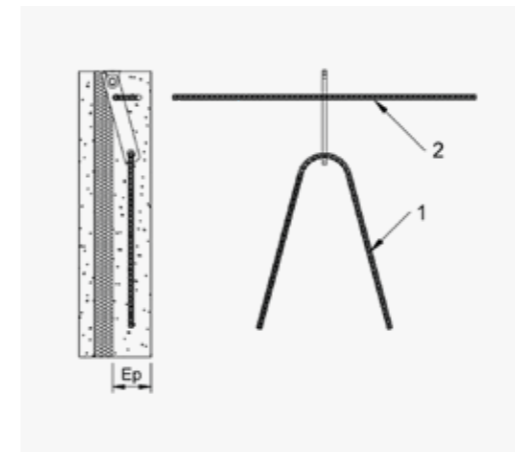
ANCHOR REFERENCE	SWL AXIAL (T)	Ø HA (MM)	L (MM)
PPS025250	2.5 T	14	800
PPS050300	5 T	16	1200

Reinforced ribbed steel B500B

2. Tilting stirrup

To be placed in the superior hole.
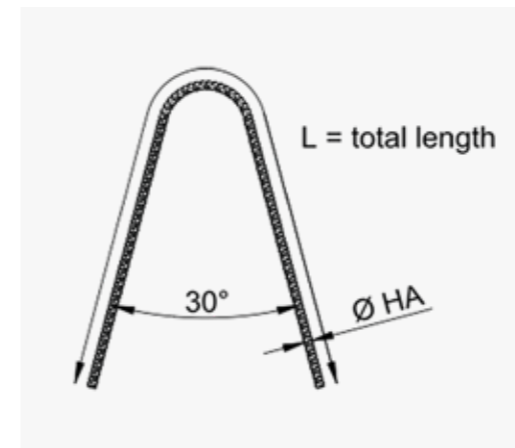
Minimal thickness of the load-bearing panel.

ANCHOR REFERENCE	SWL AXIAL (T)	SWL LATERAL (T)	EP MINI (MM)
PPS025250	2.5 T	0.8 T	100
PPS050300	5 T	1.8 T	120
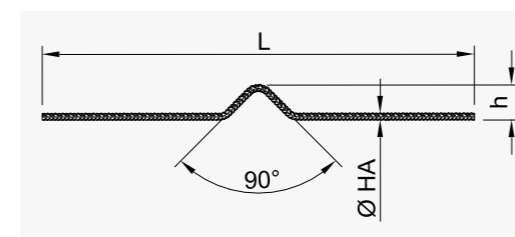
ANCHOR REFERENCE	SWL AXIAL (T)	Ø HA (MM)	L (MM)	H MINI (MM)
PPS025250	2.5 T	10	600	≥ 60
PPS050300	5 T	14	700	≥ 80

SDG PRODUCT CATALOGUE

PRECAST ACCESSORIES

3. Formers and Accessories

When the anchors are placed on the side of the concrete element, the formers must be placed parallel to the panel.
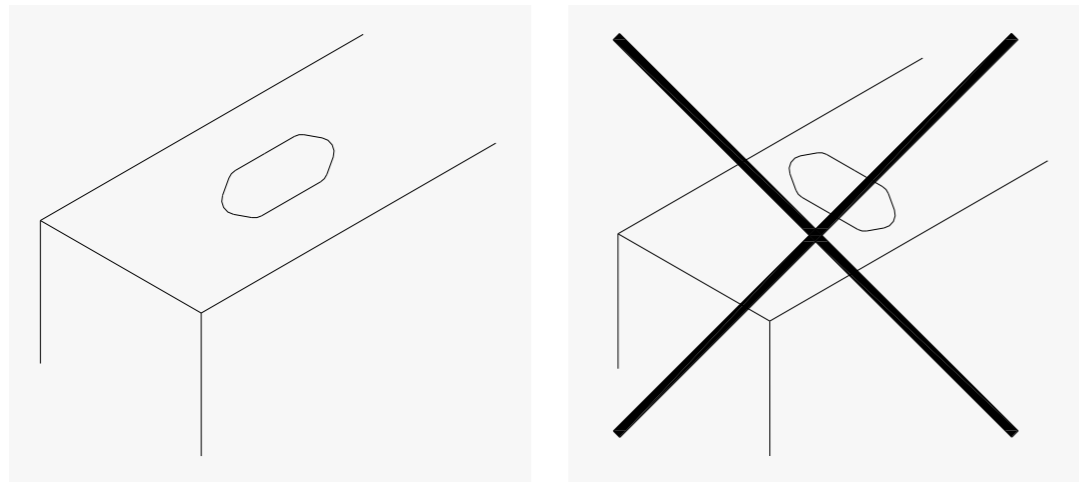
3.1 Spread Anchor System

Rubber Former (ref RP)
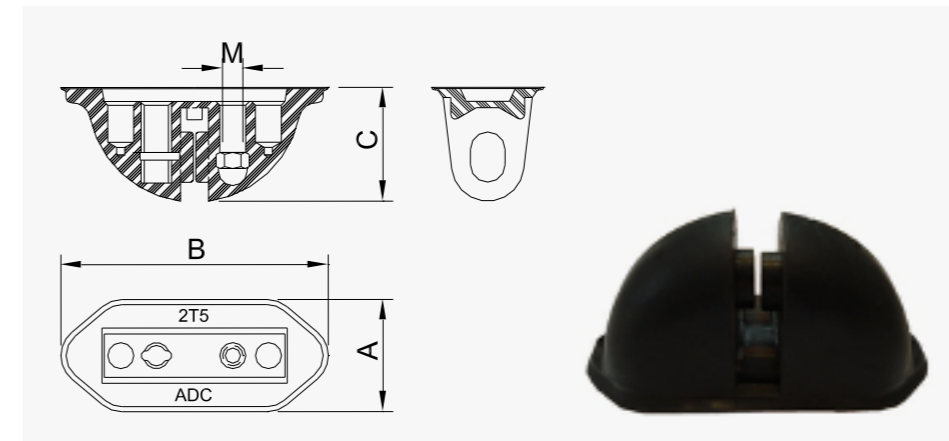
REFERENCE	LOAD	FOR ANCHORS	A	B	C	M
RP0125	1.25 T	1.25 T	29	62	35	M8
RP025	2.5 T	1.4T – 2.5 T	43	106	45	M8
RP050	5 T	4 T – 5 T	55	134	59	M8
RP100	10 T	7.5 T – 10 T	78	188	81	M12
RP260	26T	12.5 T – 26 T	109	240	120	M16

This is the most common former range. Made of flexible elastomer, it can be used up several times in normal operating conditions.

It can be fixed to the mould by different ways:

- It can be nailed to the wooden mould
- It can be screwed to the mould with the thread holding bolt (refer to §3.2) and the nut cast into the former

- It can be screwed to the mould with the bayonet holding bolt (refer to §3.2) and the special plate cast into the former
- It can be maintained with a holding plate (refer to §3.2).

The 2 holes will help open the former when released from the concrete.

Magnetic Former (ref RP...M)
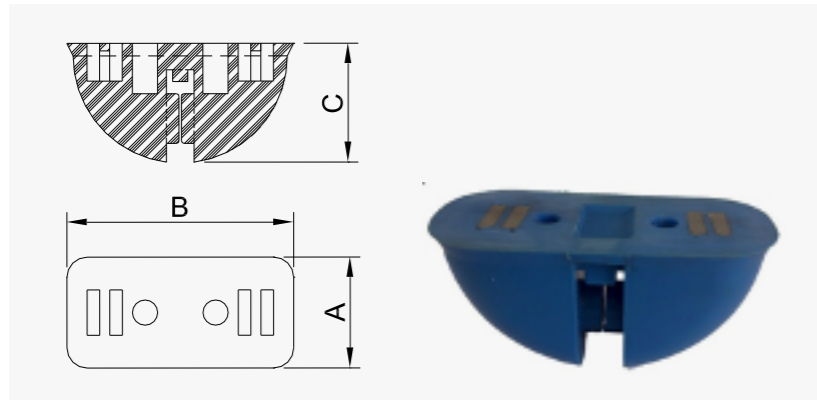
REFERENCE	LOAD	FOR ANCHORS	A	B	C	MAGNETISM INSTALLED
RP025M	2.5 T	1.4T – 2.5 T	44	90	48	30 daN
RP050M	5 T	4 T – 5 T	53	115	62	50 daN
RP100M	10 T	7.5 T – 10 T	70	160	87	100 daN

Polyurethane former with cast in magnets.

This former is to be used on metallic moulds.

3.2 Additional Accessories for Formers

A. Holding Plate
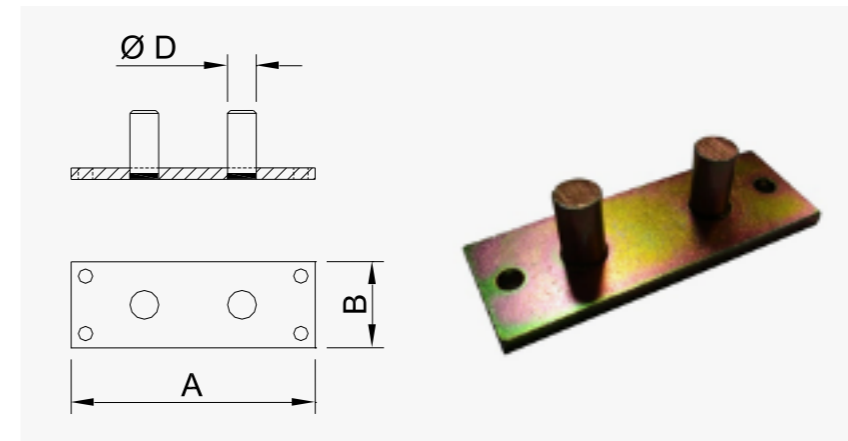
REFERENCE	LOAD	A	B	ØD
PLM025	2.5 T	70	15	10
PLM050	5 T	85	30	10
PLM100	10 T	125	45	12

The holding plate can be nailed, screwed, welded and glued to the mould.

It is designed to maintain the rubber former on the mould.

B. Magnetic Holding Plate
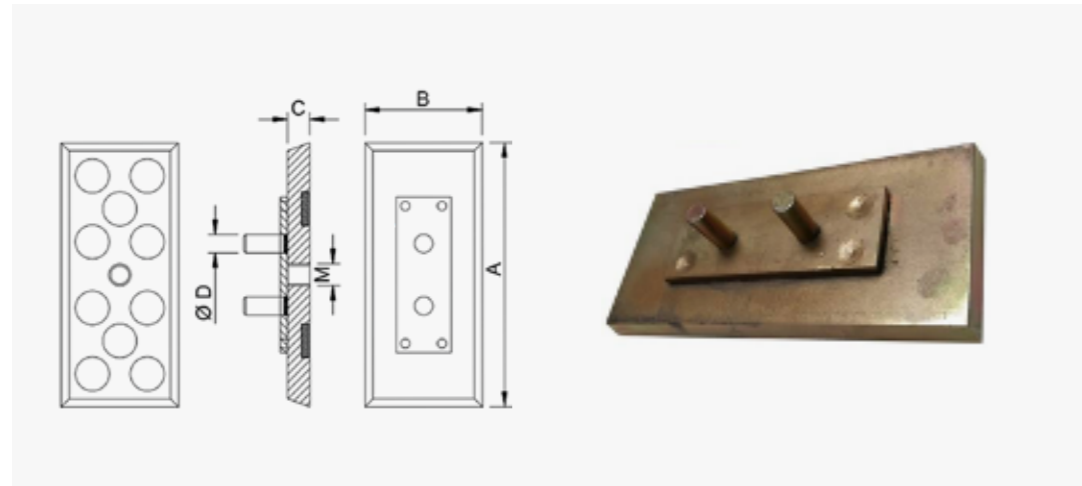
REFERENCE	LOAD	INSTALLED MAGNETISM	A	B	C	ØD
PLM025M	2.5 T	100 kg	70	15	12	10
PLM050M	5 T	100 kg	85	30	12	10
PLM100M	10 T	100 kg	125	45	12	12

The Magnetic holding plate allows the fixation on a metal mould without having to pierce it. Magnetism can be increased or decreased on demand by adding or removing some magnets. It allows the elastomer former to be maintained when the concrete is cast.

C. Thread Holding Bolt
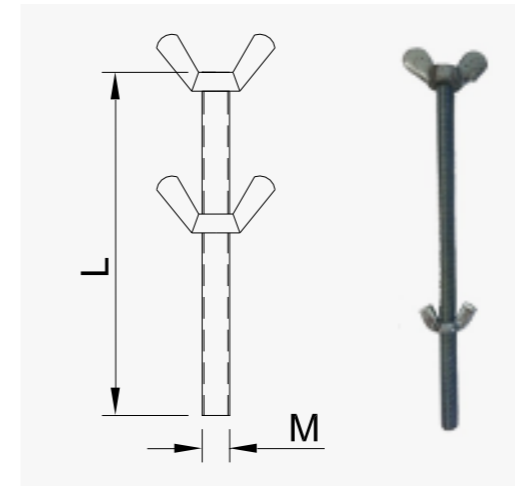
REFERENCE	LOAD	M	L
	2.5 T	8	160
	5 T	8	160
	10 T	12	160

The thread holding bolt is designed to maintain the rubber former on the mould.

It is screwed in the cap nut cast into the rubber former.

D. Bayonet Holding Bolt

4. Lifting Eye

Ring Clutch
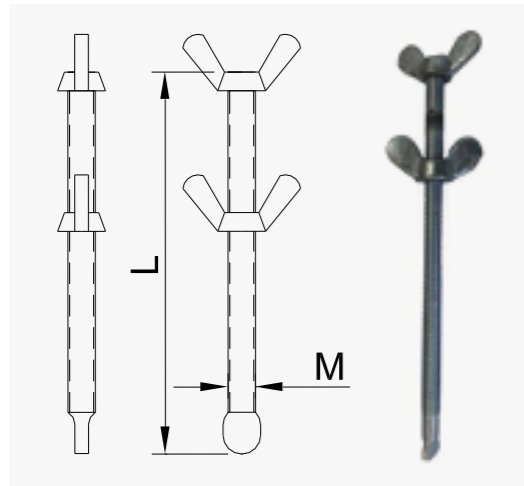
REFERENCE	LOAD	M	L
BAIONETTEM8	2.5 T	8	160
BAIONETTEM8	5 T	8	160
BAIONETTEM10	10 T	12	180

The bayonet holding bolt is designed to maintain the rubber former on the mould.

It is inserted into the bayonet connection of the rubber former and turned 90°.
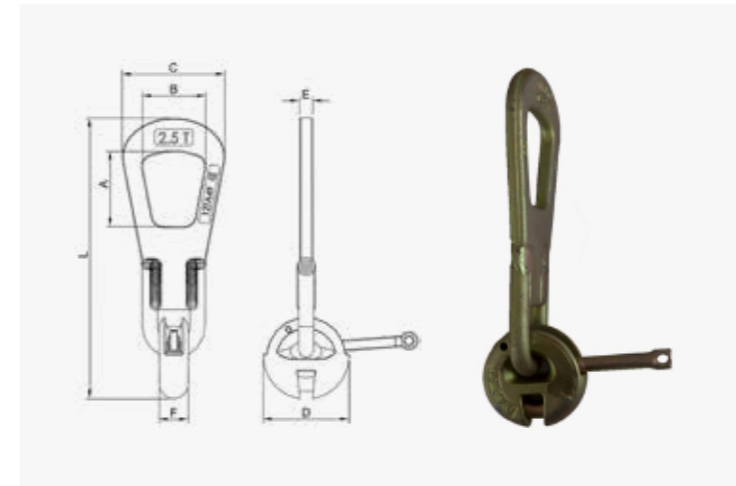
REFERENCE	SWL	FOR ANCHORS	A	B	C	D	E	F	L
PA025	2.5 T	1.4T – 2.5 T	70	59	95	79	12	27	264
PA050	5 T	4 T – 5 T	85	66	117	102	17	37	333
PA100	10 T	7.5 T – 10 T	110	85	148	148	25	50	412
PA260	26 T	12.5 T – 26 T	160	120	210	209	30	72	605

The ring clutch must be chosen to match the anchor load. Under no circumstances should a lifting eye be used with a different capacity to that of the anchor, even if the load capacity of the lifting eye is superior to the load capacity of the anchor.

Combination Clutch
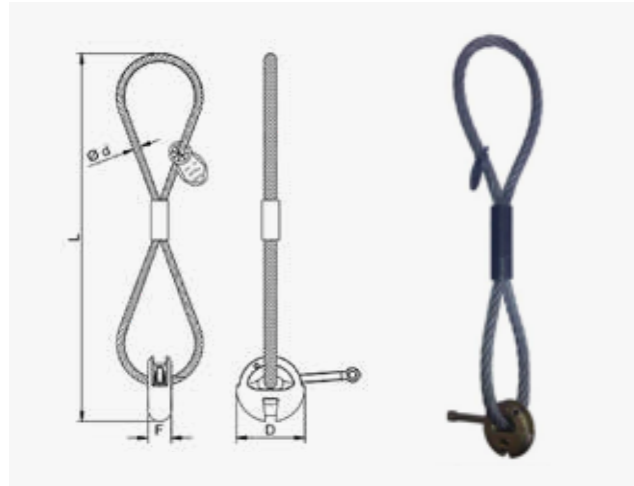
REFERENCE	SWL	FOR ANCHORS	D	Ø D	F	L
PA0125C	1.25 T	1.25 T	52	8	20	360
PA025C	2.5 T	1.4T – 2.5 T	79	14	27	600
PA050C	5 T	4 T – 5 T	102	18	37	710
PA100C	10 T	7.5 T – 10 T	148	22	50	790

The lifting ring clutch with wire cable must be chosen to match the anchor load. Under no circumstances should a lifting eye be used with a different capacity to that of the anchor, even if the load capacity of the lifting eye is superior to the load capacity of the anchor.

4.1 Quality system

The dimensions of the Lifting eyes are 100% quality checked. For each batch, destructive testing is carried out to ensure quality standards are maintained.

Each lifting eye is provided with a CE declaration of conformity. On the back of this declaration, the safety and usage and conditions are stated.

4.2 Periodic control

Whatever the frequency of use, each lifting eye must be controlled at least once a year by a competent person. Any physical abnormality, deformation, any sign of welding, must lead to the immediate destruction of the lifting eye. The lifting eyes cannot be repaired.

The points to control are:

(1) Visual control

– Absence of permanent deformation (elongated or twisted handle)

– Absence of welding signs (except the original weld).

(2) Control of the correct hinge operation between the nut and the handle

(3) Control of the lips spacing (using a gauge or a caliper) of the head:
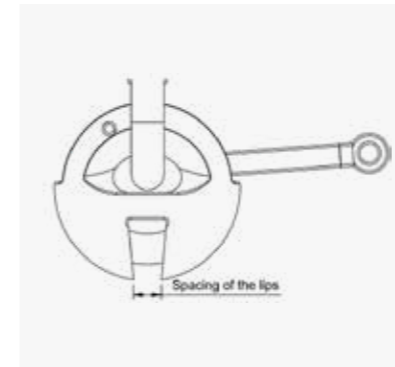
REFERENCE	SWL	DIMENSION MAXI
PA0125C	1.25T	8.0
PA025 / PA025C	2.5 T	13.0
PA050 / PA050C	5 T	19.5
PA100 / PA100C	10 T	23.5
PA260	26T	37.0

(4) Control of the diameter of the locking bolt:
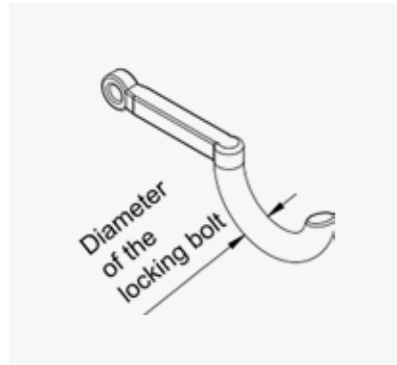
REFERENCE	SWL	DIMENSION MINI
PA0125C	1.25T	7.0
PA025 / PA025C	2.5 T	12.0
PA050 / PA050C	5 T	15.5
PA100 / PA100C	10 T	22.5
PA260	26T	37.0

(5) Control of the diameter of the stirrup (U part) of the shackle:
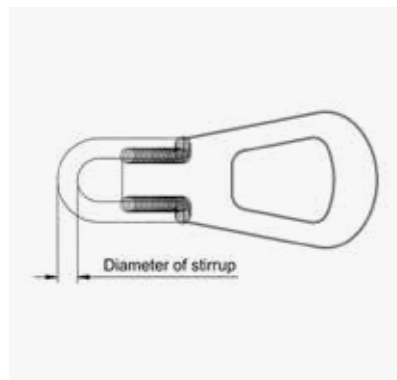
REFERENCE	SWL	DIMENSION MINI
PA025	2.5 T	13.0
PA050	5 T	19.0
PA100	10 T	25.0
PA260	26T	38.5

5. Usage and Safety Conditions

With each lifting eye, a summary note covering usage and safety conditions is provided.

Before use, the calculation assumptions must be check, in particular:

– The mechanics of handling

– The expected lifting system (sling or lifting/spreader beam), the length of the slings (or the angle of the slings)

– The lifting means (stationary crane, bridge crane...)

– The minimum concrete strength.

Kinetic of the lifting eye

Engaging

Insert the lifting eye in the recess of concrete and close the locking bolt manually, pushing it to the limit position.

Push down the locking bolt
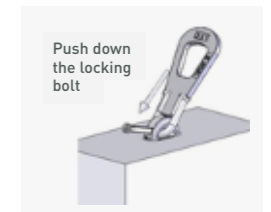
Lifting

The lifting eye can be used in any direction (up to the load limit of the anchor). However, the sling coefficient must be considered in calculations. Therefore, the front and behind angle should be limited to 60°.

≤ 60° ≤ 60°

≤ 90° ≤ 90°
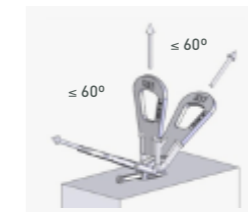
Releasing

The lifting eye can be released manually, just by puling back the locking bolt.

Pull back the locking bolt
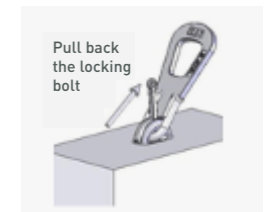
BEFORE USE

To do

– You must check that the safe working load of the anchor is the same as the safe working load of the lifting eye.

– The length of the slings should be at least twice the distance between the anchors, in order to have an angle of 30° between the slings. It is possible to have a bigger angle only if it has been considered in calculations. It is always better to use a lifting beam.

– The concrete strength should be at least equal to that used in the calculations. The minimum concrete strength is 15 MPa.

– The locking bolt must be fully closed and pushed to the limit position up to resting on the concrete.

30° max. (except special calculation)

Locking bolt resting on concrete
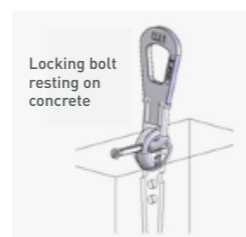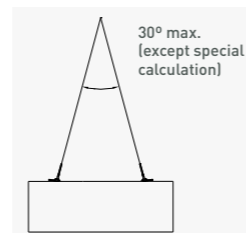
– For cable rings, make sure that the diameter of the hook or shackle attached to the cable, is not less than 2.5 times the diameter of the cable of the lifting eye. We recommend, if possible, a diameter greater than 5 times the diameter of the cable.

Ø 5xd
Ø d
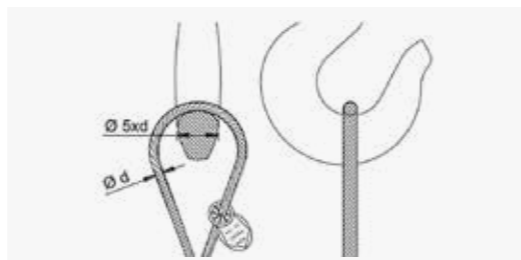
Not to do

– You must not break the concrete around the anchor.
The lifting eye hooks onto the anchor without any other action.

– You must not weld the anchor nor the lifting eye, for whatever reason.
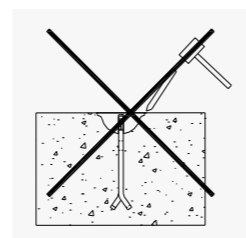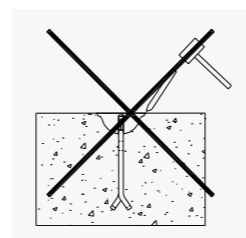
– Never be in one of the 3 following dangerous positions:

If the shakle is under the head of the lifting ring at the time of application of the load, the stirrup may bent.

If the lifting eye is pulled towards the top surface of the precast, the shackle may bend on the edge of the precast.

On the left position, the shackle may lock within the clutch housing. A narrow lifting cable angle will cause the shackle to become bent. The problem can be overcome by turning the shackle through approximately 45° (left drawing).

IN USE

– When precast concrete elements are transported by construction company, they are subject to shock and impact loads. This factor increases the load on the anchor by several times the dead-weight and should be taken into account in load calculations. Therefore, care should be taken in transporting the elements on site

– When the anchors are used to lift a unit from a mould, the adhesion between the freshly cast concrete and the mould increase the forces on the anchors.

MAINTENANCE

– All lifting eye must be controlled at least once a year by a competent person. The lifting eye must not show any sign of deformity

– The lifting eye cannot be repaired.

GENERAL
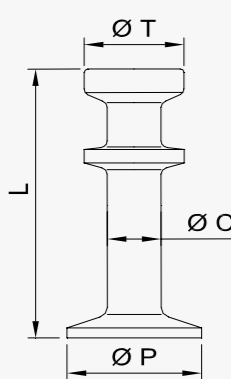
– The lifting eye must be used only for lifting precast concrete elements

– Users of the lifting eyes must be familiar with the usage and safety instructions

– All usage and safety instructions must be respected when you lifting eyes are used.

Lifting with Spherical Anchor Systems

ACCESSORIES		1.3T	2.5T	5T	7.5T	10T	15T	20T	32T
LIFT HEAD ANCHOR	REF.	AP 013...	AP 025...	AP 050...	AP 075...	AP 100...	AP 50...	AP 200...	A 320...
T (MM)		18	25	36	46	46	69	69	88
C (MM)		10	14	20	24	28	34	38	50
P (MM)		25	35	50	60	70	85	98	135
L (MM)		40	45	75	100	115	140	200	280
		50	55	85	100	115	140	200	280
		55	65	95	120	135	165	240	320
		65	75	120	140	150	200	250	500
		85	85	180	165	170	300	340	700
		120	120	240	200	200	400	500	
		170	140	340	240	250			
		240	170		300	340			
			210						
			240						
			280						

The lift head anchors can be provided black, electro zinc plated (Z) or hot dip galvanised (G).

ACCESSORIES		1.3T	2.5T	5T	7.5T	10T	15T	20T	32T
DOUBLE HEAD ANCHOR	REF.	AM 013...	AM 025...	AM 050...					
T (MM)		18	25	36					
C (MM)		10	14	20					
P (MM)		25	35	50					
L (MM)		55	55	85					
		65	65	120					
		75	85	180					
		85	120	240					
		120	170						
		240	240						

ACCESSORIES		1.3T	2.5T	5T	7.5T	10T	15T	20T	32T
EYE ANCHOR	REF.	AO 130065	AO 025090	AO 050120		AO 100180		AO 200250	AO 320200
T (MM)		18	25	36		46		69	88
C (MM)		10	14	20		28		38	50
L (MM)		65	90	120		180		250	300
G (KG)		0.06	0.16	0.40		1.16		3.17	6.34
	REF.			AO 050090		AO 100115			
T (MM)				36		46			
C (MM)				20		28			
L (MM)				90		115			
G (KG)				0.35		0.82			

The eye anchors can be provided black, electro zinc plated (Z) or hot dip galvanised (G).

FOOT & EYE ANCHOR	REF.	AOP 013050	AOP 02565	AOP 050080				
T (MM)		18	25	36				
C (MM)		10	14	20				
P (MM)		22	35	47				
L (MM)		50	65	80				
G (KG)		0.06	0.17	0.38				
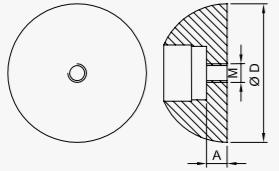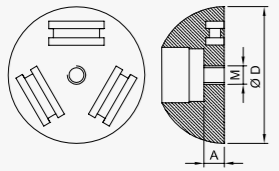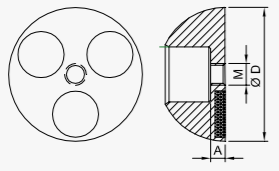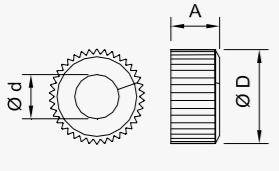
The foot & eye anchors can be provided black, electro zinc plated (Z) or hot dip galvanised (G).

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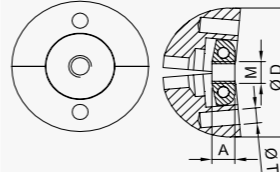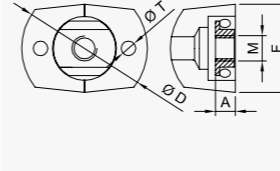
ACCESSORIES		1.3T	2.5T	5T	7.5T	10T	15T
REBAR ANCHOR	REF.		AA 025400	AA 05080		AA 100870	AA 1501080
	T (MM)		25	36		46	69
	C (MM)		14	20		28	32
	L (MM)		400	580		870	1080
	G (KG)		0.70	1.43		4.30	7.00
	REF.		AA 025520				
	T (MM)		25				
	C (MM)		14				
	L (MM)		520				
	G (KG)		0.80				
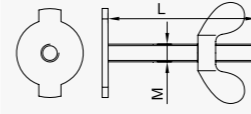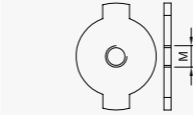
The rebar anchors can be provided black, electro zinc plated (Z) or hot dip galvanised (G).

PLATE ANCHOR	REF.		AS 025055	AS 050065	AS 100115		
	L (MM)		55	65	115		
	AXB (MM)		70x70	90x90	90x90		
	E (MM)		6	8	10		
	G (KG)		0.34	0.74	1.09		
	REF.		AS 025120	AS 050095			
	L (MM)		120	95			
	AXB (MM)		70x70	90x90			
	E (MM)		6	8			
	G (KG)		0.42	0.80			

The plate anchors can be provided black, electro zinc plated (Z) or hot dip galvanised (G).

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ACCESSORIES		1.3T	2.5T	5T	7.5T	10T	15T	20T	32T
ROUND RUBBER FORMER WITH STUD	REF.	REC 013	REC 025	REC 050	REC 075	REC 100	REC 150	REC 200	REC 320
	D (MM)	60	74	94	118	118	160	160	204
	T (MM)	6.5	6.5	8.5	10.5	10.5	10.5	10.5	10.5
	A (MM)	9	13	15.5	18	18	19	19	19
	M	M8	M10	M10	M12	M12	M12	M12	M12
	G (KG)	0.13	0.21	0.40	0.74	0.62	1.43	1.30	3.60
ROUND RUBBER FORMER	REF.	RE 013	RE 025	RE 050	RE 075	RE 100	RE 150	RE 200	RE 320
	D (MM)	60	74	94	118	118	160	160	204
	T (MM)	6.5	6.5	8.5	10.5	10.5	10.5	10.5	10.5
	A (MM)	6	10	11.5	14	14	16	16	14
	G (KG)	0.08	0.16	0.29	0.54	0.42	1.19	1.06	3.40
NARROW RUBBER FORMER WITH STUD	REF.	REEC 013	REEC 025	REEC 050	REEC 075	REEC 100	REEC 150	REEC 200	REEC 320
	D (MM)	60	74	94		118		160	
	T (MM)	6.5	6.5	8.5		10.5		10.5	
	A (MM)	9	13	15.5		18		19	
	M	M8	M10	M10		M12		M12	
	G (KG)	0.11	0.17	0.35		0.73		1.58	
NARROW RUBBER FORMER	REF.	REE 013	REE 025	REE 050	REE 075	REE 100	REE 150	REE 200	REE 320
	D (MM)	60	74	94		118		160	
	F (MM)	43	53	69		85		124	
	T (MM)	6.5	6.5	8.5		10.5		10.5	
	A (MM)	6	10	11.5		14		16	
	G (KG)	0.06	0.12	0.24		0.53		1.34	

ACCESSORIES		1.3T	2.5T	5T	7.5T	10T
STEEL FORMER	REF.	RA013	RA025	RA050		RA100
	D (MM)	60	74	94		118
	A (MM)	8	10	12		14
	M	M8	M12	M12		M12
	G (KG)	0.32	0.61	1.30		2.60
MAGNETIC FORMER	REF.	RM013	RM025	RM050		RM100
	D (MM)	60	74	94		118
	A (MM)	6	9	12		12
	M	M8	M10	M10		M10
	MAGNET (KG)	60	75	100		150
	G (KG)	0.11	0.20	0.36		0.58
MAGNETIC STEEL FORMER	REF.	RAM013	RAM025	RAM050		RAM100
	D (MM)	60	74	94		118
	A (MM)	8	10	12		14
	M	M8	M12	M12		M12
	G (KG)	0.32	0.61	1.30		2.30
RUBBER RING	REF.	BC013	BC025	BC050		BC100
	D (MM)	22	32	39		49
	D (MM)	10	14	20		28
	A (MM)	11	12	14		20
	G (KG)	0.01	0.01	0.02		0.04

ACCESSORIES		1.3T	2.5T	5T	7.5T	10T
ARTICULATED STEEL FORMER	REF.	RAA013	RAA025	RAA050		RAA100
	D (MM)	60	74	94		118
	T (MM)	7	7	10		9
	A (MM)	10	10	10		10
	M	M10	M10	M12		M12
	G (KG)	0.35	0.71	1.46		2.79
ARTICULATED STEEL FORMER	REF.	RAAE013	RAAE025			
	D (MM)	60	74			
	F (MM)	42	48			
	T (MM)	7	7			
	A (MM)	10	10			
	M	M12	M10			
	G (KG)	0.23	0.52			

ACCESSORIES		1.3T	2.5T	5T	7.5T	10T	15T	20T
FIXING SET	REF.	EF013	EF025	EF050	EF100	EF100	EF200	EF200
	M	M8	M10	M10	M12	M12	M12	M12
	L (MM)	80	80	100	100	100	100	100
	G (KG)	0.05	0.05	0.11	0.20	0.20	0.24	0.24
THREADED PLATE	REF.	PT013	PT025	PT050	PT100	PT100	PT200	PT200
	M	M8	M10	M10	M12	M12	M12	M12
	G (KG)	0.01	0.02	0.04	0.05	0.05		

ACCESSORIES		1.3T	2.5T	5T
TIGHTENING FORMER	REF.	RC013	RC025	RC050
	D(MM)	60	74	94
	A(MM)	9	11	14
	M	M8	M10	M10
	G(KG)	0.10	0.19	0.23
MAGNETIC TIGHTENING FORMER	REF.	RCM013	RCM025	RCM050
	D(MM)	60	74	94
	A(MM)	9	11	14
	M	M8	M10	M10
	MAGNET (KG)	60	60	100
	G(KG)	0.15	0.20	0.25

ACCESSORIES		1.3T	2.5T	5T
INTERNAL MAGNETIC FORMER	REF.	RI013	RI025	RI050
	D (MM)	60	74	94
	A (MM)	9	11	14
	M	M8	M10	M10
	G (KG)	0.45	0.88	1.60
INTERNAL & EXTERNAL MAGNETIC FORMER	REF.	RIM013	RIM025	
	D (MM)	60	74	
	A (MM)	9	11	
	M	M8	M10	
	MAGNET (KG)			
	G (KG)	0.45	0.88	

ACCESSORIES		1.3T	2.5T	5T	7.5T	10T	15T	20T	32T
LIFT HEAD SHACKLE	REF.	AN013	AN025	AN050	AN100		AN200		AN320
	A (MM)	70	85	88	112		150		189
	B(MM)	46	58	70	84		118		175
	C(MM)	74	88	118	160		186		269
	D(MM)	20	25	37	50		75		100
	E(MM)	12	14	16	26		30		45
	G(KG)	0.89	1.62	3.18	9.70		26.20		45.80

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1. Sizing Methods

1.1 Design process

The aim of this design process is the evaluation of the load on cemented anchors in reinforced Precast concrete in order to select the appropriate anchor.

This method is based on the most common applications. If you have any doubt on the application, the assumptions or any points mentioned in this document, you should contact the SDG Technical Department.

It is also essential that the assumptions are clearly communicated to the organizations tasked with the handling and lifting operations, to ensure that the assumptions are representative of the actual handling and lifting conditions.

1.2 Calculation assumptions

To define the force on the lifting anchors, all of the following points must be considered:

– The technical drawing of the Precast element and the mechanics of handling
– The weight of the element (and of the formwork and other accessories lifted with the element)
– The formwork adhesion at the removal from the mould
– The number of efficient lifting points (and not the number of actual lifting points)
– The sling angle
– The dynamic coefficient (lifting machinery)

To define the correct anchor to use (type, length, size) it is also necessary to know:

– The concrete strength when the element is lifted.

It is also necessary to distinguish between the handling of the element in the precast factory and on the construction site. All the calculations have to be done for both cases.

All these points are detailed in the following paragraphs.

1.3 Drawing of the Precast element and expected lifting process

Firstly, the technical drawing of the element has to be considered, and the means by which it is to be handled.

It is necessary to distinguish between the handling in the precast factory and on site.

1.4 Weight of the Element (P)

The actual weight of the element must be considered. It includes in particular:

– The weight of the concrete element (volume x density). The reinforced concrete density is equal to 2500 daN/m³ (or 25 kN/m³) in general.

– The weight of the formwork and accessories lifted with the element.

1.5 Formwork adhesion at the removal from the mould (A)

The adhesion will depend on 2 factors:

– The surface area of the element in contact with the formwork (S in m²). All the surfaces in contact with the formwork need to be considered, included inclined surfaces.

– The surface condition of the mould. This surface condition is defined by an adhesion factor (q_{adh} in daN/m²)

This force is to be considered at the removal of the element from the mould.

Type of mould	Adhesion factor q_{adh}
Oiled steel mould, Plywood coated with oiled plastic	100 daN/m²
Varnished oiled wooden mould	200 daN/m²
Oiled rough wooden mould	300 daN/m²
Polyurethane matrix	Consult the matrix supplier

The adhesion force is:

$$A = q_{adh} \text{ x } S$$

This adhesion force must be added to the weight of the element in order to calculate the force required to lift it.

In some cases, the adhesion force can be zero if the concrete is not in contact with the mould (pre-stressed beam for example).

1.6 Location and determination of the number of efficient lifting points (n)

Set up the lifting points symmetrically to the center of gravity.

Here are some examples of lifting point positions:

SLAB

BEAM

PANEL

PIPE

ROTATION PIECE

It is possible that some lifting positions are not appropriate for selected anchor types (see § 2). In particular, minimum distances between lifting points and minimum distances from the edges of the concrete have to be maintained. A minimum coating may be required.

Based on the number of apparent lifting points and the use or not of a balanced lifting system (such as a lifting beam), the number of efficient lifting points is defined as follows:

APPARENT LIFTING POINTS	EFFICIENT LIFTING POINTS NUMBER (N)	
	WITH A BALANCED SYSTEM	OTHERS LIFTING MEANS
4	4	2
3	3	2
2	2	2

Some examples:

Balanced system

Apparent lifting points = 4

Efficient lifting points = 4

Unbalanced System

Apparent lifting points = 4

Efficient lifting points = 2

1.7 Sling angle and multiplication coefficient (Ce)

A multiplication coefficient Ce is generated by vertical forces (weight) on the slings.

For the calculation, angle β is to be considered as the angle between the vertical and the most inclined sling.

SLAB

BEAM

PIPE

ROTATION PIECE
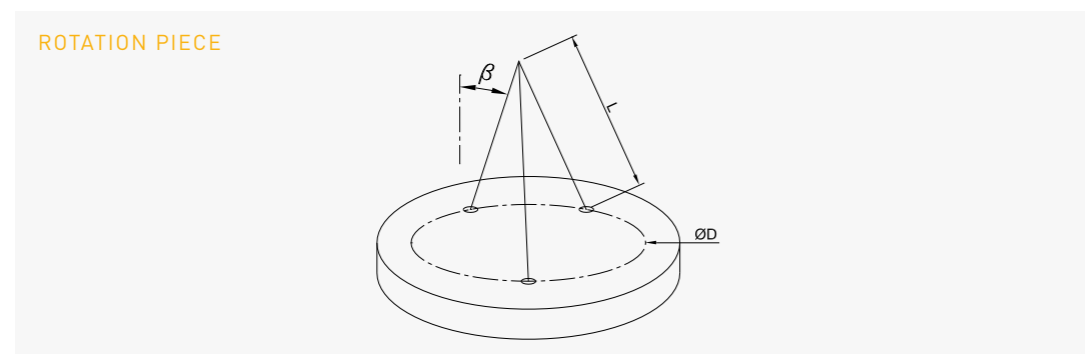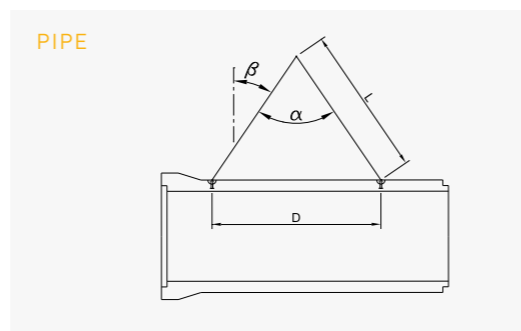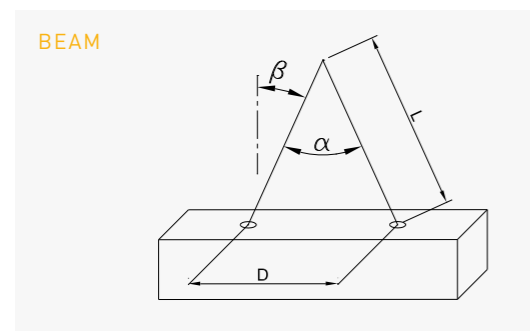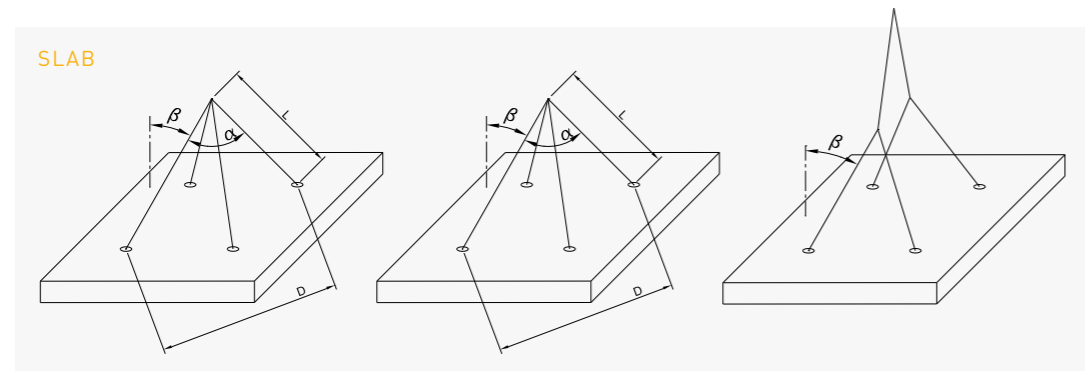
β	0	15°	22,5°	30°	45°	60°
α = 2 β	0	30°	45°	60°	90°	120°
Ce	1	1,035	1,082	1,155	1,414	2
L	-	2 D	1,3 D	D	0,7 D	0,6 D

$$Ce = \frac{1}{\cos(\beta)} = \frac{1}{\cos\left(\dfrac{\alpha}{2}\right)}$$

β = angle between the vertical and the most inclined sling.

It is necessary to consider the worst-case scenario with the largest angle β.

1.8 Lifting and handling dynamic coefficient (Cd)

The values given in the table below are indicative only.

The expected lifting system and the values used must be notified to the users (factory and site).

LIFTING AND HANDLING MACHINE	LIFTING SPEED	DYNAMIC COEFFICIENT Cd
Stationary crane or rail-mounted	< 1 m/s	1,15
Stationary crane or rail-mounted	> 1 m/s	1,30
Bridge crane	< 1 m/s	1,15
Bridge crane	> 1 m/s	1,60
Lifting and handling on flat terrain		2
Lifting and handling on rough terrain		≥ 4

Dynamic coefficient required by type of element:

TYPE OF ELEMENT	DYNAMIC COEFFICIENT Cd
Pipe and sewer	2
Frame below 12T	1,60
Frame between 12 and 20T	1,30
Frame above 20T	1,15
Wall	1,30
Beam below 12T	1,60
Beam between 12 and 20T	1,30
Beam above 20T	1,215

1.9 Resultant load by lifting point (F)

The resultant load for each lifting point is equal to:

$$F = \frac{(P + A) \times Ce \times Cd}{n}$$

This calculation must be done for the lifting activity in the Precast factory, on site, and for any other handling activity of the precast element.

NOTE: Anchors used more than 10 times, must not to be subject to a force more than 0.6 times their safety working load (SWL). It is necessary to check in this case that F < 0.6* SWL (Anchor).

1.10 Concrete resistance (f$_{ck}$)

The concrete strength has to be determined:

– When lifting the element from the mould in the Precast factory

– When transporting and installing on site

The minimum permitted resistance of the concrete is 10 MPa.

2. Choice of Anchor

This choice can be made according to the resultant load values by lifting point in the factory (Fu), and on site (Fc), and from the concrete resistance at the first lifting or on site. The most unfavourable calculation (worst case scenario) is used to ensure the anchor is suitable for all applications.

If you have any doubt about your calculation, you should contact the SDG Technical Department.

The anchor load capacity must be at least equal to the highest load value (Fu and Fc) calculated.

Various anchor types are available, and the choice of type of anchor to be used is made according to each individual set up.

There are 6 major types of lifting anchors:

Lift Head Anchor
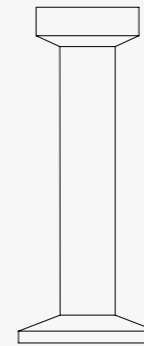
Eye Anchor
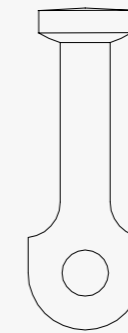
Rebar Anchor

Double Head Anchor
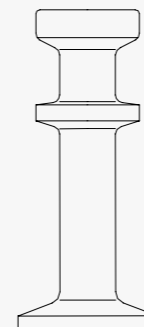
Foot & Eye Anchor
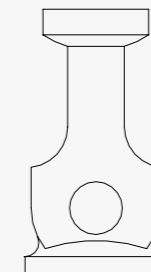
Plate Anchor
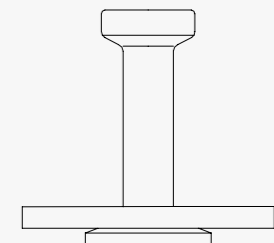
PRECAUTIONS TO BE TAKEN WHEN SETTING UP THE ANCHORS

– Do not weld the anchors

– Always use the appropriate former for each anchor type

– Anchors have to be slightly recessed from the surface of the concrete (the recess is generated by the appropriate former).

ANTICORROSION PROTECTION

Anchors are provided in black (plain steel). On request, anchors can be zinc-plated of hot dip galvanized for additional anti-corrosion protection.

2.1 Lift Head Anchor
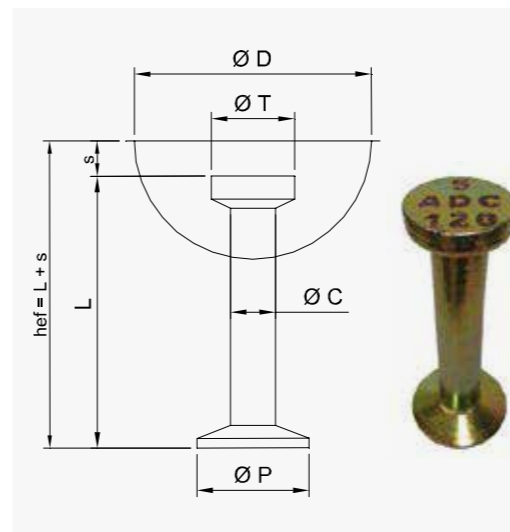
REFERENCE	SWL	DIMENSIONS [MM]					
		ØT	ØC	ØP	L	ØD	S
AP013...	1.3 T	18	10	25	40 à 240	60	8
AP025...	2.5 T	25	14	35	45 à 280	74	10
AP050...	5 T	36	20	50	75 à 340	94	12
AP075...	7.5 T	46	24	60	100 à 300	118	14
AP100...	10 T	46	28	70	115 à 340	118	14
AP150...	15 T	69	34	85	140 à 400	160	14
AP200...	20 T	69	38	98	200 à 500	160	14
AP320...	32 T	88	50	135	280 à 700	204	16

The anchorage in the concrete is produced by the foot of the anchor creating a wrenching cone. The anchorage resistance depends on:

• The concrete resistance (f_{ck})

• The length of the foot anchor (L)

• Distances to the edge of the concrete (T_N)

• Distances between each anchor (T_N)

The larger the wrenching cone, the higher the anchorage is resistant. It is at its maximum when the distance between fixing centers of the anchors is greater than 6 times the anchoring depth (h_{ef}) and the distance to the edge of the concrete is greater than 3 times h_{ef}.
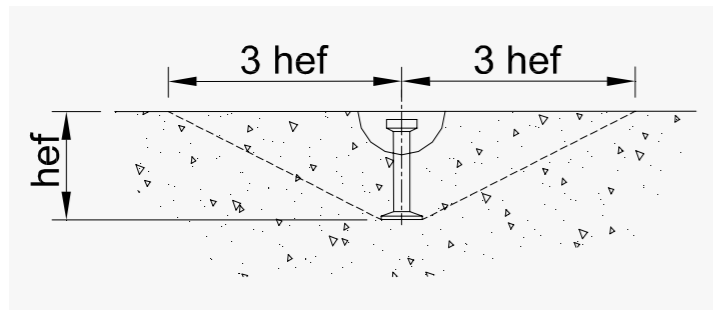
The tables on the following pages indicate the resistance value (in Tons) for foot anchor in practical cases.

Case No. 1 : Complete wrenching cone

Distances to the edge > 3 h_{ef}
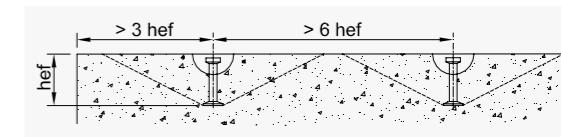
Distances between anchors > 6 h_{ef}

REFERENCE	LOAD (TONS)	LENGTH (MM)	S (MM)	CONCRETE RESISTANCE F_{ck} (MPA)						
				10	15	20	25	30	35	40
AP013040	1,3	40	8	0,43	0,56	0,68	0,79	0,89	0,99	1,08
AP013050	1,3	50	8	0,62	0,82	0,99	1,15	1,30	1,30	1,30
AP013055	1,3	55	8	0,74	0,97	1,17	1,30	1,30	1,30	1,30
AP013065	1,3	65	8	0,99	1,30	1,30	1,30	1,30	1,30	1,30
AP013085	1,3	85	8	1,30	1,30	1,30	1,30	1,30	1,30	1,30
AP013120	1,3	120	8	1,30	1,30	1,30	1,30	1,30	1,30	1,30
AP013170	1,3	170	8	1,30	1,30	1,30	1,30	1,30	1,30	1,30
AP013240	1,3	240	8	1,30	1,30	1,30	1,30	1,30	1,30	1,30
AP025045	2,5	45	10	0,56	0,74	0,89	1,04	1,17	1,30	1,42
AP025055	2,5	55	10	0,78	1,03	1,25	1,45	1,64	1,81	1,98
AP025065	2,5	65	10	1,04	1,37	1,66	1,93	2,18	2,42	2,50
AP025075	2,5	75	10	1,34	1,76	2,13	2,48	2,50	2,50	2,50
AP025085	2,5	85	10	1,67	2,20	2,50	2,50	2,50	2,50	2,50
AP025120	2,5	120	10	2,50	2,50	2,50	2,50	2,50	2,50	2,50
AP025140	2,5	140	10	2,50	2,50	2,50	2,50	2,50	2,50	2,50
AP025170	2,5	170	10	2,50	2,50	2,50	2,50	2,50	2,50	2,50
AP025210	2,5	210	10	2,50	2,50	2,50	2,50	2,50	2,50	2,50
AP025240	2,5	240	10	2,50	2,50	2,50	2,50	2,50	2,50	2,50
AP025280	2,5	280	10	2,50	2,50	2,50	2,50	2,50	2,50	2,50
AP050075	5	75	12	1,40	1,84	2,23	2,60	2,93	3,25	3,56
AP050085	5	85	12	1,75	2,29	2,78	3,23	3,65	4,04	4,42
AP050095	5	95	12	2,12	2,79	3,38	3,93	4,44	4,92	5,00
AP050120	5	120	12	3,23	4,24	5,00	5,00	5,00	5,00	5,00
AP050180	5	180	12	5,00	5,00	5,00	5,00	5,00	5,00	5,00
AP050240	5	240	12	5,00	5,00	5,00	5,00	5,00	5,00	5,00
AP050340	5	340	12	5,00	5,00	5,00	5,00	5,00	5,00	5,00
AP075100	7,5	100	14	2,41	3,16	3,84	4,46	5,04	5,58	6,11
AP075120	7,5	120	14	3,33	4,37	5,30	6,16	6,96	7,50	7,50
AP075140	7,5	140	14	4,40	5,77	7,00	7,50	7,50	7,50	7,50
AP075165	7,5	165	14	5,95	7,50	7,50	7,50	7,50	7,50	7,50
AP075200	7,5	200	14	7,50	7,50	7,50	7,50	7,50	7,50	7,50
AP075240	7,5	240	14	7,50	7,50	7,50	7,50	7,50	7,50	7,50
AP075300	7,5	300	14	7,50	7,50	7,50	7,50	7,50	7,50	7,50
AP100115	10	115	14	3,09	4,05	4,91	5,71	6,45	7,15	7,82
AP100135	10	135	14	4,12	5,41	6,56	7,61	8,60	9,54	10,00
AP100150	10	150	14	4,99	6,55	7,94	9,22	10,00	10,00	10,00
AP100170	10	170	14	6,28	8,24	10,00	10,00	10,00	10,00	10,00
AP100200	10	200	14	8,50	10,00	10,00	10,00	10,00	10,00	10,00
AP100250	10	250	14	10,00	10,00	10,00	10,00	10,00	10,00	10,00
AP100340	10	340	14	10,00	10,00	10,00	10,00	10,00	10,00	10,00
AP150140	15	140	14	4,40	5,77	7,00	8,13	9,19	10,19	11,14
AP150165	15	165	14	5,95	7,80	9,46	10,99	12,41	13,76	15,00
AP150200	15	200	14	8,50	11,15	13,52	15,00	15,00	15,00	15,00
AP150300	15	300	14	15,00	15,00	15,00	15,00	15,00	15,00	15,00
AP150400	15	400	14	15,00	15,00	15,00	15,00	15,00	15,00	15,00
AP200200	20	200	14	8,50	11,15	13,52	15,70	17,74	19,67	20,00
AP200240	20	240	14	11,97	15,71	19,05	20,00	20,00	20,00	20,00
AP200250	20	250	14	12,93	16,97	20,00	20,00	20,00	20,00	20,00
AP200340	20	340	14	20,00	20,00	20,00	20,00	20,00	20,00	20,00
AP200500	20	500	14	20,00	20,00	20,00	20,00	20,00	20,00	20,00
AP320280	32	280	16	16,26	21,33	25,87	30,04	32,00	32,00	32,00
AP320320	32	320	16	20,95	27,49	32,00	32,00	32,00	32,00	32,00
AP320500	32	500	16	32,00	32,00	32,00	32,00	32,00	32,00	32,00
AP320700	32	700	16	32,00	32,00	32,00	32,00	32,00	32,00	32,00

Safety Working Load (SWL) in Tons.

SDG PRODUCT CATALOGUE

PRECAST ACCESSORIES

Case No. 2 : Incomplete wrenching cone, cone at 45°

Distances to the edge > h_{ef}

Distances between anchors > 2 h_{ef}
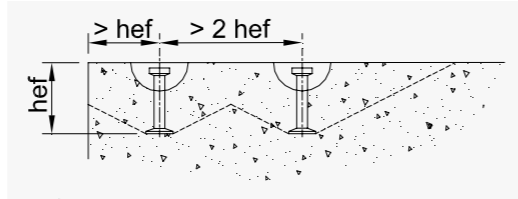
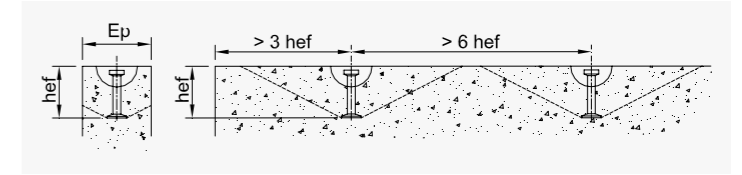| REFERENCE	LOAD (TONS)	LENGTH (MM)	S (MM)	CONCRETE RESISTANCE F_{ck} (MPA)						
				10	15	20	25	30	35	40
AP013040	1,3	40	8	0,11	0,14	0,17	0,20	0,22	0,25	0,27
AP013050	1,3	50	8	0,16	0,20	0,25	0,29	0,33	0,36	0,40
AP013055	1,3	55	8	0,18	0,24	0,29	0,34	0,38	0,43	0,47
AP013065	1,3	65	8	0,25	0,32	0,39	0,46	0,52	0,57	0,63
AP013085	1,3	85	8	0,40	0,53	0,64	0,74	0,84	0,93	1,02
AP013120	1,3	120	8	0,76	1,00	1,21	1,30	1,30	1,30	1,30
AP013170	1,3	170	8	1,30	1,30	1,30	1,30	1,30	1,30	1,30
AP013240	1,3	240	8	1,30	1,30	1,30	1,30	1,30	1,30	1,30
AP025045	2,5	45	10	0,14	0,18	0,22	0,26	0,29	0,32	0,36
AP025055	2,5	55	10	0,20	0,26	0,31	0,36	0,41	0,45	0,50
AP025065	2,5	65	10	0,26	0,34	0,42	0,48	0,54	0,60	0,66
AP025075	2,5	75	10	0,34	0,44	0,53	0,62	0,70	0,78	0,85
AP025085	2,5	85	10	0,42	0,55	0,67	0,77	0,87	0,97	1,06
AP025120	2,5	120	10	0,78	1,03	1,25	1,45	1,64	1,81	1,98
AP025140	2,5	140	10	1,04	1,37	1,66	1,93	2,18	2,42	2,50
AP025170	2,5	170	10	1,50	1,97	2,39	2,50	2,50	2,50	2,50
AP025210	2,5	210	10	2,25	2,50	2,50	2,50	2,50	2,50	2,50
AP025240	2,5	240	10	2,50	2,50	2,50	2,50	2,50	2,50	2,50
AP025280	2,5	280	10	2,50	2,50	2,50	2,50	2,50	2,50	2,50
AP050075	5	75	12	0,35	0,46	0,56	0,65	0,73	0,81	0,89
AP050085	5	85	12	0,44	0,57	0,69	0,81	0,91	1,01	1,11
AP050095	5	95	12	0,53	0,70	0,85	0,98	1,11	1,23	1,34
AP050120	5	120	12	0,81	1,06	1,29	1,49	1,69	1,87	2,05
AP050180	5	180	12	1,71	2,24	2,72	3,16	3,57	3,96	4,33
AP050240	5	240	12	2,95	3,87	4,69	5,00	5,00	5,00	5,00
AP050340	5	340	12	5,00	5,00	5,00	5,00	5,00	5,00	5,00
AP075100	7,5	100	14	0,60	0,79	0,96	1,11	1,26	1,40	1,53
AP075120	7,5	120	14	0,83	1,09	1,33	1,54	1,74	1,93	2,11
AP075140	7,5	140	14	1,10	1,44	1,75	2,03	2,30	2,55	2,79
AP075165	7,5	165	14	1,49	1,95	2,37	2,75	3,10	3,44	3,76
AP075200	7,5	200	14	2,12	2,79	3,38	3,93	4,44	4,92	5,38
AP075240	7,5	240	14	2,99	3,93	4,76	5,53	6,25	6,93	7,50
AP075300	7,5	300	14	4,57	6,00	7,28	7,50	7,50	7,50	7,50
AP100115	10	115	14	0,77	1,01	1,23	1,43	1,61	1,79	1,95
AP100135	10	135	14	1,03	1,35	1,64	1,90	2,15	2,38	2,61
AP100150	10	150	14	1,25	1,64	1,99	2,31	2,61	2,89	3,16
AP100170	10	170	14	1,57	2,06	2,50	2,90	3,28	3,64	3,98
AP100200	10	200	14	2,12	2,79	3,38	3,93	4,44	4,92	5,38
AP100250	10	250	14	3,23	4,24	5,14	5,97	6,75	7,49	8,19
AP100340	10	340	14	5,81	7,63	9,25	10,00	10,00	10,00	10,00
AP150140	15	140	14	1,10	1,44	1,75	2,03	2,30	2,55	2,79
AP150165	15	165	14	1,49	1,95	2,37	2,75	3,10	3,44	3,76
AP150200	15	200	14	2,12	2,79	3,38	3,93	4,44	4,92	5,38
AP150300	15	300	14	4,57	6,00	7,28	8,45	9,55	10,59	11,58
AP150400	15	400	14	7,95	10,43	12,65	14,69	15,00	15,00	15,00
AP200200	20	200	14	2,12	2,79	3,38	3,93	4,44	4,92	5,38
AP200240	20	240	14	2,99	3,93	4,76	5,53	6,25	6,93	7,58
AP200250	20	250	14	3,23	4,24	5,14	5,97	6,75	7,49	8,19
AP200340	20	340	14	5,81	7,63	9,25	10,74	12,14	13,46	14,72
AP200500	20	500	14	12,26	16,08	19,50	20,00	20,00	20,00	20,00
AP320280	32	280	16	4,06	5,33	6,47	7,51	8,49	9,41	10,29
AP320320	32	320	16	5,24	6,87	8,33	9,68	10,93	12,12	13,26
AP320500	32	500	16	12,35	16,21	19,65	22,82	25,79	28,59	31,27

Safety Working Load (SWL) in Tons.

Case No. 3 : Wrenching cone in a thin inner wall

Distances to the edge > 3 h_{ef}

Distances between anchors > 6 h_{ef}

REFERENCE	LOAD (TONS)	LENGTH (MM)	INNER WALL THICKNESS (MM)	S (MM)	CONCRETE RESISTANCE F_{ck} (MPA)						
					10	15	20	25	30	35	40
AP013120	1,3	120	60	8	0,37	0,49	0,59	0,69	0,78	0,86	0,94
AP013120	1,3	120	70	8	0,43	0,57	0,69	0,80	0,91	1,00	1,10
AP013120	1,3	120	80	8	0,50	0,65	0,79	0,92	1,03	1,15	1,25
AP025170	2,5	170	80	10	0,70	0,92	1,11	1,29	1,46	1,62	1,77
AP025170	2,5	170	100	10	0,87	1,14	1,39	1,61	1,82	2,02	2,21
AP025170	2,5	170	120	10	1,04	1,37	1,66	1,93	2,18	2,42	2,50
AP050240	5	240	100	12	1,22	1,60	1,94	2,26	2,55	2,83	3,09
AP050240	5	240	120	12	1,47	1,92	2,33	2,71	3,06	3,39	3,71
AP050240	5	240	140	12	1,71	2,24	2,72	3,16	3,57	3,95	4,32
AP075300	7,5	300	120	14	1,83	2,40	2,91	3,38	3,82	4,23	4,63
AP075300	7,5	300	140	14	2,13	2,80	3,39	3,94	4,45	4,93	5,39
AP075300	7,5	300	160	14	2,43	3,19	3,87	4,50	5,08	5,63	6,16
AP0100340	10	340	140	14	2,40	3,15	3,82	4,44	5,02	5,56	6,08
AP0150400	15	400	160	14	3,21	4,22	5,11	5,94	6,71	7,44	8,13
AP0150400	15	400	180	14	3,61	4,74	5,75	6,67	7,54	8,36	9,15
AP0150400	15	400	200	14	4,01	5,26	6,38	7,41	8,38	9,29	10,16
AP0200500	20	500	160	14	3,99	5,24	6,35	7,37	8,33	9,24	10,10
AP0200500	20	500	180	14	4,49	5,89	7,14	8,29	9,37	10,39	11,36
AP0200500	20	500	200	14	4,99	6,54	7,93	9,21	10,41	11,54	12,62
AP0200500	20	500	220	14	5,48	7,19	8,72	10,13	11,45	12,69	13,88
AP0320700	32	700	200	16	6,95	9,12	11,06	12,84	14,51	16,09	17,60
AP0320700	32	700	220	16	7,64	10,03	12,16	14,12	15,96	17,70	19,35
AP0320700	32	700	240	16	8,34	10,94	13,27	15,41	17,41	19,30	21,11
AP0320700	32	700	260	16	9,03	11,85	14,37	16,69	18,85	20,90	22,86
AP0320700	32	700	280	16	9,72	12,76	15,47	17,96	20,30	22,51	24,61
AP0320700	32	700	300	16	10,41	13,67	16,57	19,24	21,74	24,11	26,37
AP0320700	32	700	320	16	11,11	14,57	17,67	20,52	23,19	25,71	28,12

Safety Working Load (SWL) in Tons.

SDG PRODUCT CATALOGUE

PRECAST ACCESSORIES

Case No. 4 : Round surfaces (pipes)

In the longitudinal way: Distances at the edge > 3 h_{ef}
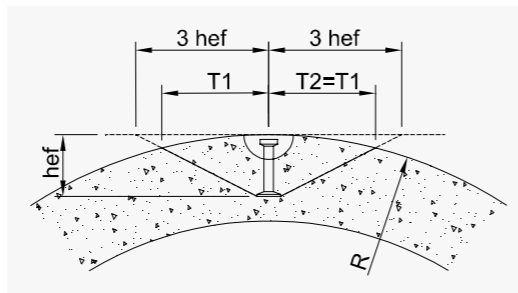
INTERIOR Ø PIPE (MM)	THICKNESS PIPE (MM)	LENGTH ANCHOR (MM)	S (MM)	T1 (MM)	CONCRETE RESISTANCE F$_{ck}$ (MPA)									
					10	15	20	25	30	35	40	45	50	55
600	62	40	8	101	0,38	0,50	0,61	0,70	0,80	0,88	0,97	1,05	1,12	1,20
700	70	40	8	105	0,39	0,51	0,62	0,72	0,81	0,90	0,98	1,06	1,14	1,22
800	80	45	10	120	0,51	0,67	0,81	0,94	1,06	1,18	1,29	1,40	1,50	1,60
800	80	55	10	136	0,70	0,92	1,11	1,29	1,46	1,61	1,77	1,91	2,05	2,19
900	90	55	10	140	0,71	0,93	1,13	1,31	1,48	1,64	1,79	1,94	2,08	2,22
900	90	65	10	156	0,93	1,21	1,47	1,71	1,93	2,14	2,34	2,54	2,72	2,90
1000	100	65	10	160	0,94	1,23	1,49	1,73	1,96	2,17	2,38	2,57	2,76	2,94
1000	100	75	10	176	1,19	1,56	1,89	2,19	2,47	2,74	3,00	3,25	3,49	3,71
1200	120	75	10	184	1,21	1,59	1,93	2,24	2,53	2,81	3,07	3,33	3,57	3,80
1200	120	85	10	200	1,50	1,96	2,38	2,76	3,12	3,46	3,79	4,10	4,40	4,69
1400	140	85	12	211	1,58	2,08	2,52	2,93	3,31	3,67	4,01	4,34	4,66	4,97
1400	140	95	12	227	1,91	2,50	3,03	3,52	3,98	4,41	4,82	5,22	5,60	5,97
1500	150	95	12	231	1,92	2,52	3,06	3,55	4,01	4,45	4,87	5,26	5,65	6,02
1500	150	120	12	271	2,84	3,73	4,53	5,26	5,94	6,59	7,20	7,79	8,36	8,91
1600	160	115	14	271	2,75	3,61	4,38	5,08	5,74	6,37	6,96	7,53	8,09	8,62
1600	160	135	14	302	3,59	4,72	5,72	6,64	7,50	8,32	9,10	9,85	10,57	11,26
1800	180	135	14	311	3,66	4,80	5,82	6,76	7,63	8,46	9,26	10,02	10,75	11,46
1800	180	150	14	334	4,37	5,73	6,95	8,07	9,12	10,11	11,06	11,97	12,84	13,69
2000	200	150	14	343	4,44	5,82	7,06	8,19	9,26	10,27	11,23	12,15	13,04	13,90
2000	200	170	14	374	5,49	7,21	8,74	10,15	11,46	12,71	13,90	15,04	16,14	17,21
2500	250	165	14	386	5,38	7,05	8,55	9,93	11,22	12,45	13,61	14,73	15,81	16,85
2500	250	200	14	443	7,51	9,85	11,94	13,87	15,67	17,38	19,00	20,56	22,07	23,52
2800	280	200	14	455	7,62	10,00	12,13	14,08	15,91	17,64	19,30	20,88	22,41	23,89
2800	280	240	14	518	10,49	13,76	16,69	19,38	21,89	24,28	26,55	28,73	30,83	32,86

Safety Working Load (SWL) in Tons.

General case

The following general formula defines the acceptable wrenching force F consistent with the concrete wrenching cone rupture:

$$F = 0{,}217 \times h_{ef}^2 \times f_{ck} 0{,}67 \times \sqrt{\sin\left(30 \times \frac{T_1}{h_{ef}}\right)} \times \sqrt{\sin\left(30 \times \frac{T_2}{h_{ef}}\right)} \times \sqrt{\sin\left(30 \times \frac{T_3}{h_{ef}}\right)} \times \sqrt{\sin\left(30 \times \frac{T_4}{h_{ef}}\right)} \Big/ 2{,}5$$

With

- F (T) = Acceptable wrenching force
- h_{ef} (cm) = casting depth of the anchor
- f_{ck} (T/cm²) = Concrete resistance during lifting
- T_N (cm) = distance to the edge of the concrete or semi-distance between the anchors, limited to 3 x h_{ef}
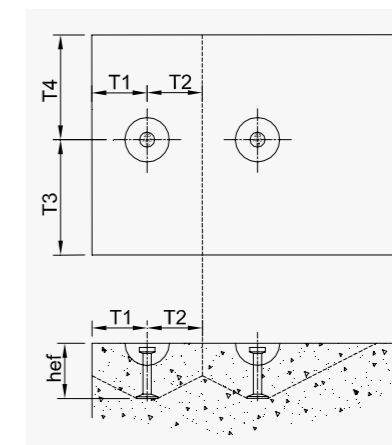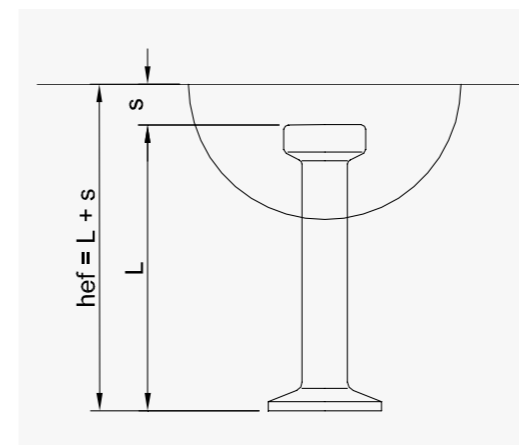
ANCHOR LOAD	S (MM)
1.3 T	8
2.5 T	10
5 T	12
7.5 – 10 T	14
15 – 20 T	14
32 T	16

SDG PRODUCT CATALOGUE

PRECAST ACCESSORIES

Case for rounded shapes (Pipes)

For rounded forms (like pipes for example), the transversal distances are reduced to take into account the exterior radius of the element.

So in this case:

$$T_1 = T_2 = R \times \sin\left\{180 - \arcsin\left[\cos(18,4)\,\frac{R - h_{ef}}{R}\right] - 108,4\right\}$$

With
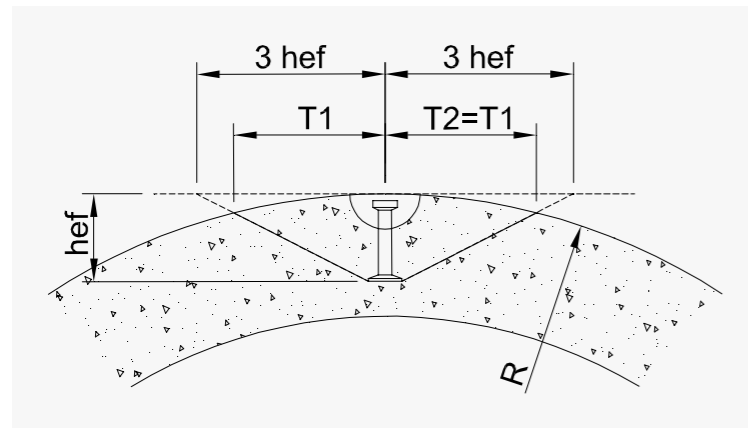
– R (cm) = Bend radius of the concrete element

– h_{ef} (cm) = Casting depth of the anchor

– T_N (cm) = distance to the edge of the concrete or semi-distance between the anchors, limited to $3 \times h_{ef}$

2.2 Double Head Anchor
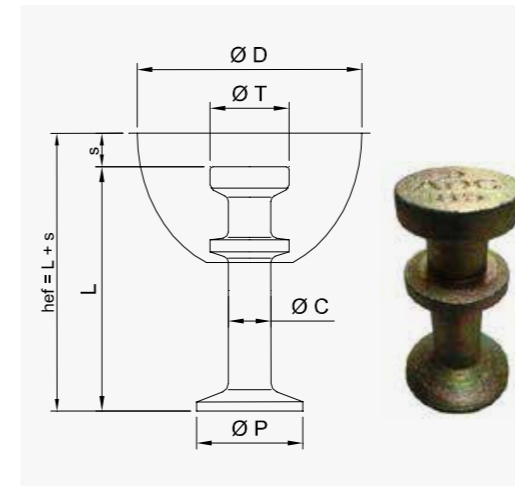
REFERENCE	SWL	DIMENSIONS [MM]					
		ØT	ØC	ØP	L	ØD	S
AP013...	1.3 T	18	10	25	55 à 240	60	8
AP025...	2.5 T	25	14	35	55 à 240	74	10
AP050...	5 T	36	20	50	120 à 180	94	12

The resistance value of the double head anchor is the same as the equivalent lift head anchor (same SWL and same length). Indeed lift head anchors and double head anchors have the same body and foot diameter.

Like for the lift head anchor, the anchorage is produced in the concrete due to the foot of the anchor which generates a compression cone. So, the anchorage resistance depends on the concrete resistance (f_{ck}), the length of the anchor (L) and the distances to the edge of the concrete (T_N) and between each anchor (T_N).

The wrenching resistance values are shown in paragraph 2.1 relating to lift head anchors.

2.3 Eye Anchor
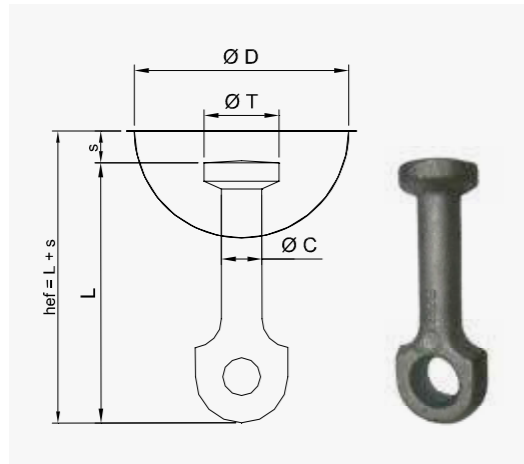
REFERENCE	SWL	DIMENSIONS [MM]				
		ØT	ØC	L	ØD	S
AO013065	1.3 T	18	10	65	60	8
AO025090	2.5 T	25	14	90	74	10
AO050120	5 T	36	20	120	94	12
AO050090	5 T	36	20	90	94	12
AO100180	10 T	46	28	180	118	14
AO100115	10 T	46	28	115	118	14
AO200250	20 T	69	38	250	160	14
AO320300	32 T	88	50	300	204	16

With its complementary reinforced steel bar, the eye anchor has a universal use.

The anchorage resistance is transmitted to the concrete via the reinforced steel bar.

Thus, the anchorage capacity depends on the diameter and the length of the associated reinforced steel bar.

The longer the bar, the more the anchorage in resistant (within the SWL limit of the anchor).

The following table indicates the diameter and the total length of the reinforced steel bar to use.

REINFORCED RIBBED STEEL FEE500, (ACCORDING TO THE NF A 35-016 NORM)		1,3 T	2,5 T	5 T	10 T	20 T	32 T
	REINFORCING STEEL DIAMETER (MM)	8	10	16	20	32	40
	CONCRETE AT 10 MPA	930	1380	1790	2760	3570	4550
	CONCRETE AT 15 MPA	770	1140	1490	2280	2970	3780
	CONCRETE AT 20 MPA	670	980	1290	1960	2570	3270
	CONCRETE AT 25 MPA	590	870	1140	1730	2280	2900
	CONCRETE AT 30 MPA	530	780	1030	1560	2060	2620
	CONCRETE AT 35 MPA	490	710	950	1420	1900	2410
	CONCRETE AT 40 MPA	460	660	880	1310	1760	2240
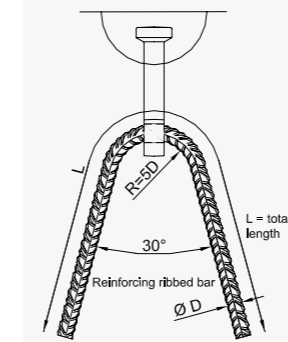
The eye anchor cannot be used under any circumstances without reinforcing steel.

The eye anchor is particularly adapted to the narrow panels.

It is important to respect the diameters of the bending mandrel indicated in the standards covering the reinforcing steel for reinforced concrete, and to conform to the Eurocode 2 standards.

It is advisable to set up the reinforcing steel in a "V" form with a 30° angle. If the concrete element does not allow it, it is possible to set up the reinforcing steel horizontally and to tie it to the lower wire mesh.

2.4 Flat End Anchor
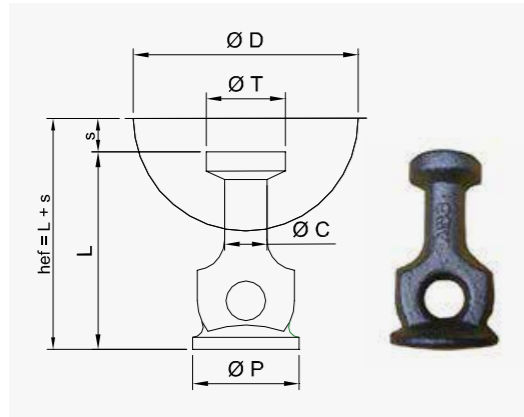
REFERENCE	SWL	DIMENSIONS [MM]					
		ØT	ØC	ØP	L	ØD	S
AOP013050	1.3 T	18	10	22	50	60	8
AOP025065	2.5 T	25	14	35	65	74	10
AOP050080	5 T	36	20	20	80	94	12

The foot and eye anchor resistance is transmitted to the concrete via its reinforcing steel. So, the anchorage capacity depends on the diameter and the length of the reinforcing steel. The diameters and lengths of the reinforcing steels are the same than those used for the eye anchors.

The reinforcing steel to use is the same than the one used for the eye anchor with the same SWL. (Please check the paragraph 2.3).

The foot and eye anchor cannot under any circumstances be used without reinforcing steel.

Smaller than the eye anchor, the foot and eye anchor allows the setting up of an anchorage in narrow elements.

It is important to respect the diameters of the bending mandrel indicated in the standards covering the reinforcing steel for reinforced concrete, and to conform to the Eurocode 2 standards.

2.5 Rebar Anchor
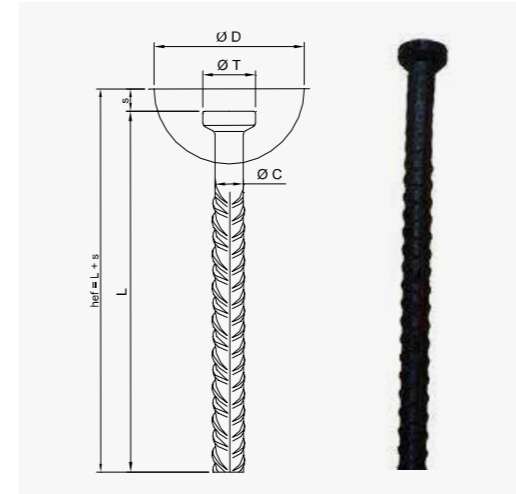
REFERENCE	SWL	DIMENSIONS [MM]				
		ØT	ØC	L	ØD	S
AA020400	2.0 T	25	14	400	74	10
AA025400	2.5 T	25	14	400	74	10
AA025520	2.5 T	25	14	520	74	10
AA040510	4 T	36	20	510	94	12
AA040720	4 T	36	20	720	94	12
AA0401150	4 T	36	20	1150	94	12
AA050580	5 T	36	20	580	94	12
AA050900	5 T	36	20	900	94	12
AA075750	7.5 T	46	25	750	118	14
AA0751150	7.5 T	46	25	1150	118	14
AA100870	10 T	46	28	870	118	14
AA1001300	10 T	46	28	1300	118	14
AA1501080	10 T	69	32	1080	160	14
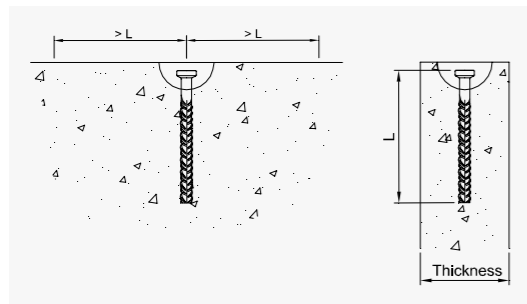
The anchorage resistance is transmitted to the concrete via the reinforcing steel of the anchor's body.

| REFERENCE	LOAD (TONS)	LENGTH (MM)	INNER WALL THICKNESS (MM)	CONCRETE RESISTANCE F$_{ck}$ (MPA)						
				10	15	20	25	30	35	40
AA020400	2	400	98	1.70	2.00	2.00	2.00	2.00	2.00	2.00
AA020400	2	400	70	1.40	1.84	2.00	2.00	2.00	2.00	2.00
AA025400	2.5	400	98	1.70	2.23	2.50	2.50	2.50	2.50	2.50
AA025400	2.5	400	70	1.40	1.84	2.22	2.50	2.50	2.50	2.50
AA025520	2.5	520	98	2.26	2.50	2.50	2.50	2.50	2.50	2.50
AA025520	2.5	520	70	1.86	2.44	2.50	2.50	2.50	2.50	2.50
AA040510	4	510	140	3.10	4.00	4.00	4.00	4.00	4.00	4.00
AA040510	4	510	100	2.55	3.35	4.00	4.00	4.00	4.00	4.00
AA040720	4	720	140	4.00	4.00	4.00	4.00	4.00	4.00	4.00
AA040720	4	720	100	3.71	4.00	4.00	4.00	4.00	4.00	4.00
AA0401150	4	1150	140	4.00	4.00	4.00	4.00	4.00	4.00	4.00
AA0401150	4	1150	100	4.00	4.00	4.00	4.00	4.00	4.00	4.00
AA050580	5	580	140	3.57	4.68	5.00	5.00	5.00	5.00	5.00
AA050580	5	580	100	2.94	3.85	4.67	5.00	5.00	5.00	5.00
AA050900	5	900	140	5.00	5.00	5.00	5.00	5.00	5.00	5.00
AA050900	5	900	100	4.70	5.00	5.00	5.00	5.00	5.00	5.00
AA075750	7.5	750	175	5.78	7.50	7.50	7.50	7.50	7.50	7.50
AA075750	7.5	750	125	4.76	6.24	7.50	7.50	7.50	7.50	7.50
AA0751150	7.5	1150	175	7.50	7.50	7.50	7.50	7.50	7.50	7.50
AA0751150	7.5	1150	125	7.50	7.50	7.50	7.50	7.50	7.50	7.50
AA100870	10	870	196	7.60	9.96	10.00	10.00	10.00	10.00	10.00
AA100870	10	870	140	6.26	8.20	9.94	10.00	10.00	10.00	10.00
AA1001300	10	1300	196	10.00	10.00	10.00	10.00	10.00	10.00	10.00
AA1001300	10	1300	140	9.58	10.00	10.00	10.00	10.00	10.00	10.00
AA1501080	15	1080	224	10.71	14.04	15.00	15.00	15.00	15.00	15.00
AA1501080	15	1080	160	8.82	11.56	14.01	15.00	15.00	15.00	15.00

Safety Working Load (SWL) in Tons.

2.6 Plate Anchor
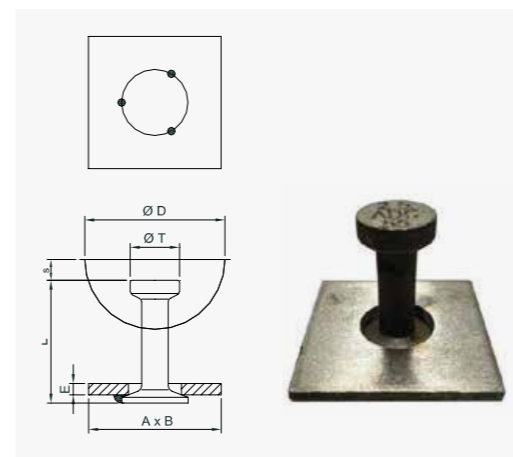
REFERENCE	SWL	DIMENSIONS [MM]					
		ØT	ØC	L	A x B x E	ØD	S
AS025055	2.5 T	25	14	55	70x70x6	74	10
AS025120	2.5 T	25	14	120	70x70x6	74	10
AS050065	5 T	36	20	65	90x90x8	94	12
AS050095	5 T	36	20	95	90x90x8	94	12
AS100115	10 T	46	28	115	90x90x10	118	12

The plate anchor is well adapted for thin elements.

It must be used with the reinforcing steel bars specified in the table here after.

The plate of the anchor and the additional reinforcing steel must be placed under the upper wire mesh and tied to the lower wire mesh

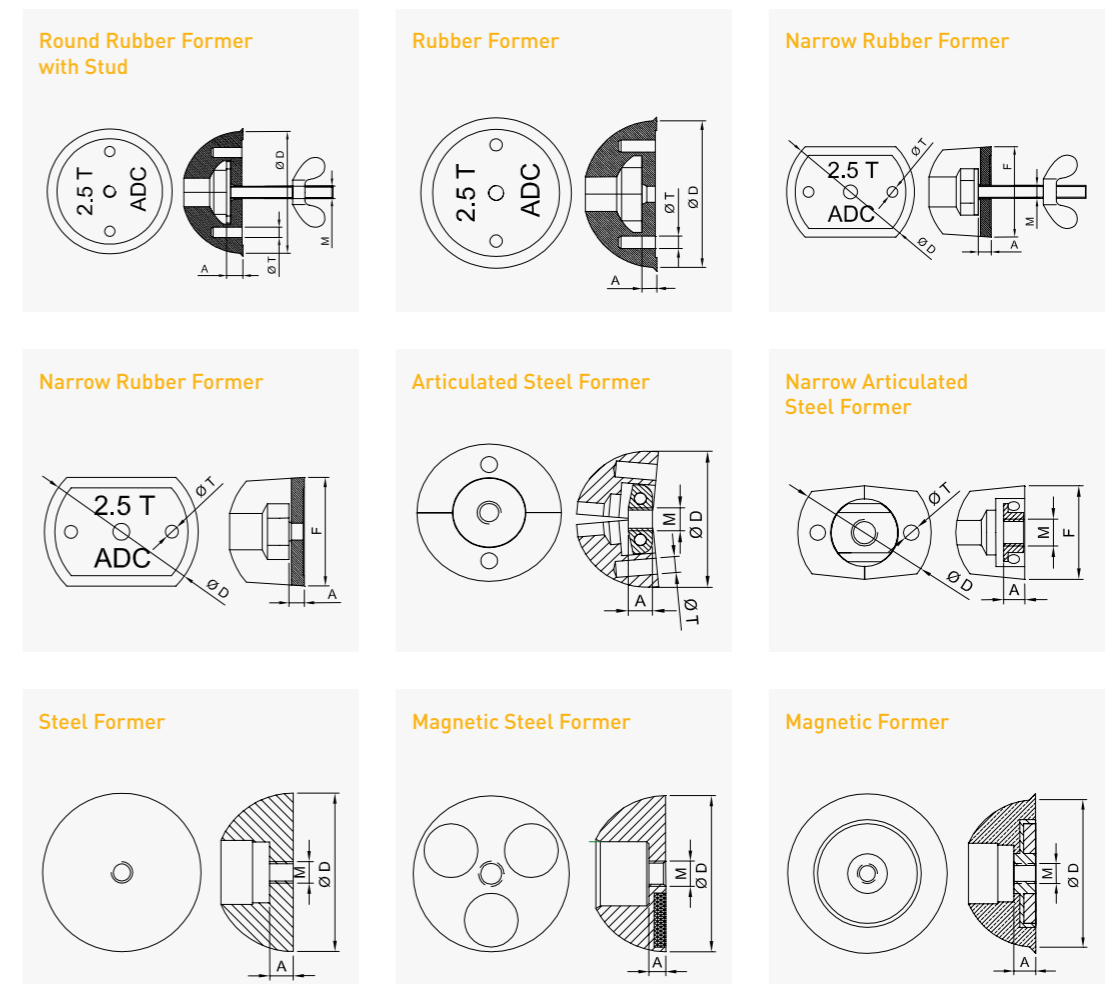When loading, the concrete resistance must be at least at 15 MPa.
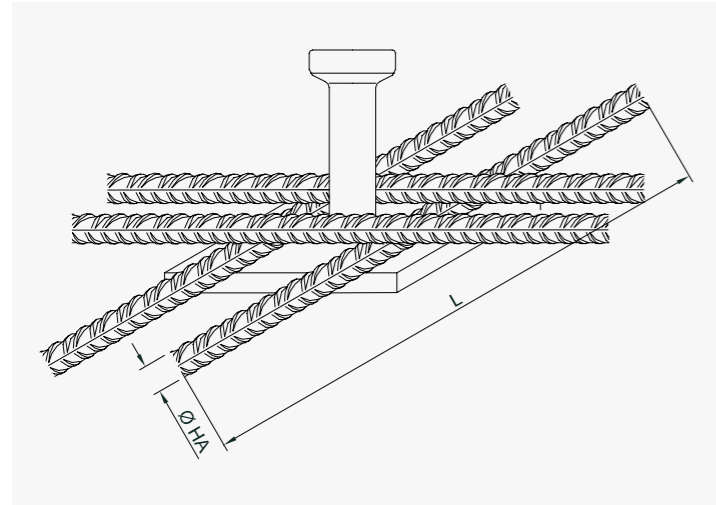
The following table indicates the diameter and the total length of the reinforcing steel bars to use.

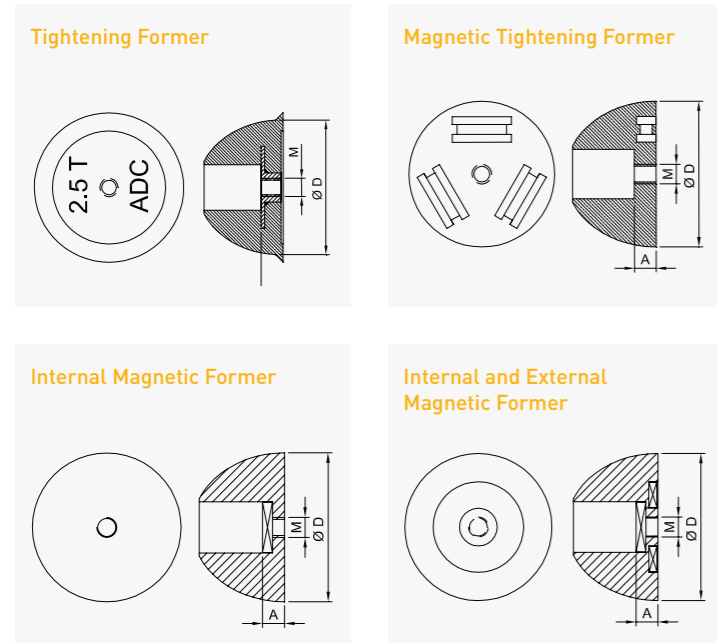| REFERENCE	SWL	REINFORCED RIBBED STEEL FEE500
AS025055	2.5 T	4 rebars Ø10 length 650mm
AS025120	2.5 T	4 rebars Ø10 length 650mm
AS050065	5 T	4 rebars Ø14 length 900mm
AS050095	5 T	4 rebars Ø14 length 900mm
AS100115	10 T	4 rebars Ø16 length 1520mm

3. Choice of Former

There are various ranges of recess formers to match the application, the mould, and the number of times the formers are re-used.

Formers for lift head anchors / eye anchors / foot & eye ancho rs / rod anchor / plate anchor

Round Rubber Former with Stud

Rubber Former

Narrow Rubber Former

Narrow Rubber Former

Articulated Steel Former

Narrow Articulated Steel Former

Steel Former

Magnetic Steel Former

Magnetic Former

Formers for double head anchors

Tightening Former

Magnetic Tightening Former

Internal Magnetic Former

Internal and External Magnetic Former

3.1 Formers for Lift Head Anchors, Eeye Anchors, and Foot & Eye Anchors
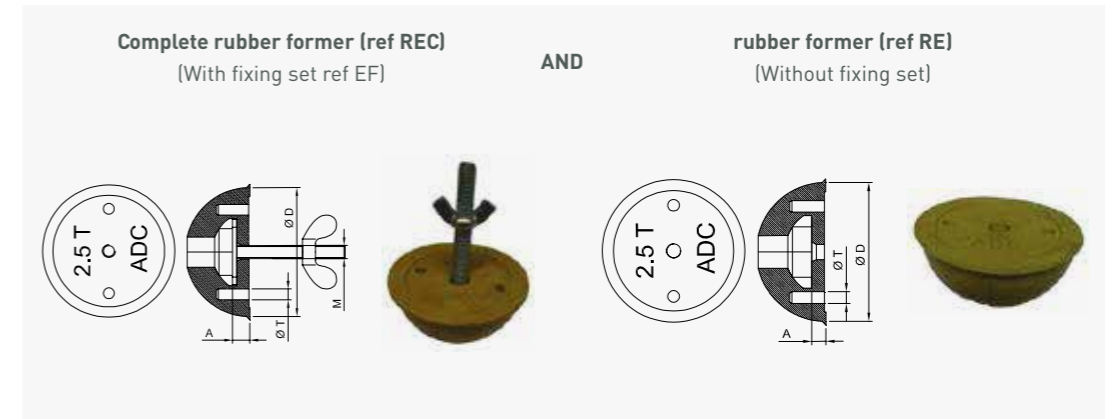
Complete rubber former (ref REC)
(With fixing set ref EF)

AND

rubber former (ref RE)
(Without fixing set)

REFERENCE WITH FIXING SET	REFERENCE WITHOUT FIXING SET	LOAD	COLOUR	DIMENSIONS (MM)			
				ØD	ØT	A	M
REC013	RE013	1.3 T	Blue	60	6,5	9	M8
REC025	RE025	2.5 T	Yellow	74	6,5	13	M10
REC050	RE050	5 T	Blue	94	8,5	15,5	M10
REC075	RE075	7.5 T	Red	118	10,5	18	M12
REC100	RE100	10 T	Yellow	118	10,5	18	M12
REC150	RE150	15 T	Grey	160	10,5	19	M12
REC200	RE200	20 T	Black	160	10,5	19	M12
REC320	RE320	32 T	Black	204	10,5	19	M12

This is the most common former range. Made of flexible elastomer, it can be used up to 30 or 40 times in normal conditions of use.

The complete rubber former (ref REC) is composed of two parts: the rubber former (ref RE) and the fixing set (ref EF).

Complete narrow rubber former (ref REC)
(With fixing set ref EF)

AND

Narrow rubber former (ref RE)
(Without fixing set)

| REFERENCE WITH FIXING SET	REFERENCE WITHOUT FIXING SET	LOAD	COLOUR	DIMENSIONS (MM)				
				ØD	ØT	A	M	F
REC013	RE013	1.3 T	Black	60	6,5	9	M8	43
REC025	RE025	2.5 T	Black	74	6,5	13	M10	53
REC050	RE050	5 T	Black	94	8,5	15,5	M10	69
REC100	RE100	10 T	Black	118	10,5	18	M12	85
REC200	RE200	20 T	Black	160	10,5	19	M12	124

It is the narrow version of the rubber former.

The complete narrow rubber former (ref REEC) is composed of 2 parts: the narrow rubber former (ref REE) and the fixing set (ref EF).

Articulated steel former (ref RAA)
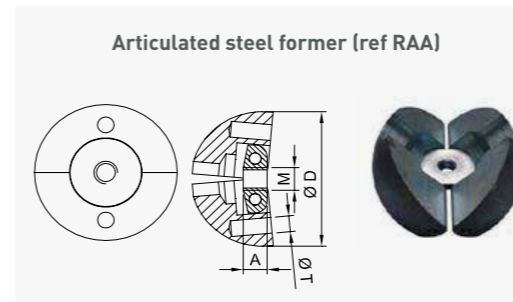
Its shape is the same as the rubber former. Made out of steel, it can be re-used indefinitely.

REFERENCE	LOAD	DIMENSIONS (MM)			
		ØD	ØT	A	M
RAA013	1.3 T	60	7	10	M10
RAA025	2.5 T	74	7	10	M10
RAA050	5 T	94	10	10	M12
RAA100	10 T	118	10	10	M12

**Narrow articulated steel former (ref RAAE)**
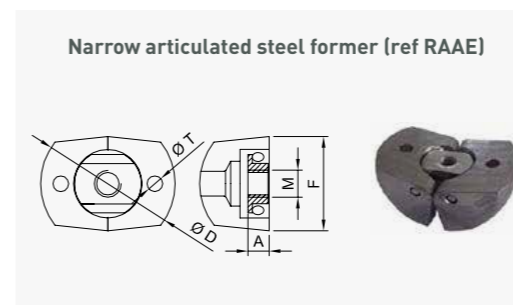
Its shape is the same as the narrow rubber former. Made out of steel, it can be re-used indefinitely.

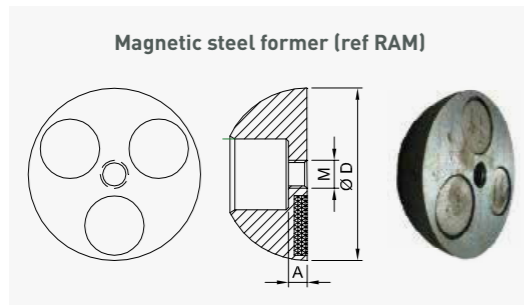| REFERENCE	LOAD	DIMENSIONS (MM)				
		ØD	ØT	A	M	F
RAAE013	1.3 T	60	7	10	M12	42
RAAE025	2.5 T	74	7	10	M10	48

Steel former (ref RA)
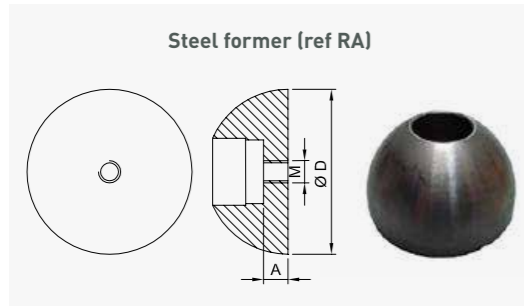
This former is suitable for welding or screwing onto the mould. It must be used with a rubber ring (ref BC) to retain the anchor.

REFERENCE	LOAD	DIMENSIONS (MM)		
		ØD	A	M
RA013	1.3 T	60	10	M10
RA025	2.5 T	74	10	M10
RA050	5 T	94	10	M12
RA100	10 T	118	10	M12
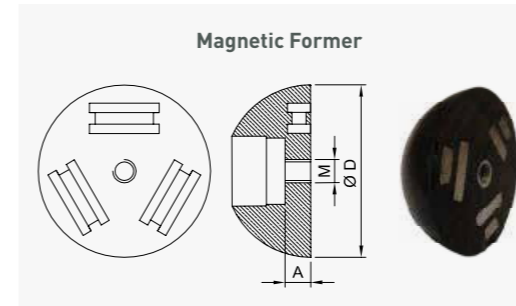
Magnetic steel former (ref RAM)

This former is to be used on metallic moulds. It must be used with a rubber ring (ref BC) to retain the anchor.

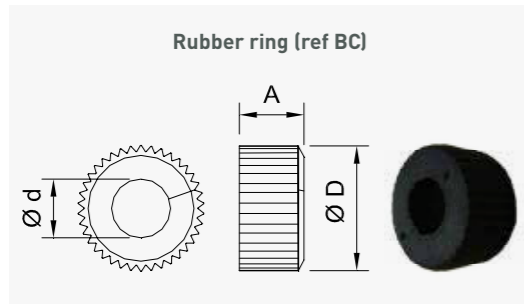| REFERENCE	LOAD	MAGNETISM INSTALLED	DIMENSIONS (MM)		
			ØD	A	M
RAM013	1.3 T		60	8	M8
RAM025	2.5 T		74	10	M12
RAM050	5 T		94	12	M12
RAM100	10 T		118	14	M12

Magnetic Former

This former is to be used on metallic moulds. It must be used with a rubber ring (ref BC) to retain the anchor.

REFERENCE	LOAD	MAGNETISM INSTALLED	DIMENSIONS (MM)		
			ØD	A	M
RM013	1.3 T	60 kg	60	6	M8
RM025	2.5 T	75 kg	74	9	M10
RM050	5 T	100 kg	94	12	M10
RM100	10 T	150 kg	118	12	M10

3.2 Additional Accessories for Formers

Rubber ring (ref BC)

REFERENCE	LOAD	DIMENSIONS (MM)		
		ØD	Ød	A
BC013	1.3 T	22	10	11
BC025	2.5 T	32	14	12
BC050	5 T	39	20	14
BC100	10 T	49	28	20

Fixing set (ref EF)
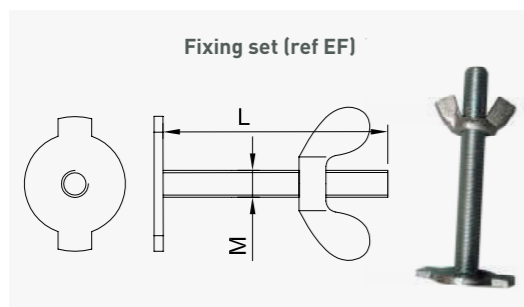
REFERENCE	LOAD	DIMENSIONS (MM)	
		L	M
EF013	1.3 T	80	M8
EF025	2.5 T	80	M10
EF050	5 T	100	M10
EF100	7.5 – 10 T	100	M12
EF200	15 – 20 T	100	M12

Threaded plate (ref PT)
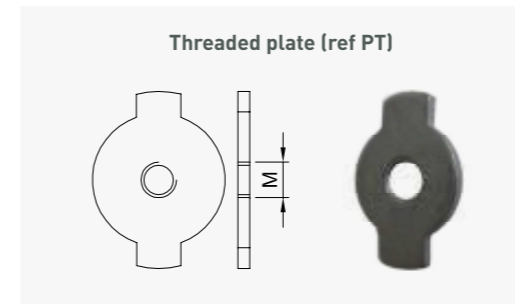
REFERENCE	LOAD	DIMENSIONS (MM)
		M
PT013	1.3 T	M8
PT025	2.5 T	M10
PT050	5 T	M10
PT100	7.5 – 10 T	M12
PT200	15 – 20 T	M12

3.3 Formers for Double Head Anchors

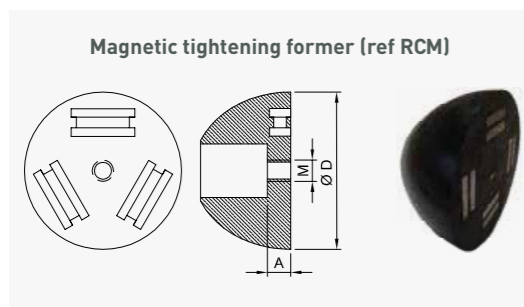**Tightening former (ref RC)**
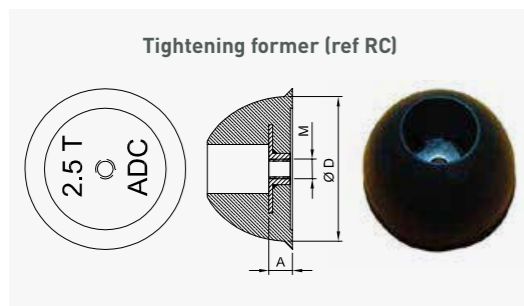
This former is made of elastomer. The double head anchor is forced lightly into the former held in place by pressure on the anchor head and collar.

The former is screwed into the mould.

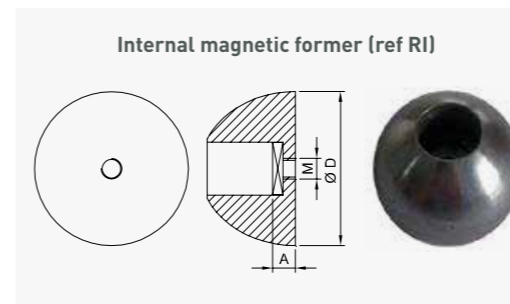| REFERENCE	LOAD	DIMENSIONS (MM)		
		ØD	A	M
RC013	1.3 T	60	9	M8
RC025	2.5 T	74	11	M10
RC050	5 T	94	14	M10

Magnetic tightening former (ref RCM)

It is the magnetic version of the tightening former.

This former is made of polyurethane. The double head anchor is forced lightly into the former held in place by pressure on the anchor head and collar.

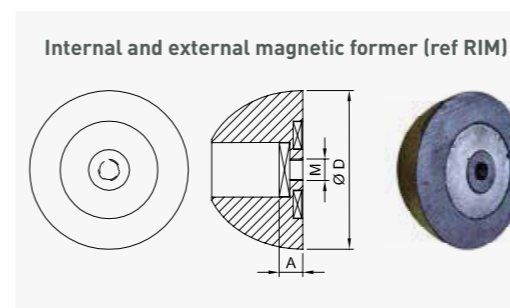The former is held onto a metallic mould by its magnet.

REFERENCE	LOAD	MAGNETISM INSTALLED	DIMENSIONS (MM)		
			ØD	A	M
RCM013	1.3 T	60 kg	60	9	M8
RCM025	2.5 T	60 kg	74	11	M10
RCM050	5 T	100 kg	94	14	M10

Internal magnetic former (ref RI)

This former is made of steel. The double head anchor is set up into the former and held by a light internal magnet, allowing a rapid and easy removal from the mould.

The former can be screwed or welded onto the mould.

REFERENCE	LOAD	DIMENSIONS (MM)		
		ØD	A	M
RC013	1.3 T	60	9	M8
RC025	2.5 T	74	11	M10
RC050	5 T	94	14	M10

Internal and external magnetic former (ref RIM)
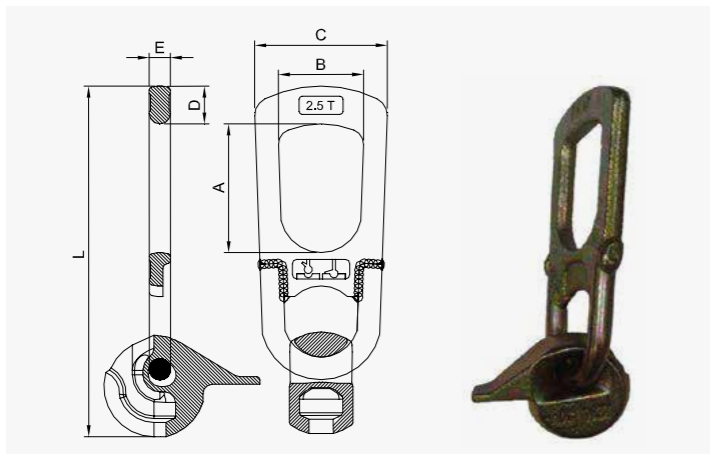

It is the magnetic version of the internal magnetic former.

The former is held onto a metallic mould by its magnet.

REFERENCE	LOAD	MAGNETISM INSTALLED	DIMENSIONS (MM)		
			ØD	A	M
RIM013	1.3 T	75 kg	60	9	M8
RIM025	2.5 T	75 kg	74	11	M10

4. Lift Head Shackle

REFERENCE	SWL	DIMENSIONS (MM)					
		A	B	C	D	E	L
AN013	1.3 T	70	46	74	20	12	190
AN025	2.5 T	85	58	88	25	14	235
AN050	5 T	88	70	118	37	16	280
AN100	10 T	112	84	160	50	26	390
AN200	20 T	150	118	186	75	30	500
AN320	32 T	189	175	269	100	45	

The lift head shackle must be chosen to match the anchor load. Under no circumstances should a lift head shackle be used with a different capacity to that of the anchor, even if the load capacity of the lift head shackle is superior to the load capacity of the anchor.

4.1 Quality system

The dimensions of the Lift Head Shackle are 100% quality checked.

For each batch, destructive testing is carried out to ensure quality standards are maintained.

Each Lift Head Shackle is provided with a CE declaration of conformity. On the back of this declaration, the safety and usage and conditions are stated.

4.2 Periodic control

Whatever the frequency of use, each Lift Head Shackle **must be tested once a year** by a competent person. Any physical abnormality, deformation, any sign of welding, must lead to the immediate destruction of the shackle. The Lift Head Shackles cannot be repaired.
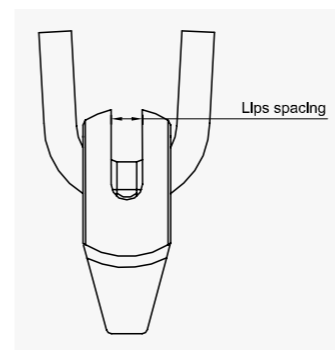
The points to test are:

1. **Visual test**
   – Absence of permanent deformation (elongated or twisted handle)
   – Absence of welding signs (except the original weld).

2. **Test of the correct hinge operation between the nut and the handle**

3. **Test of the nut lips spacing (using a gauge or a caliper) on the whole of its length:**

REFERENCE	SWL	MINIMAL DIMENSION	MAXIMAL DIMENSION
AN013	1.3 T	10.5	13.0
AN025	2.5 T	15.0	17.5
AN050	5 T	20.5	23.5
AN100	10 T	28.5	32.0
AN200	20 T	40.5	45.0
AN320	32 T	51.0	58.0

4.3 Remote decoupling

A remote decoupling system can be provided to decouple the lift head shackle from the anchors when access to the anchor points is difficult.

5. Use and Safety Conditions

With each lift head shackle, a summary note covering usage and safety conditions is provided.

Before use, the calculation assumptions must be check, in particular:

– The mechanics of handling

– The expected lifting system (sling or lifting/spreader beam), the length of the slings (or the angle of the slings)

– The lifting means (stationary crane, bridge crane...)

– The minimum concrete strength.

## Lift head shackle – usage and safety conditions

BEFORE USE

To do

– You must check that the safety working load of the anchor is the same as the safety working load of the Lift Head Shackle
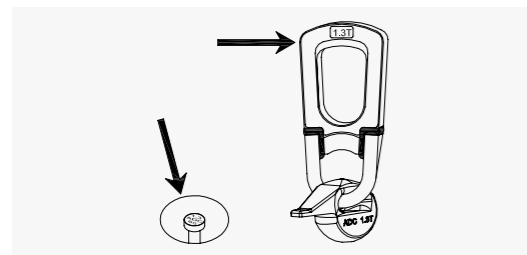
– The length of the slings should be at least twice the distance between the anchors, in order to have an angle of 30° between the slings. It is possible to have a bigger angle only if it has been considered in calculations. It is always better to use a lifting bea.


30° max.
(except special calculation)
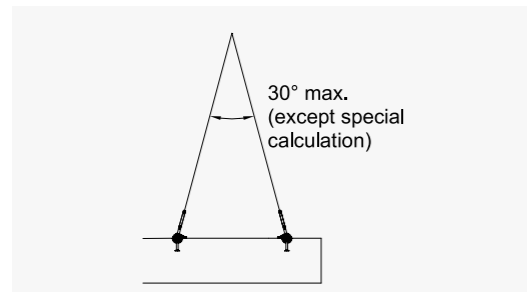
– The concrete strength should be at least equal to that used in the calculations. The minimum concrete strength is 10 MPa

– You must check that the nose is resting on the concrete

– The nose must be in the direction of the force. When tilt up, the nose must be in the upper position.

Put the nose in the upper position

Put the nose on the concrete in the direction of the force
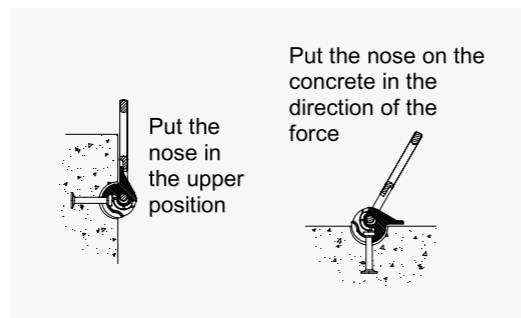
What not to do

– You must not break the concrete around the anchor. The lift head shackle hooks onto the anchor without any other action.

– You must not weld the anchor nor the lift head shackle, for whatever reason.
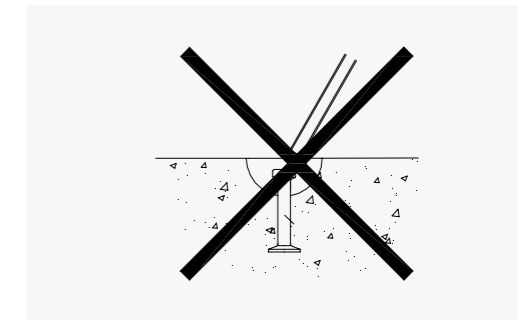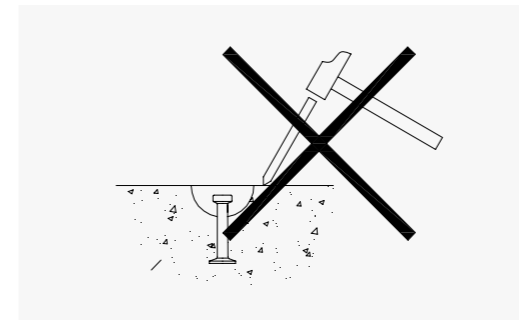
IN USE

– When Precast concrete are transported by construction plant, they are subject to shock and impact loads. This factor increases the load on the anchor by several times the dead-weight and should be taken into account in load calculations. Therefore, care should be taken in transporting the elements on site

– When the anchors are used to lift a unit from a mould, the adhesion between the freshly cast concrete and the mould increase the forces on the anchors.

MAINTENANCE

– All lift head shackles must be examined once a year by a competent person. The lifting eye must not show any sign of deformity

– The lift head shackle cannot be repaired.

GENERAL

– The lift head shackle must be used only for lifting Precast concrete elements

– Users of the lift head shackle must be familiar with the usage and safety instructions

– All usage and safety instructions must be respected when lift head shackles are used.

Precast Plastic Spacers

Fence Post Spacers

PRODUCT CODE	DESCRIPTION	SIZE
PLA080	Fence Post Spacer 75 x 75	1000 / Bag
PLA082	Fence Post Spacer 87 x 87	1000 / Bag
PLA083	Fence Post Spacer 100 x 100	1000 / Bag
PLA084	Fence Post Spacer 112 x 112	1000 / Bag
PLA085	Fence Post Spacer 125 x 125	1000 / Bag

Gate Post Spacers

PRODUCT CODE	DESCRIPTION	SIZE
PLA086	Gate Post Spacer 7 x 7	500 / Bag

Sill Spacers

PRODUCT CODE	DESCRIPTION	SIZE
PLA175	Plastic Sill Spacer	500 / Bag

Flag Spacers

PRODUCT CODE	DESCRIPTION	SIZE
PLA070	Flag Spacer Double	1000 / Bag
PLA075	Flag Spacers 370mm	2000 / Bag

Cattle Slot Spacers

PRODUCT CODE	DESCRIPTION	SIZE
PLA001	Bar Spacer 6x3	1000 / Bag
PLA002	Bar Spacer 7x4	500 / Bag

SDG Spacers

PRODUCT CODE	DESCRIPTION	SIZE
PLA163	SDG 200	1000 / Bag
PLA164	SDG 300	1000 / Bag

Panel Packers

PRODUCT CODE	DESCRIPTION	SIZE
PLA105	Panel Packers	200 / Bag
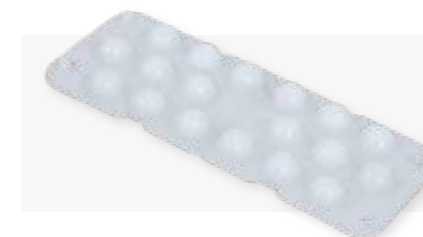
Plastic Shim

Allow for alignment and levelling of heavy section steel plate and pre-cast concrete sections.

PRODUCT CODE	PRODUCT DESCRIPTION	PRODUCT SIZE
PLA170	Plastic Shim 2 mm: 70 x70 mm	125 per Bag
PLA171	Plastic Shim 3 mm: 70 x 70 mm	125 per Bag
PLA172	Plastic Shim 5 mm: 70 x 70 mm	125 per Bag
PLA173	Plastic Shim 7 mm: 70 x 70 mm	125 per Bag
PLA174	Plastic Shim 9 mm: 70 x 70 mm	125 per Bag
PLA174B	Plastic Shim 20 mm: 70 x 70 mm	50 per Bag

Caps

Provide formwork cover and prevent rust staining.

Concrete End Caps

PRODUCT CODE	DESCRIPTION	SIZE
PLA069	End Caps 7mm	5000 / Bag
PLA071	End Caps 6mm	8000 / Bag

HD End Caps

PRODUCT CODE	DESCRIPTION	SIZE
PLA051	HD End Cap 25mm / 4-8mm	500 / Bag
PLA051B	HD End Cap 25mm / 10-16mm	500 / Bag
PLA051A	HD End Cap 20mm / 4-8mm	2500 / Bag
PLA052	HD End Cap 30mm / 10-16mm	250 / Bag

Barchip 48

Synthetic fire concrete reinforcement

BarChip 48 is a high performance structural synthetic fibre concrete reinforcement, optimised for pavements, industrial floors and precast elements. Work with BarChip and together we'll unlock the full potential of your concrete mix.

Benefits:

- Comprehensive design and technical support
- Redistributes load – increased ductility / toughness
- Eliminates corrosion – long term durability
- Eliminates set-up of steel mesh
- Improves precast production speeds up to 50%
- Increases abrasion and impact protection
- 70% reduction in carbon footprint compared to steel
- Safer and lighter to handle than steel
- Reduced wear on concrete pumps and hoses.

Still looking for something?

Visit our website for further product information or call
our sales team to speak to one of our expert advisors.

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SDG

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