

FRIMEDA LIFTING ANCHOR SYSTEM

TECHNICAL PRODUCT INFORMATION



FRIMEDA LIFTING ANCHOR SYSTEM

TPA 16-E

CONCRETE

This catalogue conforms to the installation and application instructions in accordance with the VDI/BV-BS 6205 guidelines.



FRIMEDA LIFTING ANCHOR SYSTEM

Introduction

Certified quality from HALFEN – Connected to safety.



The FRIMEDA Lifting Anchor System meets the requirements of the European machine guideline (MD) 2006/42/EC. The required steel load capacity for transport systems is defined in these guidelines.

To also ensure safe use of transport anchor systems with the required resistance values for cast-in anchors, HALFEN Transport anchor and transport anchor systems also meet the requirements of VDI/BV-BS regulation 6205.

The regulation titled "Transport anchor and transport anchor systems for precast concrete elements" represents up-to-date technological knowledge in this field. HALFEN ensures a constant high standard of safety for its transport anchors and systems by complying with the requirements set in these regulations.

To confirm conformity with MD 2006/42/EC in conjunction with the VDI/BV-BS 6205 all HALFEN Transport anchor systems are CE marked.

This catalogue is an installation and application instruction as defined in VDI/BV-BS 6205.

To guarantee a high level of safety all HALFEN Anchors and anchor systems are subjected to regular self- and third-party quality control.

We guarantee continuous high quality and maximal safety for your company, your employees and your customers. This quality is ensured by external controlling and confirmed with the CE mark.

HALFEN – dependability

- high ductility – high performance even in extreme situations
- increased dependable cold-toughness – same characteristics irrespective of environmental conditions
- quality control – for reliable application



Specially tempered steel guarantees extensive elastic and plastic properties. The required unique steel compositions to achieve product characteristics are specified by HALFEN. Numerous tests and many years of experience guarantee best possible results and maximum safety in all applications.



The special composition of the steel ensures constant identical characteristics (temperature independent).

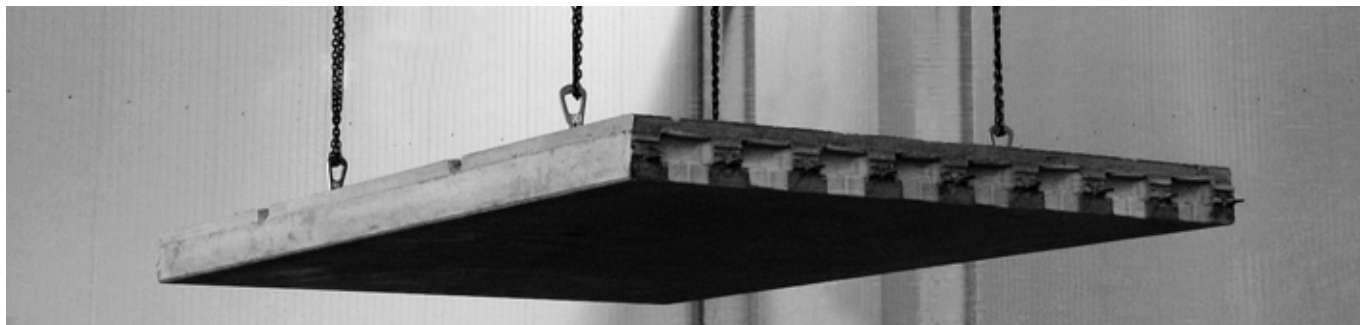
Steel used by HALFEN exceeds the requirement of DIN EN 10025.



By specifying products and material, continual raw material, product monitoring and testing by renown independent bodies and universities, our customers are assured that the quality and properties of all HALFEN anchors remain consistent.

FRIMEDA LIFTING ANCHOR SYSTEM

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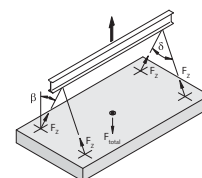
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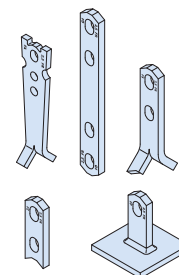
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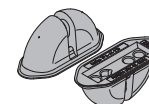
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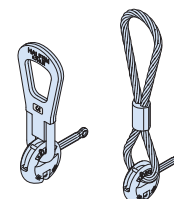
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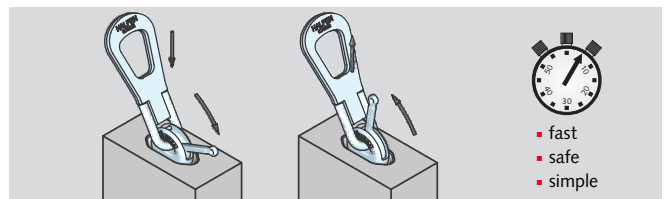
System Advantages Overview

The FRIMEDA Transport anchor is a high quality and cost effective system for transporting all types of concrete elements. The erection anchor allows lifting horizontally-cast wall elements upright when not using a tilting table. A remote release is also available; this increases efficiency and safety when lifting tall elements. Our extensive range of anchors and accessories provide the perfect solution for nearly all lifting applications.



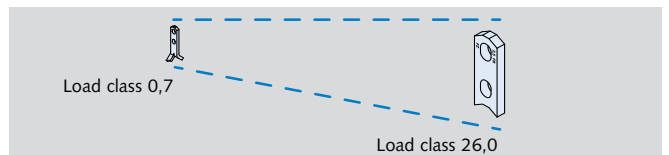
Fast, simple, safe

The FRIMEDA Quick-clutch lifting system guarantees simple, safe and fast connection and disconnection of lifting links and anchors.



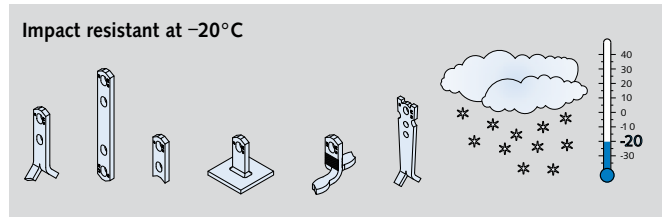
Load range

The FRIMEDA Quick-clutch lifting system can be used for load capacities of 0.7 – 26.0t.



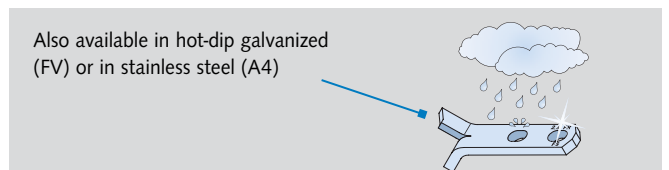
High quality material

We offer a wide selection of anchors in high quality killed-steel "special grade" with an alloy composition specially designed for transport applications in any environment.



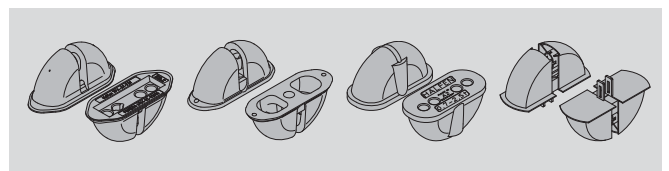
Corrosion protection

Apart from the mill-finished standard type, the majority of transport anchors in the FRIMEDA range are available in a zinc-galvanized and in a special, stainless steel type.



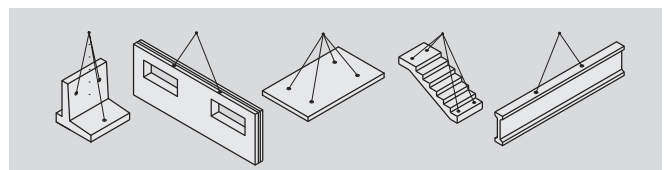
Wide range of accessories

A wide range of accessories, especially recess formers, guarantee cost-effective use in all applications.



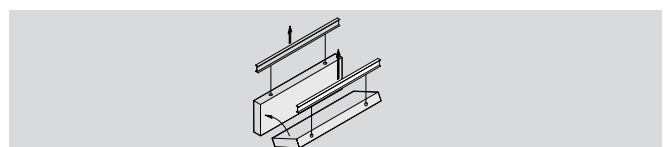
FRIMEDA TPA – perfect for most applications

FRIMEDA TPA is suitable for lifting and transporting precast elements regardless of shape and size.



Tilting wall elements

The FRIMEDA Erection anchor is the ideal solution for tilting horizontally transported walls at the construction site.

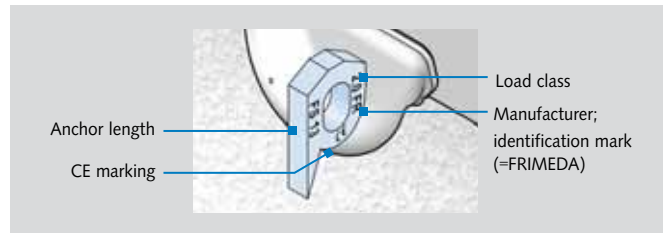


FRIMEDA LIFTING ANCHOR SYSTEM

System Advantages Overview

Avoid mix-ups

Even after installation, the load class, anchor length and the manufacturer's identification mark are easily and correctly identified on all anchors. This and the unique head shape ensures mix-ups are avoided!



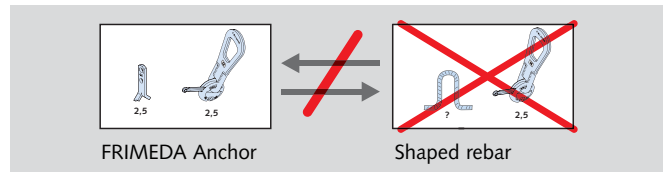
Matching components

Anchor and lifting link are designed to ensure that only components with the same load class can be used together. The same principle applies to the design of the recess formers.

Load class ring clutch	1,25	2,5	5,0	10,0	26,0
Load class recess former	1,25	2,5	5,0	10,0	26,0
Load class anchor	1,25	0,7	3,0		12,5
		1,4	4,0	7,5	14,0
		2,0	5,0	10,0	17,0
		2,5			22,0
					26,0

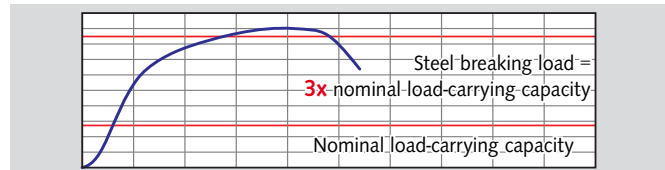
System safety

Maximal safety is only assured when using system components from the same manufacturer.



Steel failure safety factor

All anchors are sufficiently dimensioned to three times the safety factor for steel failure.



Quality control

An extensive certified quality system monitors the complete production process; starting with incoming raw materials; monitoring at every stage of production and final check of the finished product.



Independent testing

Extensive meticulous testing of every part of the system by independent certification bodies and universities.



CE conform

All HALFEN Lifting links and anchors are CE marked. This guarantees compliance with the relevant European regulations.



Certified

All HALFEN production facilities are certified by the DNV-GL according to DIN EN ISO 9001:2008.

The HALFEN GmbH Quality Management System is certified for HALFEN facilities in Germany, France, the Netherlands, Switzerland, Poland, Austria and the Czech Republic according to ISO 9001:2008, certificate-no. QS-281 HH.

Quality

HALFEN Quality – from start to finish.

Quality and safety is the ultimate target in production of original FRIMEDA Lifting anchors; this applies to all HALFEN products. Therefore all HALFEN production facilities are DIN EN ISO 9001 certified.

What exactly does this mean?

On the one hand this involves continual inspection, machine maintenance and quality testing during the manufacturing process, on the other hand it involves stringent quality control procedures of incoming raw materials right through to delivery of the finished product.



Quality always comes first for HALFEN products and is guaranteed during every step of production.

Compliance of all lifting anchors with national and European technical requirement has been tested and approved by the Materials Testing Institute North Rhine-Westphalia (Materialprüfungsanstalt des Landes Nordrhein-Westfalen). All anchors produced are subject to stringent in-house and independent quality checks.



Spectral analysis

The extent, type and frequency of production checks carried out by HALFEN are defined by independent supervisory bodies

FRIMEDA Lifting anchors are made exclusively by HALFEN. Our products are made only with strictly regulated raw materials, which must meet our stringent material specifications. Suppliers of all raw materials and of finished products are also required to meet our stringent material specifications. Our suppliers must be DIN EN ISO 9001 certified and must provide complete documentation on required performance and quality. Our suppliers have to prove compliance with our material specifications with a 3.1 inspection certificate according to DIN EN 10204.

The inspection of incoming material is not limited to visual examination and measurement checks. Every consignment is also chemical analysed to ensure the correct chemical content. Tensile tests are subsequently required to verify yield stress, ultimate tensile strength and elongation rupture. After passing all test requirements and if in compliance with the 3.1 inspection certification the tested items are released into production.

The anchors are continually checked during production for dimensional precision. The required frequency for measurement control is determined by our quality manager.

Daily quality checks in which each and every produced batch is checked. All anchors must have a minimum safety factor against steel failure.



Measurement control FRIMEDA TPA

HALFEN guarantees the whole production process from incoming raw materials right through to delivery of the finished product. This ensures that all HALFEN products are made to the quality that we promise.

HALFEN understands the responsibility; we will continue to live up to our reputation as supplier of high quality products. Because quality means safety.



Material procurement; cut the price not the quality.

All manufacturers endeavour to offer products at competitive prices by keeping production costs low, by strict cost management and by effective raw material procurement.

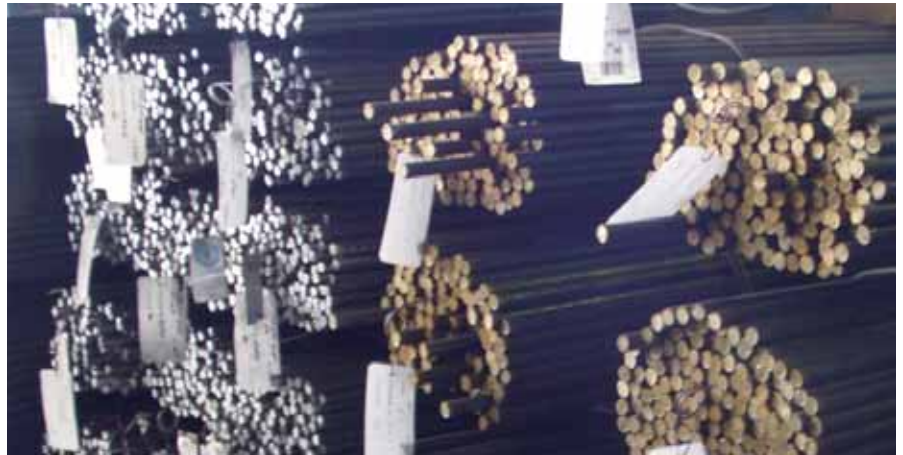
To achieve this objective, products are often manufactured in low-wage countries as finished articles instead of local in-house production. Especially when safety is an issue, it soon becomes obvious that the cheap option is more often than not the more expensive option. This applies particularly when material defects hide a serious fault. This could be because the material composition cannot be properly traced or if a continual and monitored production process is in doubt.

Experience shows that a significant number of suppliers, many in so-called low-wage countries, are unable to provide sufficient evidence of acceptable quality controlled production.

Un-monitored processes are a risk! HALFEN sources raw material and finished products exclusively from suppliers who can verify and guarantee the stipulated performance and quality. In our experience the required product safety for transport anchor products is only ensured with regular monitoring of all materials used.

The HALFEN Management has therefore decided to only sell and distribute FRIMEDA Lifting anchors manufactured exclusively in HALFEN quality controlled facilities under the brand name FRIMEDA.

HALFEN as a transport anchor supplier with high quality standards reduces your liability risk.



Not the time for experiments

The importance of quality steel for transport anchors

Transport anchors are used to lift and move heavy pre-fabricated concrete elements in precast plants and on construction sites.

It is inevitable that concrete elements sometimes need to be manoeuvred over critical areas and facilities. The failure of an anchor here could have devastating consequences. Even with correct calculation, deviant material quality can still constitute the critical weak spot.

Anchors are subject to further stress factors especially from dynamic loads (shock factors). Impact strength and elongation at failure are both critical here. Selecting high quality raw material is therefore of the uppermost importance.

Experience is also essential when forging the FRIMEDA Lifting anchor; incorrect temper can change the structure in the steel reducing its load-bearing capacity.

The standard of quality for HALFEN Transport anchors is guaranteed by monitoring incoming raw materials, stringent quality controlled production and final product control; and of course the DIN EN ISO 9001 certified HALFEN Quality Management System.

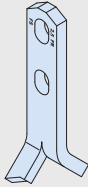

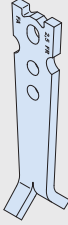
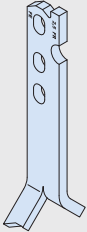
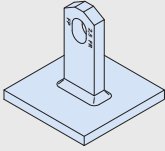
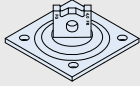
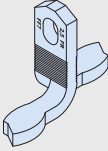



To summarize:

- The correct metallurgical composition of the steel is the only guarantee of permanent quality e.g. when using anchors at low temperatures and for effects of dynamic shock.
- The accuracy of the forging tools itself is a critical factor; this ensures the transport anchors fit the lifting devices exactly, enabling the calculated loads to be lifted safely.

HALFEN sources all raw material exclusively from certified suppliers. HALFEN manufactures all transport anchors exclusively in its own facilities in accordance with the most stringent quality control.

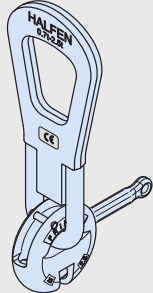
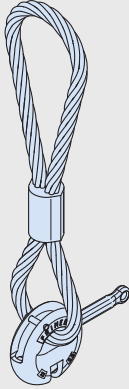
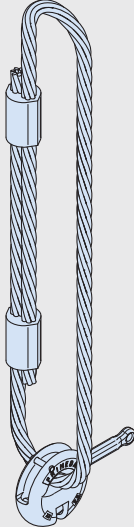
FRIMEDA LIFTING ANCHOR SYSTEM

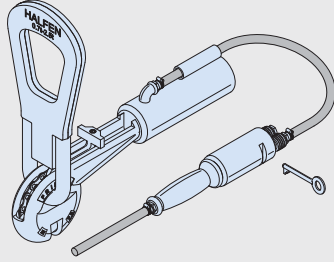
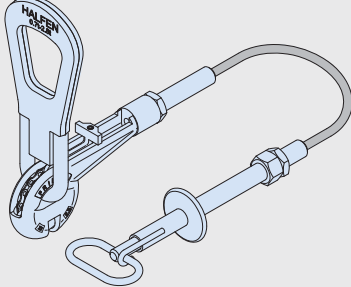
System Overview

FRIMEDA TPA Anchors				
Type	Spread anchor TPA-FS	Two hole anchor TPA-FZ	Erection anchor TPA-FA	Unilateral erection anchor TPA-FE
				
Application	Columns, beams, trusses, wall elements, π-slabs	Prestressed concrete trusses, thin-wall elements, low strength concrete (e.g. lightweight concrete)	Thin-wall concrete elements, being lifted from a horizontal to a perpendicular position	Thin-wall concrete elements, being lifted from a horizontal to a perpendicular position
Parameters	Component thickness, concrete grade, reinforcement	Component thickness, concrete grade, reinforcement	Component thickness, concrete grade, reinforcement	Component thickness, concrete grade, reinforcement
Load class	0,7 – 22,0	1,4 – 26,0	1,4 – 22,0	1,4 – 22,0
Information	see page 23–30	see page 31–33	see page 34–36	see page 34–36
Type	Plate anchor TPA-FP	Garage anchor TPA-FG	Flat foot anchor TPA-FF	Double ended column anchor TPA-FD
				
Application	Very thin ceiling slabs with surface-embedded anchors	Precast concrete garages, embedding in floor or ceiling slabs	Ceiling slabs with surface-embedded anchors, tubes	Columns
Parameters	Component thickness, concrete grade, reinforcement	Component thickness, concrete grade, reinforcement	Component thickness, concrete grade, reinforcement	Component thickness, concrete grade, reinforcement
Load class	1,4 – 10,0	4,0	0,7 – 22,0	2,5 – 26,0
Information	see page 40	see page 41	see page 38–39	see page 44
Type	Sandwich panel anchor TPA-FX	Universal anchor TPA-FU		
				
Application	Sandwich panels	see TPA-FS, TPA-FZ and TPA-FA		
Parameters	Component thickness, concrete grade, reinforcement	Component thickness, concrete grade, reinforcement		
Load class	2,5 – 17,0	1,25		
Information	see page 42–43	see page 37		

FRIMEDA LIFTING ANCHOR SYSTEM

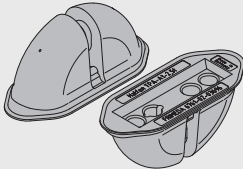
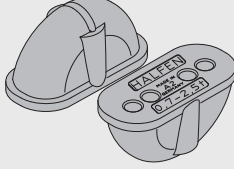
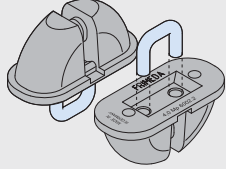
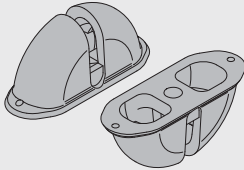
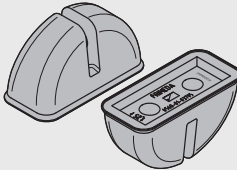
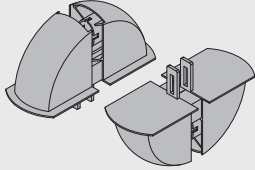
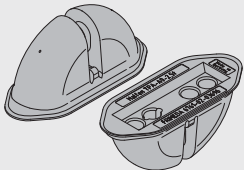
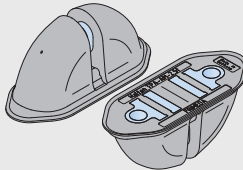
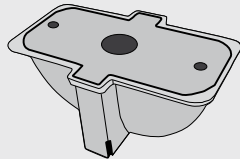
System Overview

FRIMEDA Attachment links			
Type	Ring clutch TPA-R1	Ring clutch TPA-R2	Ring clutch TPA-R3
			
Type	With shackle	With wire cable	With wire cable
Application	For manual release	For manual release	For manual release
Load class	2,5 - 26,0	1,25 - 10,0	26,0

Type	Ring clutch TPA-F1	Ring clutch TPA-F2
		
Type	With shackle	With shackle
Application	Pneumatic remote release	Manual remote with bowden cable
Load class	2,5 - 22,0	2,5 - 22,0

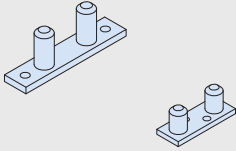
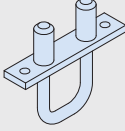
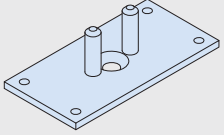
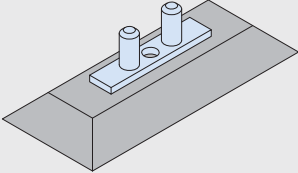
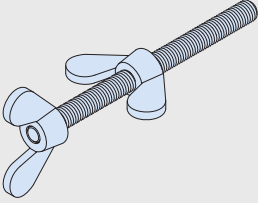
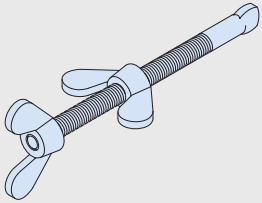
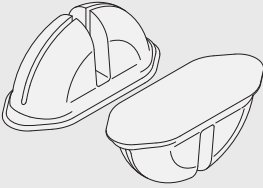
FRIMEDA LIFTING ANCHOR SYSTEM

System Overview

FRIMEDA Recess former			
Type	TPA-A-1	TPA-A-2	TPA-A-3
			
Material	Plastic	Rubber	Rubber
Application	For all anchors except TPA-FU and TPA-FG	For anchors TPA-FS, TPA-FZ, TPA-FD, TPA-FP, TPA-FF	For anchor TPA-FG
Installation	Holding plates H1, H2, HM; holding bolts S1 oder S2	Holding plate H3	With locking bracket (included in delivery)
Features	High durability and good resistance to formwork treatment agents	High durability and good resistance to formwork treatment agents	High durability and good resistance to formwork treatment agents
Load class	2,5 – 26,0	2,5 – 10,0	5,0
Type	TPA-A-4	TPA-A-7	TPA-A-8
			
Material	Plastic (hard)	Plastic	Plastic
Application	For all anchors except TPA-FU, TPA-FG	For universal anchor TPA-FU	For anchors of load class 2,5
Installation	Holding bolt S1	Holding plate H1, holding bolt S1	Two part recess former, pressed together over the anchor head; secured to the formwork with a wedge, pressed between the two fixing tabs
Features	High durability and good resistance to formwork treatment agents	For especially small recesses, high durability and good resistance to formwork treatment agents	Single-use application
Load class	2,5 – 26,0	1,25	2,5
Type	TPA-A-9	TPA-AM	TPA-SCFS/-SCFA
			
Material	Plastic	Plastic	Plastic
Application	Specially suitable for TPA-FS, TPA-FZ, TPA-FF and TPA-FD, not suitable for: TPA-FA, TPA-FE, TPA-FU, TPA-FG and TPA-FX	For all anchors except TPA-FU, TPA-FG	For spread anchors etc. see TPA-A-9 (SCFS) for erection anchor TPA-FA (SCFS) For load class 0072.150 -00004 ① for load class 0072.150 -00002 ② -00003 ③ -00005 ④
Installation	Holding plates H1, H2, HM; holding bolts S1 or S2	Magnetic	
Features	As for TPA-A-1, but for smooth recesses without protruding concrete	High durability and good resistance to formwork treatment agents	Single-use application
Load class	2,5 – 26,0	2,5 / 5,0	① 3,0–5,0 ② 3,0–4,0 ③ 5,0 ④ 7,5

FRIMEDA LIFTING ANCHOR SYSTEM

System Overview

FRIMEDA Holding plates and holding bolts			
Type	TPA-H1	TPA-H2	TPA-H3
			
Application	For recess formers TPA-A1, TPA-A7 and TPA-A9	For recess formers TPA-A1 and TPA-A9	For recess formers TPA-A2
Installation	For fixing to formwork	For floating installation	For nailing to formwork
Load class	1,25 – 26,0	2,5 – 26,0	2,5 – 10,0
Type	TPA-HM	TPA-S1 with thread	TPA-S2 bayonet holding bolt
			
Application	For recess formers TPA-A1, TPA-A9 to load class 10,0	For recess formers TPA-A1, TPA-A7, TPA-A4, TPA-A9, TPA-A2*	For recess formers TPA-A1, TPA-A9
Installation	For fixing to steel formwork Feature: magnetic	*TPA-A2 only in combination with holding plate TPA-H3	
Load class	2,5 – 10,0	1,25 – 26,0	2,5 – 26,0
Type	TPA-V1		
			
Application	To seal recesses for transport, during storage or also as a permanent seal		
Features	Polystyrene		
Installation	Recesses for anchors TPA-A1, TPA-A2, TPA-A3, TPA-A4, TPA-A9 and TPA-AM		
Load class	2,5 – 26,0		

FRIMEDA LIFTING ANCHOR SYSTEM

Product Range TPA Anchors

Spread anchor TPA-FS				
Load class	Mill finish		Hot-dip galvanized	
	Article number	Order no. 0070.010-	Article number	Order no. 0070.110-
2,5	TPA-FS 0,7-11	00001	TPA-FS 0,7-11 FV	00032
	TPA-FS 1,4-11	00002	TPA-FS 1,4-11 FV	00033
	TPA-FS 1,4-16	00003	TPA-FS 1,4-16 FV	00034
	TPA-FS 2,0-13	00004	TPA-FS 2,0-13 FV	00035
	TPA-FS 2,0-16	00005	TPA-FS 2,0-16 FV	00036
	TPA-FS 2,0-21	00006	TPA-FS 2,0-21 FV	00037
	TPA-FS 2,5-15	00007	TPA-FS 2,5-15 FV	00038
	TPA-FS 2,5-20	00008	TPA-FS 2,5-20 FV	00039
	TPA-FS 2,5-25	00009	TPA-FS 2,5-25 FV	00040
5,0	TPA-FS 3,0-16	00010	TPA-FS 3,0-16 FV	00041
	TPA-FS 3,0-20	00011	TPA-FS 3,0-20 FV	00042
	TPA-FS 3,0-28	00012	TPA-FS 3,0-28 FV	00043
	TPA-FS 4,0-18	00013	TPA-FS 4,0-18 FV	00044
	TPA-FS 4,0-24	00014	TPA-FS 4,0-24 FV	00045
	TPA-FS 4,0-32	00015	TPA-FS 4,0-32 FV	00046
	TPA-FS 5,0-18	00016	TPA-FS 5,0-18 FV	00047
	TPA-FS 5,0-24	00017	TPA-FS 5,0-24 FV	00048
	TPA-FS 5,0-40	00018	TPA-FS 5,0-40 FV	00049
10,0	TPA-FS 7,5-26	00022	TPA-FS 7,5-26 FV	00053
	TPA-FS 7,5-30	00023	TPA-FS 7,5-30 FV	00054
	TPA-FS 7,5-42	00024	TPA-FS 7,5-42 FV	00055
	TPA-FS 10,0-30	00025	TPA-FS 10,0-30 FV	00056
	TPA-FS 10,0-37	00026	TPA-FS 10,0-37 FV	00057
	TPA-FS 10,0-52	00027	TPA-FS 10,0-52 FV	00058
	26,0	TPA-FS 14,0-37	00028	TPA-FS 14,0-37 FV
TPA-FS 14,0-46		00029	TPA-FS 14,0-46 FV	00060
TPA-FS 22,0-50		00030	TPA-FS 22,0-50 FV	00061
TPA-FS 22,0-62		00031	TPA-FS 22,0-62 FV	00062

Two hole anchor TPA-FZ				
Load class	Mill finish		Hot-dip galvanized	
	Article number	Order no. 0070.020-	Article number	Order no. 0070.110-
2,5	TPA-FZ 1,4- 9	00002	TPA-FZ 1,4- 9 FV	00064
	TPA-FZ 2,0- 9	00003	TPA-FZ 2,0- 9 FV	00065
	TPA-FZ 2,5- 9	00004	TPA-FZ 2,5- 9 FV	00066
5,0	TPA-FZ 3,0-12	00005	TPA-FZ 3,0-12 FV	00067
	TPA-FZ 4,0-12	00006	TPA-FZ 4,0-12 FV	00068
	TPA-FZ 5,0-12	00007	TPA-FZ 5,0-12 FV	00069
10,0	TPA-FZ 7,5-16	00009	TPA-FZ 7,5-16 FV	00071
	TPA-FZ 10,0-17	00010	TPA-FZ 10,0-17 FV	00072
26,0	TPA-FZ 14,0-24	00011	TPA-FZ 14,0-24 FV	00073
	TPA-FZ 22,0-30	00013	TPA-FZ 22,0-30 FV	00075
	TPA-FZ 26,0-30	00012	TPA-FZ 26,0-30 FV	00074

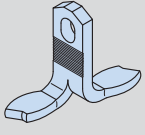
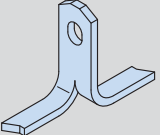
Erection anchor TPA-FA				
Load class	Mill finish		Hot-dip galvanized	
	Article number	Order no. 0070.030-	Article number	Order no. 0070.110-
2,5	TPA-FA 1,4-20	00001	TPA-FA 1,4-20 FV	00001
	TPA-FA 2,5-23	00002	TPA-FA 2,5-23 FV	00002
5,0	TPA-FA 4,0-27	00003	TPA-FA 4,0-27 FV	00003
	TPA-FA 5,0-29	00004	TPA-FA 5,0-29 FV	00004
10,0	TPA-FA 7,5-32	00005	TPA-FA 7,5-32 FV	00005
	TPA-FA 10,0-39	00006	TPA-FA 10,0-39 FV	00006
26,0	TPA-FA 12,5-50	00007	TPA-FA 12,5-50 FV	00007
	TPA-FA 17,0-50	00008	TPA-FA 17,0-50 FV	00008
	TPA-FA 22,0-50	00009	TPA-FA 22,0-50 FV	00009
2,5	TPA-FA 2,5-23 A4	00010	Stainless steel A4	
5,0	TPA-FA 4,0-27 A4	00012	Stainless steel A4	
	TPA-FA 5,0-29 A4	00011	Stainless steel A4	

Single ended erection anchor TPA-FE				
Load class	Mill finish		Hot-dip galvanized	
	Article number	Order no. 0070.040-	Article number	Order no. 0070.110-
2,5	TPA-FE 1,4-20	00001	TPA-FE 1,4-20 FV	00010
	TPA-FE 2,5-23	00002	TPA-FE 2,5-23 FV	00011
5,0	TPA-FE 4,0-27	00003	TPA-FE 4,0-27 FV	00012
	TPA-FE 5,0-29	00004	TPA-FE 5,0-29 FV	00013
10,0	TPA-FE 7,5-32	00005	TPA-FE 7,5-32 FV	00014
	TPA-FE 10,0-39	00006	TPA-FE 10,0-39 FV	00015
26,0	TPA-FE 12,5-50	00007	TPA-FE 12,5-50 FV	00016
	TPA-FE 17,0-50	00008	TPA-FE 17,0-50 FV	00017
	TPA-FE 22,0-50	00009	TPA-FE 22,0-50 FV	00018

Universal anchor TPA-FU			
Load class	Article number	Order no. 0070.100-	Type
	1,25	TPA-FU 1,25-12	00001
1,25	TPA-FU 1,25-12 FV	00003	Hot-dip galvanized
1,25	TPA-FU 1,25-12 A2	00002	Stainless steel A2 (W 1.4301)

FRIMEDA LIFTING ANCHOR SYSTEM

Product Range TPA Anchors / Ring Clutches

Flat foot anchor TPA-FF				
Load class	 Load class 2,5-5,0		 Load class 10,0-26,0	
	Mill finish		Hot-dip galvanized	
	Article number	Order no. 0070.070-	Article number	Order no. 0070.110-
2,5	TPA-FF 0,7- 6	00001	TPA-FF 0,7- 6 FV	00019
	TPA-FF 1,4- 6	00002	TPA-FF 1,4- 6 FV	00020
	TPA-FF 2,0- 7	00003	TPA-FF 2,0- 7 FV	00021
	TPA-FF 2,5- 7	00004	TPA-FF 2,5- 7 FV	00022
5,0	TPA-FF 3,0- 9	00005	TPA-FF 3,0- 9 FV	00023
	TPA-FF 4,0-11	00006	TPA-FF 4,0-11 FV	00024
	TPA-FF 5,0-12	00007	TPA-FF 5,0-12 FV	00025
10,0	TPA-FF 7,5-17	00009	TPA-FF 7,5-17 FV	00027
	TPA-FF 10,0-20	00010	TPA-FF 10,0-20 FV	00028
26,0	TPA-FF 12,5-22	00011	TPA-FF 12,5-22 FV	00029
	TPA-FF 17,0-27	00012	TPA-FF 17,0-27 FV	00030
	TPA-FF 22,0-31	00013	TPA-FF 22,0-31 FV	00031

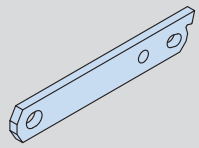
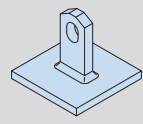
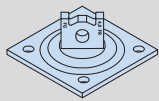
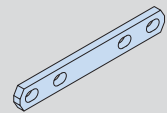
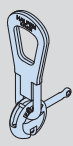
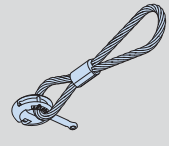
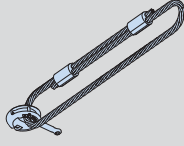
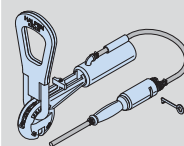
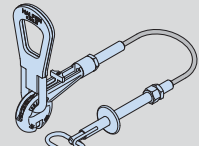

Sandwich panel anchor TPA-FX				
Load class				
	Mill finish		Hot-dip galvanized	
	Article number	Order no. 0070.090-	Article number	Order no. 0070.090-
2,5	TPA-FX 2,5-25	00001	TPA-FX 2,5-25 FV	00006
5,0	TPA-FX 5,0-30	00002	TPA-FX 5,0-30 FV	00007
10,0	TPA-FX 7,5-35	00003	TPA-FX 7,5-35 FV	00008
	TPA-FX 10,0-35	00004	TPA-FX 10,0-35 FV	00009
26,0	TPA-FX 17,0-40	00005	TPA-FX 17,0-40 FV	00010

Plate anchor TPA-FP				
Load class				
	Mill finish		Hot-dip galvanized	
	Article number	Order no. 0070.050-	Article number	Order no. 0070.110-
2,5	TPA-FP 1,4- 5	00001	TPA-FP 1,4- 5 FV	00076
	TPA-FP 2,5- 8	00002	TPA-FP 2,5- 8 FV	00077
5,0	TPA-FP 5,0-12	00003	TPA-FP 5,0-12 FV	00078
10,0	TPA-FP 10,0-16	00004	TPA-FP 10,0-16 FV	00079

Garage anchor TPA-FG				
Load class				
	Mill finish		Hot-dip galvanized	
	Article number	Order no. 0070.060-	Article number	Order no. 0070.110-
5,0	TPA-FG 4,0 - 7	00001	-	-

Double ended column anchor TPA-FD				
Load class				
	Mill finish		Hot-dip galvanized	
	Article number	Order no. 0070.089-	Article number	Order no. 0070.089-
2,5	TPA-FD 2,5 - L-SK	00001 ^①	TPA-FD 2,5 - L-SK FV	00002 ^①
5,0	TPA-FD 5,0 - L-SK	00001 ^①	TPA-FD 5,0 - L-SK FV	00002 ^①
10,0	TPA-FD 7,5 - L-SK	00001 ^①	TPA-FD 7,5 - L-SK FV	00002 ^①
	TPA-FD 10,0 - L-SK	00001 ^①	TPA-FD 10,0 - L-SK FV	00002 ^①
26,0	TPA-FD 12,5 - L-SK	00001 ^①	TPA-FD 12,5 - L-SK FV	00002 ^①
	TPA-FD 17,0 - L-SK	00001 ^①	TPA-FD 17,0 - L-SK FV	00002 ^①
	TPA-FD 22,0 - L-SK	00001 ^①	TPA-FD 22,0 - L-SK FV	00002 ^①
	TPA-FD 26,0 - L-SK	00001 ^①	TPA-FD 26,0 - L-SK FV	00002 ^①

① specify anchor length (L) when ordering

Load class	FRIMEDA Ring clutches						Ring clutches with remote control release				Replacement part	
	TPA-R1		TPA-R2		TPA-R3		TPA-F1		TPA-F2		TPA-R-E1	
											 zi = galvanized	
	Article number	Order no. 0071.010-	Article number	Order no. 0071.020-	Article number	Order no. 0071.020-	Article number	Order no. 0071.030-	Article number	Order no. 0071.040-	Article number	Order no. 0071.060-
1,25	-	-	TPA-R2 1,25	00001	-	-	-	-	-	-	TPA-R-E1 1,25-zi	00001
2,5	TPA-R1 2,5	00001	TPA-R2 2,5	00002	-	-	TPA-F1 2,5	-	TPA-F2 2,5	-	TPA-R-E1 2,5-zi	00002
5,0	TPA-R1 5,0	00002	TPA-R2 5,0	00003	-	-	TPA-F1 5,0	page 54	TPA-F2 5,0	page 56	TPA-R-E1 5,0-zi	00003
10,0	TPA-R1 10,0	00003	TPA-R2 10,0	00004	-	-	TPA-F1 10,0	-	TPA-F2 10,0	-	TPA-R-E1 10,0	00004
22,0	-	-	-	-	-	-	TPA-F1 22,0	-	TPA-F2 22,0	-	-	-
26,0	TPA-R1 26,0	00004	-	-	TPA-R3 26,0	00005	-	-	-	-	TPA-R-E1 26,0	00005

FRIMEDA LIFTING ANCHOR SYSTEM

Product Range TPA Recess Formers / Accessories

FRIMEDA Recess formers										
Load class	TPA-A1		TPA-A2		TPA-A3		TPA-A4		TPA-A7	
	Article number	Order no. 0072.010-	Article number	Order no. 0072.020-	Article number	Order no. 0072.030-	Article number	Order no. 0072.040-	Article number	Order no. 0072.070-
1,25	-	-	-	-	-	-	-	-	TPA-A7 1,25	00001
2,5	TPA-A1 2,5	00001	TPA-A2 2,5	00001	-	-	TPA-A4 2,5	00001	-	-
5,0	TPA-A1 5,0	00002	TPA-A2 5,0	00002	TPA-A3 5,0	00001	TPA-A4 5,0	00002	-	-
10,0	TPA-A1 10,0	00003	TPA-A2 10,0	00003	-	-	TPA-A4 10,0	00003	-	-
26,0	TPA-A1 26,0	00004	-	-	-	-	TPA-A4 26,0	00004	-	-

FRIMEDA Recess formers										
Load class	TPA-A8		TPA-A9		TPA-AM		TPA-SCFS		TPA-SCFA	
	Article number	Order no. 0072.080-	Article number	Order no. 0072.090-	Article number	Order no. 0072.100-	Article number	Order no. 0072.150-	Article number	Order no. 0072.150-
1,25	-	-	-	-	-	-	-	-	-	-
2,5	TPA-A8 2,5	00001	TPA-A9 2,5	00001	TPA-AM 2,5	00001	-	-	-	-
5,0	-	-	TPA-A9 5,0	00002	TPA-AM 5,0	00002	TPA-SCFS 5,0	00004	TPA-SCFA 4,0/5,0	00002/00003
10,0	-	-	TPA-A9 10,0	00003	-	-	-	-	TPA-SCFA 7,5	00005
26,0	-	-	TPA-A9 26,0	00004	-	-	-	-	-	-

Recess filler				Accessories			
Load class	TPA-V1		TPA-A-Z1		TPA-A-E1		
	Article number	Order no. 0073.080-	Article number	Order no. 0072.120-	Article number	Order no. 0072.120-	
1,25	-	-	-	-	-	-	
2,5	TPA-V1 2,5	00001	TPA-A-Z1 2,5	00006	TPA-A-E1 2,5	00002	
5,0	TPA-V1 5,0	00002	TPA-A-Z1 5,0	00007	TPA-A-E1 5,0	00003	
10,0	TPA-V1 10,0	00003	TPA-A-Z1 10,0	00008	TPA-A-E1 10,0	00004	
26,0	TPA-V1 26,0	00004	TPA-A-Z1 26,0	00009	TPA-A-E1 26,0	00005	

FRIMEDA Holding plates								FRIMEDA Holding bolts				
Load class	TPA-H1		TPA-H2		TPA-H3		TPA-HM		TPA-S1		TPA-S2	
	Article number	Order no. 0073.010-	Article number	Order no. 0073.020-	Article number	Order no. 0073.030-	Article number	Order no. 0073.050-	Article number	Order no. 0073.060-	Article number	Order no. 0073.070-
1,25	TPA-H1 1,25	00001	-	-	-	-	-	-	-	-	-	-
2,5	TPA-H1 2,5	00002	TPA-H2 2,5	00001	TPA-H3 2,5	00001	TPA-HM 2,5	00001	TPA-S1-M 8	00001	-	-
5,0	TPA-H1 5,0	00003	TPA-H2 5,0	00002	TPA-H3 5,0	00002	TPA-HM 5,0	00002	-	-	TPA-S2-M 8	00001
10,0	TPA-H1 10,0	00004	TPA-H2 10,0	00003	TPA-H3 10,0	00003	TPA-HM 10,0	00003	TPA-S1-M12	00002	-	-
26,0	TPA-H1 26,0	00005	TPA-H2 26,0	00004	-	-	-	-	TPA-S1-M16	00003	TPA-S2-M12	00002

FRIMEDA LIFTING ANCHOR SYSTEM

Installation and Application

Safety regulations

A transport anchor system consists of the permanently cast-in transport anchor and the temporarily connected lifting equipment.

The basic principles for dimensioning and application of transport anchors can be found in the **VDI/BV-BS guideline 6205**; the guideline describe current technology in lifting.

The regulations require the following safety factors:

Failure safety factors	
Steel failure of anchors:	$\gamma = 3.0$
Concrete failure*:	$\gamma = 2.5$
Failure in the lifting-link:	$\gamma = 4.0$

* A safety factor of $\gamma = 2.1$ can be assumed for transport anchors in precast elements installed in a continuous supervised factory environment.



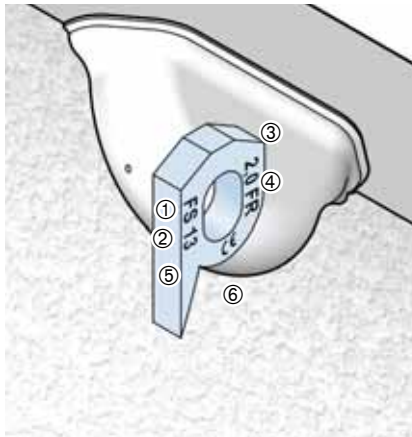
For safety reasons, these installation and application instructions for FRIMEDA Lifting systems must always be available at the place of use.

The installation and application instructions must be readily available on site, in the precast plant or on the construction site. The plant or site manager must ensure that the operator has read and understood the installation and application instructions for this system.

Identification

All DEHA Lifting and hoisting equipment are clearly and visible marked. According to VDI/BV-BS guideline 6205 safety regulations for lifting anchors and systems, identification marking of all lifting elements must remain clearly visible, even after installation.

Identification on the anchor



① System type

② Anchor type

- S = Spread anchor
- Z = Two hole anchor
- P = Plate anchor
- A = Erection anchor
- E = Unilateral erection anchor
- G = Garage anchor
- F = Flat foot anchor
- D = Double ended column anchor
- X = Sandwich panel anchor
- U = Universal anchor

③ Load class

④ Manufacturer's identification

FR = FRIMEDA

⑤ Anchor length

⑥ CE sign

Installation and application

The following technical specifications and requirements must be observed when installing FRIMEDA Lifting anchor systems.

Damaged anchor

Transport anchors which are incorrectly installed, defective or damaged (for example corrosion damage or with visible deformities) must not be used for lifting.

Stainless steel transport anchors

Transport anchors may not be used repeatedly. Multiple lifting in the normal sequence of transporting and loading through to final erection is not defined as repeated use. Transport anchors for permanent use in crane ballast etc. must be made of stainless steel in accordance with the approval regulation; approval no. Z-30.3-6.

Quality control

All required in-house quality control has been observed for transport anchors and systems in accordance with DIN EN ISO 9001.

FRIMEDA LIFTING ANCHOR SYSTEM

Installation and Application

Criteria for anchor selection

Maximum load capacities, edge distances and installation values can be found in the respective tables. Irrespective of the selected anchor-type (selected according to the load acting on the anchor) the following factors must be taken into account for calculation:

- weight of precast element
- number of anchors
- anchor layout
- number of load bearing anchors
- spread angle in the hoist
- anchor diagonal pull properties
- dynamic loads
- adhesion to the formwork

Install an erection anchor and ensure sufficient reinforcement if slabs are cast in the horizontal and subsequently lifted upright without a tilting-table.

Number of anchors

The number of anchors determines the type of hoist that needs to be used. A hoist with more than two cables is statically indeterminate if the anchors are aligned along a single axis. Hoists with more than three cables are deemed statically indeterminate if measures are not taken to ensure the load is distributed amongst all anchors (for example; with a spreader beam etc.).

Installation and application

FRIMEDA Lifting anchor systems should only be installed when the following technical specifications and requirements have been determined:

- load capacity
- edge spacing
- concrete grade
- load direction
- additional reinforcement

Load capacity

The load capacity of the anchor depends on:

- concrete compression strength f_{ci} at time of lift (cube-test $15 \times 15 \times 15$ cm)
- anchorage length of the anchor
- edge and axial anchor-spacing
- load direction
- reinforcement layout

Calculating the tension load

The tension-force Z in the anchor is generally calculated using the following formulae:

Load case: removing the formwork

$$F_Z = F_G \times z \times \xi / n$$

or

$$F_Z = (F_G + q_{adh} \times A_f) \times z / n$$

Load case: transport

$$F_Z = F_G \times z \times \psi_{dyn} / n$$

Abbreviations:

F_Z = tension force on the anchor [kN]

F_G = element weight [kN]
(according to DIN 1055-1 (06/2002) specific weight of $\gamma = 25 \text{ kN/m}^3$)

A_f = contact surface between the concrete and formwork [m^2]

n = number of load-bearing anchors

z = spread angle factor

ξ = formwork adhesion factor

ψ_{dyn} = dynamic factor

q_{adh} = base value for formwork adhesion

F_{adh} = effective load caused by formwork adhesion [kN]

FRIMEDA LIFTING ANCHOR SYSTEM

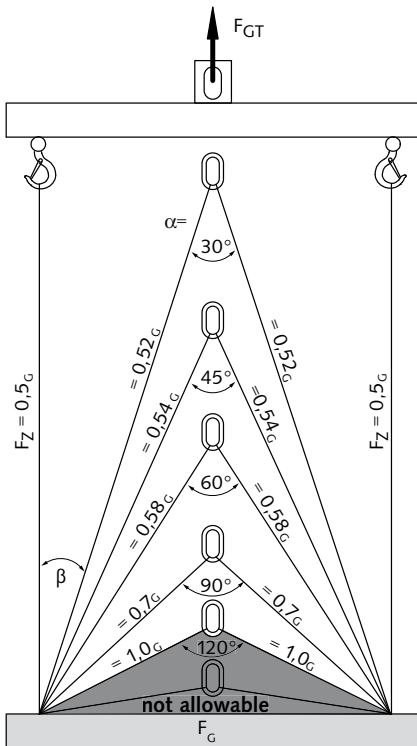
Installation and Application

Loads at the anchor – Dead weight

Element weight is defined as: Volume of the element × specific weight of the concrete

Increase factors:

1. Spread angle



Spread angle factors		
Cable angle	Spread angle	Factor
β	α	z
0°	-	1.00
7.5°	15°	1.01
15°	30°	1.04
22.5°	45°	1.08
30°	60°	1.16
37.5°	75°	1.26
45°	90°	1.41
52.5°	105°	1.64
60.0°	120.0°	2.00

2. Dynamic loads

The effect of dynamic loading depends mainly on the lifting equipment between the crane and the load lifting head.

Cables made of steel or synthetic fibre have a damping effect. With increasing cable length the damping effect is increased.

However **short chains** have an unfavourable effect. The forces acting on the lifting anchors are calculated taking the shock factor ψ_{dyn} into account.

Dynamic factors ψ_{dyn}^*	
Lifting unit	shock factor ψ_{dyn}^*
Stationary crane, swing-boom crane, rail crane	1.3
Lifting and moving on level terrain	2.5
Lifting and moving on uneven terrain	≥ 4.00

*If other values from reliable tests or through proven experience are available for ψ_{dyn} then these may be used for calculation.

For other transport and lifting situations the coefficient ψ_{dyn} is defined through reliable tests or proven experience.



Note: To avoid precast elements hanging at a slant when being moved the hook in the spreader beam should be directly above the centre of gravity. The transport anchors should be installed symmetrically to the centre of gravity, if lifting elements without a spreader beam.

3. Non-symmetrical anchor layout

The load in each anchor is calculated using bar statics if the anchors are not installed symmetrically to the load's centre of gravity.

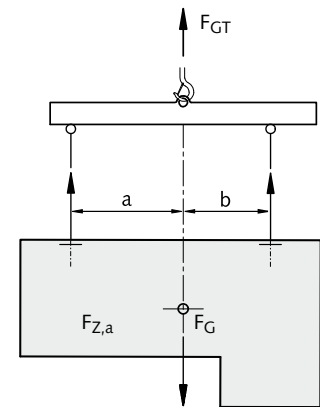


Figure: Uneven loading of the anchor caused by non-symmetrical installed anchors in respect to the centre of gravity of the load.

The load's centre of gravity will always stabilise vertically under the crane hook. Load distribution in non-symmetrical installed anchors when using a spreader beam is calculated as below:

$$F_{Z,a} = F_G \times b / (a + b)$$

$$F_{Z,b} = F_G \times a / (a + b)$$

FRIMEDA LIFTING ANCHOR SYSTEM

Installation and Application

Total load on the anchor – Formwork adhesion

Adhesion:

1. Adhesion forces

Depending on the material used for the formwork the adhesion between formwork and concrete can vary.

The following table can be used as a reference:

Adhesion to the formwork	
Lubricated steel formwork	$q_{adh} \geq 1 \text{ kN/m}^2$
Varnished timber formwork	$q_{adh} \geq 2 \text{ kN/m}^2$
Rough formwork	$q_{adh} \geq 3 \text{ kN/m}^2$

The adhesion value (F_{adh}) for the formwork is calculated with the following equation:

$$F_{adh} = q_{adh} \times A_f \text{ ①}$$

① Surface of the prefabricated concrete element in contact with the formwork prior to lifting.

2. Increased adhesion

Increased adhesion to the formwork must be assumed for π -panel and coffered ceilings slabs.

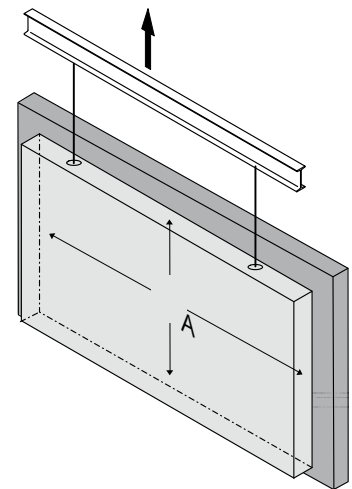
To simplify calculation, a multiple of the mass is used:

Increased adhesion to the formwork	
π - panel	$\xi = 2$
Ribbed panel	$\xi = 3$
Waffled panel	$\xi = 4$

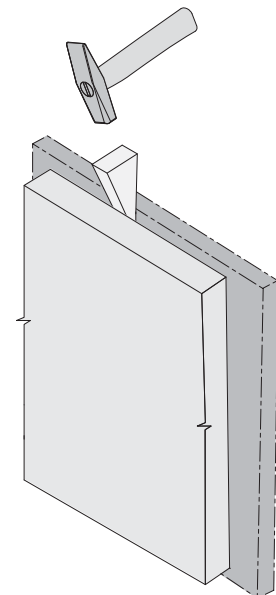
Substantial load increase can also be encountered when components are lifted parallel or near parallel to parts of the formwork. This applies to ribbed slabs and coffered ceiling slabs and can also apply to vertically cast columns and slabs.

3. Striking the formwork

Adhesion to the formwork should be minimised before lifting by removing as many parts of the formwork as possible.



To reduce forces caused by adhesion and friction – especially when lifting from tilting tables – we recommend removing the framework from the concrete elements before lifting (e.g. short vibration of the tilting table or using wedges).

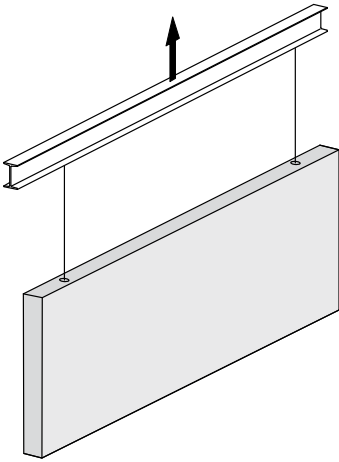


FRIMEDA LIFTING ANCHOR SYSTEM

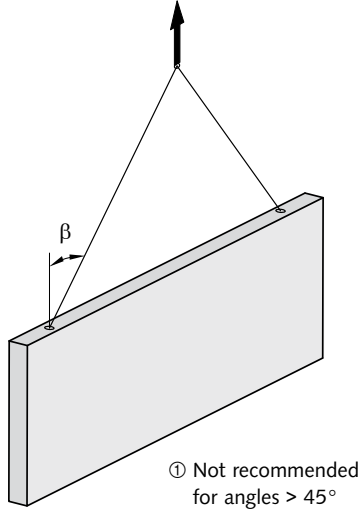
Installation and Application

Tensile loads at the anchors

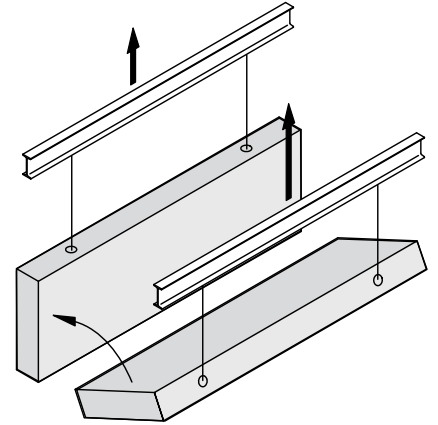
Axial load β : 0° to 10°



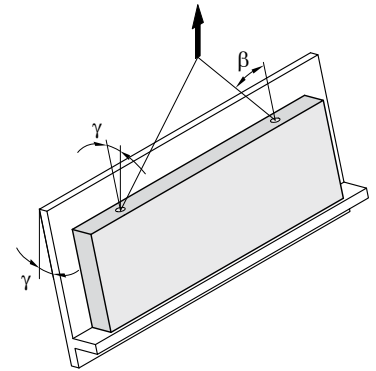
Diagonal load β : 10° to 60° ①



Tilting γ : 90°

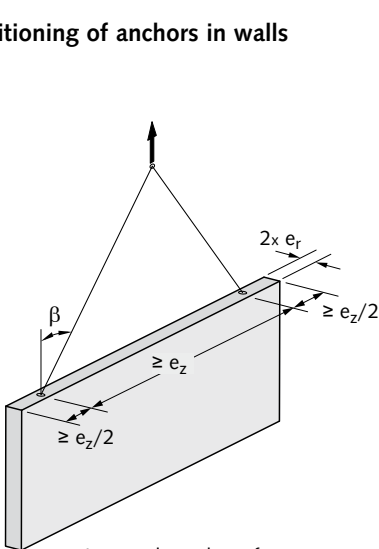


Additional shear reinforcement can be omitted when using a tilting table and a load angle of $\gamma < 15^\circ$.

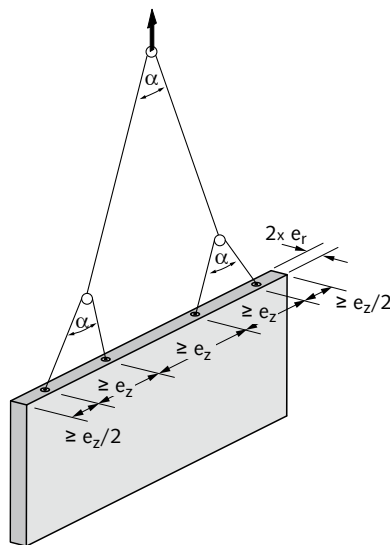


Static system

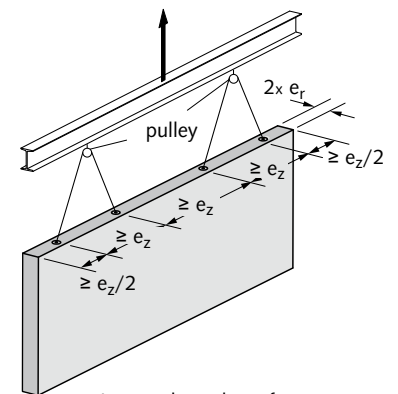
Positioning of anchors in walls



Assumed number of load bearing anchors: $n = 2$



Assumed number of load bearing anchors: $n = 4$



Assumed number of load bearing anchors: $n = 4$

FRIMEDA LIFTING ANCHOR SYSTEM

Installation and Application

Statical systems

Layout of the anchors in slabs

A beam with more than two suspension points or a panel with more than three suspension points are assumed to be statically indeterminate even if the anchors are arranged symmetrically to the load centre.

Due to unavoidable tolerances in suspension systems and in the position of the anchors, it can never be determined whether the load is distributed equally amongst all anchors.

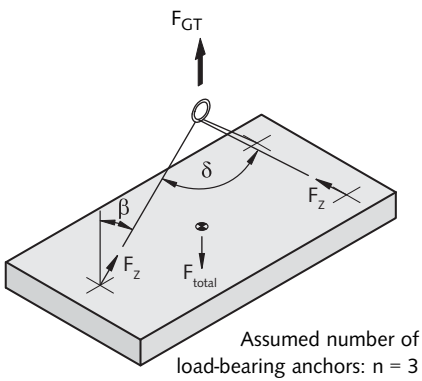
Using tolerance-compensating suspension systems permit exact load distribution (e.g. articulated lifting beam combinations, multiple slings with compensating rig, etc.).

This type of system should only be used by experienced specialists; also bear in mind that this system must be used in the precast plant and on the construction site. If in doubt assume only two anchors are load bearing (BGR 500 Ch. 2,8 / section 3.5.3).

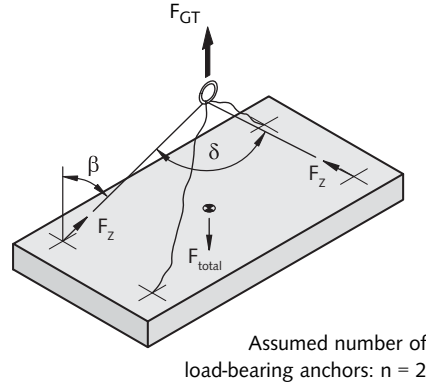
The use of two anchors is recommended for beams and upright panels, and four anchors installed symmetrically to the load centre is recommended for horizontal slabs. In both instances, it can be assumed that two anchors will be bearing equal loads.

Examples

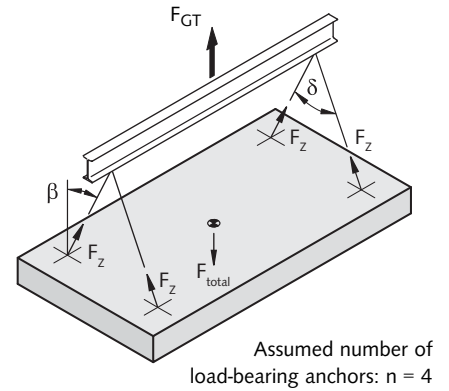
Using three anchors ensures a static determinate system.



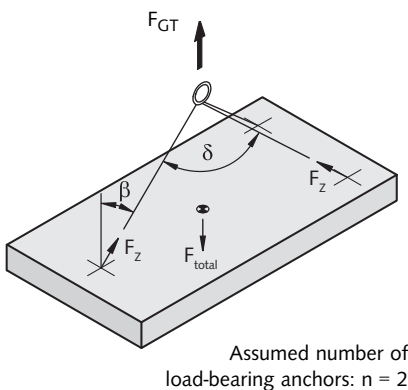
With four independent cable runs or two single diagonal cables, only two anchors can be assumed to be load-bearing.



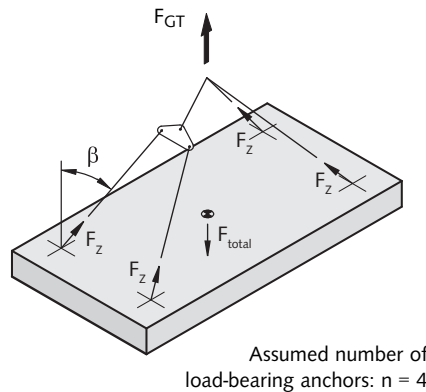
Perfect static weight distribution is achieved by using a spreader beam and two symmetrical pairs of anchors.



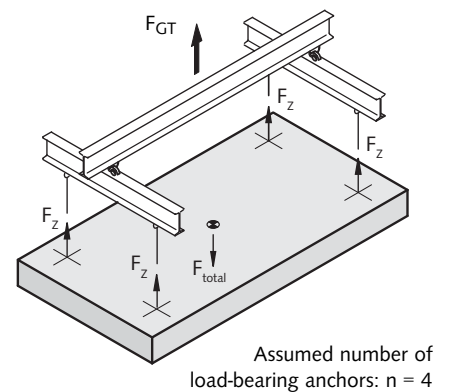
As the anchors are arranged asymmetrically, only two anchors can be assumed to be load-bearing.



The system with compensating rig makes it possible to distribute the load evenly over 4 anchors.



Perfect static weight distribution can be achieved using a spreader beam, which avoids diagonal pull.



FRIMEDA LIFTING ANCHOR SYSTEM

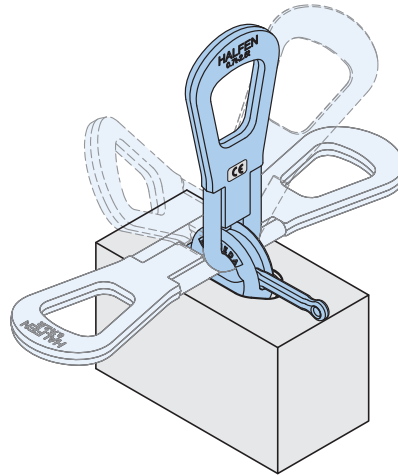
Installation and Application

Anchor installation and application – Static system

Transport anchors are made out of killed steel with a high notch toughness, which retains its safe load capacity under shock load in temperatures as low as minus 20°C. Transport anchors production is DIN EN ISO 9001 certified and is subjected to continuous monitoring.

The FRIMEDA Lifting anchor is cast in with the recess former attached. After the concrete has set, the recess former is removed. The ring clutch can then be attached to the transport anchor.

The connection meets all work regulation safety requirements; the transport anchor is in a recess so there are no dangerous protruding elements in the finished precast elements.



Cast-in anchor: multi-directional lift

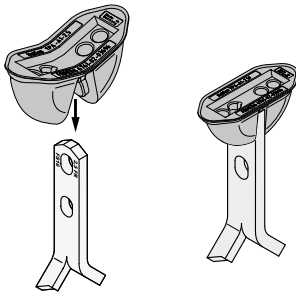
Advantages:

Safety is the top priority when moving or transporting precast elements. The cast-in forged steel spherical head transport anchors include large safety factors against steel and concrete failure. The load class is clearly marked on all anchors; on some anchors the length is also marked.

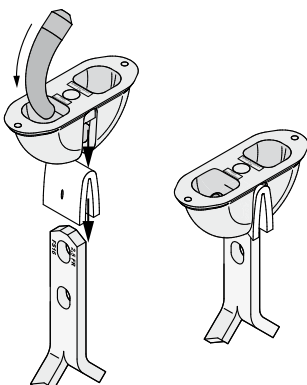
The comprehensive product range including anchors and numerous system accessories allows the most economical solution for every precast element; regardless of shape.

- There is no risk of mix-ups in a particular load class.
- The lifting link (the ring clutch) is wear resistant even in the toughest construction situations.
- The system ensures fast anchor installation in precast elements and due to the special anchor shape the crane hook is connected within seconds to the precast element.
- Anchor installation in the precast plant using the system accessories is remarkably easy.
- Engaging and disengaging the universal lifting link – fitted to a crane-cable – with the transport anchor is easy and can be done with one hand.
- Thanks to efficient production methods and its proven design FRIMEDA Lifting anchors are exceptionally economical.

Combining accessories and anchors	
Ring clutch load class	Anchor load class
1,25	1,25
	0,7
	1,4
	2,0
2,5	2,5
	3,0
	4,0
5,0	5,0
	7,5
10,0	10,0
	12,5
26,0	14,0
	17,0
	22,0
	26,0
	26,0
	26,0



Installation of recess former A1



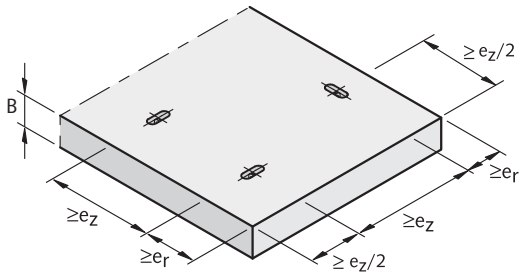
Installation of recess former A4

The HALFEN product range with its wide selection of transport anchors in various load classes and lengths guarantees that for nearly every shape of reinforced concrete precast element the required technically, correct solution is available and remains cost-efficient – for conventional building projects (beams, ceiling slabs, trusses, columns and stairs); and also for utility and excavation projects (pipes and shafts).

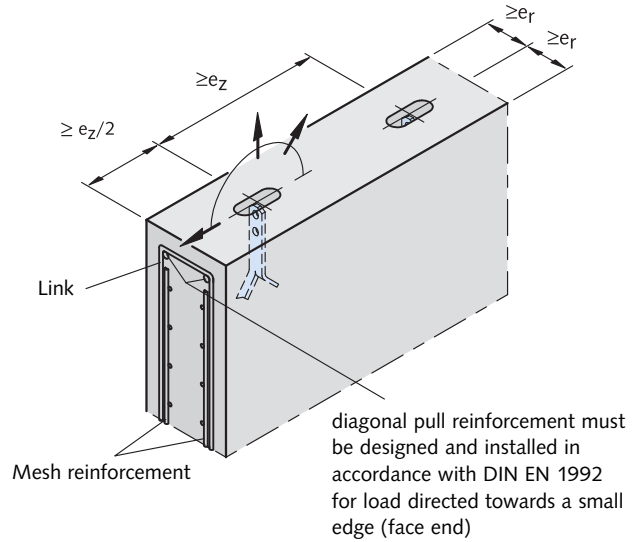
FRIMEDA LIFTING ANCHOR SYSTEM

Basic Principles for Load Capacities

Spread anchors for large surface precast elements



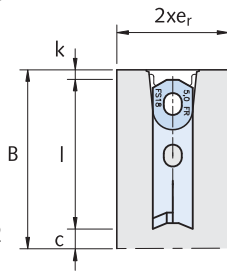
Spread anchors for thin-wall precast unit



Minimum thickness of precast elements

$$B = l + k + c$$

- l = Anchor length
- k = Cover; anchor head
- c = Concrete cover acc. to DIN EN 1992



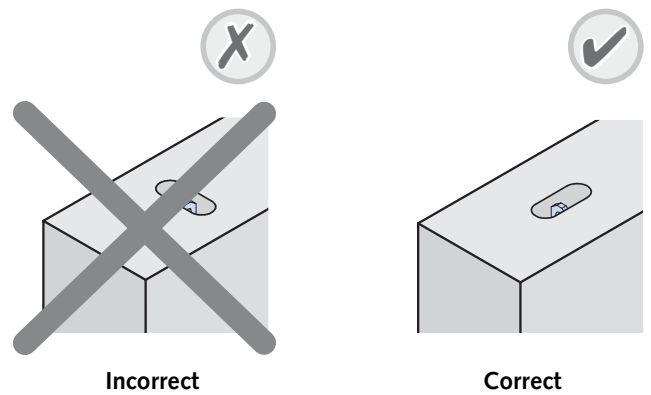
Basic principles of the load capacity tables

The values for loads and edge distances in the following tables have been calculated in accordance with the applicable regulations and a calculation process modified for anchors or established through tests.

Anchor arrangement for thin-wall elements

Spread, erection and two hole anchors may only be installed in **thin-wall elements** with the flat steel at right-angles to the slab.

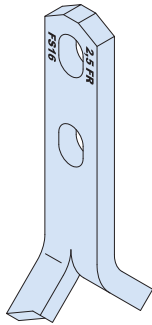
Symbols used in this catalogue	
Load direction	Symbol
Central pull in direction of anchor axis	
Transverse pull perpendicular to the anchor surface	
Transverse pull parallel to the anchor surface	
Diagonal pull, transverse component perpendicular to the anchor surface	
Diagonal pull, transverse component parallel to the anchor surface	



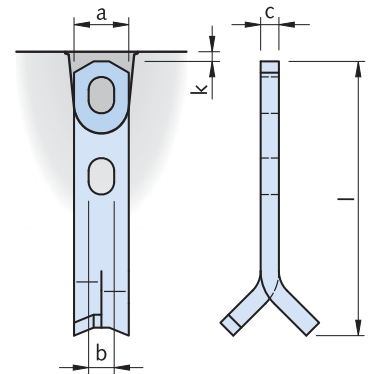
FRIMEDA LIFTING ANCHOR SYSTEM

Spread Anchor TPA-FS

Anchor dimensions



The spread anchor with additional slot is very versatile. It provides efficient anchorage in both thin panels and large surface slabs. For special requirements and very thin walls the spread anchor can also be used as a two hole anchor.



Dimensions spread anchor TPA-FS

Load class lifting link	Article number Mill finish	Order no. 0070.010-	Article number Hot-dip galvanized	Order no. 0070.110-	a [mm]	b [mm]	c [mm]	l [mm]	k [mm]
2,5	TPA-FS 0,7-11	00001	TPA-FS 0,7-11 FV	00032	30	14	5	110	10
	TPA-FS 1,4-11	00002	TPA-FS 1,4-11 FV	00033	30	14	6	110	
	TPA-FS 1,4-16	00003	TPA-FS 1,4-16 FV	00034	30	14	6	160	
	TPA-FS 2,0-13	00004	TPA-FS 2,0-13 FV	00035	30	14	8	130	
	TPA-FS 2,0-16	00005	TPA-FS 2,0-16 FV	00036	30	14	8	160	
	TPA-FS 2,0-21	00006	TPA-FS 2,0-21 FV	00037	30	14	8	210	
	TPA-FS 2,5-15	00007	TPA-FS 2,5-15 FV	00038	30	14	10	150	
	TPA-FS 2,5-20	00008	TPA-FS 2,5-20 FV	00039	30	14	10	200	
	TPA-FS 2,5-25	00009	TPA-FS 2,5-25 FV	00040	30	14	10	250	
5,0	TPA-FS 3,0-16	00010	TPA-FS 3,0-16 FV	00041	40	18	10	160	10
	TPA-FS 3,0-20	00011	TPA-FS 3,0-20 FV	00042	40	18	10	200	
	TPA-FS 3,0-28	00012	TPA-FS 3,0-28 FV	00043	40	18	10	280	
	TPA-FS 4,0-18	00013	TPA-FS 4,0-18 FV	00044	40	18	12	180	
	TPA-FS 4,0-24	00014	TPA-FS 4,0-24 FV	00045	40	18	12	240	
	TPA-FS 4,0-32	00015	TPA-FS 4,0-32 FV	00046	40	18	12	320	
	TPA-FS 5,0-18	00016	TPA-FS 5,0-18 FV	00047	40	18	15	180	
	TPA-FS 5,0-24	00017	TPA-FS 5,0-24 FV	00048	40	18	15	240	
	TPA-FS 5,0-40	00018	TPA-FS 5,0-40 FV	00049	40	18	15	400	
10,0	TPA-FS 7,5-26	00022	TPA-FS 7,5-26 FV	00053	60	26	16	260	15
	TPA-FS 7,5-30	00023	TPA-FS 7,5-30 FV	00054	60	26	16	300	
	TPA-FS 7,5-42	00024	TPA-FS 7,5-42 FV	00055	60	26	16	420	
	TPA-FS 10,0-30	00025	TPA-FS 10,0-30 FV	00056	60	26	20	300	
	TPA-FS 10,0-37	00026	TPA-FS 10,0-37 FV	00057	60	26	20	370	
	TPA-FS 10,0-52	00027	TPA-FS 10,0-52 FV	00058	60	26	20	520	
26,0	TPA-FS 14,0-37	00028	TPA-FS 14,0-37 FV	00059	80	35	20	370	15
	TPA-FS 14,0-46	00029	TPA-FS 14,0-46 FV	00060	80	35	20	460	
	TPA-FS 22,0-50	00030	TPA-FS 22,0-50 FV	00062	90	35	28	500	
	TPA-FS 22,0-62	00031	TPA-FS 22,0-62 FV	00063	90	35	28	620	

Technical basics

- observe the minimum edge distance ($e_z/2$) for the spherical head anchor
- constructive measures may be taken to lower the edge distance (reinforcement).
- present reinforcement can be

assumed as contributing towards the minimal required reinforcement for the transport anchor

- elements must be designed for load case "transport".
- horizontally cast element must be removed from the tilting table near

vertical at an angle $\geq 75^\circ$

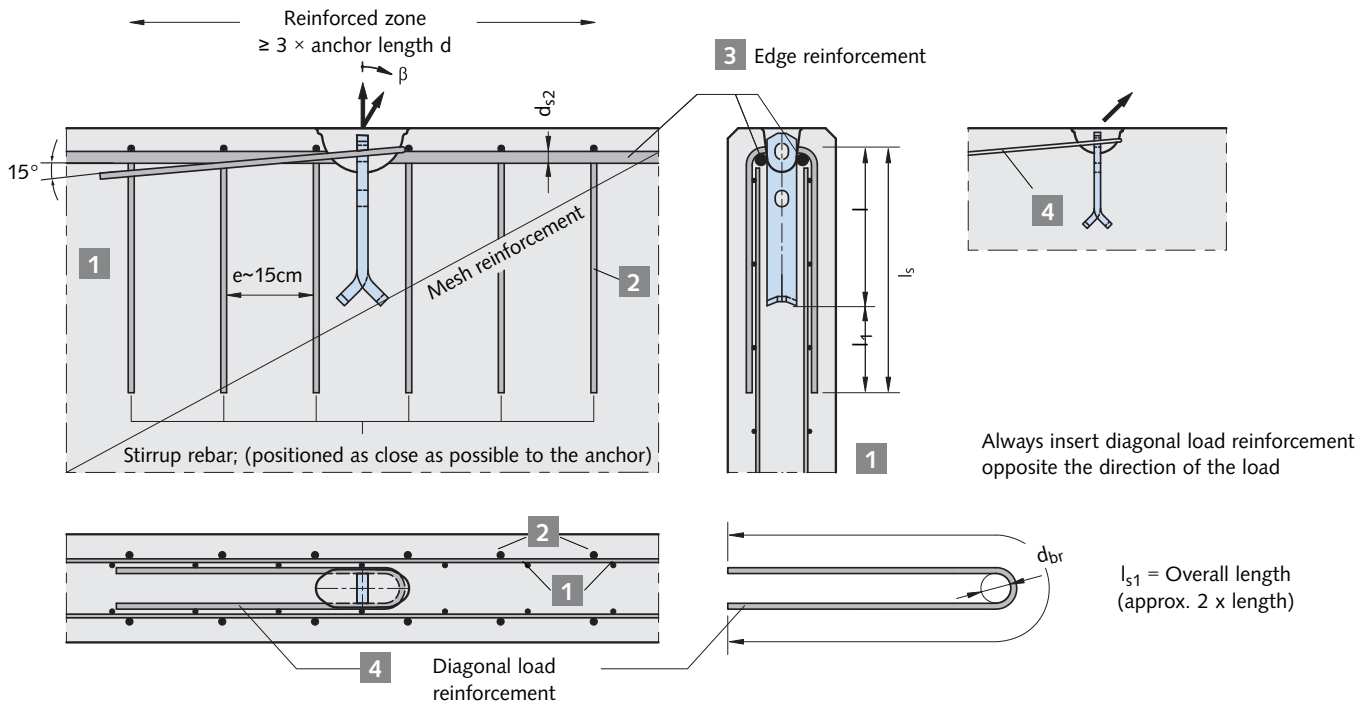
Otherwise the load case is "pitching".

- reducing the reinforcement is possible if the anchor is not subjected to maximum possible load or if other measures are taken.

FRIMEDA LIFTING ANCHOR SYSTEM

Spread Anchor TPA-FS

Reinforcement the anchor in thin-wall precast elements



! The diagonal load reinforcement must be placed as close as possible under the recess former and installed with full contact to the anchor.

A bend radius according to DIN EN 1992 is not mandatory for the diagonal stirrup.

Reinforcement of thin precast concrete elements

Load class lifting links	Load class anchor	1		2			3		4	
		Mesh reinforcement both sides crosswise Pull ($\beta \leq 30^\circ$) [mm ² /m]	Diagonal load ($\beta > 30^\circ$)			Edge reinforcement B500B d _{s2} [mm]	Diagonal pull reinforcement B500B			
			number	d _s [mm]	l ₁ [mm]		d _{s1} [mm]	d _{br,min} [mm]	l _{s1}	
2,5	0,7	2 × 131	4	∅ 6	300	∅ 8	∅ 6	47	450	
	1,4		4	∅ 6	400	∅ 8	∅ 6	47	900	
	2,0		4	∅ 6	500	∅ 8	∅ 8	47	950	
	2,5		4	∅ 8	600	∅ 10	∅ 8	47	1200	
5,0	3,0	2 × 131	4	∅ 8	700	∅ 10	∅ 10	53	1150	
	4,0		4	∅ 8	800	∅ 12	∅ 10	53	1500	
	5,0		4	∅ 10	800	∅ 12	∅ 12	53	1550	
10,0	7,5	2 × 188	4	∅ 10	800	∅ 12	∅ 14	71	2000	
	10,0		6	∅ 10	1000	∅ 14	∅ 16	71	2300	
26,0	14,0	2 × 257	8	∅ 10	1000	∅ 14	∅ 20	116	2600	
	22,0		8	∅ 10	1200	∅ 16	∅ 28	116	3450	

① Structural stirrup reinforcement and edge reinforcement for wall thickness < e_z/2

② No diagonal pull reinforcement is needed for concrete strength of:

- β_w 15 N/mm² + 3-times minimum element thickness
- β_w 25 N/mm² + 2.5-times minimum element thickness
- β_w 35 N/mm² + 2-times minimum element thickness

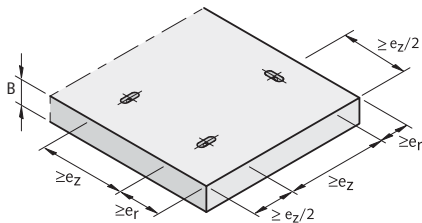
Notes: ①: When using short anchors and a high minimum number of stirrup their spacing has to be less than 15 cm.

②: l_s = l₁ + Anchor length l

FRIMEDA LIFTING ANCHOR SYSTEM

Spread Anchor TPA-FS

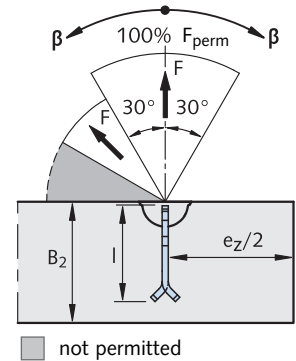
Spread anchors in slabs



The spread anchors can be used in slab-type elements. Specified edge and axial anchor spacings must be observed.



Required reinforcement **1**, reinforcement **4** only with diagonal pull. → see table on page 24 "Reinforcement of thin precast concrete elements".



■ not permitted

Spread anchor TPA-FS in slabs: Load capacities and installation dimensions

Load class lifting link	Article number	Anchor length l [mm]	Minimum element thickness B_2 [mm]	Load capacities with $f_{ct}^* \geq 15 \text{ N/mm}^2$		Minimum edge distances / slabs e_r			Minimum axial anchor spacing e_z [mm]
				Axial pull [kN]	Diagonal pull [kN]	with $\beta_w \geq 15 \text{ N/mm}^2$ [mm]	with $\beta_w \geq 25 \text{ N/mm}^2$ [mm]	with $\beta_w \geq 35 \text{ N/mm}^2$ [mm]	
2,5	TPA-FS 0,7 - 11	110	145	7.0	5.6	35	35	35	280
	TPA-FS 1,4 - 11	110	145	14.0	11.2	70	50	40	380
	TPA-FS 1,4 - 16	160	195	14.0	11.2	50	35	35	530
	TPA-FS 2,0 - 13	130	165	20.0	16.0	100	70	55	450
	TPA-FS 2,0 - 16	160	195	20.0	16.0	80	60	45	570
	TPA-FS 2,0 - 21	210	245	20.0	16.0	65	45	35	770
	TPA-FS 2,5 - 15	150	185	25.0	20.0	120	85	70	520
	TPA-FS 2,5 - 20	200	235	25.0	20.0	90	65	50	720
5,0	TPA-FS 2,5 - 25	250	285	25.0	20.0	75	50	40	920
	TPA-FS 3,0 - 16	160	195	30.0	24.0	145	100	80	550
	TPA-FS 3,0 - 20	200	235	30.0	24.0	115	85	65	710
	TPA-FS 3,0 - 28	280	315	30.0	24.0	85	60	50	1025
	TPA-FS 4,0 - 18	180	215	40.0	32.0	190	135	105	610
	TPA-FS 4,0 - 24	240	275	40.0	32.0	145	100	80	850
	TPA-FS 4,0 - 32	320	355	40.0	32.0	110	75	60	1175
	TPA-FS 5,0 - 18	180	215	50.0	40.0	260	180	145	600
10,0	TPA-FS 5,0 - 24	240	275	50.0	40.0	195	140	110	840
	TPA-FS 5,0 - 40	400	435	50.0	40.0	115	85	65	1480
	TPA-FS 7,5 - 26	260	300	75.0	60.0	300	215	175	900
	TPA-FS 7,5 - 30	300	340	75.0	60.0	265	190	150	1060
	TPA-FS 7,5 - 42	420	460	75.0	60.0	190	135	110	1540
	TPA-FS 10,0 - 30	300	340	100.0	80.0	390	275	220	1030
26,0	TPA-FS 10,0 - 37	370	410	100.0	80.0	315	225	180	1310
	TPA-FS 10,0 - 52	520	560	100.0	80.0	225	160	130	1910
	TPA-FS 14,0 - 37	370	410	140.0	112.0	500	355	285	1230
	TPA-FS 14,0 - 46	460	500	140.0	112.0	400	285	230	1590
	TPA-FS 22,0 - 50	500	540	220.0	176.0	675	480	385	1700
	TPA-FS 22,0 - 62	620	660	220.0	176.0	540	385	310	2180

- Required reinforcement: minimum standard reinforcement

- The concrete cover for the anchor foot is 25mm. Plate thicknesses $< B_2$ are only possible with suitable corrosion protection.

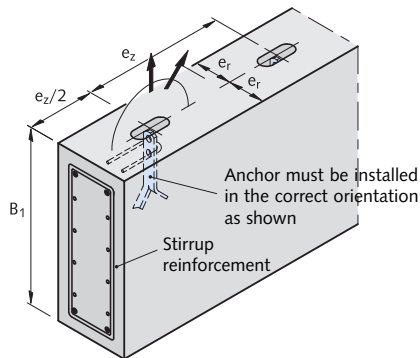
- The upper reinforcement must be dimensioned for load case 'transport'.

* f_{ct} = cube concrete strength at time of lifting

FRIMEDA LIFTING ANCHOR SYSTEM

Spread Anchor TPA-FS – no Special Requirements on the Reinforcement

Load capacities of spherical head anchors in beams and walls – no special reinforcement requirements



Required reinforcement
1 – 4 → see table on page 24
 "Reinforcement of thin precast concrete elements".
 Full stirrups can be used in place of U-bars in beams.

Spread anchors in beams and walls – no special reinforcement requirements (load class 2,5 – 5,0)

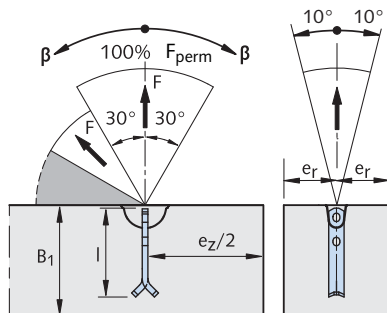
Load class lifting links	Article number	Anchor length l [mm]	Min. height of beams B ₁ [mm]	Wall thickness 2 × e _r [mm]	Load capacity [kN] at concrete strength f _{ci} for				Axial spacing of anchors e _z [mm]
					Axial pull up to 30° [β]	Diagonal pull up to 60° [β]	Axial pull and diagonal pull up to 60° [β]	Axial pull and diagonal pull up to 60° [β]	
					15 N/mm ²	15 N/mm ²	25 N/mm ²	35 N/mm ²	
2,5	TPA-FS 0,7 - 11	110	240	70	7.0	7.0	7.0	7.0	280
	TPA-FS 1,4 - 11	110	240	80	11.5	9.2	14.0	14.0	380
	TPA-FS 1,4 - 11	110	240	100	13.6	10.9	14.0	14.0	380
	TPA-FS 1,4 - 11	110	240	120	14.0	12.5	14.0	14.0	380
	TPA-FS 1,4 - 16	160	340	70	13.2	11.4	14.0	14.0	530
	TPA-FS 1,4 - 16	160	340	80	14.0	12.6	14.0	14.0	530
	TPA-FS 1,4 - 16	160	340	100	14.0	14.0	14.0	14.0	530
	TPA-FS 2,0 - 13	130	280	100	15.5	12.4	20.0	20.0	450
	TPA-FS 2,0 - 13	130	280	120	17.8	14.2	20.0	20.0	450
	TPA-FS 2,0 - 13	130	280	150	20.0	16.8	20.0	20.0	450
	TPA-FS 2,0 - 16	160	340	80	15.6	12.5	20.0	20.0	570
	TPA-FS 2,0 - 16	160	340	100	18.5	14.8	20.0	20.0	570
	TPA-FS 2,0 - 16	160	340	120	20.0	17.0	20.0	20.0	570
	TPA-FS 2,0 - 21	210	440	80	15.6	15.6	20.0	20.0	770
	TPA-FS 2,0 - 21	210	440	100	19.5	18.6	20.0	20.0	770
	TPA-FS 2,0 - 21	210	440	120	20.0	20.0	20.0	20.0	770
	TPA-FS 2,5 - 15	150	320	120	19.8	15.9	25.0	25.0	520
	TPA-FS 2,5 - 15	150	320	150	23.4	18.8	25.0	25.0	520
	TPA-FS 2,5 - 15	150	320	180	25.0	21.5	25.0	25.0	520
	TPA-FS 2,5 - 20	200	420	100	20.5	17.7	25.0	25.0	720
TPA-FS 2,5 - 20	200	420	120	24.6	20.3	25.0	25.0	720	
TPA-FS 2,5 - 20	200	420	150	25.0	24.0	25.0	25.0	720	
TPA-FS 2,5 - 25	250	520	100	20.6	20.6	25.0	25.0	920	
TPA-FS 2,5 - 25	250	520	120	24.7	24.7	25.0	25.0	920	
TPA-FS 2,5 - 25	250	520	140	25.0	25.0	25.0	25.0	920	
5,0	TPA-FS 3,0 - 16	160	340	150	24.5	19.6	30.0	30.0	550
	TPA-FS 3,0 - 16	160	340	200	30.0	24.3	30.0	30.0	550
	TPA-FS 3,0 - 16	160	340	240	30.0	27.9	30.0	30.0	550
	TPA-FS 3,0 - 20	200	420	120	25.1	20.1	27.6	30.0	710
	TPA-FS 3,0 - 20	200	420	150	29.7	23.8	30.0	30.0	710
	TPA-FS 3,0 - 20	200	420	200	30.0	29.5	30.0	30.0	710
	TPA-FS 3,0 - 28	280	580	100	25.0	23.3	30.0	30.0	1025
	TPA-FS 3,0 - 28	280	580	120	30.0	26.7	30.0	30.0	1025
	TPA-FS 3,0 - 28	280	580	150	30.0	30.0	30.0	30.0	1025
	TPA-FS 4,0 - 18	180	380	180	30.8	24.7	39.8	40.0	610
	TPA-FS 4,0 - 18	180	380	240	38.3	30.6	40.0	40.0	610
	TPA-FS 4,0 - 18	180	380	300	40.0	36.2	40.0	40.0	610
	TPA-FS 4,0 - 24	240	500	150	34.4	27.5	40.0	40.0	850
	TPA-FS 4,0 - 24	240	500	180	39.5	31.6	40.0	40.0	850
	TPA-FS 4,0 - 24	240	500	200	40.0	34.2	40.0	40.0	850
	TPA-FS 4,0 - 32	320	660	120	31.1	29.7	40.0	40.0	1175
	TPA-FS 4,0 - 32	320	660	150	38.9	35.1	40.0	40.0	1175
	TPA-FS 4,0 - 32	320	660	180	40.0	40.0	40.0	40.0	1175

* f_{ci} = cube concrete strength at time of lifting

FRIMEDA LIFTING ANCHOR SYSTEM

Spread Anchor TPA-FS – no Special Requirements on the Reinforcement

Load capacities of spherical head anchors in beams and walls – no special reinforcement requirements



■ not permitted

- diagonal pull at $30^\circ < \beta \leq 60^\circ$ without reinforcement is only allowed for:
 - $\beta_W \geq 15 \text{ N/mm}^2 + 3$ times minimum wall thickness
 - $\beta_W \geq 25 \text{ N/mm}^2 + 2.5$ times minimum wall thickness
 - $\beta_W \geq 35 \text{ N/mm}^2 + 2$ times minimum wall thickness
(minimum wall thickness = $2 \times e_r$)
- F_{perm} can be assumed at 100% if concrete strength $\beta_W \geq 23 \text{ N/mm}^2$.
- diagonal pull with cable/chain spread $\beta > 60^\circ$ is not permitted!

Spread anchor in beams and walls – no special reinforcement requirements (load class 5,0 – 26,0)

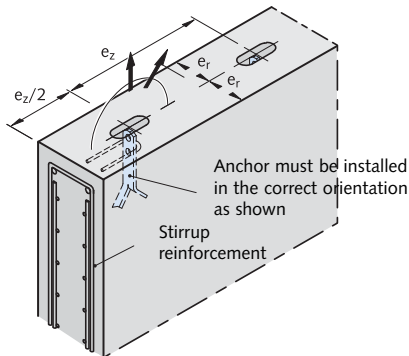
Load class lifting link	Article number	Anchor length l [mm]	Minimum height of beams B_1 [mm]	Wall thickness $2 \times e_r$ [mm]	Load capacity [kN] at concrete strength f_{ct}^* for				Axial spacing of anchors e_z [mm]
					Axial pull up to 30° [β]		Axial pull and Diagonal pull up to 60° [β]		
					15 N/mm ²	15 N/mm ²	25 N/mm ²	35 N/mm ²	
5,0	TPA-FS 5,0 - 18	180	380	240	37.8	30.2	48.8	50.0	600
	TPA-FS 5,0 - 18	180	380	300	44.7	35.7	50.0	50.0	600
	TPA-FS 5,0 - 18	180	380	400	50.0	44.3	50.0	50.0	600
	TPA-FS 5,0 - 24	240	500	200	42.3	33.9	50.0	50.0	840
	TPA-FS 5,0 - 24	240	500	240	48.5	38.8	50.0	50.0	840
	TPA-FS 5,0 - 24	240	500	300	50.0	45.9	50.0	50.0	840
	TPA-FS 5,0 - 40	400	820	150	40.5	40.5	50.0	50.0	1480
	TPA-FS 5,0 - 40	400	820	180	48.6	48.2	50.0	50.0	1480
10,0	TPA-FS 5,0 - 40	400	820	200	50.0	50.0	50.0	50.0	1480
	TPA-FS 7,5 - 26	260	550	300	61.1	48.9	75.0	75.0	900
	TPA-FS 7,5 - 26	260	550	400	75.0	60.7	75.0	75.0	900
	TPA-FS 7,5 - 26	260	550	500	75.0	71.8	75.0	75.0	900
	TPA-FS 7,5 - 30	300	630	250	60.3	48.2	75.0	75.0	1060
	TPA-FS 7,5 - 30	300	630	300	69.1	55.3	75.0	75.0	1060
	TPA-FS 7,5 - 30	300	630	400	75.0	68.6	75.0	75.0	1060
	TPA-FS 7,5 - 42	420	870	180	62.6	50.1	75.0	75.0	1540
	TPA-FS 7,5 - 42	420	870	240	75.0	62.1	75.0	75.0	1540
	TPA-FS 7,5 - 42	420	870	300	75.0	73.5	75.0	75.0	1540
	TPA-FS 10,0 - 30	300	630	400	84.7	67.8	100.0	100.0	1030
	TPA-FS 10,0 - 30	300	630	500	100.0	80.1	100.0	100.0	1030
	TPA-FS 10,0 - 30	300	630	600	100.0	91.9	100.0	100.0	1030
	TPA-FS 10,0 - 37	370	770	300	81.8	65.4	100.0	100.0	1310
	TPA-FS 10,0 - 37	370	770	400	100.0	81.2	100.0	100.0	1310
	TPA-FS 10,0 - 37	370	770	500	100.0	95.9	100.0	100.0	1310
	TPA-FS 10,0 - 52	520	1070	240	92.2	73.7	100.0	100.0	1910
	TPA-FS 10,0 - 52	520	1070	300	100.0	87.2	100.0	100.0	1910
TPA-FS 10,0 - 52	520	1070	400	100.0	100.0	100.0	100.0	1910	
26,0	TPA-FS 14,0 - 37	370	770	500	116.2	93.0	140.0	140.0	1230
	TPA-FS 14,0 - 37	370	770	600	133.3	106.6	140.0	140.0	1230
	TPA-FS 14,0 - 37	370	770	750	140.0	126.8	140.0	140.0	1230
	TPA-FS 14,0 - 46	460	950	400	119.0	95.2	140.0	140.0	1590
	TPA-FS 14,0 - 46	460	950	500	140.0	112.6	140.0	140.0	1590
	TPA-FS 14,0 - 46	460	950	600	140.0	129.1	140.0	140.0	1590
	TPA-FS 22,0 - 50	500	1030	600	170.7	136.6	220.0	220.0	1700
	TPA-FS 22,0 - 50	500	1030	800	211.8	169.5	220.0	220.0	1700
	TPA-FS 22,0 - 50	500	1030	1000	220.0	200.3	220.0	220.0	1700
	TPA-FS 22,0 - 62	620	1270	500	179.6	143.7	220.0	220.0	2180
	TPA-FS 22,0 - 62	620	1270	600	205.9	164.7	220.0	220.0	2180
	TPA-FS 22,0 - 62	620	1270	800	220.0	204.4	220.0	220.0	2180

* f_{ct} = cube concrete strength at time of lifting

FRIMEDA LIFTING ANCHOR SYSTEM

Spread Anchor TPA-FS – with Reinforcement Subjected to Load

Load capacities of spherical head anchors in beams and walls; reinforcement subjected to load



Required reinforcement

1 – 4 → see table on page 24
"Reinforcement of thin precast concrete elements".

Closed stirrup reinforcement can be used in place of U-bars in beams.

Spread anchor in beams and walls – with reinforcement subjected to load (load class 2,5 – 5,0)

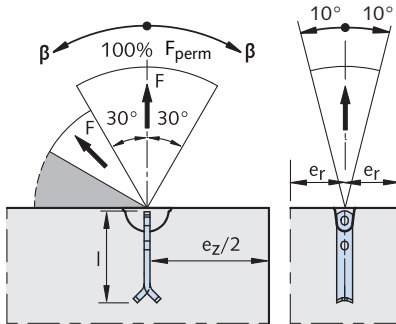
Load class lifting link	Article number	Anchor length l [mm]	Wall thickness $2 \times e_r$ [mm]	Load capacity [kN] at concrete strength f_{ci}^* for				Axial spacing of anchors e_z [mm]
				Axial pull up to 30° [β]	Diagonal pull up to 45° [β]	Axial pull and Diagonal pull up to 60° [β]	Axial pull and Diagonal pull up to 60° [β]	
				15 N/mm ²	15 N/mm ²	25 N/mm ²	35 N/mm ²	
2,5	TPA-FS 0,7 - 11	110	70	7.0	7.0	7.0	7.0	280
	TPA-FS 1,4 - 11	110	80	14.0	12.9	14.0	14.0	380
	TPA-FS 1,4 - 11	110	100	14.0	14.0	14.0	14.0	380
	TPA-FS 1,4 - 11	110	120	14.0	14.0	14.0	14.0	380
	TPA-FS 1,4 - 16	160	70	13.2	13.2	14.0	14.0	530
	TPA-FS 1,4 - 16	160	80	14.0	14.0	14.0	14.0	530
	TPA-FS 1,4 - 16	160	100	14.0	14.0	14.0	14.0	530
	TPA-FS 2,0 - 13	130	80	15.6	13.4	20.0	20.0	450
	TPA-FS 2,0 - 13	130	100	19.5	17.2	20.0	20.0	450
	TPA-FS 2,0 - 13	130	120	20.0	18.8	20.0	20.0	450
	TPA-FS 2,0 - 16	160	80	15.6	15.6	20.0	20.0	570
	TPA-FS 2,0 - 16	160	100	19.5	19.5	20.0	20.0	570
	TPA-FS 2,0 - 16	160	120	20.0	20.0	20.0	20.0	570
	TPA-FS 2,0 - 21	210	80	15.6	15.6	20.0	20.0	770
	TPA-FS 2,0 - 21	210	100	19.5	19.5	20.0	20.0	770
	TPA-FS 2,0 - 21	210	120	20.0	20.0	20.0	20.0	770
	TPA-FS 2,5 - 15	150	100	20.6	19.8	25.0	25.0	520
	TPA-FS 2,5 - 15	150	120	24.6	21.7	25.0	25.0	520
	TPA-FS 2,5 - 15	150	150	25.0	24.3	25.0	25.0	520
	TPA-FS 2,5 - 20	200	90	18.5	18.5	23.9	25.0	720
TPA-FS 2,5 - 20	200	100	20.6	20.6	25.0	25.0	720	
TPA-FS 2,5 - 20	200	125	25.0	25.0	25.0	25.0	720	
TPA-FS 2,5 - 25	250	80	16.4	16.4	21.2	25.0	920	
TPA-FS 2,5 - 25	250	100	20.6	20.6	25.0	25.0	920	
TPA-FS 2,5 - 25	250	120	24.7	24.7	25.0	25.0	920	
5,0	TPA-FS 3,0 - 16	160	120	28.8	23.0	30.0	30.0	550
	TPA-FS 3,0 - 16	160	150	30.0	25.7	30.0	30.0	550
	TPA-FS 3,0 - 16	160	180	30.0	28.2	30.0	30.0	550
	TPA-FS 3,0 - 20	200	100	25.1	25.1	30.0	30.0	710
	TPA-FS 3,0 - 20	200	110	30.0	29.6	30.0	30.0	710
	TPA-FS 3,0 - 20	200	120	30.0	30.0	30.0	30.0	710
	TPA-FS 3,0 - 28	280	100	25.1	25.1	30.0	30.0	1025
	TPA-FS 3,0 - 28	280	110	27.6	27.6	30.0	30.0	1025
	TPA-FS 3,0 - 28	280	120	30.0	30.0	30.0	30.0	1025
	TPA-FS 4,0 - 18	180	150	36.2	29.0	40.0	40.0	610
	TPA-FS 4,0 - 18	180	200	40.0	33.5	40.0	40.0	610
	TPA-FS 4,0 - 18	180	240	40.0	36.7	40.0	40.0	610
	TPA-FS 4,0 - 24	240	140	36.3	36.3	40.0	40.0	850
	TPA-FS 4,0 - 24	240	160	40.0	40.0	40.0	40.0	850
	TPA-FS 4,0 - 24	240	180	40.0	40.0	40.0	40.0	850
	TPA-FS 4,0 - 32	320	120	31.1	31.1	40.0	40.0	1175
	TPA-FS 4,0 - 32	320	140	36.3	36.3	40.0	40.0	1175
	TPA-FS 4,0 - 32	320	160	40.0	40.0	40.0	40.0	1175

* f_{ci} = cube concrete strength at time of lifting

FRIMEDA LIFTING ANCHOR SYSTEM

Spread Anchor TPA-FS – with Reinforcement Subjected to Load

Load capacities of spherical head anchors in beams and walls; reinforcement subjected to load



■ not permitted

- diagonal pull at $30^\circ < \beta \leq 60^\circ$ without reinforcement is only allowed for:
 - $\beta_W \geq 15 \text{ N/mm}^2 + 3$ times minimum wall thickness
 - $\beta_W \geq 25 \text{ N/mm}^2 + 2.5$ times minimum wall thickness
 - $\beta_W \geq 35 \text{ N/mm}^2 + 2$ times minimum wall thickness
 (minimum wall thickness = $2 \times e_r$)
- F_{perm} can be assumed at 100% if concrete strength $\beta_W \geq 23 \text{ N/mm}^2$.
- diagonal pull with cable/chain spread $\beta > 60^\circ$ is not permitted!

Spread anchor in beams and walls – with reinforcement subjected to load (load class 5,0 – 26,0)

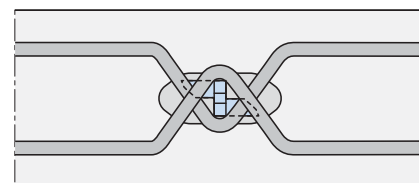
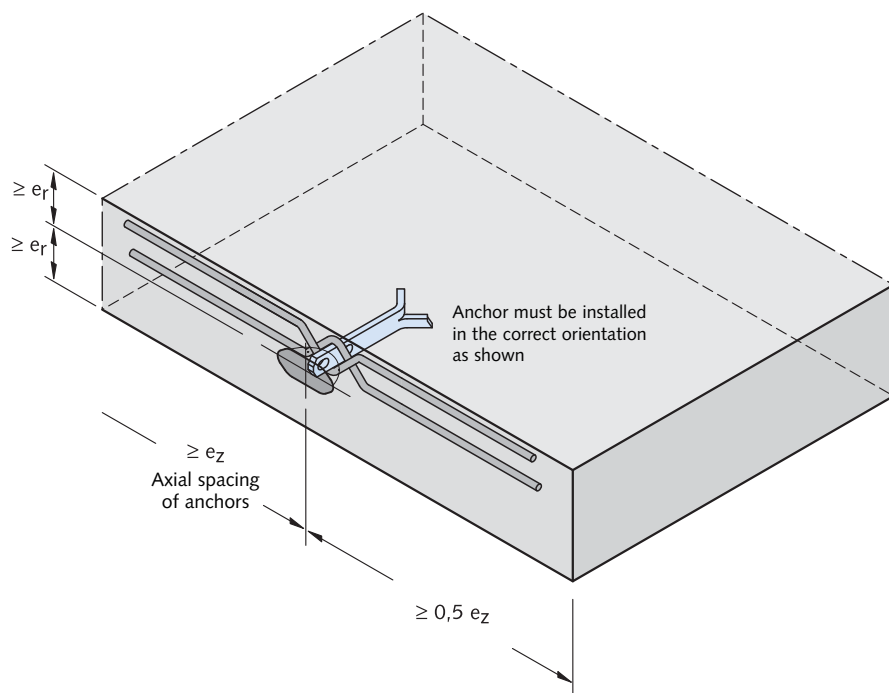
Load class lifting link	Article number	Anchor length l [mm]	Wall thickness $2 \times e_r$ [mm]	Load capacity [kN] at concrete strength f_{ci}^* for				Axial spacing of anchors e_z [mm]
				Axial pull up to 30° [β]	Diagonal pull up to 45° [β]	Axial pull and Diagonal pull up to 60° [β]	Axial pull and Diagonal pull up to 60° [β]	
				15 N/mm ²	15 N/mm ²	25 N/mm ²	35 N/mm ²	
5,0	TPA-FS 5,0 - 18	180	240	45.1	36.1	50.0	50.0	600
	TPA-FS 5,0 - 18	180	300	50.0	40.4	50.0	50.0	600
	TPA-FS 5,0 - 18	180	400	50.0	46.6	50.0	50.0	600
	TPA-FS 5,0 - 24	240	180	48.7	43.5	50.0	50.0	840
	TPA-FS 5,0 - 24	240	200	50.0	45.8	50.0	50.0	840
	TPA-FS 5,0 - 24	240	240	50.0	50.0	50.0	50.0	840
	TPA-FS 5,0 - 40	400	160	43.2	43.2	50.0	50.0	1480
	TPA-FS 5,0 - 40	400	180	48.7	48.7	50.0	50.0	1480
10,0	TPA-FS 7,5 - 26	260	240	68.2	54.5	75.0	75.0	900
	TPA-FS 7,5 - 26	260	300	75.0	61.0	75.0	75.0	900
	TPA-FS 7,5 - 26	260	400	75.0	70.4	75.0	75.0	900
	TPA-FS 7,5 - 30	300	200	73.1	58.5	75.0	75.0	1060
	TPA-FS 7,5 - 30	300	240	75.0	64.0	75.0	75.0	1060
	TPA-FS 7,5 - 30	300	300	75.0	71.6	75.0	75.0	1060
	TPA-FS 7,5 - 42	420	160	60.0	60.0	75.0	75.0	1540
	TPA-FS 7,5 - 42	420	180	67.5	67.5	75.0	75.0	1540
	TPA-FS 7,5 - 42	420	200	75.0	75.0	75.0	75.0	1540
	TPA-FS 10,0 - 30	300	400	100.0	81.4	100.0	100.0	1030
	TPA-FS 10,0 - 30	300	500	100.0	91.0	100.0	100.0	1030
	TPA-FS 10,0 - 30	300	600	100.0	99.7	100.0	100.0	1030
	TPA-FS 10,0 - 37	370	300	100.0	89.3	100.0	100.0	1310
	TPA-FS 10,0 - 37	370	400	100.0	100.0	100.0	100.0	1310
	TPA-FS 10,0 - 37	370	500	100.0	100.0	100.0	100.0	1310
	TPA-FS 10,0 - 52	520	240	94.7	94.7	100.0	100.0	1910
	TPA-FS 10,0 - 52	520	300	100.0	100.0	100.0	100.0	1910
	TPA-FS 10,0 - 52	520	400	100.0	100.0	100.0	100.0	1910
26,0	TPA-FS 14,0 - 37	370	500	138.3	110.6	140.0	140.0	1230
	TPA-FS 14,0 - 37	370	600	140.0	121.2	140.0	140.0	1230
	TPA-FS 14,0 - 37	370	750	140.0	135.5	140.0	140.0	1230
	TPA-FS 14,0 - 46	460	350	140.0	118.9	140.0	140.0	1590
	TPA-FS 14,0 - 46	460	400	140.0	127.1	140.0	140.0	1590
	TPA-FS 14,0 - 46	460	500	140.0	140.0	140.0	140.0	1590
	TPA-FS 22,0 - 50	500	600	209.6	167.7	220.0	220.0	1700
	TPA-FS 22,0 - 50	500	800	220.0	193.6	220.0	220.0	1700
	TPA-FS 22,0 - 50	500	1000	220.0	216.5	220.0	220.0	1700
	TPA-FS 22,0 - 62	620	400	218.9	175.1	220.0	220.0	2180
	TPA-FS 22,0 - 62	620	600	220.0	214.5	220.0	220.0	2180
	TPA-FS 22,0 - 62	620	700	220.0	220.0	220.0	220.0	2180

* f_{ci} = cube concrete strength at time of lifting

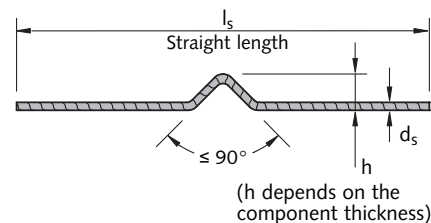
FRIMEDA LIFTING ANCHOR SYSTEM

TPA-FS Spread Anchor

Load capacity, installation dimensions for tilting and turning



The horizontal legs of the tilting and turning reinforcement are located directly within the outermost position of the reinforced area.



Material: Reinforcing steel B500B ①

Load capacities, installation dimensions for tilting and turning

Load class lifting link	Article number	$f_{ct} \geq 15 \text{ N/mm}^2$ perm. load capacities for tilting [kN]	Minimum edge distance e_r and axial spacing of anchors e_z for $\beta_W \geq 15 \text{ N/mm}^2$		Tilting and turning reinforcement	
			e_r [mm]	e_z [mm]	d_s [mm]	l_s ① [mm]
2,5	TPA-FS 0,7 - 11	3.5	100	700	8	600
	TPA-FS 1,4 - 16	7.0	100	700	10	700
	TPA-FS 2,0 - 21	10.0	100	800	10	750
	TPA-FS 2,5 - 25	12.5	100	875	12	800
5,0	TPA-FS 3,0 - 28	15.0	150	950	12	850
	TPA-FS 4,0 - 32	20.0	150	1050	14	950
	TPA-FS 5,0 - 40	25.0	150	1435	16	1000
10,0	TPA-FS 7,5 - 42	37.5	250	1470	20	1200
	TPA-FS 10,0 - 52	50.0	300	1820	20	1500
26,0	TPA-FS 14,0 - 46	70.0	525	1800	25	1800
	TPA-FS 22,0 - 62	110.0	710	2200	28	1800

① l_s = Length before bending reinforcement steel, bending radii according to DIN EN 1992

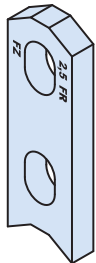
② 100% load is permitted with a concrete strength = $\beta_W \geq 23 \text{ N/mm}^2$

Required reinforcement: minimum standard reinforcement

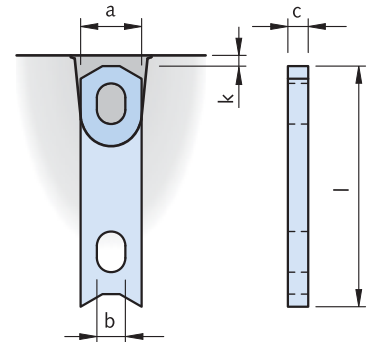
FRIMEDA LIFTING ANCHOR SYSTEM

TPA-FZ Two Hole Anchor

Anchor dimensions



The head of the two hole anchor is similar to the head of the spread anchor. The second hole in the lower part of the anchor allows an additional reinforcement bar to be used. Anchorage in the concrete is achieved with this additional reinforcement bar. Longer anchors with more additional holes can be made on request.



Dimensions TPA-FZ Two hole anchors

Load class lifting link	Article number Mill finish	Order no. 0070.020-	Article number Hot-dip galvanized	Order no. 0070.110-	a [mm]	b [mm]	c [mm]	l [mm]	k [mm]
2,5	TPA-FZ 1,4- 9	00002	TPA-FZ 1,4- 9 FV	00064	30	14	6	90	10
	TPA-FZ 2,0- 9	00003	TPA-FZ 2,0- 9 FV	00065	30	14	8	90	10
	TPA-FZ 2,5- 9	00004	TPA-FZ 2,5- 9 FV	00066	30	14	10	90	10
5,0	TPA-FZ 3,0-12	00005	TPA-FZ 3,0-12 FV	00067	40	18	10	120	10
	TPA-FZ 4,0-12	00006	TPA-FZ 4,0-12 FV	00068	40	18	12	120	10
	TPA-FZ 5,0-12	00007	TPA-FZ 5,0-12 FV	00069	40	18	15	120	10
10,0	TPA-FZ 7,5-16	00009	TPA-FZ 7,5-16 FV	00071	60	26	16	160	15
	TPA-FZ 10,0-17	00010	TPA-FZ 10,0-17 FV	00072	60	30	20	165	15
26,0	TPA-FZ 14,0-24	00011	TPA-FZ 14,0-24 FV	00073	80	35	20	240	15
	TPA-FZ 22,0-30	00013	TPA-FZ 22,0-30 FV	00075	90	35	28	300	15
	TPA-FZ 26,0-30	00012	TPA-FZ 26,0-30 FV	00074	120	65	30	300	15

Maximum edge and axial anchor spacings, load capacities

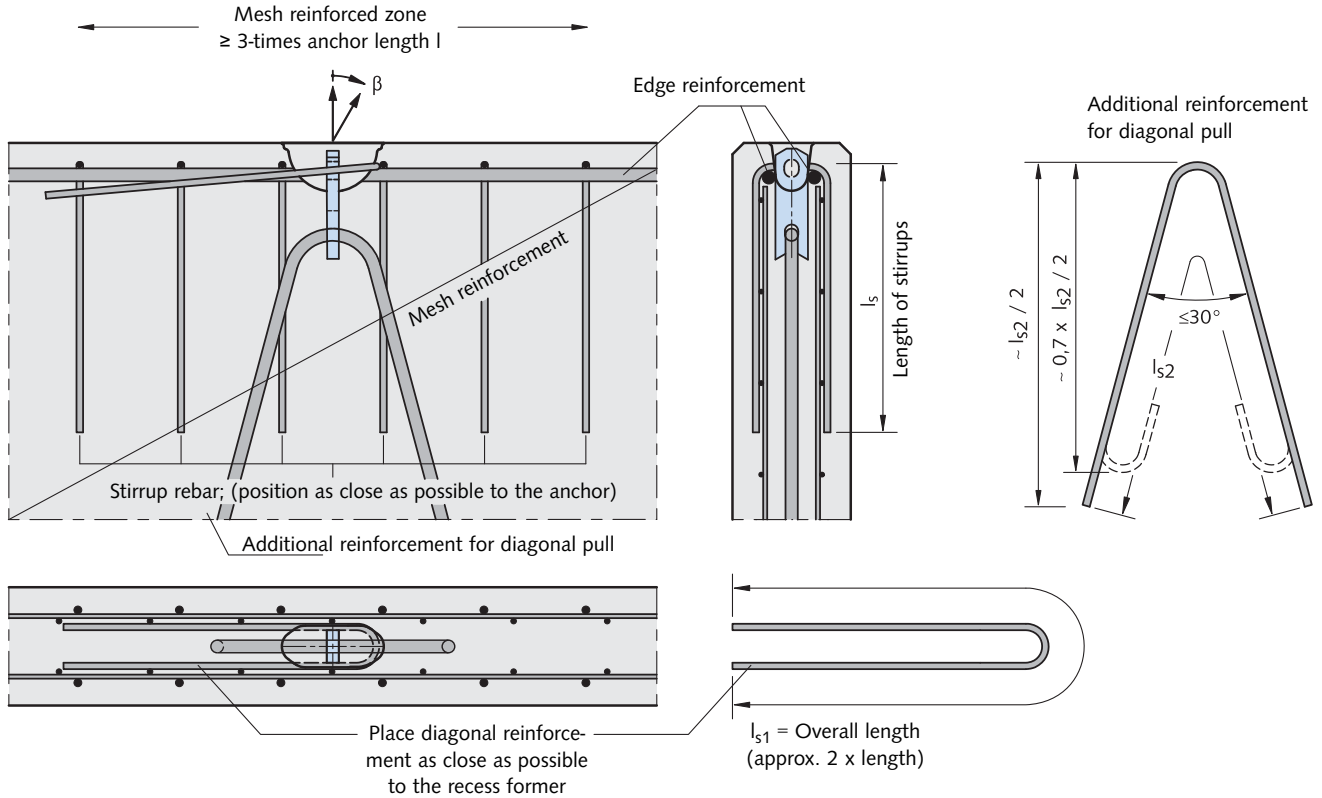
Load class lifting link	Article number	Edge and axial anchor spacings			Load capacities TPA-FZ		
		Anchor length l	Anchor spacings e_z	Minimum thickness of precast unit $2 \times e_r$	for $f_{ci} \geq 15 \text{ N/mm}^2$ 100% F_{perm} Pull ($\beta \leq 30^\circ$)	for $f_{ci} \geq 15 \text{ N/mm}^2$ 80% F_{perm} Diagonal pull ($\beta > 30^\circ$)	for $f_{ci} \geq 25 \text{ N/mm}^2$ Pull + Diagonal pull
		[mm]	[mm]	[mm]	[kN]	[kN]	[kN]
2,5	TPA-FZ 1,4- 9	90	500	80	14	11,2	14
	TPA-FZ 2,0- 9	90	600	90	20	16	20
	TPA-FZ 2,5- 9	90	600	100	25	20	25
5,0	TPA-FZ 3,0-12	120	650	100	30	24	30
	TPA-FZ 4,0-12	120	700	110	40	32	40
	TPA-FZ 5,0-12	120	750	120	50	40	50
10,0	TPA-FZ 7,5-16	160	1200	130	75	60	75
	TPA-FZ 10,0-17	165	1200	140	100	80	100
26,0	TPA-FZ 14,0-24	240	1500	160	140	112	140
	TPA-FZ 22,0-30	300	1500	180	220	176	220
	TPA-FZ 26,0-30	300	1500	200	260	208	260

Observe the reinforcement specifications on page 32-33

FRIMEDA LIFTING ANCHOR SYSTEM

Two Hole Anchor TPA-FZ

Reinforcement in anchor zone



Reinforcement

Load class Anchor	Article number	Cross-wise mesh reinforce- ment [mm ² /m]	Reinforcement with Axial pull ($\beta \leq 30^\circ$)			Reinforcement with Diagonal pull ($\beta > 30^\circ - 45^\circ$)			
			Stirrup B500B $d_s \times l_s$ [mm]	Edge reinforce- ment B500B [mm]	② Additional reinforcement for pull B500B both sides $d_{s2} \times l_{s2}$ [mm]	Stirrup B500B $d_s \times l_s$ [mm]	Edge re- inforce- ment B500B [mm]	② Additional reinforcement for pull B500B $d_{s2} \times l_{s2}$ [mm]	① Diagonal pull reinforcement B500B $d_{s1} \times l_{s1}$ [mm]
1,4	TPA-FZ 1,4- 9	131	2 $\varnothing 6 \times 400$	constructive	1 $\varnothing 10 \times 650$	4 $\varnothing 6 \times 400$	$\varnothing 8$	1 $\varnothing 10 \times 650$	$\varnothing 6 \times 900$
2,0	TPA-FZ 2,0- 9		2 $\varnothing 6 \times 500$		1 $\varnothing 12 \times 800$	4 $\varnothing 6 \times 500$	$\varnothing 8$	1 $\varnothing 10 \times 800$	$\varnothing 8 \times 950$
2,5	TPA-FZ 2,5- 9		2 $\varnothing 8 \times 600$		1 $\varnothing 12 \times 1000$	4 $\varnothing 8 \times 600$	$\varnothing 10$	1 $\varnothing 12 \times 1000$	$\varnothing 8 \times 1200$
3,0	TPA-FZ 3,0-12	131	2 $\varnothing 8 \times 700$	constructive	1 $\varnothing 14 \times 1000$	4 $\varnothing 8 \times 700$	$\varnothing 10$	1 $\varnothing 14 \times 1000$	$\varnothing 10 \times 1150$
4,0	TPA-FZ 4,0-12		2 $\varnothing 8 \times 700$		1 $\varnothing 16 \times 1200$	4 $\varnothing 8 \times 800$	$\varnothing 12$	1 $\varnothing 16 \times 1200$	$\varnothing 10 \times 1500$
5,0	TPA-FZ 5,0-12		2 $\varnothing 8 \times 800$		1 $\varnothing 16 \times 1500$	4 $\varnothing 10 \times 800$	$\varnothing 12$	1 $\varnothing 16 \times 1500$	$\varnothing 12 \times 1550$
7,5	TPA-FZ 7,5-16	188	2 $\varnothing 10 \times 800$	$\varnothing 10$	1 $\varnothing 20 \times 1750$	4 $\varnothing 10 \times 800$	$\varnothing 12$	1 $\varnothing 20 \times 1750$	$\varnothing 14 \times 2000$
10,0	TPA-FZ 10,0-17		4 $\varnothing 10 \times 800$	$\varnothing 12$	1 $\varnothing 25 \times 1850$	6 $\varnothing 10 \times 1000$	$\varnothing 14$	1 $\varnothing 25 \times 1850$	$\varnothing 16 \times 2300$
14,0	TPA-FZ 14,0-24	257	4 $\varnothing 10 \times 1000$	$\varnothing 14$	1 $\varnothing 28 \times 2350$	8 $\varnothing 10 \times 1000$	$\varnothing 14$	1 $\varnothing 28 \times 2350$	$\varnothing 20 \times 2600$
22,0	TPA-FZ 22,0-30		4 $\varnothing 12 \times 1200$		1 $\varnothing 28 \times 3000$	8 $\varnothing 10 \times 1200$	$\varnothing 16$	1 $\varnothing 28 \times 3000$	$\varnothing 25 \times 3000$
26,0	TPA-FZ 26,0-30		6 $\varnothing 12 \times 1200$		2 $\varnothing 28 \times 3050$	8 $\varnothing 12 \times 1200$	$\varnothing 16$	2 $\varnothing 28 \times 3050$	$\varnothing 28 \times 3450$

① **No diagonal pull reinforcement is needed for concrete strength of:**

- $\beta_W \geq 15 \text{ N/mm}^2 + 3$ -times minimum element thickness
- $\beta_W \geq 25 \text{ N/mm}^2 + 2.5$ -times minimum element thickness
- $\beta_W \geq 35 \text{ N/mm}^2 + 2$ -times minimum element thickness

② For other concrete strengths, the length l_{s2} of the additional reinforcement bar for pull may be reduced in relation to the permissible bond stress ($\beta_W = 25 \text{ N/mm}^2 : \times 0.8$; $\beta_W = 35 \text{ N/mm}^2 : \times 0.65$)

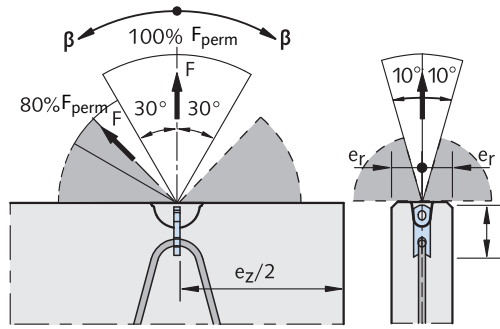
Please contact HALFEN if the concrete strength is lower or if lightweight concrete is used.

FRIMEDA LIFTING ANCHOR SYSTEM

Two Hole Anchor TPA-FZ

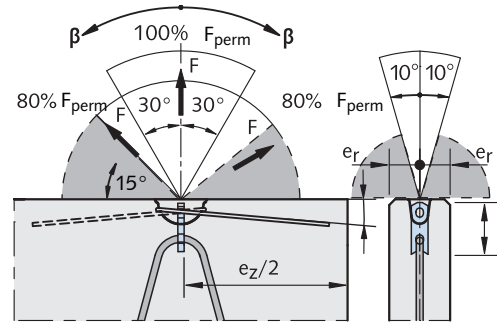
Reinforcement in anchor zone – Diagonal pull reinforcement

With no diagonal pull reinforcement



■ not permitted

With diagonal pull reinforcement



■ not permitted

Diagonal pull at $30^\circ < \beta \leq 45^\circ$ with no diagonal pull reinforcement is allowable only if:

$\beta_W \geq 15 \text{ N/mm}^2 + 3\text{-times min. element thickness}$

$\beta_W \geq 25 \text{ N/mm}^2 + 2.5\text{-times min. element thickness}$

$\beta_W \geq 35 \text{ N/mm}^2 + 2\text{-times min. element thickness}$

(minimum thickness of element: $e = 2 \times e_r$)



Diagonal pull is not permissible for two hole anchors.

Two hole anchors are **not suitable for application in slab-type elements (floor slabs, stairs).**

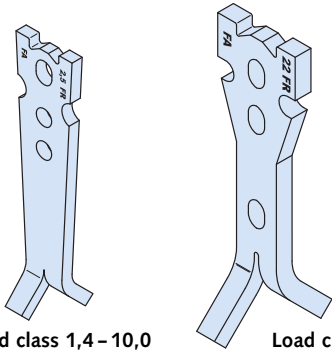
The diagonal pull reinforcement has to be placed **close to the recess former** in direct contact with the anchor.



FRIMEDA LIFTING ANCHOR SYSTEM

Erection Anchor TPA-FA / Unilateral Erection Anchor TPA-FE

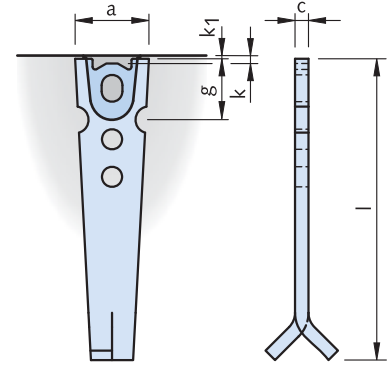
Anchor dimensions TPA-FA



Load class 1,4-10,0

Load class 12,5-22,0

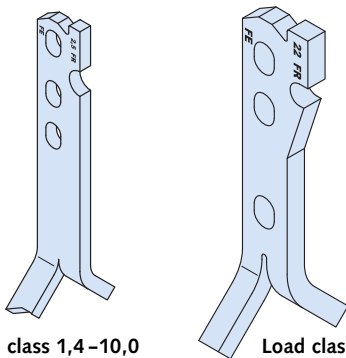
Due to the specially shaped anchor head the lifting clutch rests on the anchor and not the concrete when subjected to lateral loads; the pitching loads react through the anchor avoiding spalling in the concrete. Two semi-circular notches are provided in the anchor for additional pitching and turning reinforcement bars.



Dimensions — erection anchor TPA-FA

Load class lifting link	Article number Mill finish	Order no. 0070.030-	Article number Hot-dip galvanized	Order no. 0070.110-	l [mm]	a [mm]	c [mm]	g [mm]	k [mm]	k ₁ [mm]
2,5	TPA-FA 1,4- 20	00001	TPA-FA 1,4- 20 FV	00001	200	55	6	45	10	5
	TPA-FA 2,5- 23	00002	TPA-FA 2,5- 23 FV	00002	230	55	10	45		
5,0	TPA-FA 4,0-27	00003	TPA-FA 4,0-27 FV	00003	270	70	12	70	10	5
	TPA-FA 5,0-29	00004	TPA-FA 5,0-29 FV	00004	290	70	15	70		
10,0	TPA-FA 7,5-32	00005	TPA-FA 7,5-32 FV	00005	320	95	15	90	15	6
	TPA-FA 10,0-39	00006	TPA-FA 10,0-39 FV	00006	390	95	20	90		
26,0	TPA-FA 12,5-50	00007	TPA-FA 12,5-50 FV	00007	500	148	20	90	15	9
	TPA-FA 17,0-50	00008	TPA-FA 17,0-50 FV	00008	500	148	25	90		
	TPA-FA 22,0-50	00009	TPA-FA 22,0-50 FV	00009	500	148	30	90		

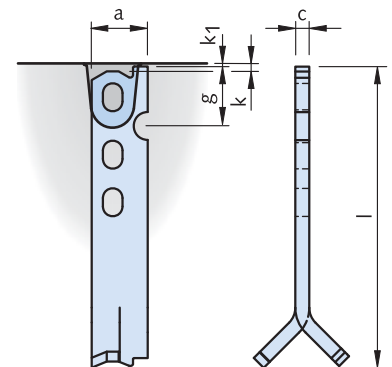
Anchor dimensions TPA-FE



Load class 1,4-10,0

Load class 12,5-22,0

Compared to the TPA-FA erection anchor the TPA-FE anchor can only be subjected to load in one direction. Its shape makes it particularly suitable for thin components. A single semi-circular notch is provided in the anchor for additional reinforcement bars for pitching and turning.



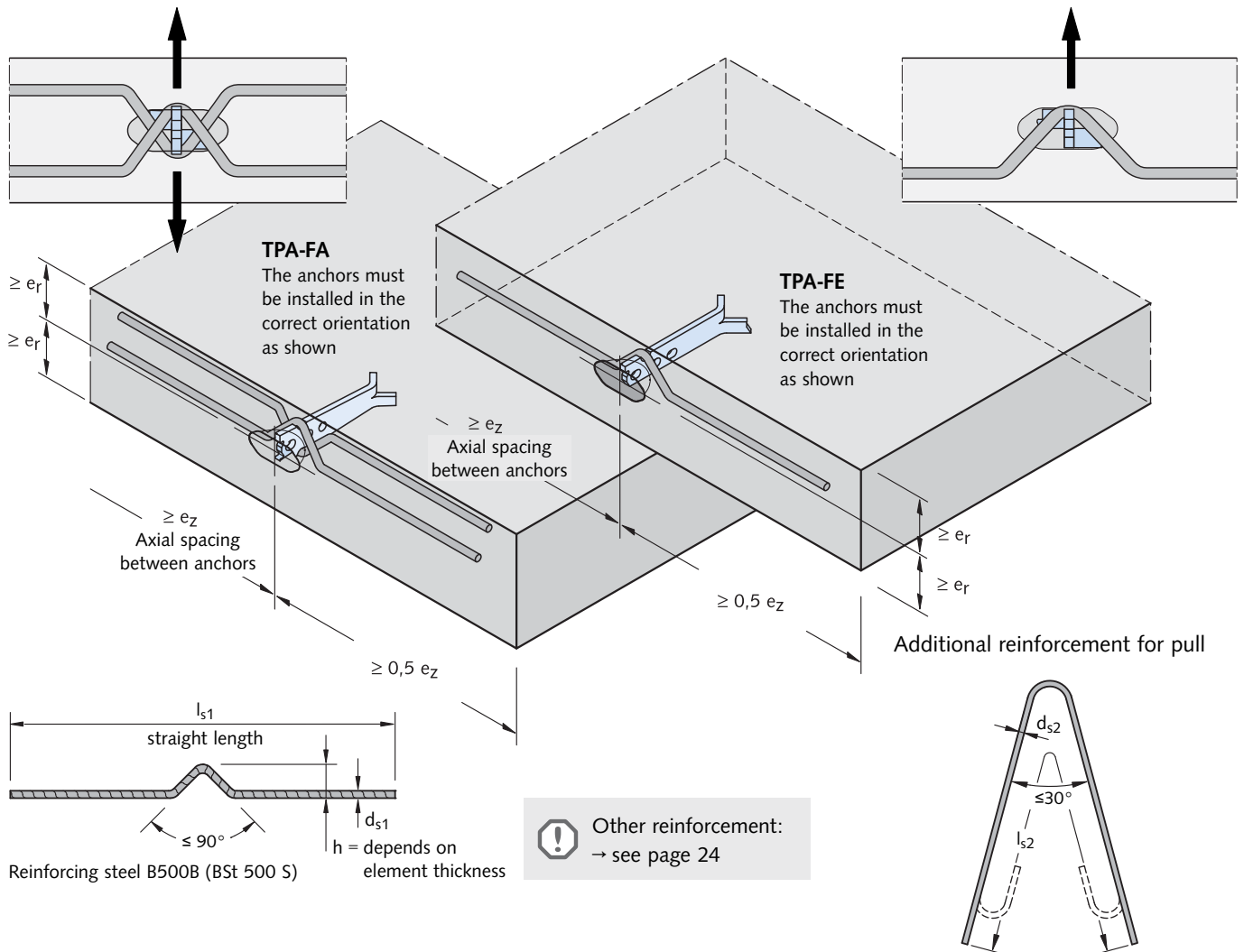
Dimensions — unilateral erection anchor TPA-FE

Load class lifting link	Article number Mill finish	Order no. 0070.040-	Article number Hot-dip galvanized	Order no. 0070.110-	l [mm]	a [mm]	c [mm]	g [mm]	k [mm]	k ₁ [mm]
2,5	TPA-FE 1,4- 20	00001	TPA-FE 1,4- 20 FV	00010	200	40	6	42.2	10	5
	TPA-FE 2,5- 23	00002	TPA-FE 2,5- 23 FV	00011	230	40	10	42.5		
5,0	TPA-FE 4,0-27	00003	TPA-FE 4,0-27 FV	00012	270	55	12	50.5	10	5
	TPA-FE 5,0-29	00004	TPA-FE 5,0-29 FV	00013	290	55	15	50.5		
10,0	TPA-FE 7,5-32	00005	TPA-FE 7,5-32 FV	00014	320	80	15	78.0	15	6
	TPA-FE 10,0-39	00006	TPA-FE 10,0-39 FV	00015	390	80	20	78.0		
26,0	TPA-FE 12,5-50	00007	TPA-FE 12,5-50 FV	00016	500	115	20	88.5	15	9
	TPA-FE 17,0-50	00008	TPA-FE 17,0-50 FV	00017	500	115	25	88.5		
	TPA-FE 22,0-50	00009	TPA-FE 22,0-50 FV	00018	500	115	30	88.5		

FRIMEDA LIFTING ANCHOR SYSTEM

Erection Anchor TPA-FA / Unilateral Erection Anchor TPA-FE

Reinforcement in the anchor zone



Additional reinforcement for erecting thin-wall concrete precast elements

Load class lifting link	Load class anchor	Tilting and pitching reinforcement B500B $d_{s1} \times l_{s1}$ ① with $f_{ci} \geq 15 \text{ N/mm}^2$	Additional reinforcement for pull B500B $d_{s2} \times l_{s2}$ with $f_{ci} \geq 15 \text{ N/mm}^2$
		[mm]	[mm]
2,5	1,4	$\varnothing 10 \times 700$	$\varnothing 10 \times 650$
	2,5	$\varnothing 12 \times 800$	$\varnothing 12 \times 1000$
5,0	4,0	$\varnothing 14 \times 950$	$\varnothing 16 \times 1200$
	5,0	$\varnothing 16 \times 1000$	$\varnothing 16 \times 1500$
10,0	7,5	$\varnothing 20 \times 1200$	$\varnothing 20 \times 1750$
	10,0	$\varnothing 20 \times 1500$	$\varnothing 20 \times 1900$
26,0	12,5	$\varnothing 25 \times 1500$	$\varnothing 25 \times 2200$
	17,0	$\varnothing 25 \times 1800$	$\varnothing 28 \times 2500$
	22,0	$\varnothing 25 \times 1800$	$\varnothing 28 \times 3000$

① l_{s1} = length before bending / bending radii according to DIN EN 1992
For other concrete strengths the length l_{s1} of the erection reinforcement can be reduced in relation to the permitted composite stresses.
($\beta_W = 25 \text{ N/mm}^2 : \times 0,8$; $\beta_W = 35 \text{ N/mm}^2 : \times 0,65$)

The horizontal legs of the pitching and turning reinforcement are located directly towards the inside of the outermost reinforcement. The bilateral pitching reinforcement also acts as diagonal pull reinforcement. No further diagonal reinforcement is required.

Without additional reinforcement for pull:

Mesh, stirrups and edge reinforcement as for TPA-FS.

With additional reinforcement for pull:

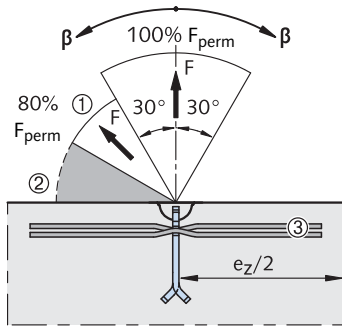
Mesh, stirrups and edge reinforcement as for TPA-FZ.

FRIMEDA LIFTING ANCHOR SYSTEM

Erection Anchor TPA-FA / Unilateral Erection Anchor TPA-FE

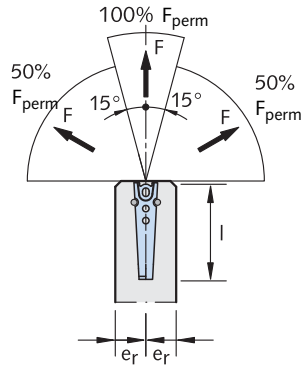
Load capacities, installation dimensions

Lifting TPA-FA



■ not permitted

Erecting TPA-FA

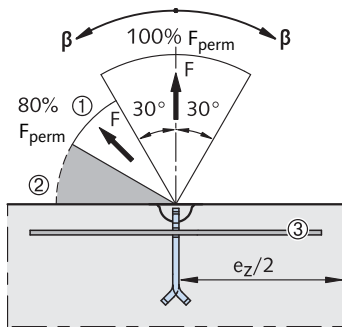


① F_{perm} can be assumed at 100% if concrete strength $\beta_w \geq 23 \text{ N/mm}^2$

② Angles of $\beta > 60^\circ$ due to cable spread are not allowed!

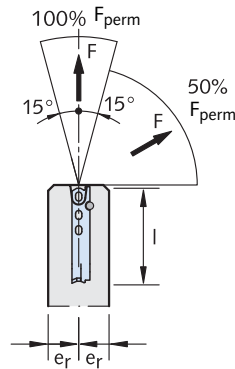
③ Insert the erection reinforcement in the anchor notches.

Lifting TPA-FE






■ not permitted

Erecting TPA-FE



Load capacities, installation dimensions

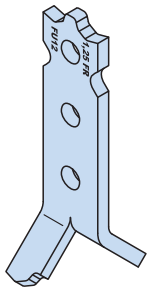
Load class lifting link	Load class anchor	Anchor length l [mm]	Axial e_z [mm]	Minimum thickness ($2 \times e_r$)				Lifting  Pull ($\beta \leq 30^\circ$) 15 N/mm ² [kN]	Lifting  ① Diagonal pull ($\beta > 30^\circ$) 15 N/mm ² [kN]		Tilting  25 N/mm ² [kN]	
				with additional reinforcement for pull		without additional reinforcement for pull			Pull/ Diag. pull 25 N/mm ² [kN]	15 N/mm ² [kN]	25 N/mm ² [kN]	
				TPA-FE [mm]	TPA-FA [mm]	TPA-FE [mm]	TPA-FA [mm]					
2,5	1,4	200	700	90	100	90	100	14	11	14	7	7
	2,5	230	800	100	120	110	120	25	22	25	12	13
5,0	4,0	270	950	140	150	140	150	38	31	40	20	20
	5,0	290	1000	140	160	170	180	47	37	50	25	25
10,0	7,5	320	1200	160	175	200	220	65	52	75	37	38
	10,0	390	1500	200	240	250	280	85	65	100	50	50
26,0	12,5	500	1500	220	240	320	350	120	96	125	62	63
	17,0			280	300	380	400	140	112	170	85	85
	22,0			360	380	470	500	200	160	220	110	110

Note: Observe the notes on reinforcement on pages 24–25

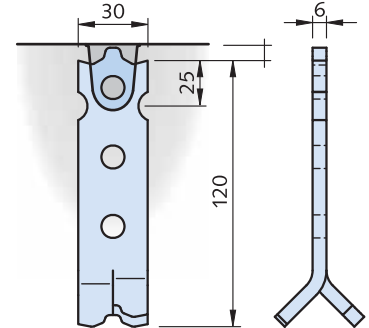
FRIMEDA LIFTING ANCHOR SYSTEM

Universal Anchor TPA-FU

Anchor dimensions, load capacities, installation dimensions, reinforcement



This anchor combines the advantages of spread-, two hole- and erection anchor but requires only a very small recess in the precast element.




Universal anchor TPA-FU

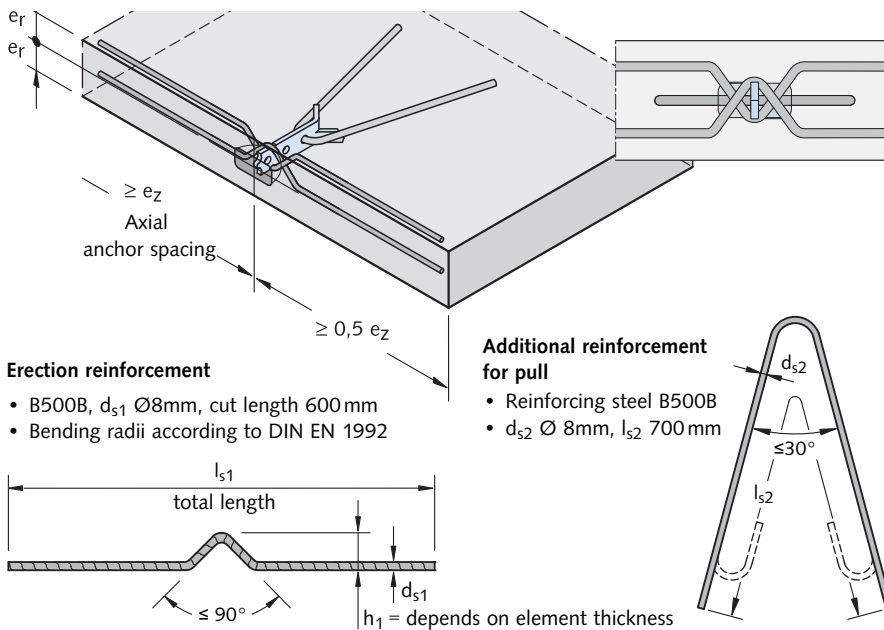
Load class	Article number Mill finish	Order no. 0070.100-	Article number Hot-dip galvanized	Order no. 0070.100-
1,25	TPA-FU 1,25-12	00001	TPA-FU 1,25-12 FV	00003

The erection and transport anchors used in very thin precast concrete elements (e.g. balcony parapet panels) must fulfil the special requirements for this application. The FRIMEDA TPA-FU Universal anchor 1,25-12 has been specially designed for this specific application, and is therefore ideal for tilting, turning and lifting this type of element.




Recommended reinforcement

Additional reinforcement is required for distributing loads in very thin panels or panels with only a single-layer of reinforcement. Dedicated turning and tilting reinforcement must be used in this application (→ see illustration on the left).

 Further reinforcement:
→ see page 24 (load class 1,4)



Allowable loads universal anchor TPA-FU

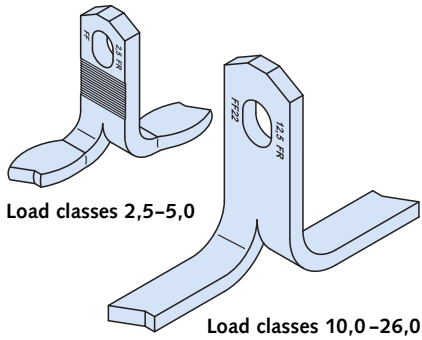
Article number	Minimum element thickness $2 \times e_r$ [mm]	Axial pull up to 30° 			Diagonal pull up to 45° 			Tilting and turning 			Minimum axial spacing e_z [mm]
		Permitted load at concrete strength f_{ci} =			Permitted load at concrete strength f_{ci} =			Permitted load at concrete strength f_{ci} =			
		15 N/mm ² [kN]	25 N/mm ² [kN]	35 N/mm ² [kN]	15 N/mm ² [kN]	25 N/mm ² [kN]	35 N/mm ² [kN]	15 N/mm ² [kN]	25 N/mm ² [kN]	35 N/mm ² [kN]	
TPA-FU 1,25-12	60	10.0 ^①	12.5 ^①	12.5 ^①	10.0 ^①	12.5 ^①	12.5 ^①	-	-	-	240
	80	12.5 ^①	12.5 ^①	12.5 ^①	10.0 ^①	12.5 ^①	12.5 ^①	4.1	4.6	5.0	
	100	12.5 ^①	12.5	12.5	10.0 ^①	12.5	12.5	4.5	5.2	5.6	
	120	12.5	12.5	12.5	12.5	12.5	12.5	4.8	5.6	6.0	
	140	12.5	12.5	12.5	12.5	12.5	12.5	6.0	6.25	6.25	
	160	12.5	12.5	12.5	12.5	12.5	12.5	6.25	6.25	6.25	

① with additional reinforcement for pull $\phi 8 \times 700$

FRIMEDA LIFTING ANCHOR SYSTEM

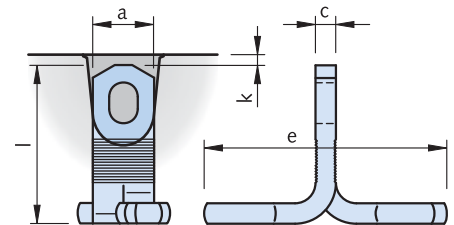
Flat Foot Anchor TPA-FF

Anchor dimensions TPA-FF



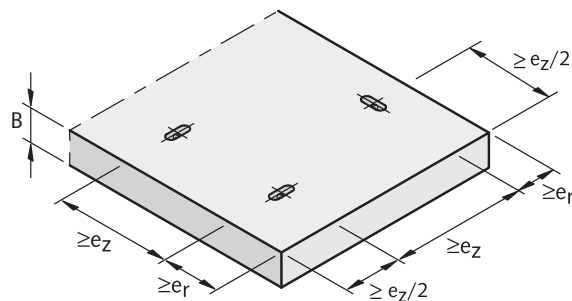
For all large surface, thin precast elements that are lifted perpendicular to their main face.

This anchor is an alternative to the plate anchor TPA-FP. The main use is in elements with a concrete strength at lifting in excess of 25 N/mm² and more.



Load capacity of the flat foot anchor

To ensure load distribution in the flat foot anchor, it is crucial that the flat foot is positioned under the main reinforcement. If this is not possible, suitable additional reinforcement must be placed over the flat foot.



Additional reinforcement is not included in delivery.



Required elements dimensions → see table on page 39

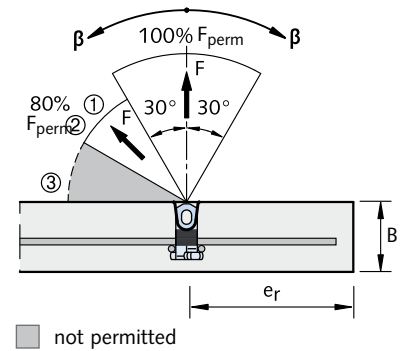
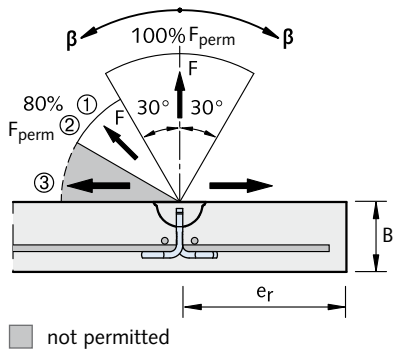
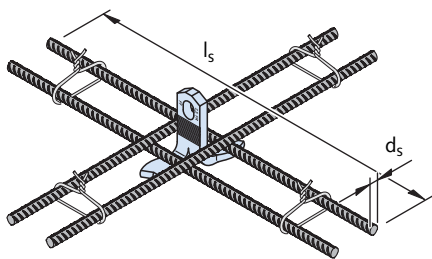
Dimensions – Flat foot anchor TPA-FF

Load class lifting link	Article number Mill finish	Order no. 0070.070-	Article number Hot-dip galvanized	Order no. 0070.110-	a [mm]	c [mm]	l [mm]	e [mm]	k [mm]
2,5	TPA-FF 0,7- 6	00001	TPA-FF 0,7- 6 FV	00019	30	5	65	70	10
	TPA-FF 1,4- 6	00002	TPA-FF 1,4- 6 FV	00020	30	6	65	70	
	TPA-FF 2,0- 7	00003	TPA-FF 2,0- 7 FV	00021	30	8	70	80	
	TPA-FF 2,5- 7	00004	TPA-FF 2,5- 7 FV	00022	30	10	75	94	
5,0	TPA-FF 3,0- 9	00005	TPA-FF 3,0- 9 FV	00023	40	10	90	100	10
	TPA-FF 4,0-11	00006	TPA-FF 4,0-11 FV	00024	40	12	110	100	
	TPA-FF 5,0-12	00007	TPA-FF 5,0-12 FV	00025	40	15	125	105	
10,0	TPA-FF 7,5-17	00009	TPA-FF 7,5-17 FV	00027	60	16	170	120	15
	TPA-FF 10,0-20	00010	TPA-FF 10,0-20 FV	00028	60	20	200	120	
26,0	TPA-FF 12,5-22	00011	TPA-FF 12,5-22 FV	00029	80	16	220	200	15
	TPA-FF 17,0-27	00012	TPA-FF 17,0-27 FV	00030	80	20	270	200	
	TPA-FF 22,0-31	00013	TPA-FF 22,0-31 FV	00031	90	28	310	200	

FRIMEDA LIFTING ANCHOR SYSTEM

Flat Foot Anchor TPA-FF

Additional reinforcement in the anchor zone



Where loads are acting towards the edge of the element, insert diagonal pull reinforcement as for spread or two hole anchors. (→ see page 24).

Additional reinforcement has to be placed as close as possible to the anchor.

- ① Diagonal pull at $30^\circ < \beta \leq 60^\circ$ without diagonal pull reinforcement only permissible when:
 - $\beta_W \geq 15 \text{ N/mm}^2 + 3\text{-times min. element thickness}$
 - $\beta_W \geq 25 \text{ N/mm}^2 + 2.5\text{-times min. element thickness}$
 - $\beta_W \geq 35 \text{ N/mm}^2 + 2\text{-times min. element thickness}$
- ② F_{perm} can be assumed at 100% if concrete strength $\beta_W \geq 23 \text{ N/mm}^2$.
- ③ Angles of $\beta > 60^\circ$ due to cable spread are not permitted!

Element dimensions, additional reinforcement and load capacities

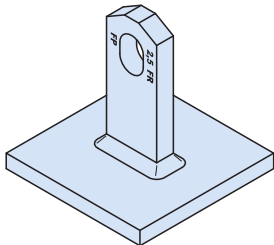
Load class lifting link	Article number	Anchor length l [mm]	Minimum element thickness B [mm]	Min. edge distance or axial anchor spacing		Additional reinforcement B500B		Load capacity Axial pull, Diagonal pull, Transverse pull at concrete strength f_{ci}			
				e_r [mm]	e_z [mm]	d_s [mm]	l_s [mm]	$\geq 15 \text{ N/mm}^2$ [kN]	$\geq 25 \text{ N/mm}^2$ [kN]	$\geq 35 \text{ N/mm}^2$ [kN]	
2,5	TPA-FF 0,7 - 6	65	95 ^④	140	210	8	200	7.0	7.0	7.0	
	TPA-FF 1,4 - 6	65	95 ^④	140	210			14.0	14.0	14.0	
	TPA-FF 2,0 - 7	70	100 ^④	150	225			300	18.0	20.0	20.0
	TPA-FF 2,5 - 7	75	105 ^④	160	240			300	20.0	25.0	25.0
5,0	TPA-FF 3,0 - 9	90	120	190	285	10	400	28.0	30.0	30.0	
	TPA-FF 4,0 - 11	110	140	230	345	12	450	37.0	40.0	40.0	
	TPA-FF 5,0 - 12	125	160	260	390	12	500	44.0	50.0	50.0	
10,0	TPA-FF 7,5 - 17	170	215	340	510	14	600	54.6	70.4	75.0	
	TPA-FF 10,0 - 20	200	245	400	600	14	600	77.4	100.0	100.0	
26,0	TPA-FF 12,5 - 22	220	265	440	660	16	750	96.8	125.0	125.0	
	TPA-FF 17,0 - 27	270	315	540	810	16	900	131.6	170.0	170.0	
	TPA-FF 22,0 - 31	310	355	620	930	20	1100	170.4	220.0	220.0	

④ The elements thickness can be reduced, if protection against corrosion is ensured.

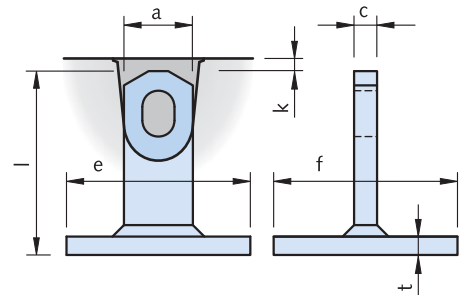
FRIMEDA LIFTING ANCHOR SYSTEM

Plate Anchor TPA-FP

Dimensions TPA-FP



The plate anchor is suitable for all large surface, thin precast elements. Additional cross-wise reinforcement on the anchor plate must be used.

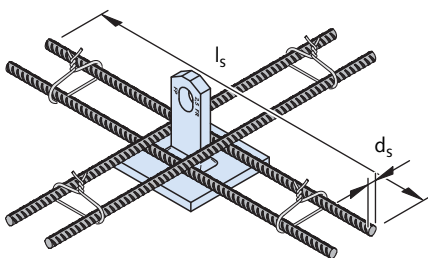


Dimensions Plate anchor TPA-FP

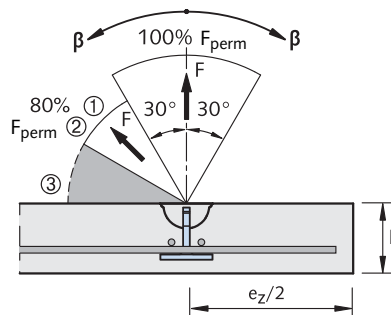
Article number Mill finish	Order no. 0070.050-	Article number Hot-dip galvanized	Order no. 0070.110-	Load class	a [mm]	c [mm]	l [mm]	e × f [mm]	t [mm]	k [mm]
TPA-FP 1,4- 5	00001	TPA-FP 1,4- 5 FV	00076	2,5	30	6	55	80 × 80	8	10
TPA-FP 2,5- 8	00002	TPA-FP 2,5- 8 FV	00077			10	80			
TPA-FP 5,0-12	00003	TPA-FP 5,0-12 FV	00078	5,0	40	15	120	100 × 100	10	10
TPA-FP 10,0-16	00004	TPA-FP 10,0-16 FV	00079	10,0	60	20	160	140 × 140	12	15

Other load classes and anchor lengths are available on request

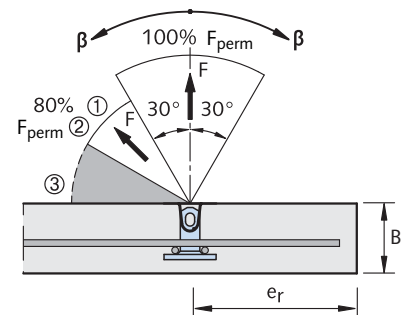
Load capacities, installation dimensions and additional reinforcement



It is important that the reinforcement bars are in direct contact with the anchor base plate!



■ not permitted



■ not permitted

- ① Diagonal pull at $30^\circ < \beta \leq 60^\circ$ without diagonal pull reinforcement only permissible when:
 - $\beta_W \geq 15 \text{ N/mm}^2 + 3\text{-times min. element thickness}$
 - $\beta_W \geq 25 \text{ N/mm}^2 + 2.5\text{-times min. element thickness}$
 - $\beta_W \geq 35 \text{ N/mm}^2 + 2\text{-times min. element thickness}$
- ② F_{perm} can be assumed at 100% if concrete strength $\beta_W \geq 23 \text{ N/mm}^2$.
- ③ Angles of $\beta > 60^\circ$ due to cable spread are not permitted!

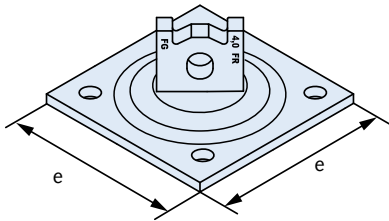
Element dimensions, additional reinforcement and load capacities

Load class lifting link	Article number	Anchor length l [mm]	Minimum element thickness B [mm]	Min. edge distance or axial anchor spacing		Additional reinforcement		Pull ($\beta \leq 30^\circ$) $f_{ci} = 15 \text{ N/mm}^2$ [kN]	Load capacity Diagonal pull ($\beta > 30^\circ$) $f_{ci} = 15 \text{ N/mm}^2$ [kN]	Pull / Diagonal pull $f_{ci} = 25 \text{ N/mm}^2$ [kN]
				e_r [mm]	e_z [mm]	d_s [mm]	l_s [mm]			
2,5	TPA-FP 1,4 - 5	55	85	115	230	8	200	14.0	11.2	14.0
	TPA-FP 2,5 - 8	80	110	165	330	10	300	25.0	20.0	25.0
5,0	TPA-FP 5,0 - 12	120	150	240	480	12	450	50.0	40.0	50.0
10,0	TPA-FP 10,0 - 16	160	195	330	660	16	600	100.0	80.0	100.0

FRIMEDA LIFTING ANCHOR SYSTEM

Garage Anchor TPA-FG

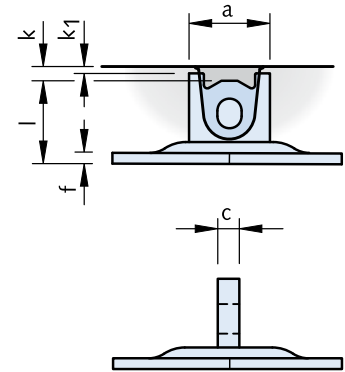
Dimensions TPA-FG



This anchor is designed for special applications, such as thin floors of prefabricated garages. The plate anchor with erection anchor head permits high diagonal pull for handling elements in areas with a very restricted access height.

For axial and diagonal pull up to 45° it is mandatory that the load is reduced by 50%.

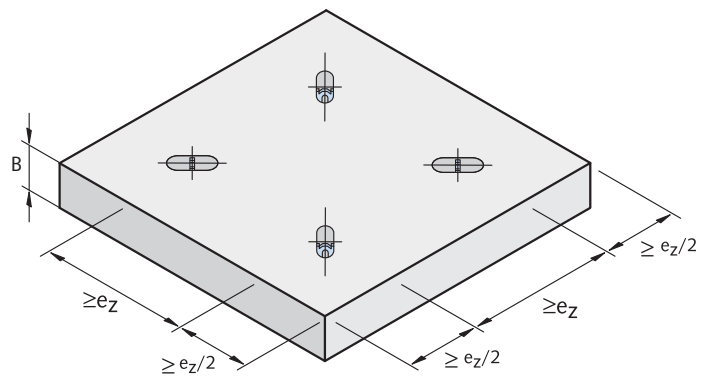
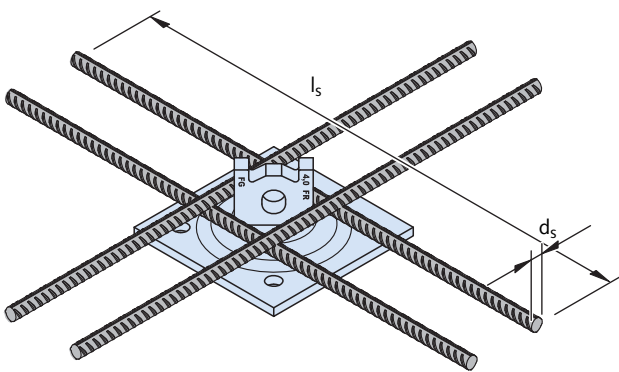
The concrete strength at time of lifting must be at least 25 N/mm².



Dimensions TPA-FG Garage anchor


Load class lifting link	Article number	Order no. 0070.060-	a [mm]	c [mm]	l [mm]	e [mm]	f [mm]	k [mm]	k ₁ [mm]
5,0	TPA-FG 4,0-7	00001	60	16	67	150	8	10	5

Load capacities, edge distances and axial additional reinforcement for thin plates



The anchors must be installed in the correct orientation as shown

Load capacities and reinforcement

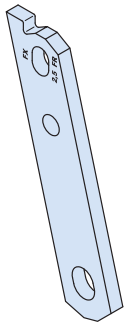
Load class lifting link	Article number	Anchor length l [mm]	Minimum element thickness B [mm]	Axial- and diagonal pull up to 45°  max. load capacity in [kN] at concrete strength f _{ci} ≥ 25 N/mm ²	Additional reinforcement		Minimum edge spacing and axial anchor spacing	
					d _s [mm]	l _s [mm]	e _z /2 [mm]	e _z [mm]
5,0	TPA-FG 4,0-7	67	95	40.0	12	450	240	480

① β = Cable spread, for β < 45° → see text above

FRIMEDA LIFTING ANCHOR SYSTEM

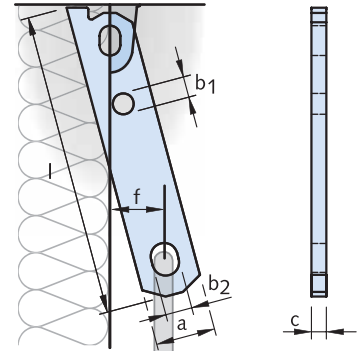
Sandwich Panel Anchor TPA-FX

Dimensions TPA-FX



This anchor is specially designed for use with precast sandwich panels. It provides a suspension point close to the gravity axis allowing the element to be transported and erected in an upright position.

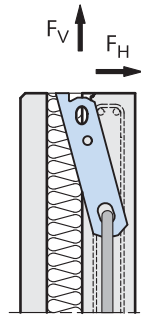
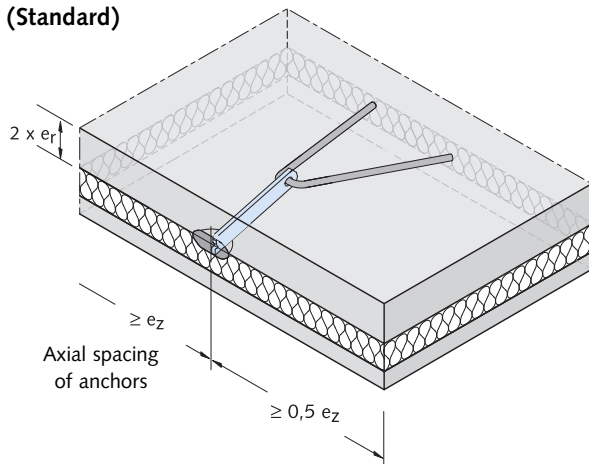
We recommend using hot-dip-galvanized anchors to ensure sufficient corrosion protection.



Dimensions sandwich panel anchor TPA-FX

Load class lifting link	Article number Mill finish	Order no. 0070.090-	Article number Hot-dip galvanized	Order no. 0070.090-	a [mm]	b ₁ [mm]	b ₂ [mm]	c [mm]	l [mm]	f [mm]
2,5	TPA-FX 2,5-25	00001	TPA-FX 2,5-25 FV	00006	40	14	18	10	250	48
5,0	TPA-FX 5,0-30	00002	TPA-FX 5,0-30 FV	00007	60	17,5	26	16	300	53
10,0	TPA-FX 7,5-35	00003	TPA-FX 7,5-35 FV	00008	80	25	35	16	350	55
	TPA-FX 10,0-35	00004	TPA-FX 10,0-35 FV	00009				20		
26,0	TPA-FX 17,0-40	00005	TPA-FX 17,0-40 FV	00010	100	30	35	20	400	66

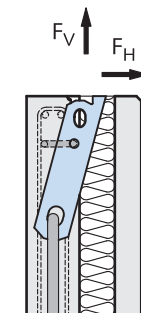
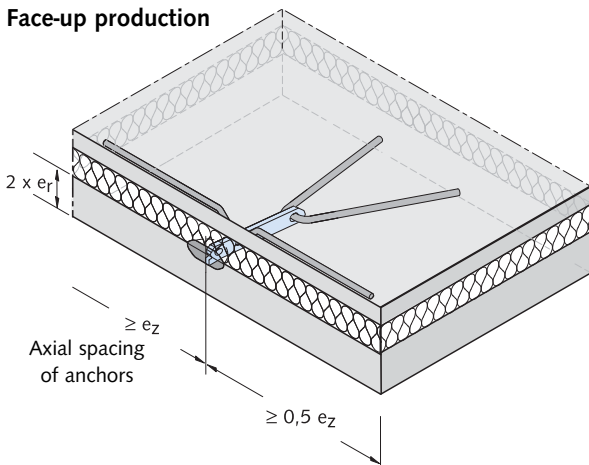
Face-down production (Standard)



The specially designed slanted head of the TPA-FX Sandwich panel anchor can be inserted close to the gravity axis in large, precast concrete sandwich-panels.

The panel hangs nearly upright during transportation and installation. The head shape is compatible with the HALFEN TPA Accessories range.

Face-up production

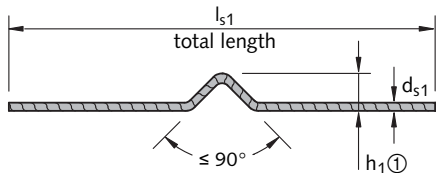


FRIMEDA LIFTING ANCHOR SYSTEM

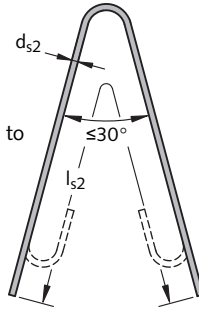
Sandwich Panel Anchor TPA-FX

Additional reinforcement TPA-FX

Erection reinforcement ②



- Reinforcing steel B500B
- Bending radii acc. to DIN EN 1992



Additional reinforcement for pull

① h_1 = thickness of the element, but at least as in the table

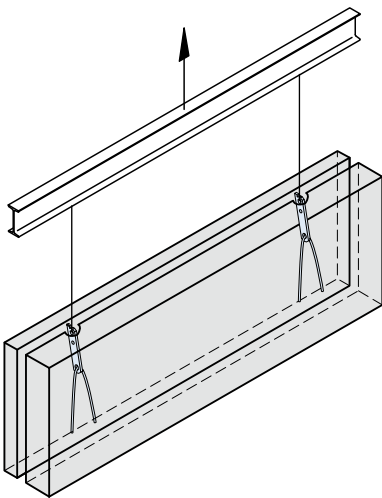
② erection reinforcement required, if F_H is in this direction, e.g. with face-up produced elements

Element dimensions, additional reinforcement and load capacities

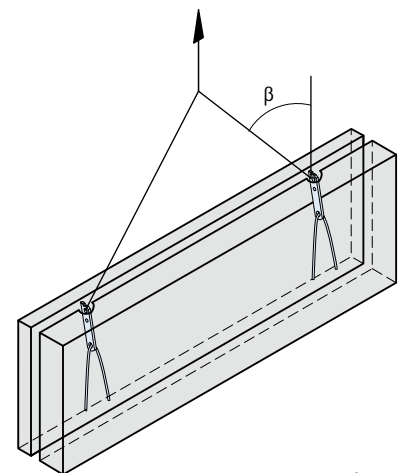
Load class lifting link	Article number	Minimum distances		Reinforcement						Load capacities	
		Element thickness load bearing inner slab $2 \times e_r$	Minimum axial anchor spacing e_z	Stirrup for pull B500B (see page 26)	Erection reinforcement (not included in delivery)			Additional reinforcement for pull (not included in delivery)		perm. load capacities at concrete strength $f_{ci} \geq 15 \text{ N/mm}^2$	
					$\varnothing \times \text{length}$	d_{s1}	l_{s1}	h_1 ③	d_{s2}	l_{s2}	Axial pull [kN]
2,5	TPA-FX 2,5-25	100	600	2 \varnothing 8 × 600	10	600	≥ 60	14	800	25.0	8.0
5,0	TPA-FX 5,0-30	120	750	2 \varnothing 8 × 800	14	700	≥ 80	16	1200	50.0	18.0
10,0	TPA-FX 7,5-35	130	1200	2 \varnothing 10 × 800	16	800	≥ 100	25	1400	75.0	26.0
	TPA-FX 10,0-35	140	1200	4 \varnothing 10 × 800	20	900	≥ 120	25	1800	100.0	35.0
26,0	TPA-FX 17,0-40	180	1500	4 \varnothing 12 × 1200	20	1100	≥ 140	28	2500	170.0	50.0

③ To ensure adequate corrosion protection, we recommend hot-dip galvanized additional reinforcement.

④ The loads for diagonal pull must be reduced to 80% – irrespective of concrete strengths. Diagonal pull should generally be avoided.



For pitching and transport with TPA-FX anchors we recommend using a spreader beam. This helps to prevent spalling of the concrete when pitching, transporting or installing.



Not advisable (diagonal pull with $\beta > 30^\circ$ is not permitted)

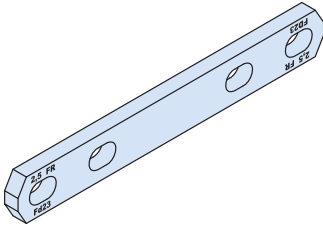


Diagonal pull only permitted with concrete strength $f_{ci} \geq 25 \text{ N/mm}^2$ and $\beta \leq 30^\circ$.

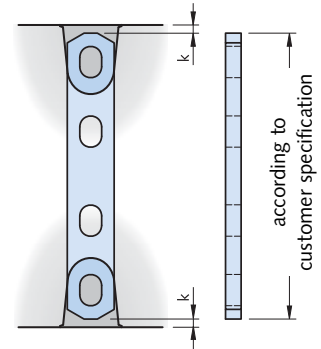
FRIMEDA LIFTING ANCHOR SYSTEM

Double Ended Column Anchor TPA-FD

Double ended column anchor TPA-FD



This anchor is similar to the head of the two hole anchor. The TPA-FD Anchor was specially developed for lifting columns or similar construction elements.



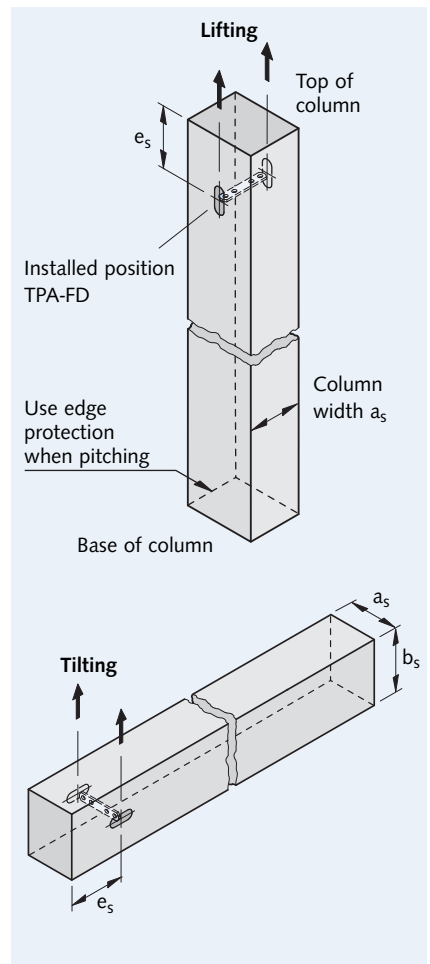
Allowable loads: Double ended column anchor TPA-FD

Load class lifting link	Article number	Allowable column weight for $f_{ci} \geq$		Element thickness ^② / minimum distances				Reinforcement	
		15 N/mm ²	25 N/mm ²	a_s ^②	b_s ^②	e_s	k	d_s	l_s
		[kN]	[kN]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
2,5	TPA-FD 2,5-L ^①	40.0	50.0	150	180	300	10	12	750
5,0	TPA-FD 5,0-L	80.0	100.0	190	300	400	10	16	1000
10,0	TPA-FD 7,5-L	120.0	150.0	250	400	500	15	20	1200
	TPA-FD 10,0-L	160.0	200.0	300	500	500	15	25	1500
26,0	TPA-FD 12,5-L	200.0	250.0	400	600	800	15	25	1500
	TPA-FD 17,0-L	272.0	340.0	400	700	800	15	28	1600
	TPA-FD 22,0-L	352.0	440.0	475	800	800	15	28	2000

① The length of the TPA-FD is according to the customer's specification. Anchor length $l =$ column dimension a_s minus $2 \times$ anchor head cover k . Article number: 0070-089-00001

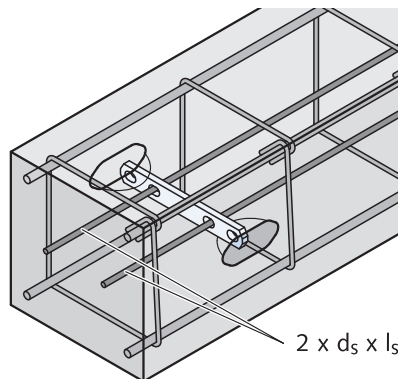
② Dimension a_s is a minimum dimension; this dimension **must not** fall below this value. The dimension b_s can be further reduced if there is a reduction in the load capacity or if lifting adhesion is higher. (Contact us for more detailed information. For contact information → see back cover).

Lifting / Tilting columns



Required additional reinforcement

Recess former are used at both ends of the anchor. The anchor and recess former assembly is then passed between the reinforcement bars and fastened to the formwork at both ends. The additional reinforcement bars are then pushed through the holes of the anchor and wired in place.



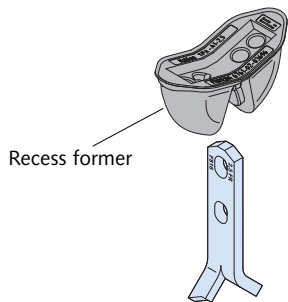
Additional reinforcement as for the two hole anchor.

! The larger the dimension e_s , the greater the load on the anchor when tilting, but the lower the load on the edge at the base of the column.

FRIMEDA LIFTING ANCHOR SYSTEM

FRIMEDA Recess Former – Installation and Application

Recess former

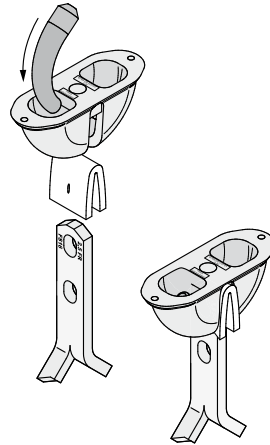


The plastic recess formers are used for easy attachment to the formwork.

Installation

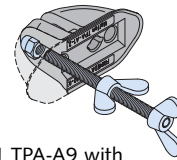
- the open recess former is placed over the anchor head
- close the recess former to secure the anchor
- the recess former and the anchor are then fixed to the formwork

Recess former TPA-A4



The anchor head is pressed into the TPA-A Z01 foam strips and secured in the recess former using the TPA-A E01 wedge as shown above. The wedge is easily removed to release the recess former. The recess former can then be removed in a vertical direction.

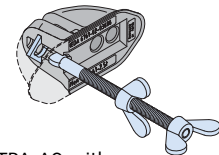
Holding bolts TPA-S1



TPA-A1 TPA-A9 with threaded holding bolt

The **threaded holding bolt TPA-S1** is used for bolting the recess former. The bolt has a fixed wing-nut at one end. A second, identical, freely adjustable wing-nut is screwed onto the thread.

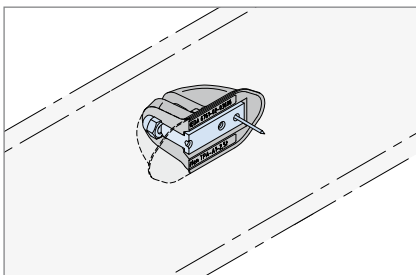
Holding bolts TPA-S2



TPA-A1 TPA-A9 with bayonet holding bolt

The **bayonet holding bolt TPA-S2** consists of a threaded holding bolt with a bayonet fitting.

Holding plates



The holding plate TPA-H1 consists of a baseplate with two bolts. Four nail holes are provided in the baseplate.

The plate can either be nailed or welded on. The recess former is easily fitted onto the bolts for installation.

The holding plate has no screw-thread.

This allows the formwork to be simply pulled off without first having to remove the plate.

Installation

- the lifting anchors are fixed to the formwork with recess formers of the same load group
- apply formwork oil to the exposed surfaces of recess formers
- insert or place additional reinforcement
- required transverse load reinforcement is always applied opposite to the load force direction

Installation

- the bayonet holding bolt is inserted into the bayonet connection of the recessed unit, and then turned 90°
- the upper wingnut should now be at right-angles to the lengthwise direction of the recessed unit
- the recess former is then secured against the formwork with the second wing nut

FRIMEDA LIFTING ANCHOR SYSTEM

Holding Plates and Holding Bolts – Installation and Application

Notes on the installation of the anchor

Only careful installation of the anchors guarantees their correct function and optimal safety in lifting. Always use the available installation accessories for all applications.

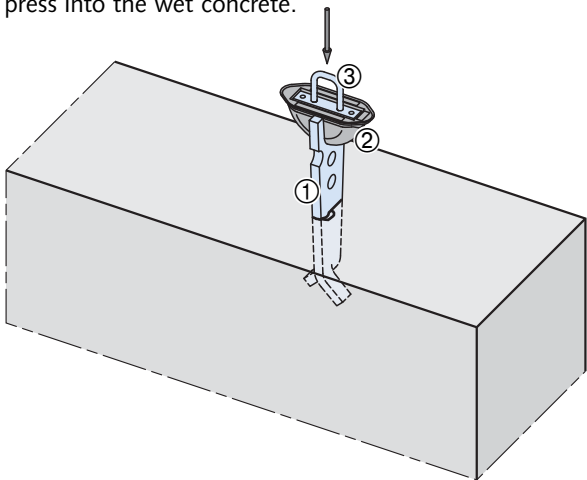
The recess former A1 is easily removed from the hardened concrete element, if it has been sufficiently greased before concreting. **We recommend not nailing the recess former to the formwork if this can be avoided.**

Floating installation

Application: columns, beams, trusses, π-slabs
 Installation aid: **Holding plate H2**

Installation:

Open up the recess former A1 ② insert the anchor ①, press the holding plate H2 ③ into the recess former and press into the wet concrete.

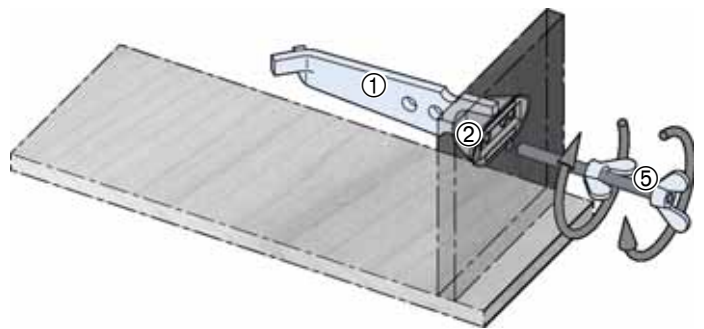


Installation to formwork (wood/steel)

Installation aid: **Holding bolt S1 or S2**

Installation:

Drill through the formwork, push the holding bolt S1 or S2 through the hole ⑤, screw into the recess former A1 ②, with the anchor inserted ①, pull towards the formwork and tighten securely against the formwork with the second wing nut.

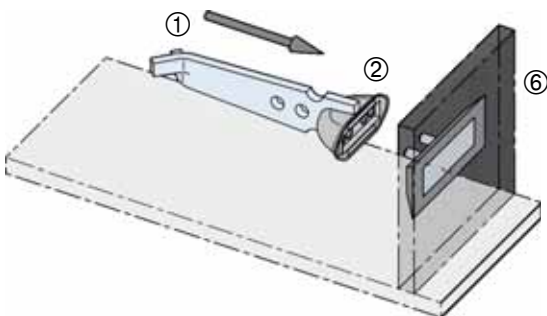


Installation to formwork (steel)

Installation accessory: **Magnetic plate HM**

Installation:

The magnetic holding plate ⑥ is placed and secured at the correct position on the formwork. Press the recess former A1 ②, with the anchor inserted ① onto the pins.

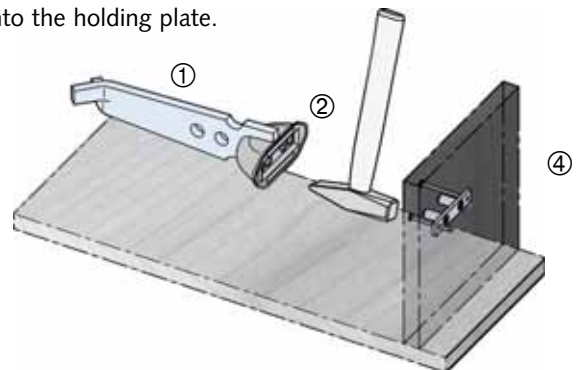


Installation to formwork (wood)

Installation accessory: **Holding plate H1**

Installation:

Nail or screw the holding plate H1 ④ onto the formwork. Press the recess former A1 ② with the anchor inserted ① onto the holding plate.



FRIMEDA LIFTING ANCHOR SYSTEM

Accessories – Installation and Application

Recess filler TPA-V1 (Polystyrene)

Use polystyrene recess formers to seal and fill the anchor recess in the precast concrete. This protects the anchor against corrosion and also prevents water collecting in the recess and consequently freezing in cold weather.

The HALFEN TPA-V1 Recess filler can be used for transport and storage or for a permanent seal after final installation.

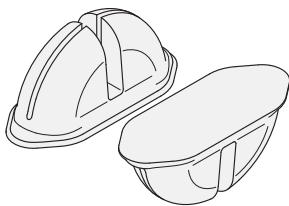
Installation of the recess filler

Hot-dip galvanized or stainless steel anchors can be applied, if corrosion protection is required.

If not available, two alternative methods of corrosion protection are illustrated below.

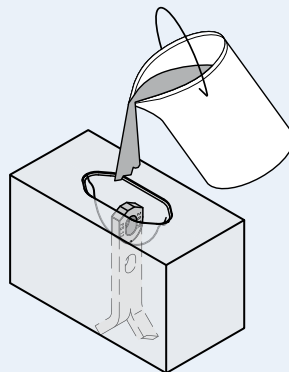
Recess filler TPA-V1

Load class	Article number	Order no. 0073.080-
2,5	TPA-V1 2,5	00001
5,0	TPA-V1 5,0	00002
10,0	TPA-V1 10,0	00003
26,0	TPA-V1 26,0	00004



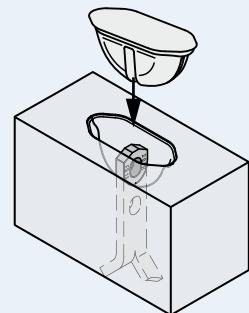
Recess filler TPA-V1

- **Method 1:** The recess in the precast element is filled with mortar.



Method 1: Fill with mortar

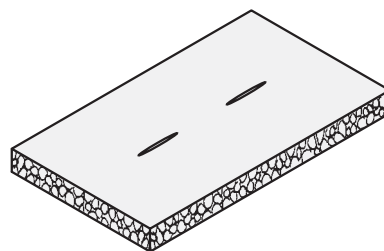
- **Method 2:** The polystyrene recess filler (TPA-V1) is placed over the anchor and pressed into the recess.



Method 2: With a TPA-V1

Foam strip TPA-A Z01 (for recess former TPA-A4)

The anchor head is pressed into the foam strip and then inserted into the recessed TPA-A4 recess former. Not using a TPA-A Z01 foam strip results in concrete seeping into the recess.



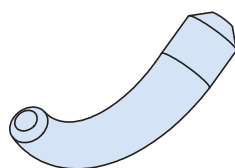
Foam strip for load classes 2,5 – 26,0

Foam strip

Load class	Article number	Order no. 0072.120-
2,5	TPA-A-Z1 2,5	00006
5,0	TPA-A-Z1 5,0	00007
10,0	TPA-A-Z1 10,0	00008
26,0	TPA-A-Z1 26,0	00009

Replacement wedge TPA-A E01 (for recess former TPA-A4)

The wedge is used to attach the anchor to the TPA-A4 recess former. The wedge is removed to loosen the recess former. The wedge is supplied with the recess former; replacement wedges can also be ordered separately.



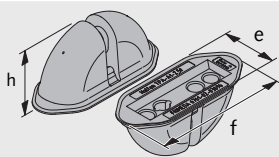
Replacement wedge E01 for load classes 2,5 – 26,0

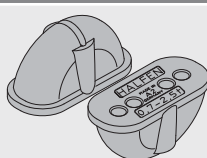
Replacement wedge

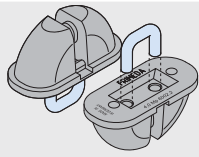
Load class	Article number	Order no. 0072.120-
2,5	TPA-A-E1 2,5	00002
5,0	TPA-A-E1 5,0	00003
10,0	TPA-A-E1 10,0	00004
26,0	TPA-A-E1 26,0	00005

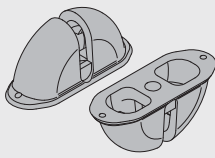
FRIMEDA LIFTING ANCHOR SYSTEM

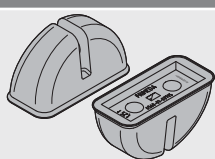
Recess Formers

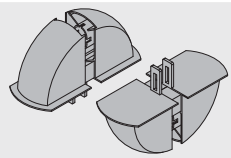
Plastic recess former TPA-A1									
Colour code	Load class	Article number	Order no. 0072.010-	e [mm]	f [mm]	h [mm]	Thread M		for all anchor types except FU, FG
orange	2,5	TPA-A1 2,5	00001	43	104	45	8		
black	5,0	TPA-A1 5,0	00002	49	126	59	8		
green	10,0	TPA-A1 10,0	00003	67	188	85	12		
blue	26,0	TPA-A1 26,0	00004	112	234	118	16		

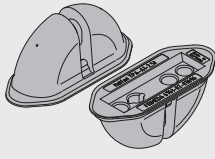
Rubber recess former TPA-A2									
Colour code	Load class	Article number	Order no. 0073.020-	e [mm]	f [mm]	h [mm]			for all anchor types except FA, FE, FX, FU, FG
black	2,5	TPA-A2 2,5	00001	41	102	47			
	5,0	TPA-A2 5,0	00002	51	126	59			
	10,0	TPA-A2 10,0	00003	70	184	84			

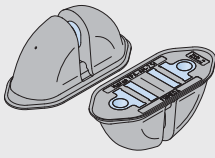
Rubber recess former TPA-A3									
Colour code	Load class	Article number	Order no. 0073.030-	e [mm]	f [mm]	h [mm]			only for anchor type FG
black	5,0	TPA-A3 5,0	00001	54	115	50			

Plastic recess former TPA-A4 (incl. TPA-A E01)									
Colour code	Load class	Article number	Order no. 0072.040-	e [mm]	f [mm]	h [mm]	Thread M		for all anchor types except FU, FG
orange	2,5	TPA-A4 2,5	00001	37	102	45	8		
black	5,0	TPA-A4 5,0	00002	48	126	59	8		
green	10,0	TPA-A4 10,0	00003	70	184	84	12		
blue	26,0	TPA-A4 26,0	00004	112	252	118	16		

Plastic recess former TPA-A7									
Colour code	Load class	Article number	Order no. 0073.070-	e [mm]	f [mm]	h [mm]			only for anchor type FU
blue	1,25	TPA-A7 1,25	00001	28	60	32			

Plastic recess former TPA-A8 (for single-use only)									
Colour code	Load class	Article number	Order no. 0073.080-	e [mm]	f [mm]	h [mm]			for all anchor types except FU
orange	2,5	TPA-A8 2,5	00001	42	100	47			

Plastic recess former TPA-A9									
Colour code	Load class	Article number	Order no. 0072.090-	e [mm]	f [mm]	h [mm]	Thread M		for all anchor types except FA, FE, FX, FU, FG
orange	2,5	TPA-A9 2,5	00001	43	104	45	8		
black	5,0	TPA-A9 5,0	00002	49	126	59	8		
green	10,0	TPA-A9 10,0	00003	67	188	85	12		
blue	26,0	TPA-A9 26,0	00004	112	234	118	16		

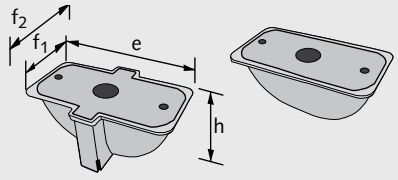
Magnetic recess former TPA-AM									
Colour code	Load class	Article number	Order no. 0072.100-	e [mm]	f [mm]	h [mm]			for all anchor types except FU, FG
orange	2,5	TPA-AM 2,5	00001	43	104	45			
black	5,0	TPA-AM 5,0	00002	49	126	59			

FRIMEDA LIFTING ANCHOR SYSTEM

Recess Formers, Accessories

Plastic recess former TPA-SCFS /-SCFA

Load class	Article number	Order no. 0072.150-	e [mm]	f (f ₁ /f ₂) [mm]	h [mm]
3,0-4,0	TPA-SCFA-...	00002	128	65/80	59
5,0	TPA-SCFA-...	00003	128	65/80	59
3,0-5,0	TPA-SCFS-...	00004	124	58	59
7,5	TPA-SCFA-...	00005	158	80/95	85



Accessories

Holding plate TPA-H1 (for recess formers TPA-A1, TPA-A7, TPA-A9)

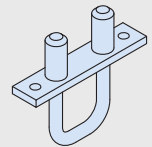
Load class	Article number	Order no. 0073.010-	e [mm]	f [mm]	t [mm]	d [mm]
1,25	TPA-H1 1,25	00001	40	15	3	8
2,5	TPA-H1 2,5	00002	70	15	4	10
5,0	TPA-H1 5,0	00003	85	30	4	10
10,0	TPA-H1 10,0	00004	125	45	4	12
26,0	TPA-H1 26,0	00005	175	65	4	16



Figure: type load class 1,25

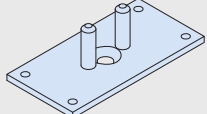
Holding plate TPA-H2 (for floating installation of recess formers TPA-A1, TPA-A9)

Load class	Article number	Order no. 0073.020-	e [mm]	f [mm]	t [mm]	d [mm]
2,5	TPA-H2 2,5	00001	70	15	4	10
5,0	TPA-H2 5,0	00002	85	30	4	10
10,0	TPA-H2 10,0	00003	125	45	4	12
26,0	TPA-H2 26,0	00004	178	65	4	16



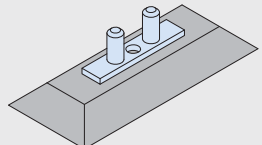
Holding plate TPA-H3 (for recess former TPA-A2)

Load class	Article number	Order no. 0073.030-	e [mm]	f [mm]	t [mm]	d [mm]
2,5	TPA-H3 2,5	00001	100	50	4	8
5,0	TPA-H3 5,0	00002	120	60	4	8
10,0	TPA-H3 10,0	00003	170	80	4	12



Magnet holding plate TPA-HM (for recess formers TPA-A1, TPA-A9)

Load class	Article number	Order no. 0073.050-	e [mm]	f [mm]	t [mm]	d [mm]
2,5	TPA-HM 2,5	00001	144	63	16	10
5,0	TPA-HM 5,0	00002	144	63	16	10
10,0	TPA-HM 10,0	00003	220	125,5	16	12



Holding bolt with wing nut TPA-S1 (for recess formers TPA-A1, TPA-A2, TPA-A7, TPA-A9 and holding plate TPA-H3)

Load class	Article number	Order no. 0073.060-	l [mm]	M
1,25	TPA-S1 M8	00001	160	M8
2,5				
5,0				
10,0	TPA-S1 M12	00003	160	M12
26,0	TPA-S1 M16	00004	180	M16



Bayonet holding bolt TPA-S2 (for recess formers TPA-A1, TPA-A9)

Load class	Article number	Order no. 0073.070-	l [mm]	a [mm]	M
2,5	TPA-S2 M8	00001	160	11	M8
5,0					
10,0	TPA-S2 M12	00002	180	16	M12
26,0					



FRIMEDA LIFTING ANCHOR SYSTEM

TPA Ring Clutches – Application

FRIMEDA Ring clutch: Application instructions

Removing formwork sections

Before lifting the precast concrete element, as many sections of the formwork as possible should be removed to minimise adhesion to the formwork. Inadequate removal of formwork is the most common cause of flaking in precast concrete elements and anchor failure. Otherwise the forces acting on the lifting system can be several times the actual weight of the precast element.

Attaching the ring clutch

When transporting an element the appropriate ring clutch for the load group is inserted over the anchor head in the concrete recess. Selecting the wrong ring clutch for the load class is not possible.

Tilting slabs without a tilting table

The FRIMEDA Lifting anchor system can be used to lift horizontal manufactured precast elements from the horizontal to the vertical. The load direction is at right-angles to the cast-in anchor. To avoid damage to the concrete the TPA-FA Erection anchor should be installed in the precast element.

Assembly to the slinging devices

A main benefit of the FRIMEDA Lifting anchor system is that the slinging devices (ring clutches) remain attached to the crane hook and doesn't need to be moved by hand. When not subjected to load, the ring clutch can be released manually by pushing back the locking bolt.

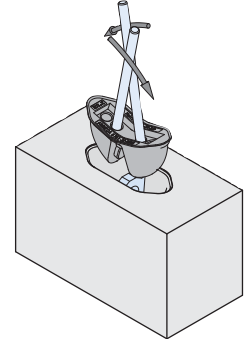
Removing the recess formers

Two rods are inserted in the holes in the recess former, which is removed from the concrete using a scissor motion. Using only this technique maximise the life span of the recess former. Attempting to remove the recess former using a hammer claw or other sharp tools will damage the recess former.

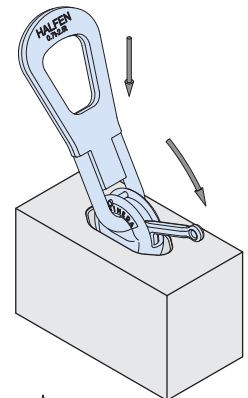
Securing the ring clutch

The ring clutch is securely locked by hand; push the locking bolt fully down to the concrete. The resulting connection is secure, and the ring clutch free to move in any direction. The precast element can be lifted out of the formwork and transported safely to its point of storage.

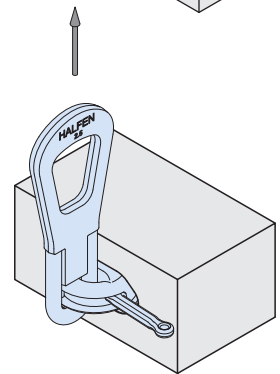
Removing a recess former using a scissor motion.



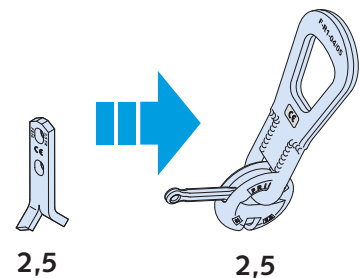
Locking the ring clutch by hand.



Lifting precast elements from the horizontal to the vertical.



Load class ring clutch	Load class anchor
1,25	1,25
2,5	0,7
	1,4
	2,0
	2,5
5,0	3,0
	4,0
	5,0
10,0	7,5
	10,0
26,0	12,5
	14,0
	17,0
	22,0
	26,0



Only the correct lifting link fits into the appropriate anchor!

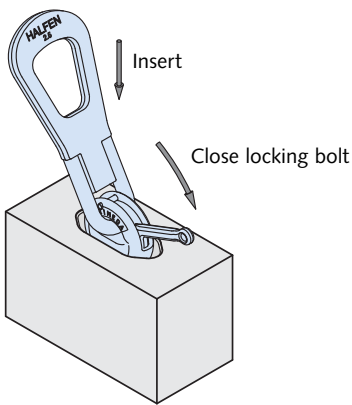
FRIMEDA LIFTING ANCHOR SYSTEM

TPA Ring Clutches - Application

Correct use of the FRIMEDA R1 Ring clutch

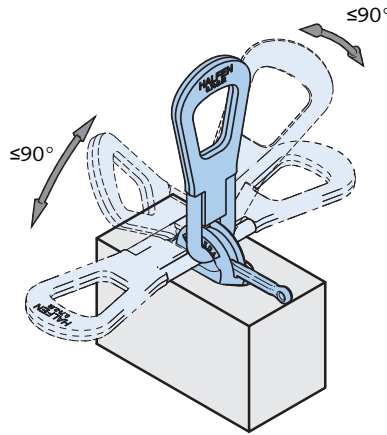
1. Engaging

Insert the ring clutch in the recess in the concrete and close the locking bolt i.e. the latch manually, pushing it fully down to the concrete. The element can now be lifted.



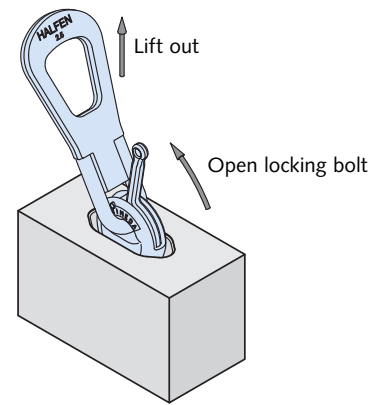
2. Handling

The ring clutch can be subjected to loads in any direction (do not exceed the load limits of the anchors!).



3. Disengaging

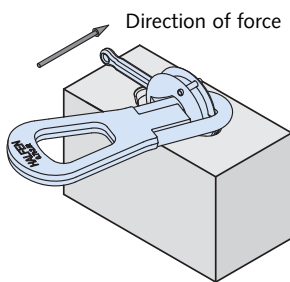
Manual ring clutch: push the bolt back by hand. The ring clutch is now disengaged.



In-correct application of the FRIMEDA Ring clutch

⊗ Shackle is restricted

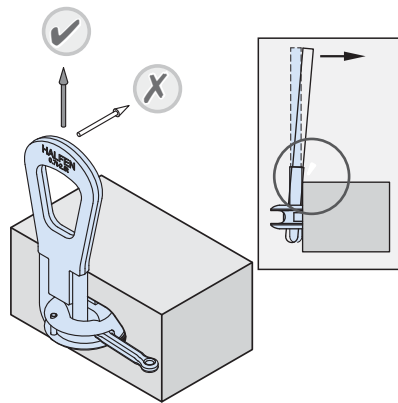
If the shackle is caught under the clutch head when subjected to load, it may lock in the position illustrated. The round shackle will be deformed when load is applied.



Problem: Shackle is restricted

⊗ Edge of slab shackle damage

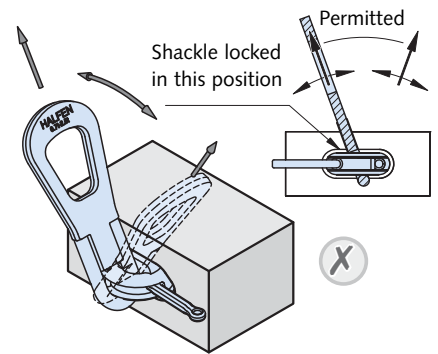
If the shackle is pulled towards the top surface of the slab when subjected to load it may bend at the slab edge.



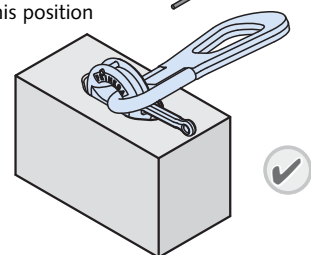
Problem: Shackle will bend at this point and cause damage

⊗ Clutch blocks shackle

In the upper position, the shackle can lock in the clutch. A small lifting cable angle will cause the shackle to bend. The problem is prevented by turning the shackle through approx. 45°.

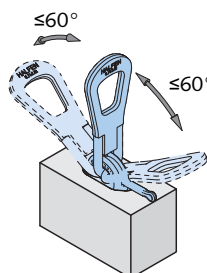


Shackle can't lock in this position



Attention!

Diagonal pull caused by cable/chain spread is permitted up to 60°.



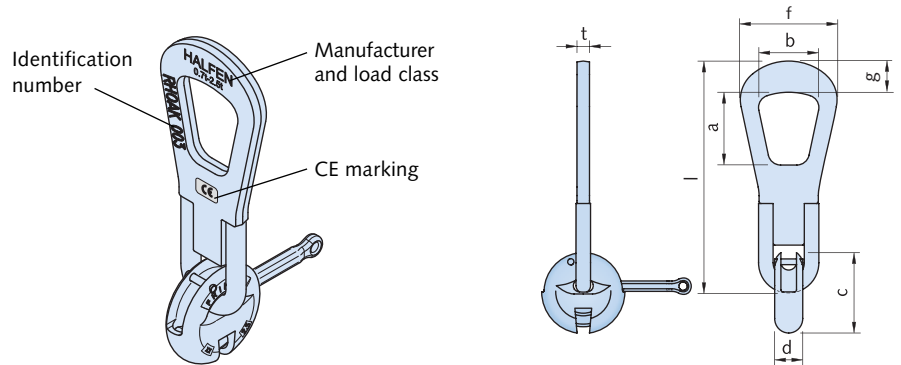
FRIMEDA LIFTING ANCHOR SYSTEM

TPA Ring Clutch TPA-R1

Ring clutch TPA-R1 with shackle for manual release

The ring clutch consists of a shackle and a clutch head. The shackle is freely moveable in all directions. The clutch head incorporates a locking bolt that engages in the anchor, which is cast in a recess in the concrete.

The allowable loads for each application are selected from the respective table for the anchor type. All lifting link safety regulations in the country of use must always be observed, in particular those for the use of cranes and lifting equipment.



TPA-R1											
Load class	Article number	Order no. 0071.010-	l [mm]	a [mm]	b [mm]	c [mm]	d [mm]	t [mm]	f [mm]	g [mm]	
2,5	TPA R1 2,5	00001	265	70	58	80	27	12	93	30	
5,0	TPA R1 5,0	00002	330	86	65	105	36	16	114	40	
10,0	TPA R1 10,0	00003	350	112	90	150	50	25	148	50	
26,0	TPA R1 26,0	00004	425	160	120	206	72	30	208	70	

Ring clutches with wire cables TPA-R2 (for load classes 1,25 / 2,5 / 5,0 / 10,0) TPA-R3 (for load class 26,0)

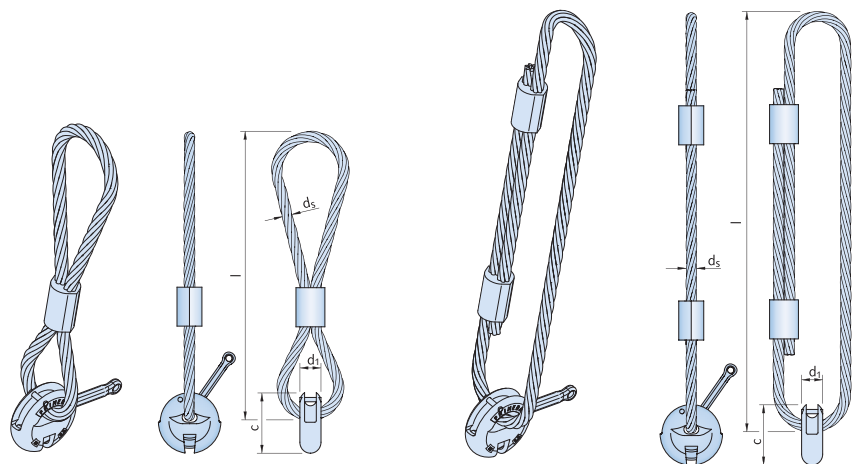
As with all other lifting and hoisting systems, ring clutches with cable loops are subject to inspection by experts to ensure safe application at least once a year. Any damaged cables must be withdrawn from use in strict accordance with the relevant accident prevention regulations for lifting equipment.

If required, worn cable loops with ferule can be replaced by HALFEN as clutch head generally have a much longer life-span than the cable loops.

The allowable loads for each application are selected from the respective table for the anchor type. Lifting link safety regulations in the country of use must always be observed, in particular those for the use of cranes and lifting equipment.

TPA-R2 load class 1,25 - 10,0

TPA-R3 load class 26,0

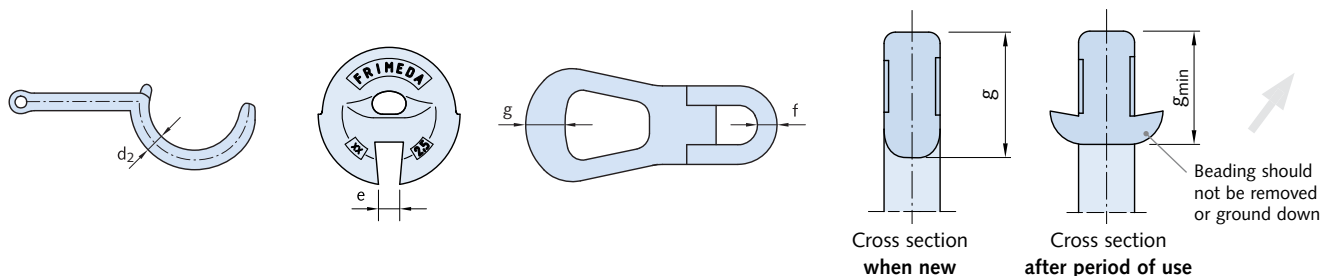


TPA-R2 / TPA-R3							
Load class	Article number	Order no. 0071.020-	Load class	l [mm]	c [mm]	d ₁ [mm]	d ₅ [mm]
1,25	TPA R2 1,25	00001	1,25	~320	52	20	∅ 8
2,5	TPA R2 2,5	00002	2,5	~560	80	27	∅ 14
5,0	TPA R2 5,0	00003	5,0	~595	105	36	∅ 18
10,0	TPA R2 10,0	00004	10,0	~702	150	50	∅ 22
26,0	TPA R3 26,0	00005	26,0	~1570	206	72	∅ 32

FRIMEDA LIFTING ANCHOR SYSTEM

TPA Ring Clutches TPA-R2, TPA-R3 / Limit Values, Checking the Anchor

Tolerances for the ring clutch TPA-R1



Load class	Nominal dimension d_2 [mm]	Minimum dimension d_2 [mm]	Nominal dimension e [mm]	Minimum dimension e [mm]	Nominal dimension f [mm]	Minimum dimension f [mm]	Nominal dimension g [mm]	Minimum dimension g_{min} [mm]
1,25	8.0 +0.4/-0.6	7	7.0 ±0.12	8	-	-	-	-
2,5	13.0 +0.7/-0.4	12	12.0 ±0.5	14	14 ± 0.4	12.5	30	22.5
5,0	16.5 +0.7/-0.4	15	18.0 +0.5/-1.0	20	20 ± 0.6	18.5	40	30
10,0	23.5 +0.8/-0.4	22	22.0 ±0.5	24	26 ± 0.8	24	50	40
26,0	32.0 +0.9/-0.5	30.5	34.0 +2.0/-1.0	38	40 ± 1.0	38	70	56

i These dimensions are valid for clutches with shackle and with wire cables.



Bent shackles must not be straightened. The FRIMEDA Ring clutch has to be discarded if the shackle has a significant deflection.

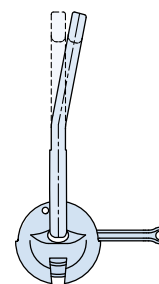


Figure: Significant bending of the shackle caused by misuse of a TPA ring clutch

Checking the connection fittings

Wire cables (TPA-R2/R3)

Wire cables should be checked for the following defects:

- kinking and buckling
- broken cable braid
- slackening of the outermost exposed layer in a free length
- compressive deformation
- compression in the loop with more than four broken wires in braided cables, or more than ten broken wires in cable-laid items
- corrosion scarring
- damage or severe wear to the cable connector or cable-end connector
- high number or broken wires



Discarding the cable

Cable type	Discard the cable if the following number of broken wires is visible over a cable length of:		
	$3d_s$	$6d_s$	$30d_s$
Strand cable	4	6	16

Wire cable inspections include checking for signs of cable slippage in the ferule. Acids, alkalis and other aggressive media that can cause corrosion must be kept away from cables. Cable loops should preferably be used with crane hooks with large section diameter. Sharp-edged hooks or hooks with small cross-section and therefore small radii will damage the cable loops.

Clutch heads with worn cable loops can be re-pressed by HALFEN as the clutch heads generally have a longer service life than the cable loops.

FRIMEDA LIFTING ANCHOR SYSTEM

TPA Ring Clutches TPA-F1

Ring clutch TPA-F1 with pneumatic release

Operating principle

The pneumatically operated remote-control release mechanism has been designed as an alternative to the manual release for distances of more than 10 metres. On the pneumatic version, the locking bolt is released using compressed air.

The compressed air (max. 7 bar) can be supplied from any suitable source, e. g. a site compressor or a portable unit. A hand valve in the air-feed line allows the ring clutch to be opened (Dead man's switch). Further air-feed lines can be connected; this depends on the number of ring clutches in use.

Operating sequence

The ring clutch is inserted in the concrete recess and engaged by closing the locking bolt by hand. The precast element can now be lifted. To disengage the clutch (e.g. after installing concrete columns) the hand valve is opened allowing compressed air into the cylinder pushing the locking bolt back to open the clutch. There is no risk of unintentional release, as the locking bolt remains closed in the event of air supply failure. The air cylinder for the system was selected to prevent bolt release if the attached load is greater than 0.2 t. Compressed air is only released if the key in the hand valve is turned in the direction of the arrow and held in the open position.

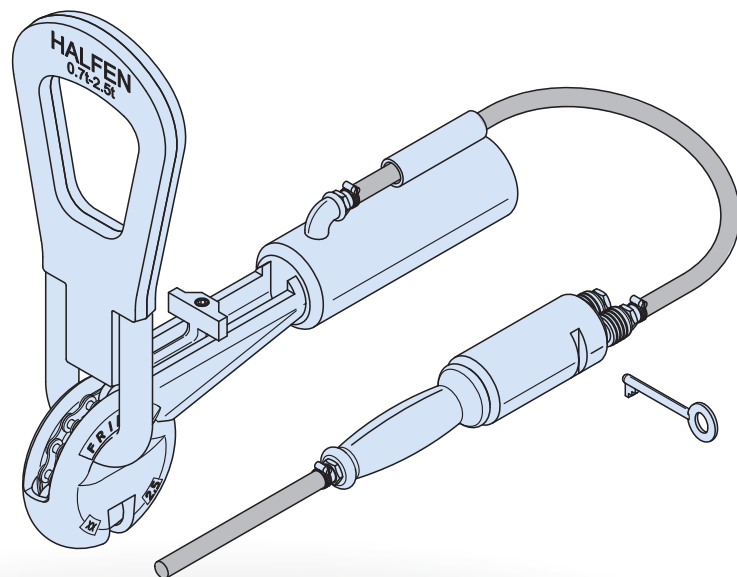
As soon as the key is released, even if it still in the keyhole, the valve is automatically closed and the air in the feed-line can escape. To ensure satisfactory operation we recommend that the air-feed lines to the cylinders are installed in the crane or crane jib. If the compressed air is fed to the precast unit directly from ground level, the air-feed between the compressor and the remote control may only be connected when it is time to release the clutch; e.g. when a column is in its final position and secured.

Remote-release ring clutches have the same markings as manual ring clutches.

TPA-F1		
Load class	Article number	Order no.
2,5	TPA-F1 2,5	00001
5,0	TPA-F1 5,0	00002
10,0	TPA-F1 10,0	00003
26,0	TPA-F1 26,0	00004



Lifting devices have to be checked regularly according to the instructions on page 53.

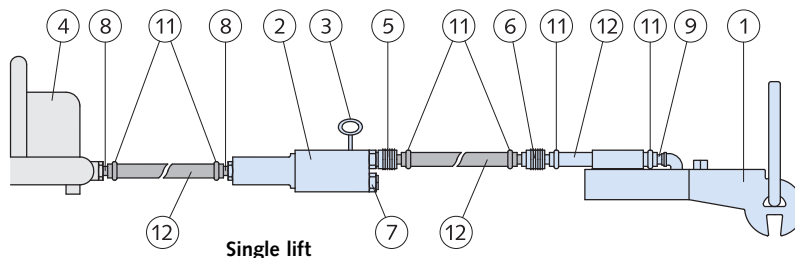


FRIMEDA LIFTING ANCHOR SYSTEM

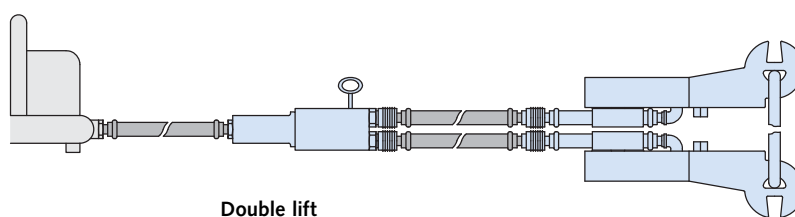
TPA Ring Clutches TPA-F1

TPA-F1 Accessories

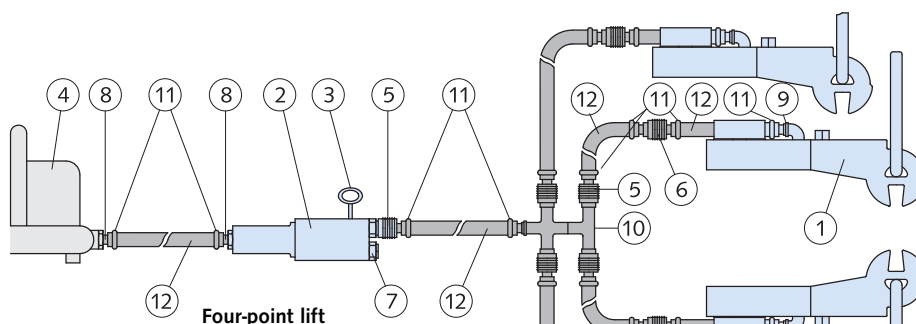
Design Single lift



Design Double lift



Design Four-point lift



Articles ①, ② and ③ are available from HALFEN.
Other parts ④-⑫ are normally available locally as standard.

Accessories

Position	Description	Order no. 0071.070-	Accessories required for:		
			Single lift	Double lift	Four-point lift
①	Ring clutch; complete	see page 54	1	2	4
②	Hand valve	00004	1	1	1
③	Key	00005	1	1	1
④	Compressor	00011	1	1	1
⑤	Quick-action hose coupler R 1/4"	00002	2	2	5
⑥	as position 5, but dual hose	00010	2	2	4
⑦	Thread plug R 1/4"	00003	-	-	1
⑧	Coupler R 3/8"	00014	2	2	2
⑨	Coupler R 1/4"	00015	2	2	4
⑩	4-way distributor	00001	-	-	1
⑪	Hose clip	00012	6	10	20
⑫	Fabric hose	00013	as required	as required	as required

FRIMEDA LIFTING ANCHOR SYSTEM

TPA Ring Clutches TPA-F2

Ring clutch TPA-F2 with bowden cable, manual remote control

Operating principle

The remote-control is used to open the ring clutch from a safe distance of up to 10 metres. A bowden cable connected to the locking bolt at the ring clutch serves as a release mechanism. At the opposite end, the release handle is secured to the tube with a safety catch. All TPA-F2 clutch heads in the various load groups have the same M27 thread, i.e. the remote-control mechanism fits any clutch head. The opening and closing mechanism, comprising of the locking bolt, the shackle with indicator and the latch are parts of the clutch head.

Operation of the manual remote-control

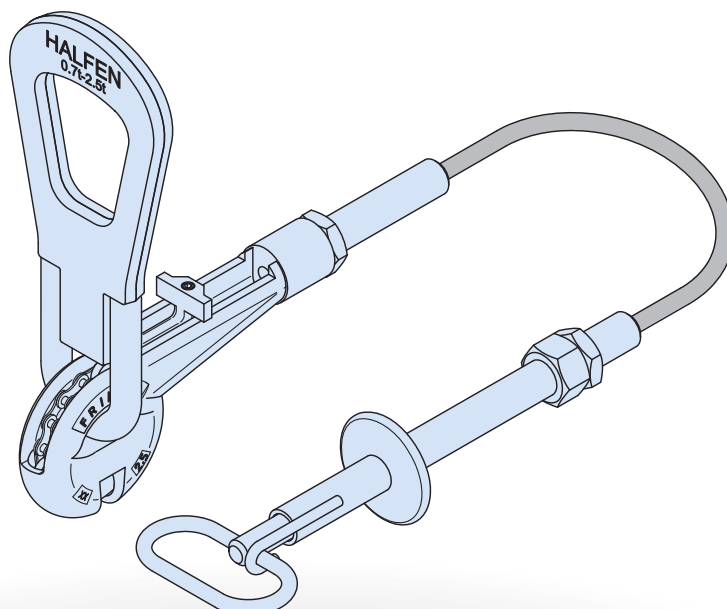
To release the ring clutch, disengage the handle by pressing and turning. Unintentional release is not possible. For safety and efficiency reasons, the locking bolt is closed by hand. The remote device is designed so the locking bolt cannot be closed remotely. The flexible tube can withstand reasonable tension and compression loads, so that the precast unit is easily handled.

The ring clutches of all the load groups can be used with any of the manual remote-control releases of lengths 2.5 m, 5.0 m, 7.5 m and 10.0 m.

TPA-F2			
Load class	Article number	Order no. 0071.040-	Cable length
2,5	TPA-F2 2,5	00001	2.5 m
		00002	5.0 m
		00003	7.5 m
		00004	10.0 m
5,0	TPA-F2 5,0	00005	2.5 m
		00006	5.0 m
		00007	7.5 m
		00008	10.0 m
10,0	TPA-F2 10,0	00009	2.5 m
		00010	5.0 m
		00011	7.5 m
		00012	10.0 m
26,0	TPA-F2 26,0	00013	2.5 m
		00014	5.0 m
		00015	7.5 m
		00016	10.0 m



Lifting devices have to be checked regularly according to instructions on page 53.



FRIMEDA LIFTING ANCHOR SYSTEM

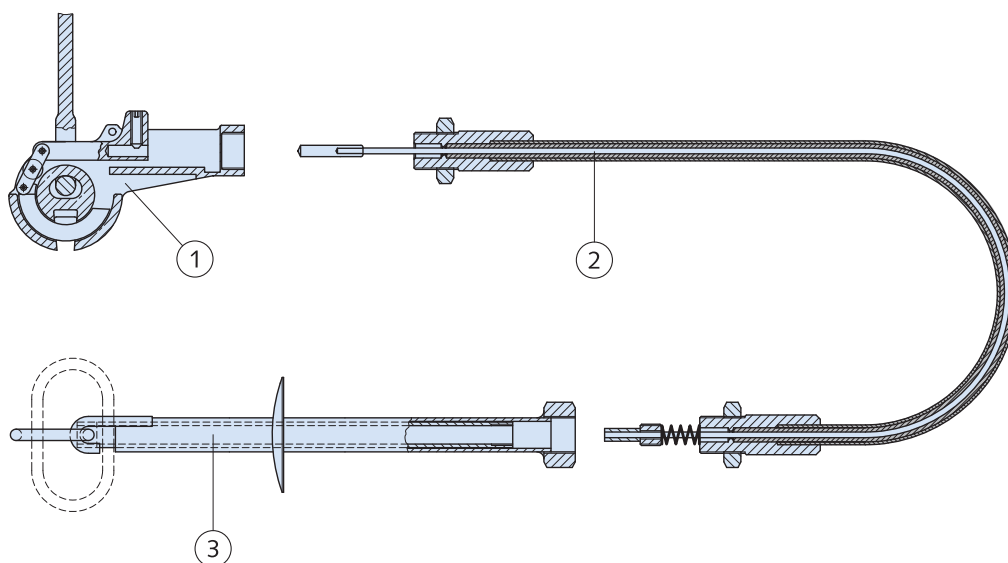
TPA Ring Clutches TPA-F2

Component parts for TPA-F2

All clutch heads in the various load groups have an M27 inner thread; this allows connection of different cables lengths and various clutch heads to the remote-control mechanism.

This allows the individual components of the remote-control mechanism to be ordered separately; and also helps to reduce storage space requirements.

As with all lifting devices, remote-control mechanisms must be checked regularly by an expert (see page 53, "Checking the lifting links"). Worn locking bolts can be replaced, Further repairs are not permitted.



- ① Clutch unit
- ② Pull cable unit
- ③ Release handle and tube

① Clutch unit TPA-F2-KUP		
Load class	Article number	Order no. 0071.080-
2,5	TPA-F2-KUP- 2,5	00001
5,0	TPA-F2-KUP- 5,0	00002
10,0	TPA-F2-KUP-10,0	00003
26,0	TPA-F2-KUP-26,0	00004

② Pull cable unit TPA-F2-SZE		
Article number	Order no. 0071.080-	Cable length
TPA-F2-SZE- 2,5	00005	2.5 m
TPA-F2-SZE- 5,0	00006	5.0 m
TPA-F2-SZE- 7,5	00007	7.5 m
TPA-F2-SZE- 10,0	00008	10.0 m

③ Release handle and tube TPA-F2-GRI	
Article number	Order no.
TPA-F2-GRI	0071.080-00009

FRIMEDA LIFTING ANCHOR SYSTEM

Application Examples



DEHA KKT SPHERICAL HEAD ANCHOR

Further HALFEN Products



The DEHA Lifting anchor system is cast into the concrete together with a recess former which will be subsequently removed. The quick and easy universal head link is used to lift the concrete element.

Quality features:

- safe, quick, efficient
- anchor length remains visible even after installation
- abrasion resistant clutch
- for all forms and sizes of precast elements
- load class 1,3 to 45,0
- lifting hook can also be ordered with a certificate
- CE marked in accordance with the EU machinery directive guide lines since April 2012



DEHA HD SOCKET LIFTING ANCHOR

Further HALFEN products



The new generation lifting system with protective cap and integrated identification cap covers the HD-Socket load range up to 25 tonnes with only nine load groups. The anchor sleeve is also available in stainless steel. The anchor sleeve protection system remains permanently in the sleeve and offers protection against all type of dirt.

Quality features:

- concise product range for load class 1,3 up to 25,0
- integrated sleeve protection with data clip
- robust lifting clutch for increased safety and economy
- lifting clutch can also be ordered with a certificate
- CE marked since April 2012 (acc. to EU machinery directive guidelines)



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