



PFEIFER Lashing Anchor System

PFEIFER



Safe lashing with PFEIFER products

POLYTEX® lashing strap systems

VDI 2700 and EN 12195-2

- Easy handling
- Enormous lashing capacity up to 20.000 daN
- Low-strech, durable, anti-abrasive, specially impregnated strap material (100% polyester) with high service life
- No moisture absorption in the strap's fibres, therefore no frost rigidity and largely non-rotting.
- Colour-coded to eliminate the possibility of making errors
- Woven-in ton stripes in strap widths of up to 50 mm
- Fittings made of galvanized, ageing-resistant steel
- With load label and short operating instructions
- Straps available in all desired lengths
- Standard length of the ratchet part is app. 0.5 m
- Heat resistant up to 100°C , frost resistant down to -40°C



Lashing chain systems

DIN EN 818, Part 1/2/4 and EN 1677, EN 12195-3, VDI 2700ff, PAS 1061

Securing heavy construction equipment, vehicles and machines on flat bed trailer requires the lashing system to have maximum WLL where transverse and diagonal direct course are concerned. PFEIFER – lashing chains – a product line consisting of ultramodern chain technology in the modular system – can solve – these maximum requirements without any problems.

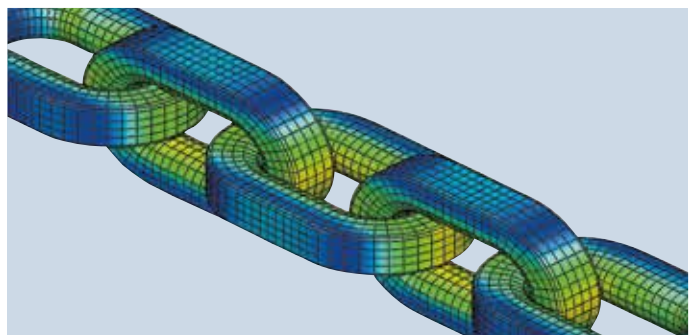
- High-tensile chains and fittings of the quality grade 80, 100 or even 120 guarantee an optimum of safety
- The inserted chain-shortener makes it possible to vary the lashing length considerably
- The chain shorteners are equipped with a safety device to prevent the chain from unintentionally loosening, as stipulated in EN 12195-3

*The lashing system
for rough operation!*



[grade 120]

HIT
STRENGTH
WITH PROFIL
PRO





The PFEIFER Lashing Anchor System comprises the following components:

PFEIFER Lashing Anchor

For installation in the shell segment



Pages 5–6, 8

PFEIFER Fastening Bolt, flat-head version



Pages 7–8

PFEIFER Lashing Point

Load carrying attachment for safe transportation.



Pages 9–12

PFEIFER Buffer Ring



Pages 9–12

PFEIFER Repair Lashing Anchor



Pages 13–14

PFEIFER External Cap

For a visually appealing way to cap PFEIFER Anchors



Page 15



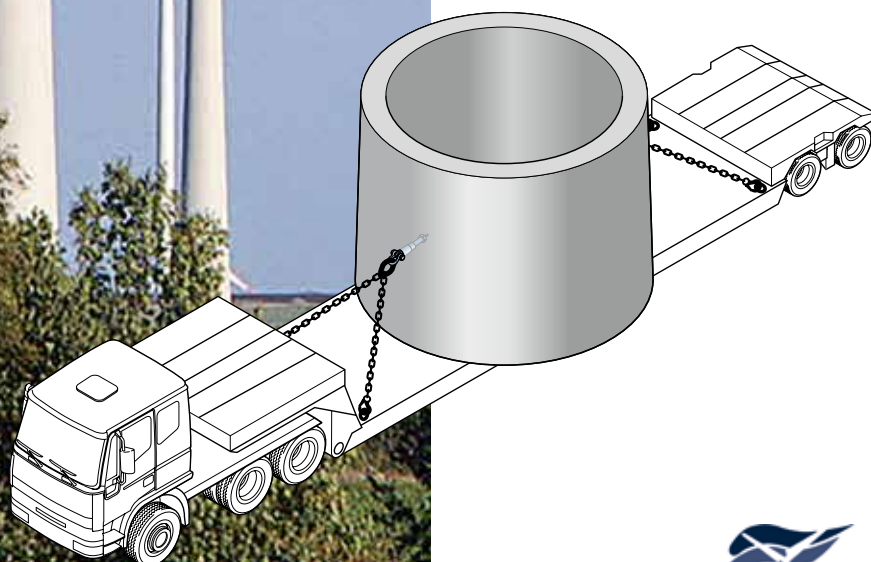
Consistent manufacturing quality thanks to semi automated processes within the scope of a quality management system certified by DIN EN ISO 9001:2008.

Experienced long-time employees control and organise production at the head office in Memmingen, producing high quality products – Made in Germany.



Your advantages with the PFEIFER Lashing Anchor System:

- + The perfect solution for safe transportation of shell segments in road traffic – developed especially for you.
- + Matching lashing anchors for every segment
- + Optimum locking accessory
- + Colour coding with RAL colours prevents confusion
- + Very high product efficiency thanks to high quality material
- + Production with state-of-the-art machines
- + Consistent quality thanks to automated production
- + Constant control of quality
- + Component tests officially accompanied by the state trade agency "LGA"
- + Safety thanks to a thread system which has been proven a millionfold
- + Dirt tolerant and resistant to impact thanks to round thread (Rd)
- + A product from one source



PFEIFER Lashing Anchor



PFEIFER

Lashing anchor system

Lashing anchor



Do not use the PFEIFER Lashing Anchor to lift concrete elements! Fall hazard due to deviant safety factors!

PFEIFER Lashing Anchors were specially developed for securing the position of round, semicircular and third-of-a-circle precast concrete elements (shell segments) for road transport by truck. Safe transportation of the shell segments is possible when using the lashing anchors in combination with PFEIFER Lashing Points.

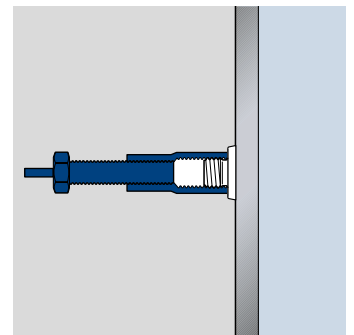
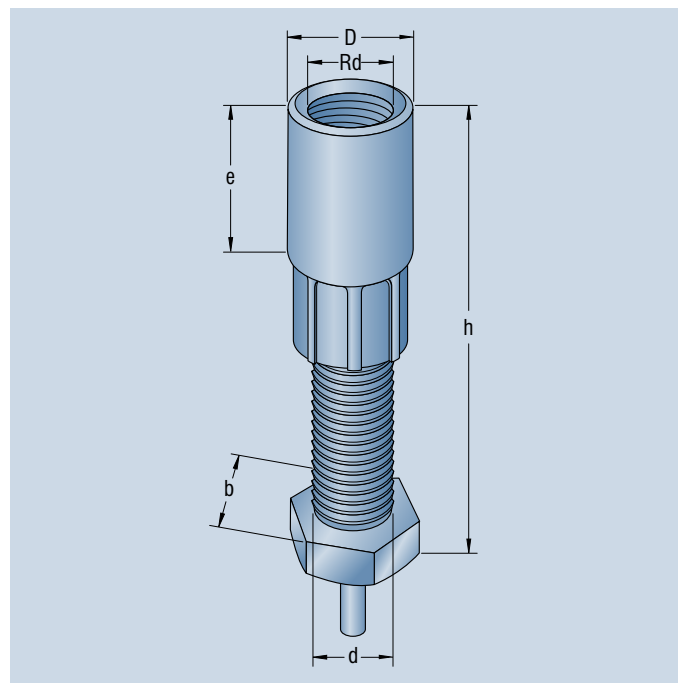
Material:

Stainless steel socket

Hexagonal bolt

Sealed socket base

Fixing bolt



Ref. No. Stainless steel	Execution	Type/Size	Measurements in mm					Weight approx. kg/100 pieces
			D	h	e	b	d	
268438	with bolt	Rd 36	47,0	180	48	46	30	130
268475	with bolt	Rd 42	54,6	202	57	55	36	210
290496	without bolt	Rd 36	47,0	180	48	46	30	128
290497	without bolt	Rd 42	54,6	202	57	55	36	208

Installation instruction for PFEIFER Lashing Anchors in segment production

1. Description

The PFEIFER Lashing Anchors were specially developed as attachment points for securing circular shell segments for transport. These precast concrete segments are produced using concrete with a minimum concrete strength class of C35/45.

The installation and use of the anchors have to be in accordance with these installation guidelines and instructions for use as well as with the respective product specifications.

2. Conditions of use

The PFEIFER Lashing Anchor must be installed on the centre line of the component (diagonal lashing) or symmetrically to it (crossover diagonal lashing)!

The installation of the lashing anchors in the segments of a full circle, a semi circle and a third of a circle is schematically illustrated in figures 1–3.

Crossover diagonal lashing is limited to full circle segments.

3. Reinforcement

PFEIFER Lashing Anchors are designed for concrete of a minimum compressive cube strength of **45 N/mm²** which must exist when being stressed for the first time. To transfer forces it is necessary to install a surface reinforcement in the concrete. The precast concrete parts must be reinforced with two layers of steel (top and bottom). The minimum surface reinforcement in the longitudinal and transverse direction is in each case 9.42 cm²/m.

4. Edge distance and minimum spacing, minimum part thickness

Specific distances from the edge and between the anchors must be kept to ensure local load transfer into the concrete. The concrete part's thickness must also be observed. It is possible to deviate from the standard installation as shown in figures 1–3, for instance in the area of the edges of recesses. In this case (figure 4: $a_{r, \min} < \text{existing edge distance } a < a_r$) however it is necessary to arrange a retention reinforcement at the edges of the part (reinforcement surround) in accordance with table 2.

Table 1: Minimum dimensions

Size	Edge distance [cm] $a_{r, \min}^{**}$	Distance from axis [cm] a_r^*	Part thickness [cm]
Rd 36	60	130	25
Rd 42	80	170	30

* a lower deviation of the minimum edge distance a_r according to table 1 is only valid in connection with the installation of a retention reinforcement according to table 2.

** the minimum edge distance $a_{r, \min}$ has to be kept.

Table 2: Retention reinforcement

Size	Edge rebar		Stirrups			
	Number n [pieces]	d_s [mm]	Number n [pieces]	d_s [mm]	s_1 [mm]	s_2 [mm]
Rd 36	2	12	4	12	60	60
Rd 42	2	12	6	12	60	60

The stirrup arms are to be fixed outside the break-out cone with an anchorage length of l_{bd} according to EC2: BS EN 1992-1-1, paragraph 8.4.4.

The stirrup bending diameter D according to EC2: BS EN 1992-1-1, paragraph 8.3.2 is to be adhered to.

5. Corrosion prevention

The PFEIFER Lashing Anchors are made of stainless steel. The lashing anchors can thus be assigned to the corrosion resistance class III medium (exposure classes SC 2, SR 1, SH 2 and SL 3) in accordance with the general building authority approval no. Z-30.3-6 of 22 April 2014 and can thus be used outdoors. The socket base is additionally permanently sealed with a special material in the swage area.

Fig. 1a
Diagonal lashing in the case of full circle segments with weights from 0 – 52 t

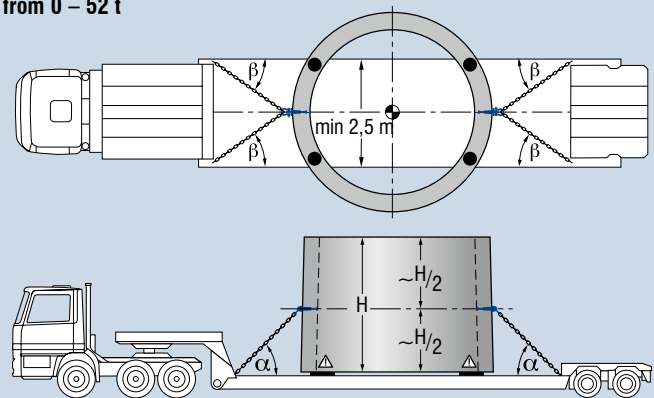


Fig. 1b
Crossover diagonal lashing in the case of full circle segments with weights from 52 – 70 t

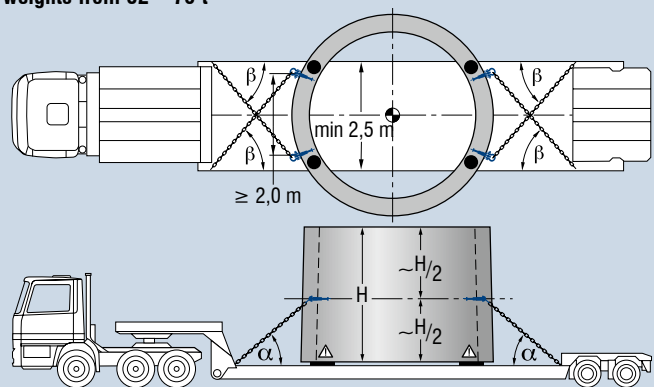


Fig. 2
Diagonal lashing in the case of semicircular segments with weights from 0 – 52 t

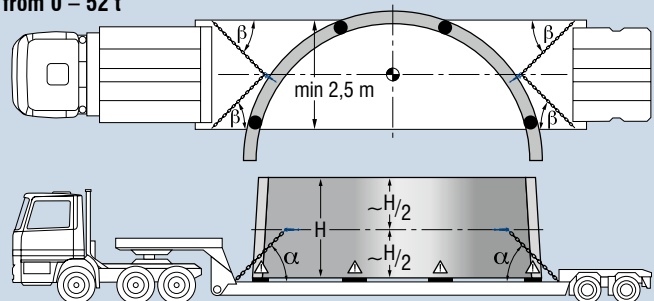
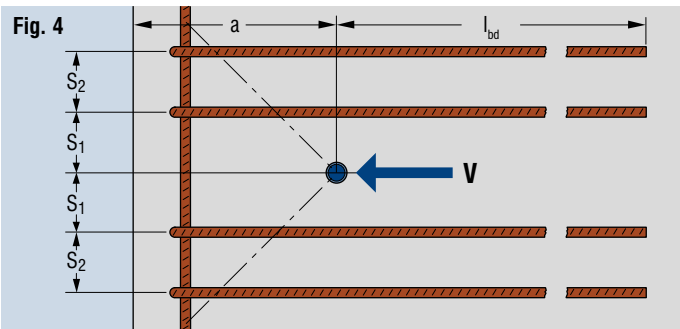
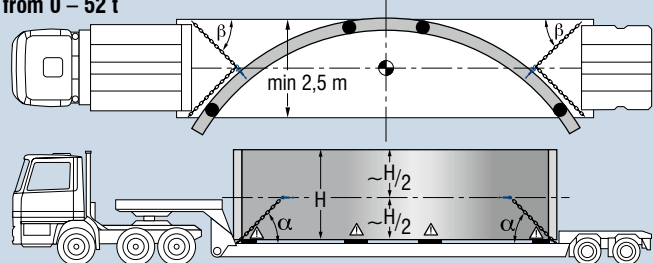
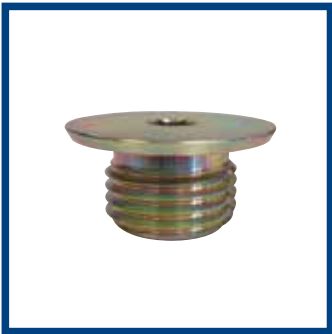


Fig. 3
Diagonal lashing in the case of third-of-a-circle segments with weights from 0 – 52 t



PFEIFER fastening bolt, flat-head version

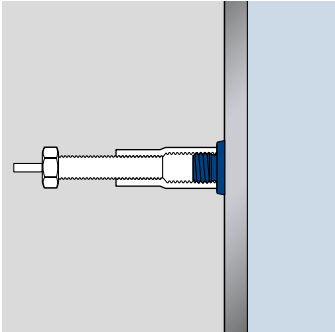
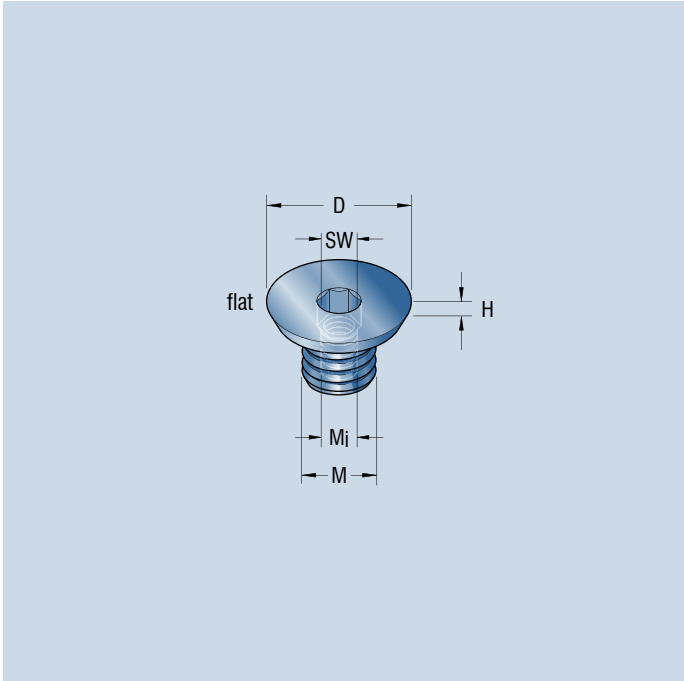


PFEIFER

Lashing anchor system
Formwork fixation

The PFEIFER Fastening Bolts – flat design – serve to seal and fix PFEIFER Lashing Anchors during concreting.

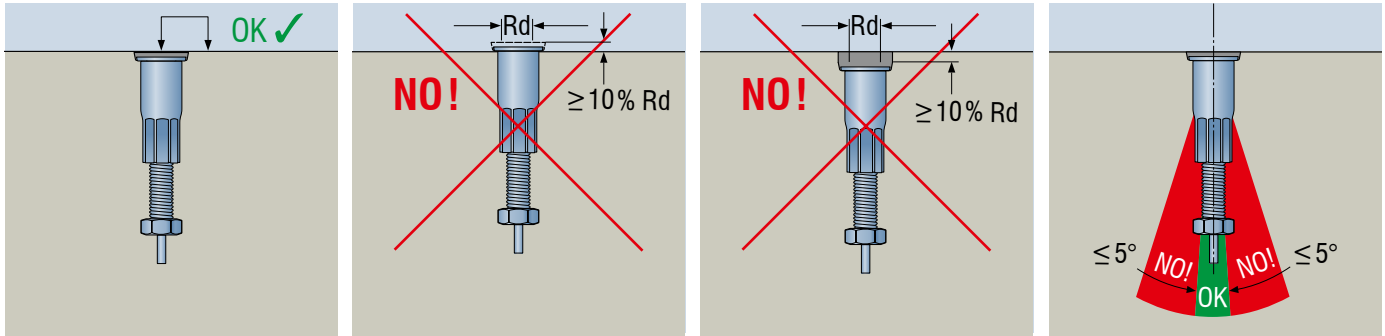
Material:
Fastening bolt
Steel, galvanized chromatized



PFEIFER fastening bolt

Ref. No.	Tread size M	Measurements in mm			SW	weight approx. kg/piece
		D	H	Mi		
268435	36	59,0	4,5	M10	14	0,48
268436	42	67,5	5,0	M16	17	0,74

Installation tolerances



Caution: Incorrect positions and incorrect anchor installation can lead to premature failure – deadly danger! As a rule, the anchor should be installed flush and at right-angles!



Installation guidelines for PFEIFER fastening bolts, flat design for segment production

The PFEIFER Fastening Bolts – flat design – can be used for the installation of the lashing anchors of the PFEIFER Lashing Anchor System. The lashing anchor may only be used with the PFEIFER Lashing Point.

The PFEIFER Lashing Anchor is installed in the formwork using specially adapted equipment.

The fastening bolts cause openings in the concrete. These can be closed in an architectonically attractively like way with PFEIFER External Caps, small (page 15).



It is compulsory to install the Lashing Anchor with the PFEIFER Fastening Bolt – flat design – in order to ensure that the lashing points can be tightened so that they have full contact with the surface. Otherwise there is a danger of bending and breakout!



The special fastening bolts without shaft must be used, as otherwise proper installation cannot take place. Danger of incorrect tightening of the lashing point and thus risk of failure!

Fig. 1

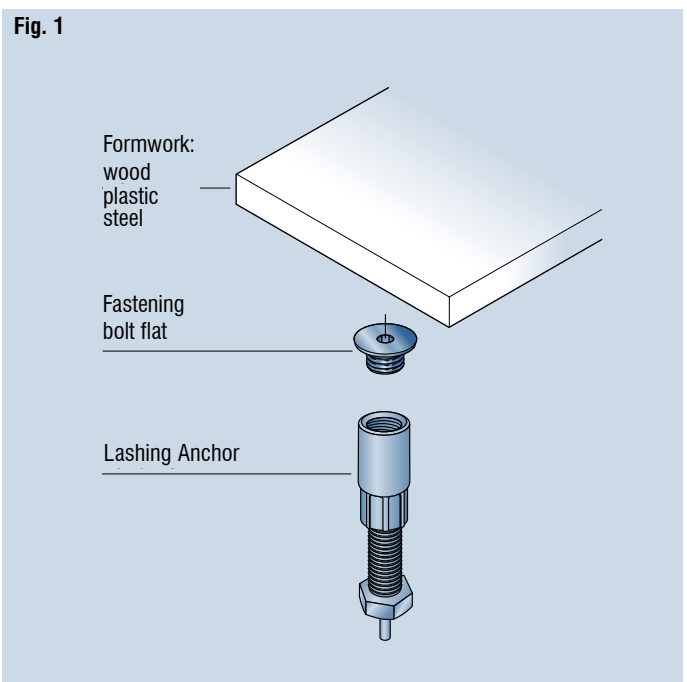
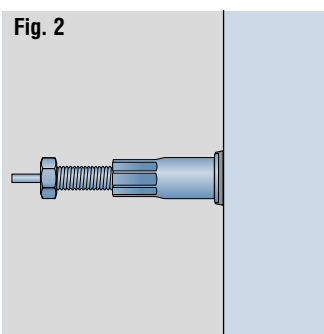


Fig. 2



PFEIFER Lashing Point



PFEIFER

Lashing anchor system

Lashing point



**Structural elements
may not be lifted by the
PFEIFER Lashing Point!
Fall hazard due to devi-
ant safety factors!**

The PFEIFER Lashing Point is the corresponding load carrying device into which the PFEIFER Lashing Anchor is screwed.

In the above mentioned combination it is designed and tested for its function as attachment point for lashing pre-

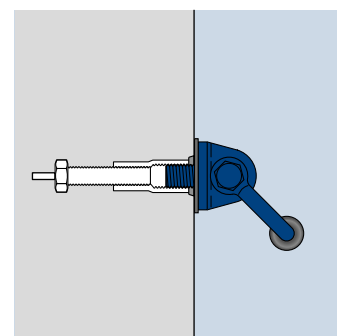
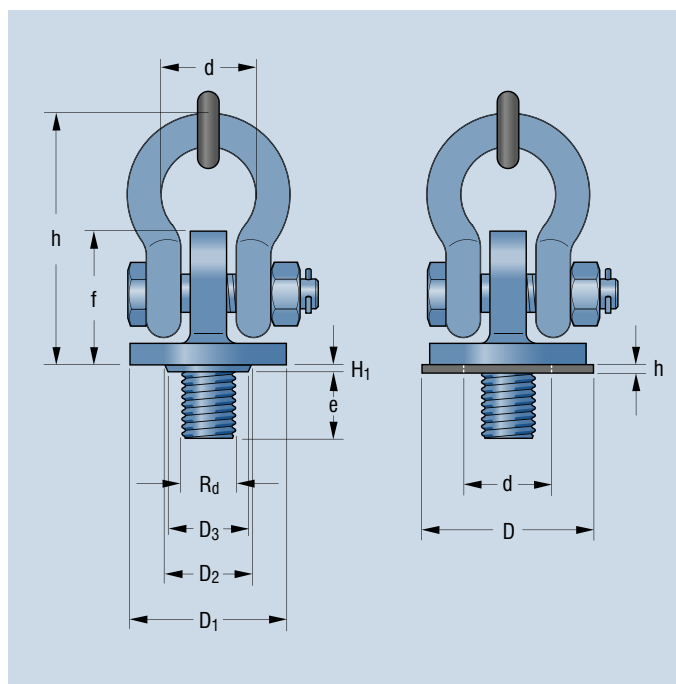
cast elements (shell segments) during transportation.

As a component part of the system, the buffer ring must be used to rotate the lashing point into the correct position.

It protects the concrete surface against indentation.

Material:

Steel,
Threaded bolt of special quality
Welded shackle, high tensile
Stirrup
Bolt
Bolt and nut
Cotter pin
Rubber buffer and rubber ring



PFEIFER Lashing Point

Ref. no.	Ref. no. LT* version	Type/Size	Measurements in mm								Weight approx. kg/piece
			D ₁	D ₂	D ₃	H ₁	e	h	f	d	
228663	263216	Rd 36	100	57,5	54,0	4,5	47,5	186	92	68	4,9
228664	263217	Rd 42	100	66,0	61,0	5,0	55,0	191	97	68	5,3

PFEIFER Buffer Ring

Ref. no.	for load group	D	d	h	Weight/100 pieces
234024	0-40	110 mm	60 mm	5 mm	1670 g
234025	40-52	110 mm	70 mm	5 mm	1910 g

* suitable for temperatures from -40 °C to 100 °C

High-tensile shackle as replacement part:

Ref. No.	Rd	Weight approx. kg/piece
181529	Rd 36/Rd 42	2,52

Rubber buffer for shackle as replacement part:

Ref. No.	Rd
231386	Rd 36/Rd 42

High-strength shackle type LT** as replacement part:

Ref. no.	Rd	Weight approx. kg/piece
263263	Rd 36/Rd 42	2,58

Instructions for use for PFEIFER Lashing Point with pressure plate and buffer ring for safe transportation

1. Construction

The PFEIFER Lashing Point was developed for lashing shell segments with PFEIFER Lashing Anchors.

The lifting eye is welded onto the pressure plate. The shackle engaged into the lifting eye by its threaded stem can be aligned in the direction of force application (figure 1). The lashing point may only be used when it is complete. A cotter pin in the cross-bolt prevents unwanted loosening of the cambered shackle.

Slight lubrication of the threaded bolts makes screwing in easier. Threaded bolt, lifting eye and shackle are made of high tensile material. This is the reason why welding and other exposure to extensive heat is not allowed.

The rubber buffer on the shackle prevents damage to the coated surface. This is why it should always be attached to the shackle. The buffer ring is positioned between the pressure plate and the tower element surface.



Load the PFEIFER Lashing Point only by diagonal lashing with corresponding and approved lashing equipment! Always fasten two lashing straps/chains or one lashing strap/chain (crossover diagonal lashing) to the lashing point. Observe lashing angles α and β as specified on page 12. If these warnings are not observed, there is a possible danger of breakout.

2. Identification mark

The imprint contains the following information: manufacturer (PFEIFER), type (lashing point), size (e. g. Rd 36), year of manufacture and serial number (e. g. 09/001).

All sizes from serial number 09/1741 come with a shackle marked 8.5 t. The load bearing capacity marked on the shackle is **not** applicable to lashing operations.

3. Handling and function

The PFEIFER Lashing Point with pressure plate is screwed into the PFEIFER Lashing Anchor (fig. 2) with the buffer ring on the threaded bolt (with the lettering facing towards the pressure plate). Only components that belong together in the PFEIFER Lashing Anchor System may be used.

The threaded bolt must be screwed in completely so that the buffer ring is pressed flush against the concrete in the area of the recess by the pressure plate. The lashing point is screwed in by hand with the shackle.

The sheet-metal lifting eye should be screwed back – max. 180 degrees – until it is aligned vertically (figure 2). The shackle must then be positioned correctly as shown in figures 2 and 3. The rubber buffer must be securely sandwiched between the tower element and the pressure plate. If the rubber buffer is loose, this means that the lashing point has been screwed back too far. Release the lashing point and screw it in more tightly by hand so that a smaller screw-back angle is required. Check the clamping again.

Only when completely screwed in and fully resting can the pressure plate and the buffer ring be supported by the concrete under load. This reduces the deformation of the threaded bolt and puts less strain on the embedded socket.

The pressure plate of the PFEIFER Lashing Point matches the diameter of the buffer ring. The lashing anchor's longitudinal axis must be exactly perpendicular to the bearing surface of the lashing point. This is why it is essential to use the PFEIFER Accessories for installation of the PFEIFER Lashing Anchors into formwork. **Otherwise it cannot be ensured that the pressure plate will press down on the buffer ring, nor that it will lie flat on the concrete (figure 3).** If the pressure plate does not rest fully and flat on the concrete, there is a danger that the threaded bolt will break due to flexural stress (figure 4).

When handling parts, pay attention to discarding time.



Please note:

The PFEIFER Lashing Anchor System is solely designed for securing shell segments for transportation by road (with HGV) by means of diagonal lashing.

If all conditions of use described in these installation guidelines are observed (lashing method, lashing angle, coefficient of sliding friction), the PFEIFER Lashing Anchor System can also be used for transportation by sea. However, it is important to note that suitable additional measures have to be taken in order to carry the vertical lifting forces according to DIN EN 12195-1.

Securing of cargo for transportation by rail is not approved.

It is not permissible to lift shell segments with the PFEIFER Lashing Anchor System.



Please note:

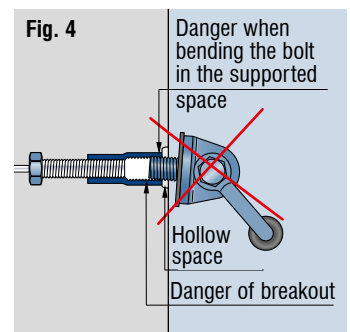
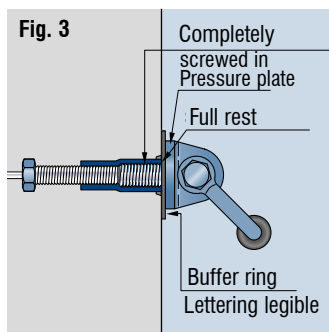
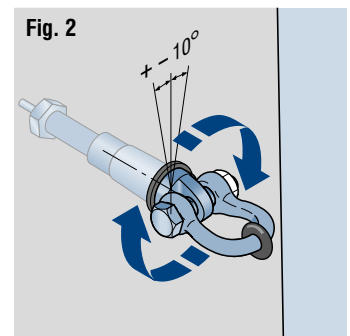
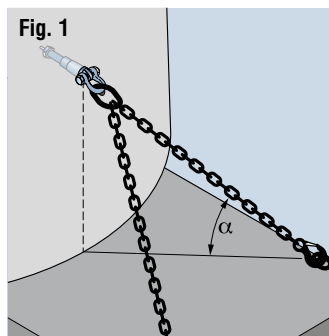
For the transport of the shell segments the separate form "Securing loads with the PFEIFER Lashing Anchor System" has to be used.



Always adhere to the described conditions of use when attaching the approved lashing equipment to the lashing point!



It must be ensured that the lashing point can be screwed in completely. The pressure plate must rest fully on the concrete. Otherwise there is the danger of bending the anchor.



4. Maintenance

The PFEIFER Lashing Point itself is maintenance-free. However, it must be ensured that the threaded bolts are kept free of dirt and residual concrete. The same applies to the bearing surface of the pressure plate and the inside of the lifting eye and the buffer ring. All traces of cement or concrete must be removed.

5. Withdrawal from service due to wear and tear and examination during use

According to the applicable regulations, PFEIFER Lashing Equipment must be checked and inspected by a technical expert at least once a year. It is recommended that documentation be kept for each part (serial number). The necessary examination involves checking for externally visible flaws, deformation, cracks, and wear and tear. Technical experts are persons expressly designated and who have an appropriate level of knowledge in the field of attachment equipment based on their training and experience. Moreover, they are familiar with the relevant accident prevention regulations and generally accepted principles of sound engineering practice insofar that they are able to assess the safety of load carrying equipment.

The lashing points have to be cleaned beforehand so that they are free of dirt and impurities.

The PFEIFER Lashing Point comprises three components, which are, firstly, the integrated shackle; secondly, the steel lifting eye part; and, thirdly, the buffer ring. It is essential that all parts be tested by a technical expert, as described above, after they have been exposed to extraordinary forces or to damaging events with the potential to impair their load bearing capacity.

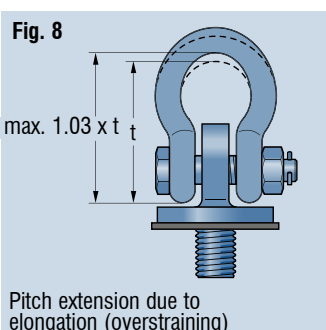
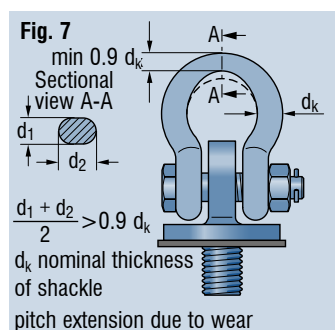
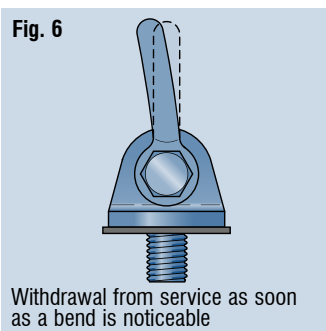
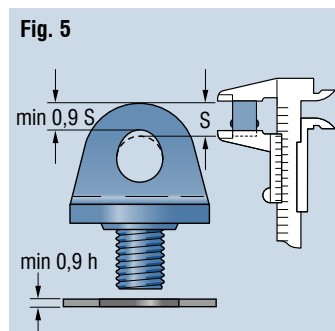
Use of the PFEIFER Lashing Points is permissible down to a temperature of -20°C . Use of the PFEIFER Lashing Point type LT is permissible down to a temperature of -40°C .

Temperatures of over 100°C are not permissible. Lashing points that have been exposed to higher temperatures must be withdrawn from service. Each component is subject to the following criteria for withdrawal from service.

5.1 Withdrawal from service of lifting eye parts and the buffer ring



**Do not use lashing points with bent threaded bolts or other parts.
This poses a danger of failure and therefore a fall hazard.**



The lifting eye part and buffer ring must be withdrawn from service if the following can be observed:

- Threads are damaged or stripped out
- Pressure plate, lifting eye or threaded bolt are deformed
- Lifting eye's cross section in any place reduced by more than 10 % due to wear or damage (see table 1 and figure 5)
- Cracks in any place, in particular in welds or in the buffer ring
- Extensive corrosion pits or flaws
- Build-up on the pressure plate or buffer ring

Table 1: Measurements of the lifting eye

Lashing point Type/Size	S [mm]	0,9 S [mm]	0,9 h [mm]
Rd 36	26,0	23,4	4,5
Rd 42	26,0	23,4	4,5

5.2 Integrated shackle

If the shackle is bent out of plane (figure 6), it must be withdrawn from service. Shackles which are worn by more than 10 % in any place (figure 7) or which have been elongated (stretched) by more than 3 % due to overloading and wear (see figure 8) must be withdrawn from service immediately. Table 2 indicates nominal values for the inspection of the shackle as shown in figures 7 and 8.

Note: the bolt must not show any signs of wear. Usage without a cotter pin is not permissible. Bent cotter pins must be replaced.

Table 2: Measurements of the shackle

Lashing point Type/Size	Inner width t [mm]	Nominal diameter d [mm]
Rd 36	120	27
Rd 42	140	27

The shackle must be withdrawn from service if it shows the following signs of damage:

- Bent bolt
- Any cracks anywhere
- Notches and pinches
- Corrosion pits

6. Limitations of use

The load group in the product specifications refers to the dead weight of the precast concrete element (shell segment), which is to be safely lashed onto the truck for transportation. The basis of the calculation to determine the anchor size is a minimum compressive cube strength of the concrete of 45 N/mm^2 . The load bearing capacity includes a 2-fold safety factor against breakout from the concrete, under consideration of all conditions for securing loads.

The load group in the product specifications refers to the dead load of the precast part (shell segment), which is to be safely lashed onto the truck for transportation.

Additional welding on the tapped sockets of the PFEIFER Lashing Anchor System is not permissible. Under no circumstances is it allowed to weld on the lashing point. Only flawless lashing anchors and lashing points may be used for securing loads. Lashing anchors that are installed incorrectly, or lashing anchors that are deformed, damaged, extensively corroded or anchors with damaged threads may not be used.

Instructions of use for securing loads

Conditions of use

When using the PFEIFER Lashing Anchor System for load securing of the shell segments it must be observed that four identical pieces of equipment are used for the diagonal lashing procedure and that the vertical angle α and the horizontal angle β (Fig. 1) are adhered to during diagonal lashing in accordance with the enclosed table.

Form locking according to table 1 comprises the support of the shell segments at suitable face and side walls or with stopper plates, wedges or squared timbers fastened to the loading platform. In addition, the use of anti-slip mats or equivalent anti-slip elements must always be provided for.

Careful driving, adapted to the respective situation, is assumed. Abrupt braking and acceleration is avoided by the adaptation of the speed and the sensible application of the brakes, particularly on gradients. The anti-slip mats/elements must have a coefficient of sliding friction of at least $\mu = 0.6$. The contacts must be clean; therefore the loading area must be swept before the use of the anti-slip mats.

Permissible angle range

Table 1: Diagonal lashing according to fig. 1 – Case A and B

Case	Without additional positive fit measures*
A Vertical angle α	35–45°
B Horizontal angle β	30–55°

* In case of non-compliance with the lashing angle, secure with an additional positive fit.
(For road transportation at the front/For sea transportation on all four sides)
Take special measures to prevent tipping over!

Our dimensioning recommendation:

Diagonal lashing with lashing chains of quality category 12 (GK 12)

Case	Type/Size	adm. segment weight	Maximum segment height H [m]	Nominal thickness of chain	max. adm. lashing force* for direct pull	Ref. No. design one-part	Ref. No. design two-part
A	Rd 36	0–40 t	3,80	8 mm	6.000 daN	229529	229536
B	Rd 42	40–52 t	3,80	10 mm	10.000 daN	229531	229537
C	Rd 42	52–60 t	3,80	10 mm	10.000 daN	229531	229537
D	Rd 42	65–70 t	2,80	10 mm	10.000 daN	229531	229537

Diagonal lashing with lashing chains of quality category 10 (GK 10)

Case	Type/Size	adm. segment weight	Maximum segment height H [m]	Nominal thickness of chain	max. adm. lashing force* for direct pull	Ref. No. design one-part
A	Rd 36	0–40 t	3,80	10 mm	8.000 daN	200957
B	Rd 42	40–52 t	3,80	13 mm	13.400 daN	200959
C	Rd 42	52–60 t	3,80	13 mm	13.400 daN	200959
D	Rd 42	65–70 t	2,80	13 mm	13.400 daN	200959

* Admissible lashing force refers to the load bearing capacity of the lashing chains (not of the lashing anchor)

Lashing chains are to be examined before, during and after use. Lashing chains must moreover be examined by a technical expert in accordance with VDI 2700 page 3.1 in intervals of minimum one year. In case of more frequent use or after extraordinary incidents they must be examined even more often.

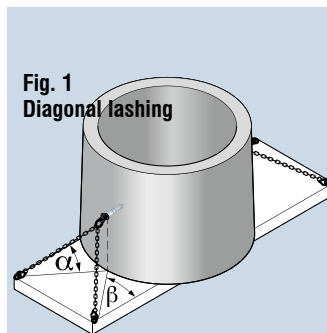
Anti slip mat ($\mu = 0.6$)

Smooth loading platforms require high restraining forces and therefore extensive lashing of loads.

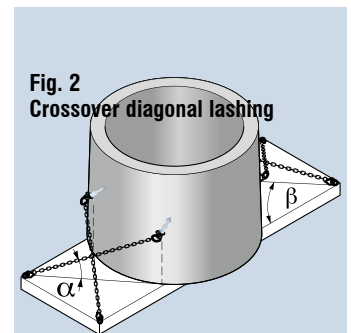
Restraining forces can be reduced by up to 60 % by using anti-slip mats with a guaranteed friction coefficient of 0.6.

Design	Thickness [mm]	Width [mm]	Length [mm]	Ref. No.
Roll	8	250	5000	123650
Box 120 pieces	8	100	200	200942
Box 100 pieces	10	100	200	200943

Other measurements and thicknesses available on request.



Case A + B



Case C + D

Table 2: Crossover diagonal lashing according to fig. 2 – Case C and D

Case	Without additional positive fit measures*
C Vertical angle α	20–60°
C Horizontal angle β	20–60°
D Vertical angle α	45–60°
D Horizontal angle β	30–60°



PFEIFER Repair Lashing Anchor



PFEIFER

Lashing Anchor system
Repair lashing anchor



Do not use the PFEIFER Repair Lashing Anchor to lift concrete parts!
Fall hazard due to deviant safety factors!

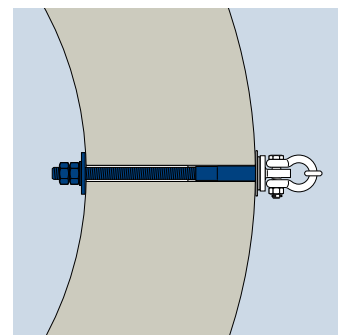
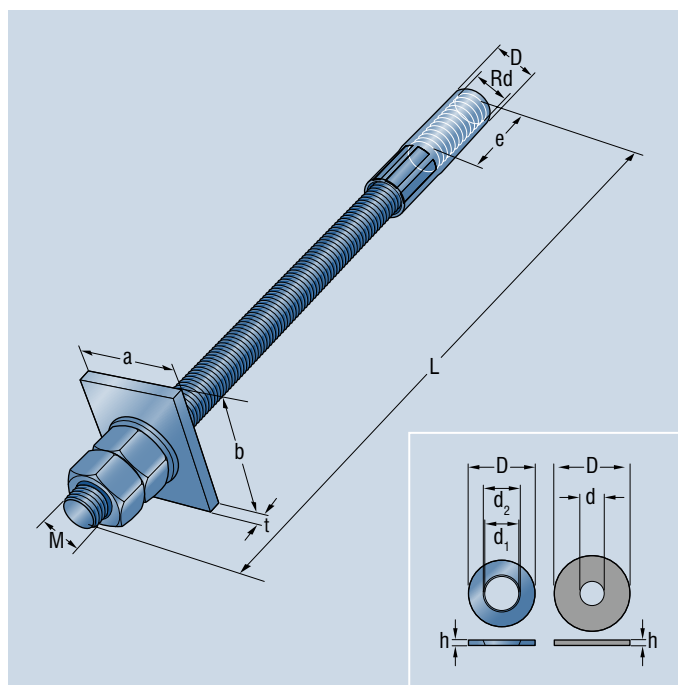
PFEIFER Lashing Anchors have been especially designed for securing the position of precast concrete elements (shell segments) during transportation by truck in road traffic.

However, the Repair Lashing Anchor can only be used if the installation of PFEIFER Lashing Anchors has been forgotten during the production of shell segments.

Safe transportation of the shell segments is possible when using the lashing anchors in combination with Lashing Points.

Materials:

Shaft and threaded rod made of stainless steel.
Anchor plate, washer and nuts are zinc coated.



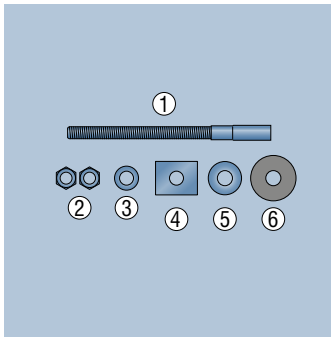
Accessory for PFEIFER Lashing Point

Ref. No.	Type/Size	Dimensions in mm								Weight approx. kg/10 piece
		D	a	x	b	x	t	e	L	M
236685	Rd36	46,8	100	x	130	x	10	68	560	36
236686	Rd42	54,0	130	x	160	x	12	80	580	42
287755	Rd42	54,0	130	x	160	x	12	80	700	42

Accessories for PFEIFER Lashing Point

PFEIFER Compensation Ring							PFEIFER Buffer Ring			
Ref. No.	Type/Size	Dimensions in mm				Weight approx. kg/10 piece	Ref. No.	Dimension in mm	Weight approx. kg/10 piece	
		D	d ₁	d ₂	h			D	d	h
236770	Rd 36	100	55,0	58,5	5,0	2,1	236707	110	38	5
236768	Rd 42	100	62,0	67,0	5,5	2,0	236708	110	45	5

PFEIFER Repair Lashing Anchor – installation instructions



Components

- Pos. 1: 1x PFEIFER Repair Lashing Anchor
- Pos. 2: 2x hexagon nut (nut and lock nut)
- Pos. 3: 1x washer
- Pos. 4: 1x anchor plate
- Pos. 5: 1x compensation ring
- Pos. 6: 1x buffer washer

Drilling the bores

- Determine the anchor position
- Drill bore (core or hammer drilling)

System bore	diameter [mm]
Rd 36	52
Rd 42	57

- Carefully clean the bore – recommended procedure:
blow out – brush – blow out – brush – blow out

Apply PFEIFER KM5 mortar fixative

- Generously spread KM5 mortar fixative on the jacket surface of the hole
- The amount of PFEIFER KM5 mortar fixative applied to the hole should at least be sufficient to ensure that the entire anchor sleeve is glued and that full contact to the wall of the bore is achieved
- Observe the application and hazard notes on the PFEIFER KM5 mortar fixative cartridge!

Installing the anchor

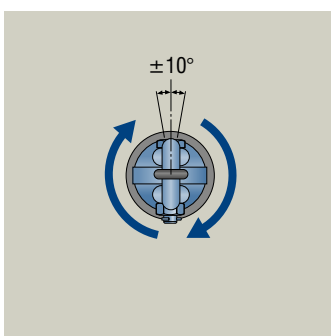
- Cover the protruding end of the thread with adhesive tape to prevent it from being contaminated by PFEIFER KM5 mortar fixative
- Insert the PFEIFER Repair Lashing Anchor (1) into the hole, turning it while doing so → Sleeve end flush with the concrete surface
- Remove the adhesive tape
- Fix the threaded rod with wedges from the reverse side of the concrete part, to ensure the anchor sits straight until the PFEIFER KM5 mortar fixative has hardened
- Remove surplus PFEIFER KM5 mortar fixative
- Observe the hardening time!

Securing the anchor

- Manually screw the lashing point with attached metal compensation ring (5) and buffer washer (6) into the PFEIFER Repair Lashing Anchor, hand-tighten
- Attach the anchor plate (4) and washer (3) to the threaded rod (vertically align anchor plate)
- Screw on the nut 1 (2) and tighten it (torque approx. 50 Nm, secure it with Loctite 2701)
- Screw on the lock nut 2 (2) and tighten it (torque approx. 250 Nm, secure it with Loctite 2701)

Aligning the lashing point

- Lashing Point in accordance with data sheet for PFEIFER Lashing Anchor System, section 3 (Handling and function)



PFEIFER external cap, small



PFEIFER

Lashing Anchor System
External caps

PFEIFER Lashing Anchors can be easily capped with PFEIFER External Caps. External caps are suitable for capping the recessed lashing anchors.

Material:

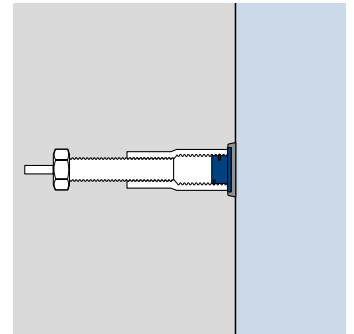
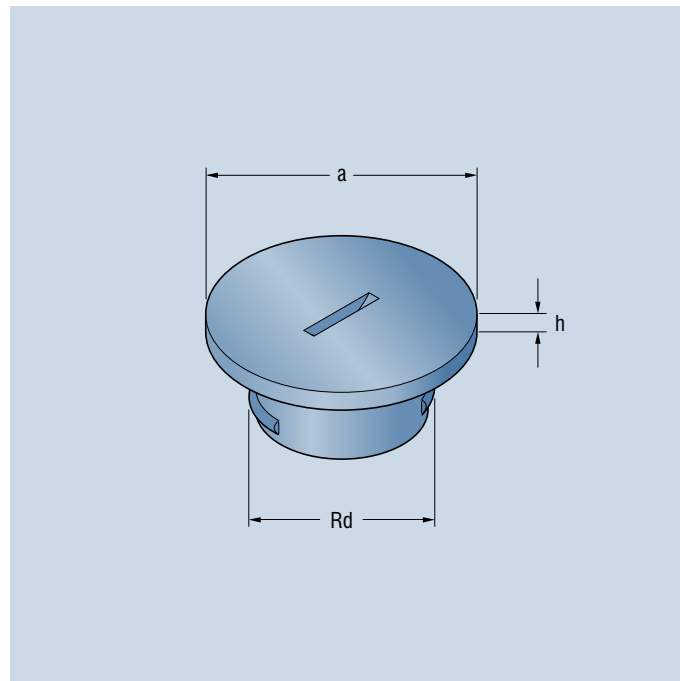
Plastic

Colour:

Agate grey (RAL 7038)

or

green (NCSG)



Ref. No.	For lashing anchor sizes	Colour	Measurements [mm]			Packing unit/piece	Weight approx. kg/packing unit
			a	h	Rd		
323151	Rd 36	Agate grey	52,5	3,5	36	100	0,67
323154	Rd 42	Agate grey	59,5	4,0	42	100	0,99
238909	Rd 36	green (NCSG)	52,5	3,5	36	100	0,67
238910	Rd 42	green (NCSG)	59,5	4,0	42	100	0,99

PFEIFER Lashing Point



PFEIFER Lashing Anchor



Project

Forwarding agent

Vehicle/vessel

Loading place

Place of unloading

Date/signature

Securing loads with the PFEIFER Lashing Anchor System

Segment	Type (full, semi, or one-third of a shell)	Length [m]	Width [m]	Height [m]	Weight [t]

Case	adm. segment weight*	Maximum segment height H [m]	Lashing Anchor System	Admissible lashing angle without additional positive fit measures		Minimum friction coefficient μ	Nominal thickness of chain	
				α	β		GK 12	GK 10
A	0–40 t	3,80	Rd 36	35–45°	30–55°	0,6	8	10
B	40–52 t	3,80	Rd 42	35–45°	30–55°	0,6	10	13
C	52–60 t***	3,80	Rd 42	20–60°	20–60°	0,6	10	13
D	52–70 t***	2,80	Rd 42	45–60°	30–60°	0,6	10	13

* The load group refers to the dead load of the precast part (shell segment), which is lashed safely onto the truck for transportation.

** In case of non-compliance with the lashing angle, secure with an additional positive fit (against a suitable front or side wall, or with stoppers, chains or square timbers). For road transport at the front/for sea transport secure on all four sides and take special measures to prevent tipping over!

*** Crossover diagonal lashing

Instructions of use for Securing loads



Securing loads for road traffic is only permissible by means of diagonal lashing! Lashing down is not permitted with the PFEIFER Lashing Anchor System!



The loading platform has to be swept. All contact surfaces have to be clean.



Install the PFEIFER Lashing Anchor System symmetrically to the centre of gravity and on the centre line (diagonal lashing) or symmetrically to it (crossover diagonal lashing) (p. 17 fig. 1–3)!



The lashing point must be screwed down with the complete length of the bolt so that the pressure plate rests fully on the part!



The shell segment has to be placed with the centre of mass in the middle of the loading platform (p. 17 fig. 1–3).



Tighten the lashing chains “hand tight” (no pretensioning force!). Adhere to the lashing angles α and β according to the table above!



Lay anti slip mats with a minimum friction coefficient of $\mu = 0,6$ underneath (p. 17 fig. 1–3)! The load must not have contact with the surface of the loading platform.



All parties involved in the transport hold responsibility for ensuring that four identical lashing devices are attached to the lashing point in the correct way.

Please take careful note!

Instructions for the use of the PFEIFER Lashing Anchor System to secure loads for transport

Instructions for the use of the PFEIFER Lashing Anchor System:

- The PFEIFER Lashing Anchor System is solely designed for securing shell segments for transport by road (by truck) by means of diagonal lashing.
- To provide roll-over stability, the outer points of the support must be spaced at least 2.5 m apart.
- If all conditions of use described in these installation guidelines are observed (lashing method, lashing angle, coefficient of sliding friction), the PFEIFER Lashing Anchor System can also be used for transportation by sea.
- It is not permissible to lift and carry shell segments with the PFEIFER Lashing Anchor System!

Instructions of use for PFEIFER Lashing Point:

- The lashing point must be screwed in completely and the pressure plate must rest fully on the concrete.
- Always attach two lashing straps to the lashing point. Observe lashing angle α and β !
- Parts must never be lifted by means of the PFEIFER Lashing Point!
- The use of the PFEIFER Lashing Point is not permissible at temperatures lower than $-20\text{ }^{\circ}\text{C}$!
- The use of the PFEIFER Lashing Point type LT is not permissible at temperatures lower than $-40\text{ }^{\circ}\text{C}$!
- Do not use lashing points with deformed parts, in particular threaded bolts!
- Under no circumstances is it allowed to weld on the lashing point!

Examination of the PFEIFER Lashing Point:

- Be sure to comply with the next inspection date.
- Examination of externally visible flaws, deformation, cracks, wear and tear before every use.
- Withdrawal from service of steel parts:
 - Threads are damaged or stripped out
 - Pressure plate, lifting eye or threaded bolt are deformed
 - Lifting eye's cross section in any place reduced by more than 10 % due to wear or damage
 - Any cracks anywhere, in particular in welds
 - Extensive corrosion pits
- Withdrawal from service of implemented shackle:
 - Deformed shackle
 - Reduction of the shackle by more than 10 % in any place
 - Shackle have been elongated by more than 3 % due to overloading and wear
 - Bolt shows any wear
 - Bent bolt
 - Any cracks anywhere
 - Notches and pinches
 - Corrosion pits

Only flawless lashing anchors and lashing points may be used for securing loads.

Fig. 1a
Diagonal lashing in the case of full circle segments with weights from 0 – 52 t

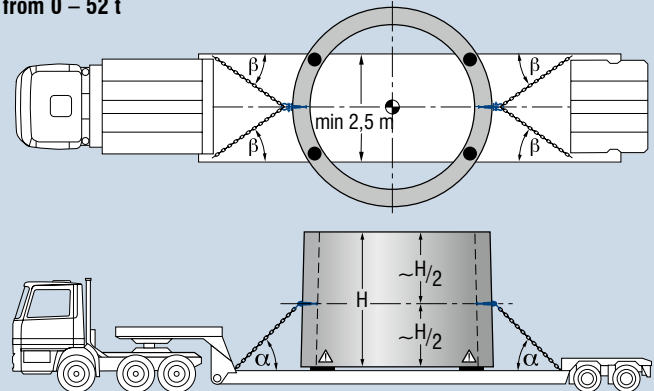


Fig. 1b
Crossover diagonal lashing in the case of full circle segments with weights from 52 – 70 t

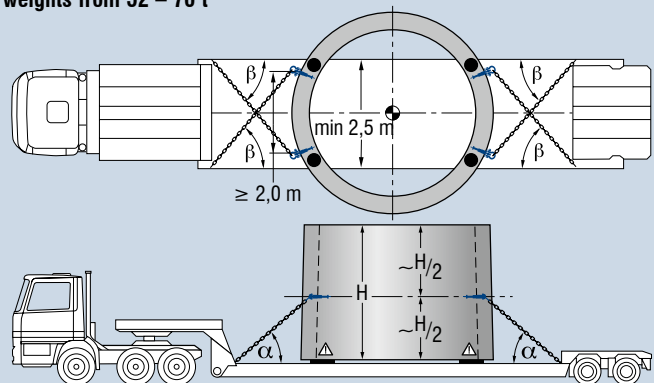


Fig. 2
Diagonal lashing in the case of semicircular segments with weights from 0 – 52 t

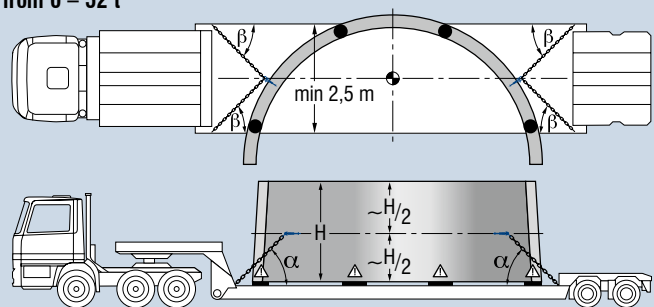
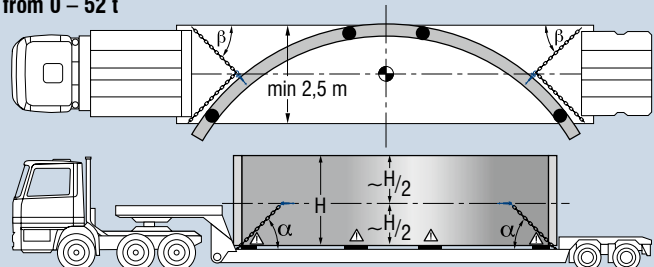


Fig. 3
Diagonal lashing in the case of third of a circle segments with weights from 0 – 52 t





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