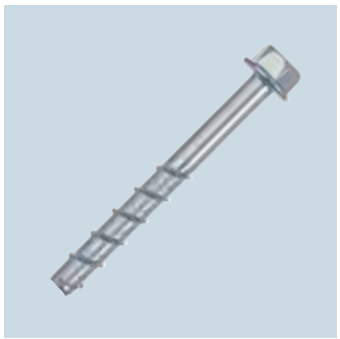
PFEIFER

When leaning is not an option ...



03/2017

PFEIFER
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GMBH

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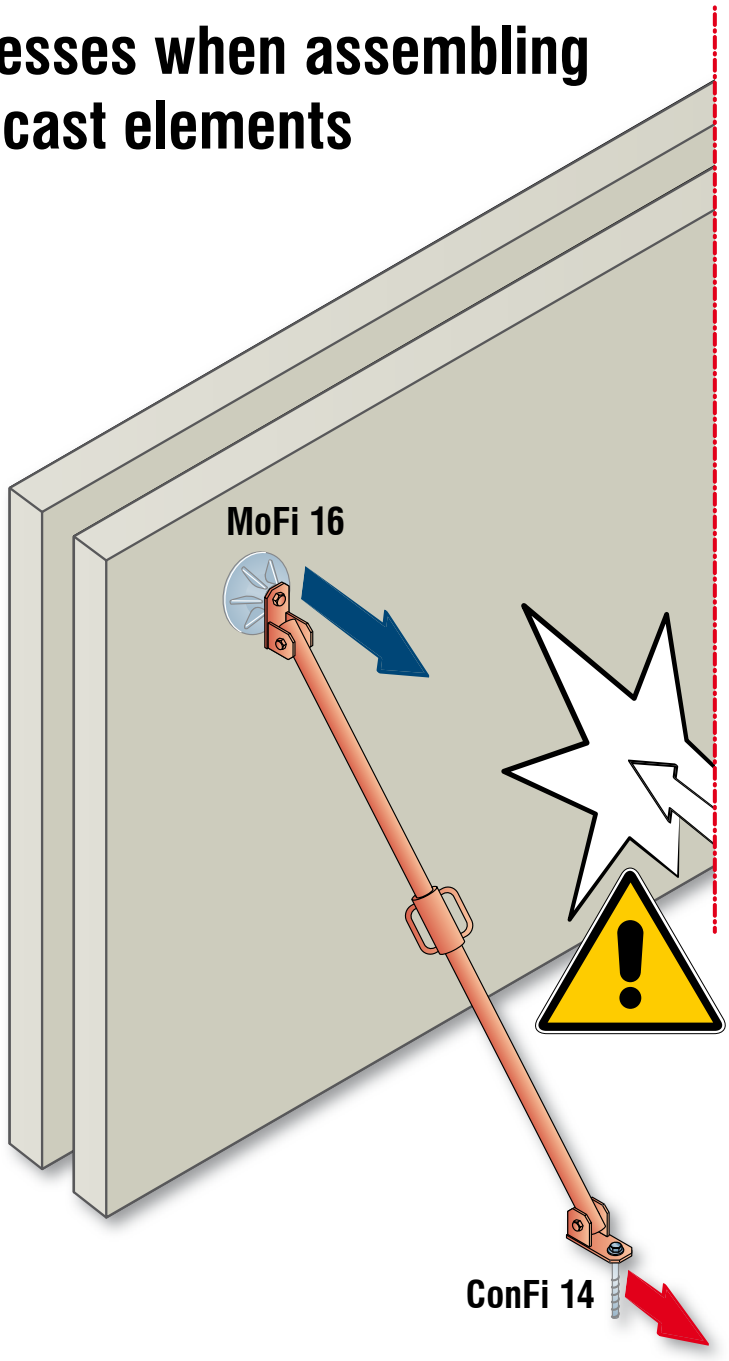
PFEIFER Fixing System for Push-Pull-Props

MoFi 16

MoFi 12

Stresses when assembling precast elements



PFEIFER Made in Germany

Safety in planning and the law

- Building authority approval

Cost-effective

- Economical built-in component
- Standard bolts can be used

Practical

- Standard M12 thread NEW
- Standard M16 thread
- Tough

High load carrying capacities

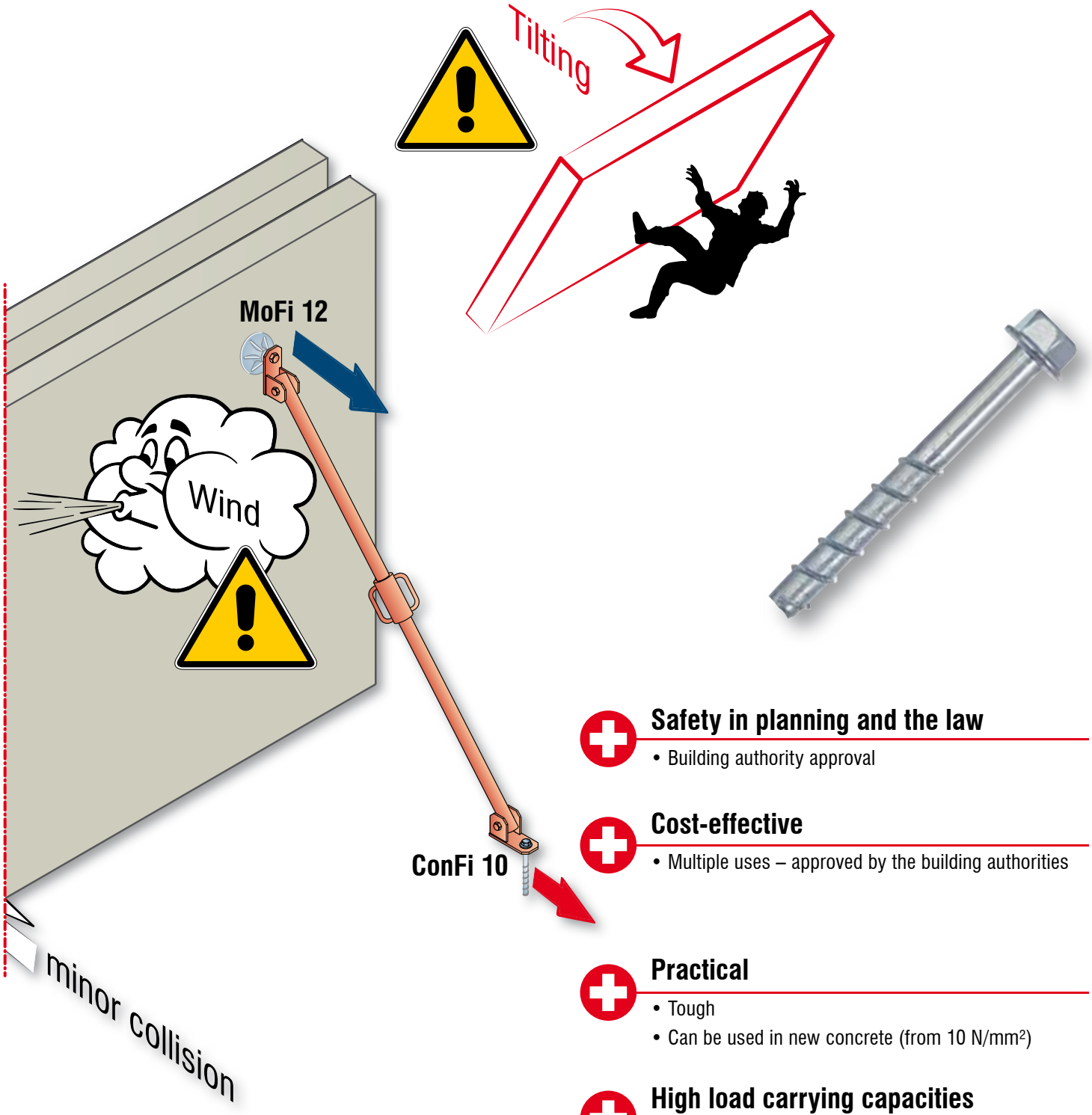
- Can be used with shell thickness from 50 mm (e.g. for double walls)

Variable use options

- High carrying capacity makes for flexibility of application

Notice: This description does not claim to cover all possible stresses. It is intended to provide only indications.

Life-threatening tilting can be simply prevented with the PFEIFER Fixing System for Push-Pull-Props (MoFi 16/ConFi 14) ...



Safety in planning and the law

- Building authority approval

Cost-effective

- Multiple uses – approved by the building authorities

Practical

- Tough
- Can be used in new concrete (from 10 N/mm²)

High load carrying capacities

- Even in new concrete
- Usable in cracked and non-cracked concrete

Flexible usage

- Simply drill and screw in without additional dowel

Notice: this illustration includes both available sizes of the PFEIFER fixing system for push-pull props and is thus intended merely to document the product variety. The actually necessary sizes of MoFi and ConFi must be specified by the responsible planner.

PFEIFER Fixing for Push-Pull-Props MoFi

Item no. 05.263
Item no. 05.264
Item no. 05.265

PFEIFER

Fixing Systems

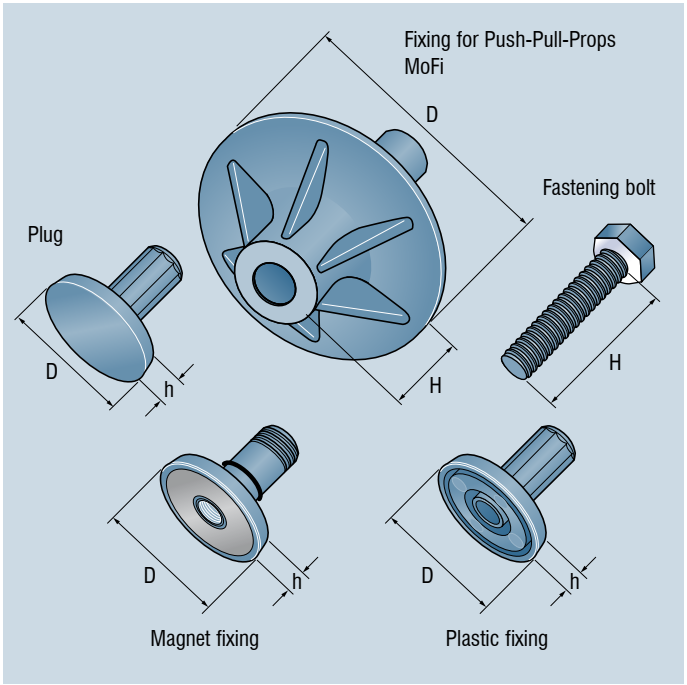
Fixing for Push-Pull-Props

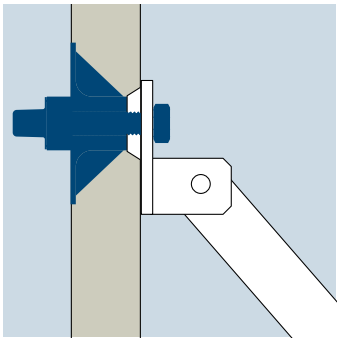
Can be used for:
• top-sided installation in precast concrete elements

For use by:
• trained and qualified personal

The PFEIFER fixing system for push-pull-props MoFi is used for fixing braces to precast concrete elements during the assembly of these elements. The anchors are used here for temporarily bearing wind or similar loads.

Materials:
– fibre-reinforced plastic
– Steel high-strength, galvanized



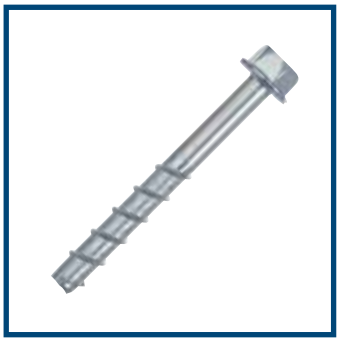


Ref. no.	Type	Size	Thread	H	D	h	Packing unit	Weight kg/approx. Packing unit
[–]	[–]	[–]	[M]	[mm]	[mm]	[mm]		
05.265.012.065	Fixing for Push-Pull-Props	MoFi 12	M 12	44	65	–	50	3,9
05.265.016.120	Fixing for Push-Pull-Props	MoFi 16	M 16	45	120	–	50	11,5
05.264.012.095	Fastening bolt	–	M 12	95	–	–	25	2,50
05.264.016.095	Fastening bolt	–	M 16	95	–	–	25	4,65
05.263.052.001	Magnet fixing	MoFi 16	M 16	–	52	8	1	0,20
05.263.043.002	Plastic fixing	MoFi 12	–	–	43	8	50	0,50
05.263.052.002	Plastic fixing	MoFi 16	–	–	52	8	50	0,60
05.263.043.003	Plug	MoFi 12	–	–	43	8	50	0,30
05.263.052.003	Plug	MoFi 16	–	–	52	8	50	0,35

Notice: the approval text of the fixing system for push-pull-props MoFi is an inherent component of these instructions for installation and use. For deviations, the building authority approval Z-21.8-2040 must always be used.

PFEIFER Concrete Screw ConFi

Item no. 05.265



PFEIFER

Fixing Systems

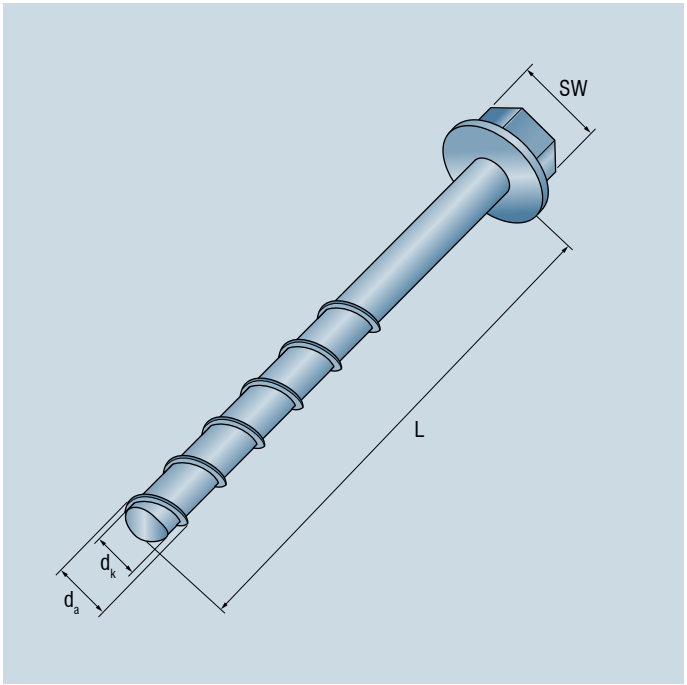
Concrete Screw

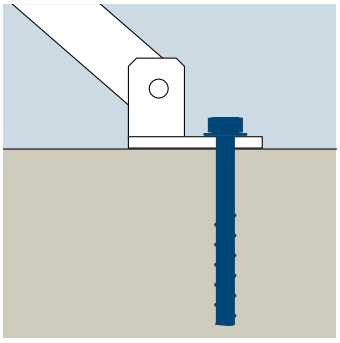
Can be used for:
- Installation in in-situ concrete floor slabs.

For use by:
- trained and qualified personal

The PFEIFER concrete screw ConFi is for fixing braces to in-situ concrete foundations or floors during assembly. A suitable anchorage is achieved by simply drilling and screwing in without an additional dowel. The bolt is used here for temporarily bearing wind or similar loads.

Materials:
– Steel, special quality



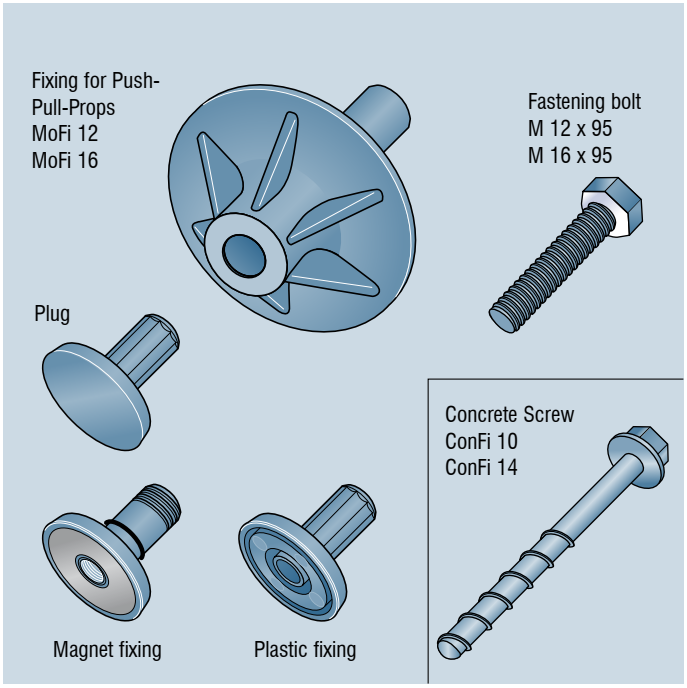


Ref. no.	Type	Size	Thread	d_k	d_s	L	SW	Packing unit	Weight kg/approx. Packing unit
[–]	[–]	[–]	[–]	[mm]	[mm]	[mm]	[mm]		
05.265.010.100	Concrete Screw	ConFi 10	–	9,4	12,5	100	15	50	4,00
05.265.014.125	Concrete Screw	ConFi 14	–	13,3	16,6	125	21	10	2,00

Notice: The approval text of the concrete screw is an inherent component of these instructions for installation and use. For deviations, the building authority **approval Z-21.8-2049** must always be used.

Instructions for installation and use

System



The PFEIFER Fixing System for Push-Pull-Props (MoFi 16/ConFi 14) consists of the Fixing for Push-Pull-Props MoFi and the formwork fixing in the plastic or magnetic version for fixing to the precast element and the Concrete Screw ConFi for fixing to the foundation or floor slab.

System components for the brace head:

– PFEIFER Fixing for Push-Pull-Props MoFi 12/MoFi 16
– PFEIFER formwork fixing plastic/magnetic
– Bolt M12/M16, strength grade 8.8 acc. to DIN EN ISO 898-1 (customer or from the PFEIFER range)
– M12/M16 washer (customer/not supplied by PFEIFER/to suit the attached item) or adapter sleeve (specific to the brace)
– **optional** PFEIFER plug

System component for the brace base:

– PFEIFER Concrete Screw ConFi 10/ConFi 14

Warning: The use of other elements for formwork fixing could lead to reduced depths of embedding and therefore to reduced carrying capacities. Use only the genuine accessories.

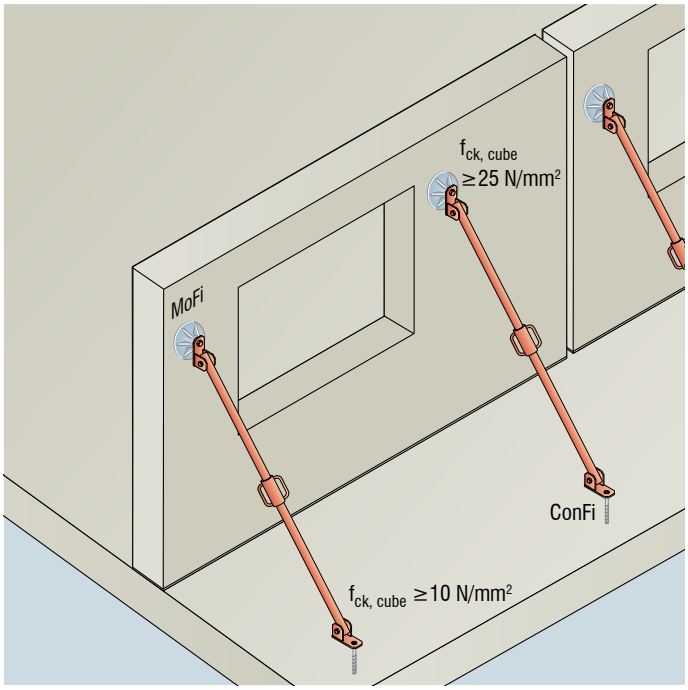
Warning: Use of bolts and washers of lower quality is not permissible and reduces the intended carrying capacities. Use only the appropriate bolts as specified.

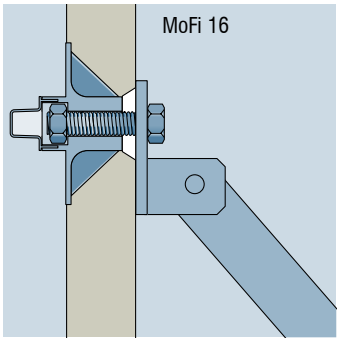
Warning: The concrete screw ConFi must never be screwed into the fixing system for push-pull-props MoFi. Carrying capacities cannot be calculated. Danger to life.

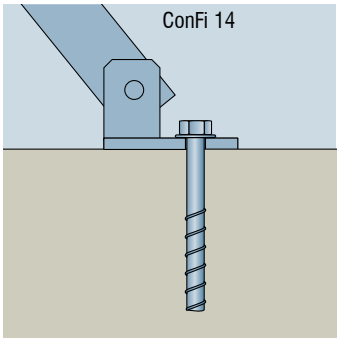
Notice: The design/selection of the brace is not a component of the PFEIFER system. This must be done by the responsible PLANNER/FITTER himself in accordance with the current state of the art.

Notice: The fixing system for push-pull-props MoFi 1 and the concrete screw ConFi can be used mutually independently.

Use





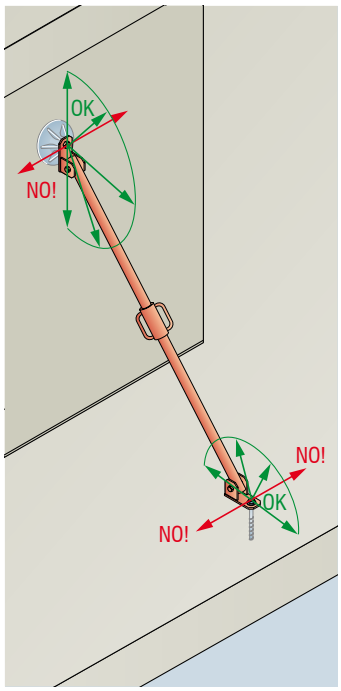


Temporary assembly fixing of braces can be carried out with the PFEIFER fixing system for push-pull-props MoFi and the PFEIFER concrete screw ConFi. In this context, the fixing system for push-pull-props MoFi is intended for installing in the precast element and the concrete screw ConFi in the in-situ concrete floor or in the foundation.
They are able to take stresses arising from wind or other temporary loadings. In this context, it is important to pay attention to the correct selection of bolts, washers and braces (stays) that withstand tension and compression forces.

Notice: In selecting the positions and number of the anchors, always have regard for a stable fixing and mounting. As a rule, at least 2 braces/anchors are needed per wall panel.

Notice: Fixing to solid panels with the fixing system for push-pull-props MoFi can similarly be done. In this case pay particular attention to the maximum possible screw-in depth since, owing to the cap, there is only limited space available for accepting length tolerances of the bolt.

Calculation



The resistances specified in the section „Dimensioning“ in tables 1 and 2 apply in all directions (with the exception of loads in the direction transverse to the longitudinal axis/plane of the brace, similar to the picture on the left). The responsible planner can do the dimensioning with the indicated resistance values, taking account of all possible stresses such as light collisions, wind, tipping, etc. In doing this, the minimum edge and intermediate distances as in Table 3 must be complied with.

Proof

$$\frac{F_{Ed}}{F_{Rd}} \leq 1{,}0$$

Warning: The indicated resistance values always refer to the bolt axis. Load-increasing influences from the braces employed may need to be specially determined.

Notice: Compressive forces that arise are born by the contact area of the brace. This must be specifically demonstrated by the responsible planner. In doing this, the circular area of the recess block of the MoFi anchor must be accounted for as a missing contact area.

Dimensioning

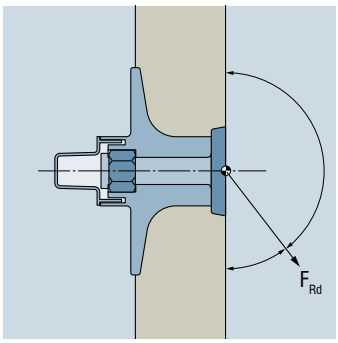
Table 1: Design resistance valuesPFEIFER Fixing for Push-Pull-Props

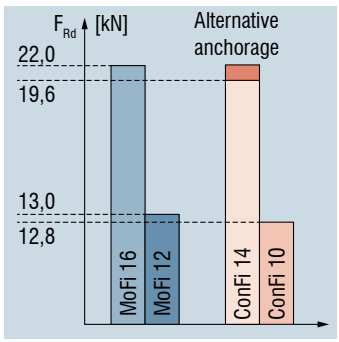
		MoFi 12	MoFi 16
uncracked concrete concrete strength class C20/25 to C50/60	$F_{Rd,ucr}$ [kN]	13,0	22,0
cracked concrete concrete strength class C20/25 to C50/60	$F_{Rd,cr}$ [kN]	9,3	15,7

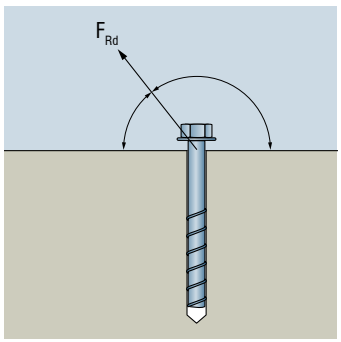
Table 2: Design resistance values PFEIFER Concrete Screw ConFi*

	F_{Rd} [kN] bei $f_{ck,\,cube}$			
	10 N/mm²	15 N/mm²	20 N/mm²	25 N/mm²
ConFi 10	8,1	9,9	11,4	12,8
ConFi 14	12,4	15,2	17,6	19,6

* for cracked and non-cracked concrete







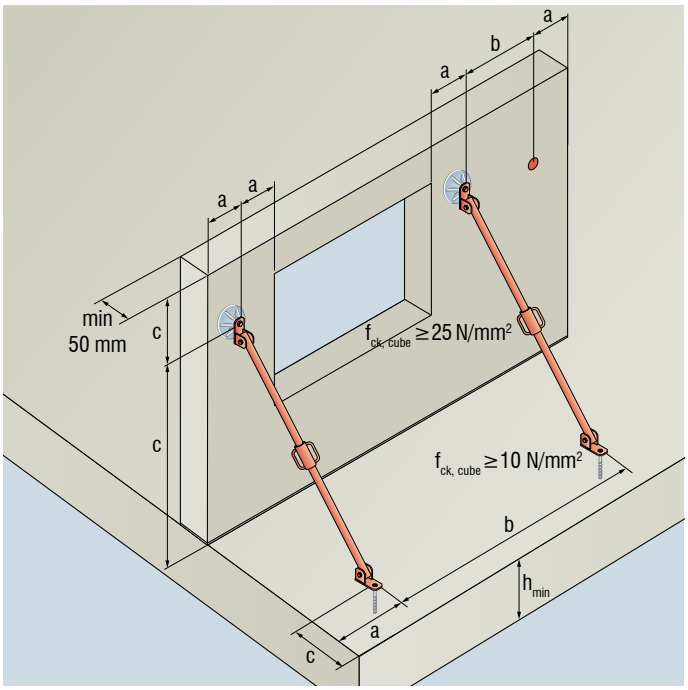
Notice: The given resistance values do not apply in the direction transverse to the longitudinal axis/plane of the brace. Loading is intended and permissible only in the axis of the brace! Also see the drawing in the section “Calculation”.

Dimensioning

Table 3: Minimum distances from edge

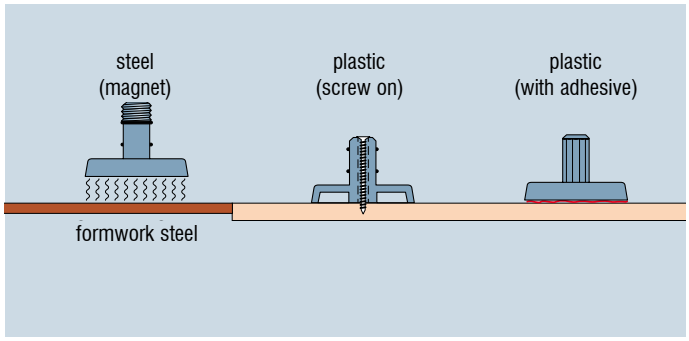
Type	Minimum distance from edge load direction c [mm]	Minimum intermediate distance b [mm]	Minimum distance to edge transverse to load direction a [mm]	Minimum part thickness h_{min} [mm]
MoFi 12	300	400	200	–
MoFi 16	1000	800	400	–
ConFi 10	135	410	205	205
ConFi 14	170	510	255	255

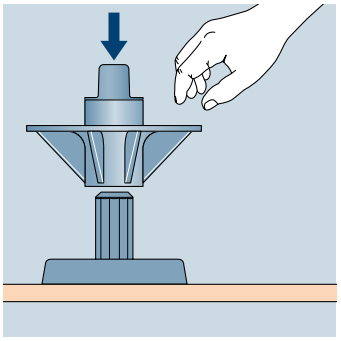
Reinforcement: Only a minimum surface reinforcement (Q188) according to DIN 488 is necessary.

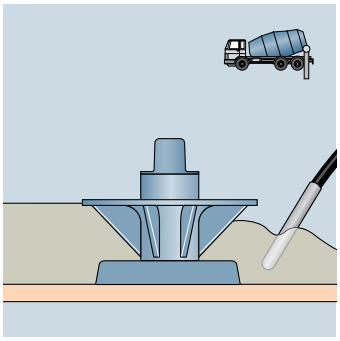


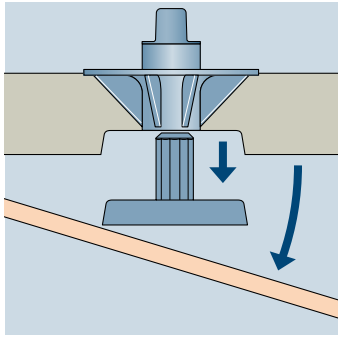
Installation

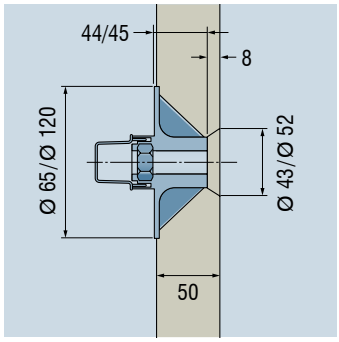
PFEIFER Fixing for Push-Pull-Props MoFi:











Caution: Plastic or magnet fixing is always an integral part of the system and must therefore be used. Use of other means of fixing or omission can lead to reduced load capacity and therefore to danger for life and limb.

Notice: When compacting the concrete ensure that built-in components are not displaced and there are no defects in the anchoring area.

Notice: In the pictures only the fixing with the help of the plastic recess was shown. The variant with the magnetic recess should be used in a similar way.

PFEIFER Concrete Screw ConFi:

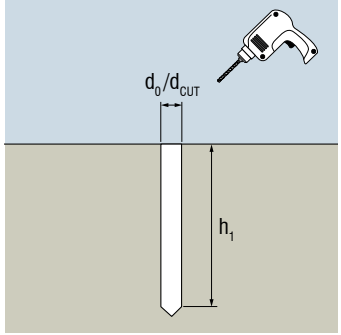


Table 4: Drilling the hole for Concrete Screw ConFi

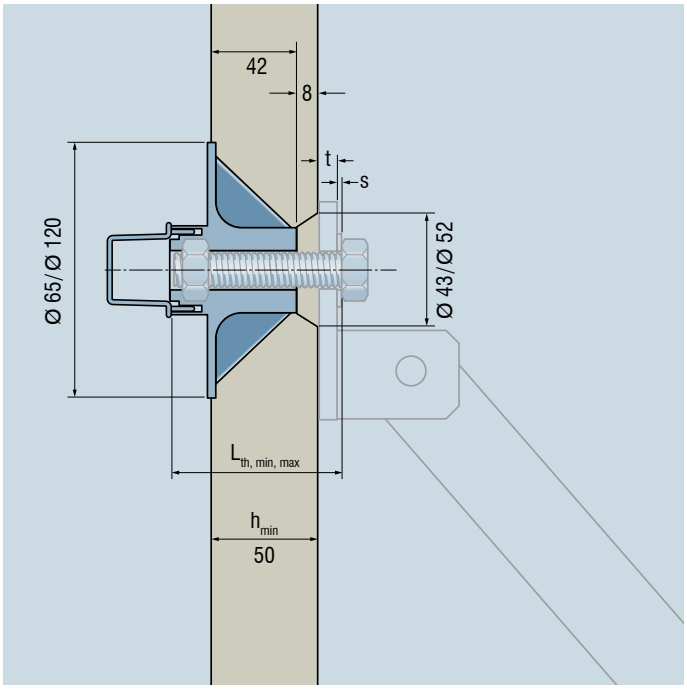
	Drill bit nominal diameter d_0 [mm]	Drill cutter diameter d_{cut} [min]	Drill-hole depth h_1 [mm]
ConFi 10	10	10,45	110
ConFi 14	14	14,50	140

The bore hole must be made with a hard-metal masonry drill in accordance with Table 4. The resulting bore dust must then be removed from the bore hole. This procedure must be documented and performed in accordance with section 4.2 of the building authority approval.

Notice: If a fault occurs in the drilling, a new borehole should be made at a distance of 2x the depth of the failed hole. **Multiple use** of the same borehole is not permissible! The bolt is screwed directly into the cleaned borehole and itself cuts a thread in the process. An additional dowel is not required.

Use

PFEIFER Fixing for Push-Pull-Props MoFi 12/MoFi 16:



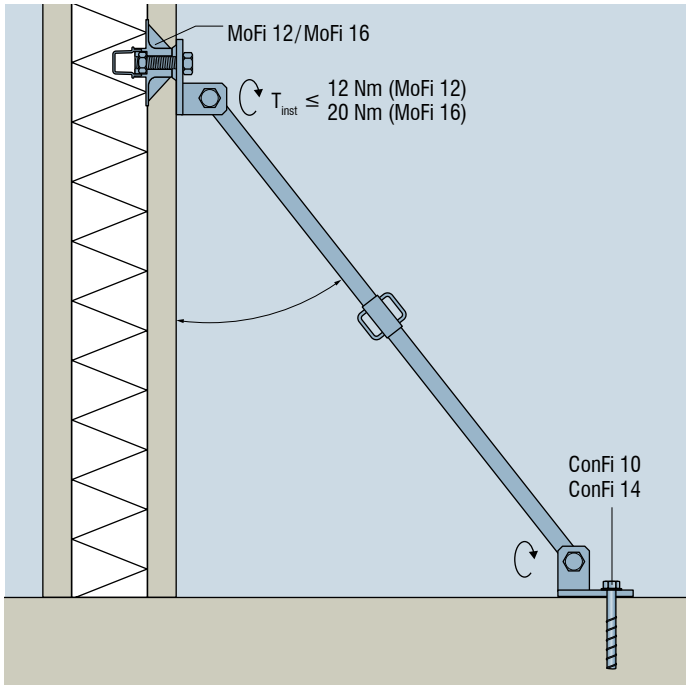
Assembly of brace with Fixing for Push-Pull-Props MoFi 12/MoFi 16 – the head

1. Select matching fastening bolt M12/M16
   → When the PFEIFER M12/M16 x 95 fastening bolt is used, the overall dimension “t+s” can be in the range 5-25 mm.

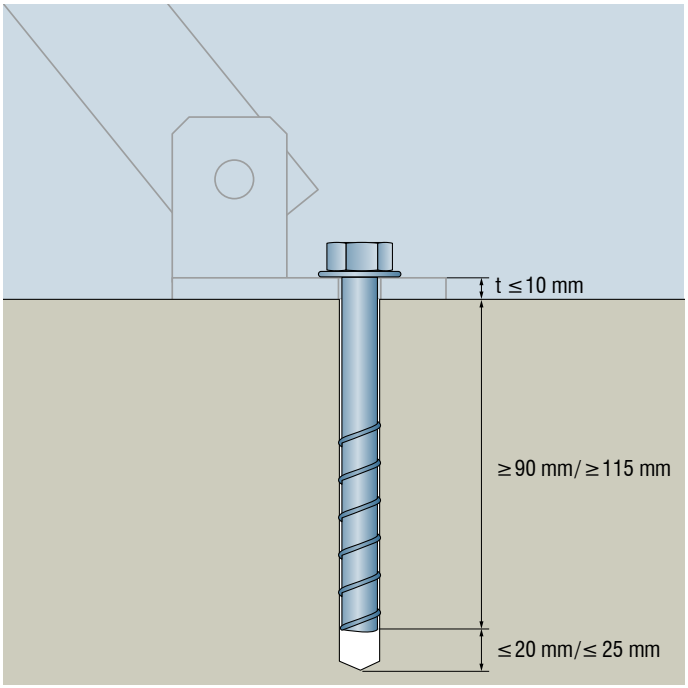
Notice:
minimum screw-in depth $L_{th,min}$: t + s + 70 mm
maximum screw-in depth $L_{th,max}$: t + s + 90 mm

2. Select a suitable brace as specified by the planner.
3. Use a fastening bolt M12/M16 to secure the brace to the MoFi 12/MoFi 16
   → Comply with the correct assembly torque.

Caution: In the assembly process ensure that the actual angle of the brace is as intended in the plan. With less favourable boundary conditions an overloading of the brace must be assumed and it is likely to fail. Always comply with the permitted inclination angle.



PFEIFER Concrete Screw ConFi 10/ConFi 14:



Assembly of brace with Concrete Screw ConFi 10/ConFi 14 – the base

1. Check the borehole for conformance with the approval. The borehole diameter must be accurate.
2. Check the reusable bolt ConFi 10/ConFi 14 with a ring gauge in accordance with the approval.
3. Select a suitable brace in compliance with the plan.
4. Use bolt ConFi 10/ConFi 14 to secure the brace. It is correctly secured if:
   → the whole area of the base plate to be fixed is bolted to the concrete without an intermediate layer,
   → an easy rotation of the bolt is not possible,
   → the required seating depth of 85 mm/115 mm is achieved.

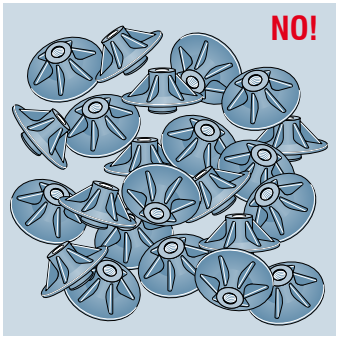
Caution: The bolt must always be fully screwed into the anchor thread to achieve the full carrying capacity. With a smaller screw-in depth the carrying capacity is reduced and there is a threat of failure.

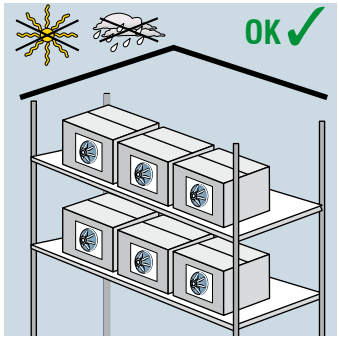
Caution: The bolt must be used only once in the same borehole. Screwing it into the same borehole twice causes reduced resistance values and can cause danger to life and limb.

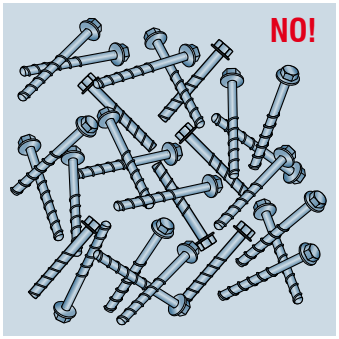
Notice: to prevent the nut coming out of the MoFi, the maximum specified torque moment must be ensured with an appropriate cut-off device when mounting the brace using a screwdriver. The screwdriver must be applied with appropriate care. Alternatively, tools without specified torque moment can be used.

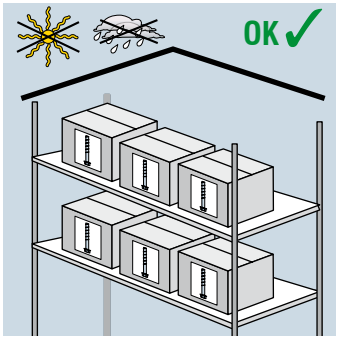
Notice: The brace is correctly anchored if
– the whole area of the fixed base plate is bolted to the concrete without an intermediate layer and
– the screw-in/seating depths comply with the approvals.

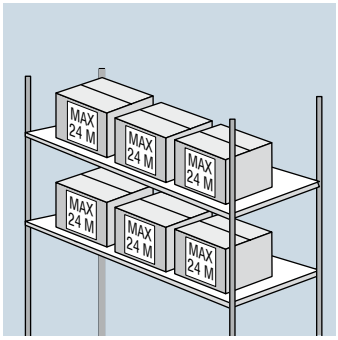
Storage









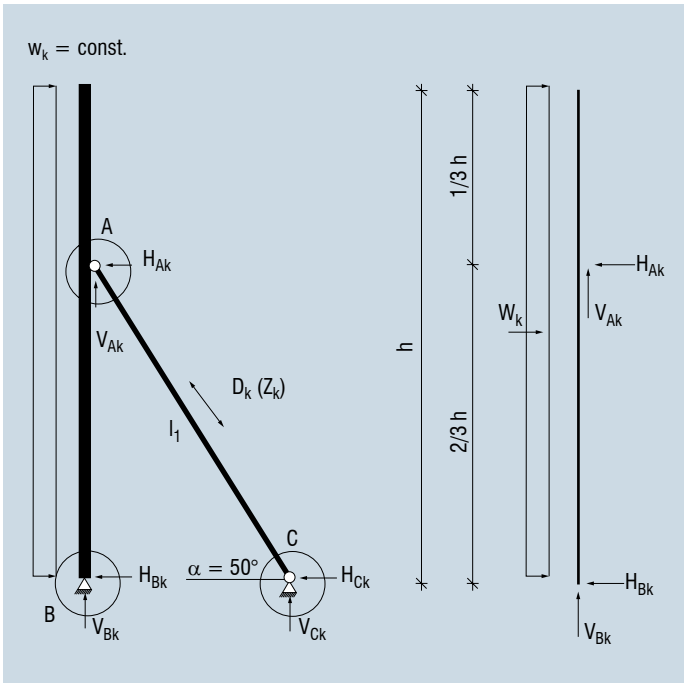


Example of application:

Assumptions:

- Dimensions of double wall: 6,75 m x 3,0 m
- Shell thickness: 50 mm
- Concrete quality: $f_{ck,\,cube} \geq 25$ N/mm²
- Surface reinforcement: Q188
- Wind pressure (h ≤ 10 m; wind zone 2): $q_p = 0{,}65$ kN/m² (as in DIN 1991-1-4/NA:2010-12, Tab. NA.B.3)
- Brace inclination: 50°
- No further relevant stresses during assembly (snow, earthquake, collision)
- Assembly done between May and August (maximum 3 months) or assembly takes a maximum of 3 days

Static model:



Determination of wind effect:

Velocity pressure: $q_P = 0{,}65$ kN/m²

Reduction for state of building: $0{,}5 \times q_P = 0{,}5 \times 0{,}65$ kN/m² = 0,325 kN/m² (DIN EN 1991-1-4/NA:2010-12, Tab. NA.B.5)

Pressure coefficient $c_{P,net}$: 3,4 (Note: referring to a long wall)

Characteristic wind load:

$$W_k = w_k \cdot b \cdot h = 1{,}105\ \frac{\text{kN}}{\text{m}^2} \cdot 3\ m \cdot 6{,}75\ m = 22{,}38\ kN$$

with

$$w_k = q_p \cdot c_{P,\,net} \cdot red_{Wind} = 0{,}65\ \frac{\text{kN}}{\text{m}^2} \cdot 3{,}4 \cdot 0{,}5 = 1{,}105\ kN/m^2$$

Determination of relevant loads:

$\sum M_B = 0$: $H_{AK} = W_k \cdot ¾ = H_{CK}$

$H_{AK} = H_{CK} = 22{,}38$ kN · ¾ = 16,79 kN

$\sum H = 0$: $H_{BK} = W_k - H_{AK}$

$H_{BK} = 22{,}38$ kN – 16,79 kN = 5,59 kN

$\sum V = 0$: $V_{BK} = 0{,}9 \cdot G_K - V_{AK}$

Determination of stay force:

$$D_k = \frac{H_{AK}}{cos50°} = \frac{16{,}79}{cos50°} = 26{,}12\ kN$$

Determination of required stay length:

$$l_1 = \frac{2/3 \cdot h}{sin50°} = \frac{2/3 \cdot 6{,}75}{sin50°} = 5{,}87\ m$$

Dimensioning

- 2 braces (2 anchors each)
- $f_{ck,\,cube} \geq 30$ N/mm² (strength measured on the building site – precast element)
- $f_{ck,\,cube} \geq 20$ N/mm² – in-situ concrete floor

Stresses:

Brace head: Fixing for Push-Pull-Props MoFi 16

$$D_{Ed} = D_k \cdot \gamma \cdot \frac{1}{\text{Proof fulfilled}} = 26{,}12\ \text{kN} \cdot 1{,}5 \cdot \frac{1}{2} = 19{,}59 \leq F_{Rd,ucr} = 22{,}00\ \text{kN}$$

Number of anchors ✔

Brace base: Concrete Screw ConFi 14

$$D_{Ed} = D_k \cdot \gamma \cdot \frac{1}{\text{Proof fulfilled}} = 26{,}12 \cdot 1{,}5 \cdot \frac{1}{2} = 19{,}59\ \text{kN} \leq F_{Rd} = 19{,}60\ \text{kN}$$

Number of anchors ✔

Notice: This dimensioning is limited to determining the forces, in particular relating to the Fixing for Push-Pull-Props MoFi 16 and the Concrete Screw ConFi 14. For complete dimensioning, the proofs for the brace itself, the load capacity of the attached elements and the securing of the bottom point of the concrete element against shifting (point B in the picture) require proof in addition. Similarly, the dimensioning was done with the assumption that there are no stress-increasing effects arising from the geometry of the shoes of the stays.

Essentially, the smallest rated resistance of all involved components is decisive! The dimensioning of the MoFi 12 fixing system for push-pull-props and the ConFi 10 concrete screw is done in the same way.

Important notes/check list:

- **All stresses during assembly taken into account in the dimensioning?**
- **Is the brace proved for all stresses and are the manufacturer's specifications complied with?**
- **Are all proofs done for the anchoring of the head and base of the brace?**
- **Were the slab thicknesses of the brace heads and bases taken into account in determining the bolt lengths?**
- **Do the screw-in depths comply with the approval?**

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