When leaning is not an option ...
Stresses when assembling precast elements

MoFi 16

MoFi 12

Safety in planning and the law
- Building authority approval

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

Practical
- Standard M12 thread
- 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) ...
PFEIFER Fixing for Push-Pull-Props MoFi

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

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

<table>
<thead>
<tr>
<th>Ref. no.</th>
<th>Type</th>
<th>Size</th>
<th>Thread</th>
<th>H</th>
<th>D</th>
<th>h</th>
<th>Packing unit</th>
<th>Weight kg/approx. Packing unit</th>
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</thead>
<tbody>
<tr>
<td>05.265.012.065</td>
<td>Fixing for Push-Pull-Props MoFi 12</td>
<td>M 12</td>
<td>44</td>
<td>65</td>
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<tr>
<td>05.265.016.120</td>
<td>Fixing for Push-Pull-Props MoFi 16</td>
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<td>120</td>
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<td>–</td>
<td>25</td>
<td>2,50</td>
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<tr>
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<td>M 16</td>
<td>95</td>
<td>–</td>
<td>–</td>
<td>25</td>
<td>4,65</td>
</tr>
<tr>
<td>05.263.052.001</td>
<td>Magnet fixing</td>
<td>MoFi 16</td>
<td>M 16</td>
<td>–</td>
<td>52</td>
<td>8</td>
<td>1</td>
<td>0,20</td>
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<tr>
<td>05.263.043.002</td>
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<td>–</td>
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<td>8</td>
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<td>0,50</td>
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<td>Plastic fixing</td>
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<td>–</td>
<td>52</td>
<td>8</td>
<td>50</td>
<td>0,60</td>
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<td>05.263.052.003</td>
<td>Plug</td>
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<td>–</td>
<td>43</td>
<td>8</td>
<td>50</td>
<td>0,30</td>
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<tr>
<td>05.263.052.003</td>
<td>Plug</td>
<td>MoFi 16</td>
<td>–</td>
<td>–</td>
<td>52</td>
<td>8</td>
<td>50</td>
<td>0,35</td>
</tr>
</tbody>
</table>

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

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

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**Ref. no.** | **Type** | **Size** | **Thread** | **d₄** | **dₛ** | **L** | **SW** | **Packing unit** | **Weight kg/approx. Packing unit**
---|---|---|---|---|---|---|---|---|---
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

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**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.

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**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.

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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>
<thead>
<tr>
<th>Table 1: Design resistance values PFEIFER Fixing for Push-Pull-Props</th>
</tr>
</thead>
<tbody>
<tr>
<td>MoFi 12</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>uncracked concrete concrete strength class C20/25 to C50/60</td>
</tr>
<tr>
<td>cracked concrete concrete strength class C20/25 to C50/60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Design resistance values PFEIFER Concrete Screw ConFi*</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F_{Rd} [kN]$ bei $f_{ck, cube}$</td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>10 N/mm²</td>
</tr>
<tr>
<td>ConFi 10</td>
</tr>
<tr>
<td>ConFi 14</td>
</tr>
</tbody>
</table>

* 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”.

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**Dimensioning**

**Table 3: Minimum distances from edge**

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

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

**Installation**

**PFEIFER Fixing for Push-Pull-Props MoFi:**

- Steel (magnet)
- Plastic (screw on)
- Plastic (with adhesive)

**PFEIFER Concrete Screw ConFi:**

**Table 4: Drilling the hole for Concrete Screw ConFi**

<table>
<thead>
<tr>
<th>Type</th>
<th>Drill bit nominal diameter d_{i} [mm]</th>
<th>Drill cutter diameter d_{cu} [min]</th>
<th>Drill-hole depth h_{t} [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConFi 10</td>
<td>10</td>
<td>10,45</td>
<td>110</td>
</tr>
<tr>
<td>ConFi 14</td>
<td>14</td>
<td>14,50</td>
<td>140</td>
</tr>
</tbody>
</table>

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:

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.

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.

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

**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:

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 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.
Example of application:

Assumptions:
- Dimensions of double wall: 6,75 m x 3,0 m
- Shell thickness: 50 mm
- Concrete quality: $f_{c,\text{cub}} \geq 25 \text{ N/mm}^2$
- Surface reinforcement: Q188
- Wind pressure ($h \leq 10 \text{ m}; \text{wind zone 2}$): $q_p = 0,65 \text{ kN/m}^2$
  (as in DIN 1991-1-4/NA:2010-12, Tab. NA.B.3)
- Brace inclination: $50^\circ$
- 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: $q_p = 0,65 \text{ kN/m}^2$

Reduction for state of building: $0,5 \times q_p = 0,5 \times 0,65 \text{ kN/m}^2 = 0,325 \text{ kN/m}^2$

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

Characteristic wind load:

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

with $w_k = q_p \cdot c_{\text{ref},\text{net}} \cdot \text{red}_{\text{wind}} = 0,65 \frac{\text{kN}}{\text{m}^2} \cdot 3,4 \cdot 0,5 = 1,105 \text{ kN/m}^2$

Determination of relevant loads:

$\sum M_y = 0$: $H_{\text{ex}} = W_k \cdot \frac{3}{4} = H_{\text{ex}}$

$H_{\text{ex}} = 22,38 \text{ kN} \cdot \frac{3}{4} = 16,79 \text{ kN}$

$\sum H = 0$: $H_{\text{ex}} = W_k - H_{\text{ex}}$

$H_{\text{ex}} = 22,38 \text{ kN} - 16,79 \text{ kN} = 5,59 \text{ kN}$

$\sum V = 0$: $V_{\text{ex}} = 0,9 \cdot G_{\text{ex}} V_{\text{ex}}$

Determination of stay force:

$D_s = \frac{H_{\text{ex}}}{\cos 50^\circ} = \frac{16,79}{\cos 50^\circ} = 26,12 \text{ kN}$

Determination of required stay length:

$I_i = \frac{2/3 \cdot h}{\sin 50^\circ} = \frac{2/3 \cdot 6,75}{\sin 50^\circ} = 5,87 \text{ m}$
### Dimensioning

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

### Stresses:

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

$$D_{Ed} = D_k \cdot \gamma \cdot \frac{1}{2} = 26,12 \, \text{kN} \cdot 1.5 \cdot \frac{1}{2} = 19.59 \, \text{kN} \leq F_{Rd,ucr} = 22.00 \, \text{kN}$$

Number of anchors ✔

**Brace base: Concrete Screw ConFi 14**

$$D_{Ed} = D_k \cdot \gamma \cdot \frac{1}{2} = 26,12 \, \text{kN} \cdot 1.5 \cdot \frac{1}{2} = 19.59 \, \text{kN} \leq F_{Rd} = 19.60 \, \text{kN}$$

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?