Light Panel Formwork System (Frami)
Important Notice:

Always observe the relevant safety regulations which pertain to the use of this product in the UK. Many of the illustrations in this guide show a situation during formwork assembly and may not always be complete from a safety point of view.

The functional/technical instructions given in this guide must be strictly adhered to.

Before deviating from any of the functional/technical instructions given in this guide, confirmatory calculations must be performed.

It could be dangerous to combine our formwork systems with those of other manufacturers.

Contact Mabey Hire Limited if you intend to combine different systems.

Any damaged or deformed items must be withdrawn from use.

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Product description

Mabey Hire's Panel Formwork System, Frami, is a complete system for forming small structures quickly and economically. The sturdy elements are light and easily man-handled - all components weigh less than 50kg.

The system's versatile panel sizes, with heights of 1.20m and 1.50m and widths between 300mm and 900mm, makes it superbly adaptable to all site applications. 2.7m high panels are also available at widths of 300mm and 450mm.

Frami is tailor made for use on foundations, strip footings, shafts, chambers, slab edge formwork and other such small structures.
Frami also forms higher walls up to 3m high efficiently, as the panels can be stacked upright or rotated through 90° to achieve any wall height to within 150mm.

On sites served by crane, it is also possible to shift several elements at a time in large-area units. Special Frami lifting hooks are available for this purpose.

Further features of Frami

- Sturdy, torsionproof hollow-sectioned steel frame
- Hot-dip galvanised for high durability
- High grade, 15mm thick, film-coated plywood for high wear-resistance
- Self-aligning, continuously positional inter-linking clamps
- System-integrated alignment and bracing
- Easy-to-fasten accessories
- Integrated handles for easier handling
- Maximum permissible concrete pressure on wall formwork $50kN/m^2$
- Maximum permissible concrete pressure on column formwork $= 80kN/m^2$ utilising universal panels
- Special pallets for safe transportation and storage on site.

Important points

- This user guide outlines simple and straightforward applications for Frami when used for double sided formwork up to 2.7m (2 panels) high. Consult Mabey Hire’s engineers for assistance with more complex arrangements.
- The concrete finish which can be achieved with the Frami system is normally considered to be of F1 or F2 quality i.e. the finished appearance of the concrete should be of minimal or no importance.
- Always apply release agent to the panels prior to pouring the concrete. Mabey Hire can supply if required. If it is proposed to use release agent other than that supplied by Mabey Hire, arrangements should be made to remove and clean it from the equipment prior to off hire.
- Ensure any surplus wet concrete spilt on the equipment is immediately removed to avoid cleaning charges.
- For elevated access, support brackets and scaffold tube hand railing are available which can be used in combination with customers’ own walkway boards and toe boards, etc.
Examples of Use

Strip footing

Block foundations
Examples of Use

Stacked, e.g. for shafts
Panel Sizes (5 Widths and 2 Heights)

(two other panel sizes are also available for specific applications - see page 6 for details)

All tie bar holes are 20mm in diameter. All dimensions given on this page are in millimeters.
Height Adjustment

Here are some examples of combinations:

Further combinations of heights are possible at 150mm grid intervals. Frami panels can be used either upright or on their sides.

Stepless staggering of panel heights

75mm x 50mm timbers to allow ties and Super Plate 15.0 to be fitted

timber to be secured at this point

The bead running around the inside of every Frami panel allows the Frami Clamps to be positioned wherever practical. In this way, the panels can be staggered in height steplessly, i.e. without any fixed grid.

This makes it possible to adapt the formwork to steps, slopes and uneven sections in floors.

Slab edge formwork

Two panel sizes, 0.30m x 2.70m and 0.45m x 2.70m are available, primarily for use horizontally in slab edge formwork applications.
Ground plan Adaptability

Example of the adaptability of Frami to a non-standard ground plan

Thanks to its ideal system grid, Frami is quick and easy to adapt to any forming task. Even complicated ground plans with skewed angles can be formed simply and economically with the system.

Note: Clamping details have been omitted for clarity.
The Frami clamp:
- is a quick-acting, high-tensile-strength connecting device for all the Frami panels
- has no loseable parts
- is not sensitive to dirt
- can be operated using only a hammer
- pulls the panels together
- creates a tight, tension-proof joint
- aligns the panels and clamps them together flush.

The surrounding bead on the Frami profile means that the elements can be interlinked at any point. This also means that the panels can be staggered in height steplessly.

For forming walls
Frami panels used upright and vertically stacked.

Because of the corner form-tie holes, the upper of two stacked panels is used upside down.
(See p.14 for more details)

For forming foundations:
Frami panels used on their sides
Closures: 0-150mm

Length adjustments with fitting timbers (supplied by customer) and Frami adjustable clamp

By combining the fitting timber widths of 2, 3, 5 and 10cm in various ways, the closure can be made in 1cm increments.

The Frami adjustable clamp

The Frami adjustable clamp provides a tensionproof link between the panels and keeps them in a flush alignment. The adjustable clamp is placed directly over the crossbar.

- is a tensionproof connecting device for all closures of up to 150mm
- has no loseable parts
- is not sensitive to dirt
- can be operated using only a hammer

Closures up to 2cm

Ties through panel, without Universal waling

Closures up to 5cm

Ties through fitting timber, without Universal waling

Closures up to 7.5cm

Ties through panel, with Universal waling

Closures up to 15cm

Ties through fitting timber, with Universal waling

Twin-sided closure

The Frami universal waling is used as the form-tie support.

Corner closure

The Frami universal waling supports the form-ties and securely braces the panels.
Closures: 100-300mm

Note: This closure arrangement cannot transfer tensile forces through the panels. The location of the closure requires careful consideration.

Using plywood support and formwork sheet

Using square timbers and formwork sheet
Bracing

Where required by the anticipated loading, e.g. on larger composite units, the elements can be braced either with aligning clamps or universal walings.

Aligning clamp

**Elements linked horizontally**

- **Frami aligning clamp**
  - Permitted tensile load: 10kN
  - Permitted moment: 0.45kNm

**Elements linked vertically (stacked)**

Note: The aligning clamp cannot be used to connect stacked universal panels. Use the universal waling detail shown below.

Universal waling

**Detail of connection on crossbar**

- **Frami universal waling 0.70m**
- **Frami universal waling 1.25m**

**Detail of connection on interpanel join**

- **Frami wedge clamp**
  - Permitted tensile load in cross-profile: 4.3kN

**Frami universal waling permitted moment:**

- **1.3kNm**
Corner Joints

Wall thickness 200mm

- Frami corner connector and super plate 15.0
- Frami universal panel
- Frami panel 450mm
- Frami adjustable clamp
- Fitting timber 50mm
- Form tie

Wall thickness 250mm

- Frami outside corner
- Frami panel 450mm
- Frami inside corner (leg length 200mm)
- Form tie
- Frami clamp (see p14 for details)

Wall thickness 300mm

- Frami corner connector and super plate 15.0
- Frami universal panel
- Frami universal waling
- Frami adjustable clamp
- Fitting timber 50mm
- Frami inside corner (leg length 200mm)
- Form tie

How the universal panel works

- 50mm grid
- For right-angled corners, the Frami universal panel is used. This permits rapid and easy adjustment to different wall thicknesses, at 50mm intervals up to a maximum wall thickness of 450mm.

- Instead of the Frami corner connector, it is also possible to use the Frami universal fixing bolt 50-120mm.

- Use 2 No universal fixing bolt per 1.2m universal panel and 3 No per 1.5m universal panel.

T-connection 200mm

- Frami clamp
- Frami panel 600mm
- Form tie
- Frami inside corner

T-connection 300mm

- Frami clamp
- Frami panel 750mm
- Fitting timber 50mm
- Frami universal waling
- Frami adjustable clamp

Important Note: It is possible to achieve other corner joint and ‘T’ connection thicknesses using the Frami system. However the fitting timber size adjacent to the internal corner is 50mm. This allows the adjustable clamp to be correctly fitted.
Corner Joints

Angled corners greater than 135°

*where the angle is greater than 135°, the Frami hinged inside corner ‘I’ is used for the outside corner as well.

Angled corners 60° - 135°

The hinged inside corner ‘I’ can be fixed at a 90° angle using a Frami corner connector and super-plate 15.0.
Corner Joints

Number of clamps required at a 90° outside corner, a hinged outside corner, and at the joints between the panels within 1.8m of the corner (Concrete pressure 50kN/m²)

<table>
<thead>
<tr>
<th>Panel Height (m)</th>
<th>Width of panel connected to outside corner unit plus allowance of up to 150mm for a timber infill</th>
<th>Number of Frami clamps (Fram-236) required per corner joint</th>
<th>Number of clamps required at any vertical joints within 1.8m of the outer corner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90° outside corner (Ref. 1)</td>
<td>Hinged outside corner (Ref. 2)</td>
<td>Frami clamp (Fram-236) - (Ref. 3)</td>
</tr>
<tr>
<td>1.2</td>
<td>900 + 150                                      N/A                                    6                                      4                                      4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>750 + 150                                      3                                      6                                      3                                      4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>600 + 150                                      3                                      5                                      3                                      3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>450 + 150                                      2                                      4                                      2                                      3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>300 + 150                                      2                                      3                                      2                                      2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>900 + 150                                      N/A                                    8                                      4                                      5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>750 + 150                                      3                                      6                                      3                                      4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>750 + 50                                       N/A                                    7                                      4                                      5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>600 + 150                                      3                                      6                                      3                                      4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>450 + 150                                      3                                      5                                      3                                      3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>300 + 150                                      2                                      4                                      2                                      3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ref 1 - The quantity of clamps is based on the 10kN allowable tensile value of the Frami clamp. The clamp's shear value is not the critical value as the outside corner features shear keys.

Ref 2 - The quantity of clamps is based on the 5kN allowable shear value of the Frami clamp.

Ref 3 - The quantity of clamps is based on the 10kN allowable tensile value of the Frami clamp.

Ref 4 - The quantity of clamps is based on the 7.5kN allowable tensile value of the Frami adjustable clamp.

* - The 750 + 50 arrangement has been included to highlight the limit of the 90° outside corner.
N.b. In practice, this represents a 600mm wall thickness.

Note that the number of clamps stated is per joint (i.e x2 for both sides of the 90° outside corner and the hinged outside corner)

For example, the total number of Frami clamps required to form the joints between the Frami hinged outside corner and the 600mm wide adjacent panels for a 3.0m high corner would be:
No. of Frami clamps required = 2 (No. of 1.5 panels in height) x 6 (No. of clamps per panel) x 2 (No. of sides) = 24.

The above guidance is based on the worst case loading i.e. a block pressure of 50kN/m² applied to the panel plus a 150mm timber infill. If the loading condition is not as severe then fewer clamps can be specified, provided that supporting calculations are included in the scheme documentation.

Practicalities of fitting the clamps at outside hinged corners

The Frami hinged outside corner is adjustable between 60° and 135°. Please note that in order to achieve angles in the range 115° to 135°, the Frami clamps on both sides of the hinged corner have to be fixed in a staggered formation. If they are fixed at the same height the clamps will clash and restrict the angle to 115°.
Using Ties and Anchors

Upright panels: form-tie using tie-rod and super plate

Two corners of each Frami panel are equipped with form-tie supports. If the upper panels are used upside down when panels are vertically stacked, the super plate can support all four panels where their corners meet.

With this feature, only three form-ties are needed for heights of up to 3m.
Using Ties and Anchors

Upright panels: form-ties on top of the panels, using Frami anchoring brackets

With the Frami anchoring bracket, the top most ties can be placed on top of the panels, to make it easier to smooth the top of the concrete.
The anchoring bracket is normally positioned above the joint between two panels.

Sideways panels: form-ties allowing for joint-sealing tapes

Where universal panels are used, the bottom form-ties can be placed above the water stop.
The max. tie-placement heights must not be exceeded (see below).
The flat tie-rods are used for the top form-ties in this application. These fix the wall spacing between the panels - wall thickness 100-800mm in 50mm grid.

Ties on universal panels
Using Ties and Anchors

The Frami foundation anchoring system consists of:

- **Frami flat tie-rod** and **Frami clips**
  These fix the spacing between the panels and together constitute the top tie. wall thickness 100 - 800mm, in a 50mm grid.

- **Frami perforated tape** and **Frami foundation clamp**
  These fix the spacing between the panels in a 50mm grid and together constitute the bottom tie.

In this way, there is no need to make ties through the concrete.

The rule-of-thumb here is:

- **Number of Frami perforated tapes:**
  Up to a formwork height of 600mm : 1 per panel (immediately next to the interpanel joint).
  Formwork height of between 600 and 900mm: 2 per panel.

- **Number of Frami flat tie-rods:**
  Two in every other panel - and one in each intermediate panel. First and last panel must always have two flat tie-rods.

**Permitted load per tie:** 5kN

**Detail of Frami perforated tape:**

- **Permitted tensile load:** 10.0kN
- **Permitted shear force:** 5.0kN
- **Permitted moment:** 0.2kNm

**Permitted capacity:**
- Frami foundation clamp: 8.0kN
- Frami clip: 5.0kN
- Frami flat tie-rod: 5.0kN

**Wall thickness:**
- 18mm
- 50mm
- 50mm
- Cut length: 18mm + 30mm + 50mm + 400mm
Using Ties and Anchors

Express Anchor 16 x 125mm

The Express anchor 16 x 125mm (FRAM-263) is used to fix Frami components to concrete foundations.

Indentification

Express anchor
16 x 125mm
Code No.: FRAM-263
Weight: 0.3kg
Hire Item

16mm Coil
Code No.: FRAM-264
Weight: 0.01kg
Sale Item - single use only
Note: Only screw the 16mm coil onto the Express anchor 16 x 125mm in the direction shown above.
Do not pre-expand the coil.

Fitting the Express Anchor

1. Drill bore hole.
2. Make sure anchor hole is clean.
3. Drive in the Express Anchor as far as the depth mark.
4. Fully tighten the Express anchor.

a = 16mm  b = 140mm The bore-hole depth 'b' can be reduced by dimension 'c' (see ‘Loading Data’).

Loading Data

The data specified here applies to temporary fixing points in uncracked concrete, irrespective of the load direction in angle F.
Values below do not account for any reduction in concrete capacity due to proximity of fixing to edge of slab.

<table>
<thead>
<tr>
<th>Concrete</th>
<th>Characteristic cube compressive strength $f_{ck,cube}$ (N/mm²)</th>
<th>Permitted load $F_{perm}$ (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Green” (new) concrete</td>
<td>≥ 14</td>
<td>9.5</td>
</tr>
<tr>
<td>C20/25</td>
<td>≥ 25</td>
<td>17.0</td>
</tr>
</tbody>
</table>

For attaching components

For attaching back-stays to ring

Concrete                        | Characteristic cube compressive strength $f_{ck,cube}$ (N/mm²) | Permitted load $F_{perm}$ (kN) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>“Green” (new) concrete or cured concrete</td>
<td>≥ 14</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Do not use if the ring is damaged (deformed)
Using Ties and Anchors

Floor Fixing Plate

The Frami floor fixing plate (FRAM-262) is used together with the Express anchor 16 x 125mm (FRAM-263) to provide a safe and reliable method of fixing Frami panels to concrete foundation slabs.

Refer to page 18 for Express anchor 16 x 125mm fitting instructions.

Important Note: The Frami floor fixing plate is only allowed to be used on foundation slabs and concrete floor slabs.

Identification

Code No.: FRAM-262
Weight: 0.53kg
Finish: Galvanised

Examples of Use

Horizontally placed Frami panels held together at the top by Frami flat tie-rods, and fixed at the bottom by Frami floor fixing plates secured by Express anchors 16 x 125mm (see detail below).
Using Ties and Anchors

Floor Fixing Plate

Horizontally placed Frami panel aligned and held at the top by Frami adjusting struts 260, and fixed at the bottom by Frami floor fixing plates secured by Express anchors 16 x 125mm (see enlarged view below).

* The slotted holes (8 x 12mm) are used to hold the Frami floor fixing plate in the correct position while it is being fixed (e.g. on the concrete or on tableforms).

Upright Frami panels (as used for e.g. foundations) held together at the top by tie-rods 15.0, Frami anchoring brackets and Super plates 15.0, and fixed at the bottom by Frami floor fixing plates, secured by Express anchors 16 x 125mm (see enlarged details below).

---

**Item** | **Description** | **Code**
--- | --- | ---
A | Frami floor fixing plate | FRAM-262
B | Express anchor 16 x 125 mm | FRAM-263
C | Frami panel | -
D | Frami anchoring bracket | FRAM-255
E | Frami adjusting strut 260 | FRAM-259
F | Tie rod 15.0 mm | -
G | Super plate 15.0 | FRAM-240
H | Frami outside corner | FRAM-217 or FRAM-218
Using Ties and Anchors

Floor Fixing Plate

Number of Frami floor fixing plates required with horizontally placed Frami panels

<table>
<thead>
<tr>
<th>Concrete grade of foundation slab</th>
<th>Formwork height (m)</th>
<th>Frami panel (m)</th>
<th>Number of Frami floor fixing plates</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.20</td>
<td>1.50</td>
<td>1</td>
<td>Right next to panel joint</td>
</tr>
<tr>
<td>GEN 1 (G8/10)</td>
<td>0.75</td>
<td>2.70</td>
<td>2</td>
<td>Each 0.6m from panel joint</td>
</tr>
<tr>
<td></td>
<td>0.45</td>
<td>1.20</td>
<td>1</td>
<td>Right next to panel joint</td>
</tr>
<tr>
<td>GEN 3 (C15/20)</td>
<td>0.90</td>
<td>1.50</td>
<td>2</td>
<td>Each 0.6m from panel joint</td>
</tr>
<tr>
<td></td>
<td>0.45</td>
<td>1.20</td>
<td>1</td>
<td>Right next to panel joint</td>
</tr>
</tbody>
</table>

Example

Horizontally placed Frami panels 0.45 x 2.70m

Example

Horizontally placed Frami panels 0.90 x 1.50m

Number of Frami floor fixing plates required with upright Frami panels

<table>
<thead>
<tr>
<th>Concrete grade of foundation slab</th>
<th>Panel width (m)</th>
<th>Max. pour height (m)</th>
<th>Max. pour height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1.20 m</td>
<td>1.50 m</td>
</tr>
<tr>
<td>GEN 1 (G8/10)</td>
<td>0.90</td>
<td>1.00</td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td>0.75</td>
<td>1.10</td>
<td>1.05</td>
</tr>
<tr>
<td></td>
<td>0.60</td>
<td>1.20</td>
<td>1.20</td>
</tr>
<tr>
<td></td>
<td>0.45</td>
<td>1.45</td>
<td>1.45</td>
</tr>
<tr>
<td>GEN 3 (C15/20)</td>
<td>0.90</td>
<td>1.10</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>0.75</td>
<td>1.20</td>
<td>1.20</td>
</tr>
<tr>
<td></td>
<td>0.60</td>
<td>1.30</td>
<td>1.30</td>
</tr>
<tr>
<td></td>
<td>0.45</td>
<td>1.50</td>
<td>1.50</td>
</tr>
</tbody>
</table>

Example

Upright Frami panels 0.60 x 1.20m

Frami panel (upright) | Number and position of Frami floor fixing plates
1.20 m               | Over every panel joint
1.50 m               |

F<sub>perm</sub> load capacity in GEN1 concrete: 8.0 kN
F<sub>perm</sub> load capacity in GEN3 concrete: 11.0 kN
Minimum required concrete thickness: 160 mm
Max allowable uplift load on Frami panel profile: 2.6 kN
Forming Stop-Ends and Connections to Existing Walls

**Stop-ends**

(Plan View)

- **Form tie**
- **Frami panel**
- **Frami universal waling**
- **Frami corner connector or Frami universal fixing bolt 50-120mm and super plate 15.0**

**Stop-ends**

(Elevation)

- **1.2m panel upright**
- **Frami universal panel 750mm**
- **Frami clamp**
- **Form tie**

Stop-ends can be formed easily, using Frami universal walings and square timbers.

**In-line connection**

(Plan View)

- Ties passed through pre-drilled holes, 2 N° required per panel
- **Frami universal panel 750mm**
- **Frami clamp**
- **Form tie**

For connecting to existing walls, the versatile 750 universal panel is used. The pre-drilled “grid” of holes allows form-ties to be positioned at 50mm intervals.

**Crossways connection**

(Plan View)

- **Shoring support**
- **Frami universal panel 750mm**
- **Frami clamp**
- **Form tie**
- **max 150mm**

Frami corner connector:

- **Frami universal connecting bolt 50-120mm:**
  - Permitted tensile load: 13kN (When used in ordinary Frami panel)
  - Permitted tensile load: 15.6kN (When used in a universal panel)

Frami panel:

- Timber and plywood by customer

Frami universal waling:

- **Form tie**
- **Frami clamp**

Stop-ends can be formed easily, using Frami universal walings and square timbers.
Column Formwork

The 750mm wide Frami Universal Panels are ideal for forming columns. The pre-drilled grid of holes permits any column cross-section up to 650mm x 650mm in 50mm intervals, when using the Column Packing Strip as shown. Without the Packing Strips dimensions will be 5mm below nominal e.g. 645mm x 645mm.

The allowable concrete pressure on the formwork is 80kN/m².

**150 x 150mm column**

Frami universal panel

Frami corner connector and super plate 15.0

Column packing strip

The use of 2 Frami adjusting struts 260 on one side of the column formwork is to ensure adequate stability of the panels installed first and is best for achieving exact plumbing.

**200 x 600mm column**

Frami universal panel

Frami corner connector and super plate 15.0

Column packing strip

Instead of the Frami corner connector, it is also possible to use the Frami universal fixing bolt 50-120mm.

**650 x 650mm column**

Frami universal panel

Frami corner connector and super plate 15.0

Column packing strip

Frami corner connector:
Frami universal fixing bolt 50-120mm:
Permitted tensile load: 15.6 kN
(When used in a Universal Panel)
Access

The Frami system includes certain components for low and high level access. The customer must supplement these with walkway boards, capable of spanning up to 1350mm between supports, toe boards, possibly handrailing, and any other equipment necessary to ensure that the resulting access provision is in accordance with The Work at Height Regulations, 2005.

Low level access using the Frami Adjustment Frame.
For low formwork heights, the Frami adjustment frame can be used. With the self-locking connection, the frame is quick and easy to set up.

High level access using the Frami access bracket and guardrail post
For higher formwork heights, the access platform is made using the Frami access bracket. The bracket can be attached to all upright panels, and sideways panels up to 600mm wide. After the bracket has been attached to the panel, it must be supported from below using an adjustable prop. The Frami access bracket may only be used for access loading up to 150kg/m² and with maximum bracket centres of 1.35m.

Scaffold closure brackets are also available, for use at the ends of the walkway.
Guardrail posts are also available, and may be appropriate in some instances to provide edge protection to the rear panels.

Typical access bracket and guardrail post arrangement

- Frami Guardrail Post
- handrailing
- 2 No. Frami wedge clamps
- see detail C
- 2 No. Frami wedge clamps
- see detail D
- Frami clamp
- timber bearer
- Adjustable prop located in spigot on underside of access bracket (Type P0 for panel heights 2.25m to 2.7m, Type P1 for panel heights 3.0m to 3.6m)
- Frami Access Bracket (similar detail for guardrail post)
- peg located in slotted hole in panel
- walkway boards and toe boards
- Frami Access Bracket
- Frami wedge clamp
- Frami adjusting strut 260

High level access should always be used in combination with Frami adjusting struts to ensure overall stability.
Plumbing and Stability Accessories

The adjusting struts enable the Frami panels to be exactly plumbed and stabilized to resist imposed and environmental loadings.

**NB:** For guidance on detailing stabilising strut centres, refer to Appendix A on page 42.

**NB:** The Frami panels must be stable during every phase of construction. The formwork must also be secured against slippage at floor level. On upright panels, the adjusting struts can be fastened to any of the horizontal crossbar profiles. They cannot be fastened to a joint between panels. On sideways panels, the adjusting struts are clamped onto the frame edge profile. The struts are clipped into the slotted holes of the crossbar or frame profiles. (See detail E)

### Frami adjusting strut 260

![Detail E](image)

The adjusting struts must be anchored against tension and compression

**Adjusting strut 260 (anchorplate hole detail)**

- Minimum permitted strut load, \( P = 14.5 \text{kN} \) but this is likely to be limited further by the strength of the panel crossbar to which the top of the strut is connected. (See note 1, below)

**Detail E**

- Close-up of connection

### Frami adjusting strut 340

![Detail E](image)

The adjusting struts must be anchored against tension and compression

**Adjusting strut 340 (anchorplate hole detail)**

- Maximum permitted strut load, \( P \), ranges from 22 kN at 1.93 m (minimum length) to 8 kN at 3.4 m (maximum length) but this is likely to be limited further by the strength of the panel crossbar to which the top of the strut is connected. (See note 1, below)

**Note 1.**

**NB:** The Frami panel crossbars can only sustain a maximum component force in the vertical direction of 3.9 kN

i.e. \( P \sin \theta \leq 3.9 \text{kN} \)

(Where \( P \) = axial strut load)

**Caution:**

Anchor adjusting struts to resist tension and compression.
Single-Sided Formwork

Up to a height of 900mm

The Frami supporting construction permits single-sided forming with Frami (i.e. without using form-ties).

Two Frami supporting constructions are required for each Frami panel.

Up to a height of 1.20m

The panel is attached to the supporting construction by the Frami wedge clamp. The horizontal and vertical forces resulting from the concrete pressure can be transferred into the foundations using proprietary fixings.

Horizontal and vertical loads, allowing for the inner concrete friction

![Chart](chart.png)
Lifting

The Frami Lifting Hook is a lifting device. It may only be used for moving single Frami panels and multi-panel assemblies of Frami panels. It must not be used to lift panels made by other manufacturers, or for anything other than its intended purpose. Maximum safe working load 500 kg per lifting hook.

Lifting hook operation

1. Lift the handle (locking lever) as far as it will go.
2. Push the Frami lifting hook onto the frame profile as far as the rear stop, and close the handle (spring loaded).
3. When the panels are lifted by the crane, a load-dependent locking mechanism is activated.

NB: Before lifting, check there is a secure, firm fit between the lifting hook and the frame profile. The handle must be closed.

Safety precautions

Always check the Frami lifting hook for any signs of damage or visible deformation (over elongation) before use.
Check for:
- Crack free and notch free welds
- Deformation
- Missing or illegible rating plate
- If you suspect that the lifting hook has been damaged it must be removed from use immediately
- The lifting hook must not be used on damaged (dented) frame profiles
- Each lifting hook is supplied with a current report of thorough examination, which is valid for 6 months from the date of examination.

Shifting multi-panel elements

- Always position the Frami lifting hook over the inter-panel joint, to prevent it from sliding from side to side. (see page 28)

Exception: For horizontal panels, the lifting hook can also be placed over a cross-profile.

- Suspend the multi-panel element symmetrically (center-of-gravity position).
- It is recommended that two Frami lifting hooks should always be used.
- Maximum angle of lifting chains 60°.

Never pull/strike the formwork away from the concrete with the lifting hook!
Risk of hook failure!

Storage

Frami lifting hooks should be stored in a dry and well ventilated place, protected from the weather and from all corrosive substances.
Stacked Assemblies for Shifting Large-Area Units by Crane

Up to a height of 3.00m: Stacked assembly using Frami clamp

Up to a formwork height of 3.0m, it is sufficient to use the Frami clamp for the stacked assembly.

Close-up of connection

Section View on arrow ‘F’

Large-area units can be shifted safely by crane. After being suspended, the Frami lifting hook locks into place automatically.

Max. safe working load 500kg (5kN) per lifting hook.
Max. angle of lifting chains 60°.

Area of formwork that can be lifted using 2 lifting hooks is approx 10m².

(See page 27 for details of the Frami Lifting Hook and its usage)

Up to a height of 4.50m: Stacked assembly using Frami aligning clamp

The Frami aligning clamp is used as the connection for large-area units of between 3.00m and 4.50m in height.

NB: If the formwork is not being shifted or erected by crane in large-area units, it is sufficient to connect the panels using the Frami clamp.
Transport and Storage

The Frami pallet makes it quicker and easier to load, unload and transport Frami panels, inside corners, outside corners and hinged corners. The Frami panels can be loaded either upright or flat. Frami pallets come in two sizes. It is important that 1.2m panels, corners etc, are stacked in 1.2m pallets and similarly for 1.5m components. 1.2m components should NOT be stored in 1.5m pallet.

Loading examples
(Frami pallet shown without end-grille)

NB: If you open the side gates, this makes it easy to load and unload the pallets from the side.

Loading with large panels:
- 10 x Frami panels 900mm

Loading with small panels:
- 30 x Frami panels 300mm

Do not exceed maximum load capacity of 800kg (8 kN).

To hoist the pallet by crane you must use a four leg lifting chain (typically PSP-155) - see page 36 for further details.

Never lift or move more than one pallet at a time.

Do not stack the pallets more than two high either on site or on delivery / collection vehicles.

Always store pallets on a firm level ground.

Pallets that are part full or containing a mixture of components may need extra strapping to retain the components safely.

Always ensure the hinged side gates are locked shut before lifting the pallets.

Stacking of Frami Supporting Construction (FRAM-260). FRAM-260 should be stored flat in 1.2m pallets (FRAM-286/M) as shown above. Subsequent layers should be reversed as shown up to a max of 10 layers (20 off FRAM-260). The layers should be banded together onto the pallet frame to retain the components safely.

With strut pallet

The strut pallet is designed for the safe transportation of struts and scaffold tubes and should not be used for any other purpose.

Ensure the struts and/or scaffold tubes contained within the pallet are firmly secured to the pallet (by straps for example) prior to transportation.

Do not exceed maximum load capacity of 1100kg (11kN).

To lift the strut pallet by crane you must use a four leg chain sling (typically PSP-155).

The strut pallets are not to be stacked at any time.

Always store the pallets on a firm level ground.
Common Components

<table>
<thead>
<tr>
<th>Common Components</th>
<th>weight (kg)</th>
<th>code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frami Panels</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>galvanised</td>
<td></td>
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</tr>
<tr>
<td>overall depth: 90mm</td>
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<td></td>
</tr>
<tr>
<td>Frami Panel 0.90 x 1.20m</td>
<td>37.0</td>
<td>FRAM-201</td>
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<tr>
<td>Frami Panel 0.60 x 1.20m</td>
<td>28.4</td>
<td>FRAM-203</td>
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<td>Frami Panel 0.45 x 1.20m</td>
<td>22.8</td>
<td>FRAM-204</td>
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<td>Frami Panel 0.30 x 1.20m</td>
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<td>Frami Panel 0.90 x 1.50m</td>
<td>43.3</td>
<td>FRAM-206</td>
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<td>Frami Panel 0.60 x 1.50m</td>
<td>35.0</td>
<td>FRAM-208</td>
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<td>Frami Panel 0.45 x 1.50m</td>
<td>28.2</td>
<td>FRAM-209</td>
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<td>Frami Panel 0.30 x 1.50m</td>
<td>23.0</td>
<td>FRAM-210</td>
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<tr>
<td>Frami Panel 0.45 x 2.70m</td>
<td>48.0</td>
<td>FRAM-234</td>
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<td>Frami Panel 0.30 x 2.70m</td>
<td>39.0</td>
<td>FRAM-235</td>
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<tr>
<td><strong>Frami Outside Corners</strong></td>
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<tr>
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<td>edge-to-corner dimension: 120mm</td>
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<tr>
<td>Frami Outside Corner 1.20m</td>
<td>11.0</td>
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<tr>
<td>Frami Outside Corner 1.50m</td>
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<td><strong>Frami Universal Panels</strong></td>
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<tr>
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<td></td>
</tr>
<tr>
<td>corners marked blue</td>
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</tr>
<tr>
<td>overall depth 90mm</td>
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<tr>
<td>Frami Universal Panel 0.75 x 1.20m</td>
<td>36.8</td>
<td>FRAM-211</td>
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<tr>
<td>Frami Universal Panel 0.75 x 1.50m</td>
<td>46.6</td>
<td>FRAM-212</td>
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<td><strong>Frami Inside Corners</strong></td>
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<tr>
<td>galvanised</td>
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<td>edge-to-corner dimension: 200mm</td>
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<td>Frami Inside Corner 0.75 m/200mm</td>
<td>15.8</td>
<td>FRAM-227</td>
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<td>Frami Inside Corner 0.90 m/200mm</td>
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<tr>
<td>Frami Inside Corner 1.20 m/200mm</td>
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<td>Frami Inside Corner 1.50 m/200mm</td>
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<td><strong>Frami Universal Panels</strong></td>
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<td></td>
</tr>
<tr>
<td>corners marked blue</td>
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</tr>
<tr>
<td>overall depth 90mm</td>
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<td></td>
</tr>
<tr>
<td>Frami Universal Panel 0.75 x 1.20m</td>
<td>36.8</td>
<td>FRAM-211</td>
</tr>
<tr>
<td>Frami Universal Panel 0.75 x 1.50m</td>
<td>46.6</td>
<td>FRAM-212</td>
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<td><strong>Frami Hinged Inside Corner ‘I’</strong></td>
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<td>powder coated blue</td>
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<td>edge-to-corner dimension: 250mm</td>
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<td><strong>Frami Hinged Outside Corners ‘A’</strong></td>
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<tr>
<td>powder coated blue</td>
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<td></td>
</tr>
<tr>
<td>edge-to-corner dimension: 100mm</td>
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<tr>
<td>Frami Hinged Outside Corner ‘A’ 1.20m</td>
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<td>FRAM-221</td>
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<tr>
<td>Frami Hinged Outside Corner ‘A’ 1.50m</td>
<td>15.9</td>
<td>FRAM-222</td>
</tr>
</tbody>
</table>
# Light Panel Formwork System (Frami)

## Common Components

<table>
<thead>
<tr>
<th>Component</th>
<th>weight (kg)</th>
<th>code No.</th>
<th>Component</th>
<th>weight (kg)</th>
<th>code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frami Plywood Support 21mm</td>
<td>2.1</td>
<td>FRAM-225</td>
<td>Frami Universal Fixing Bolt 50 - 120mm</td>
<td>0.43</td>
<td>FRAM-239</td>
</tr>
<tr>
<td>Frami Clamp</td>
<td>1.2</td>
<td>FRAM-236</td>
<td>Super Plate 15.0</td>
<td>0.91</td>
<td>FRAM-240</td>
</tr>
<tr>
<td>Frami Adjustable Clamp</td>
<td>3.6</td>
<td>FRAM-237</td>
<td>Frami Universal Waling</td>
<td>3.7</td>
<td>FRAM-241</td>
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<tr>
<td>Frami Aligning Clamp</td>
<td>3.2</td>
<td>FRAM-238</td>
<td>Frami Universal Waling</td>
<td>6.4</td>
<td>FRAM-242</td>
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<tr>
<td>Frami Wedge Clamp</td>
<td>1.1</td>
<td>FRAM-244</td>
<td>Frami Universal Waling</td>
<td>1.1</td>
<td>FRAM-244</td>
</tr>
</tbody>
</table>

### Frami Universal Fixing Bolt 50 - 120mm
- galvanised
- length: 230mm
- packed in units of 60

### Super Plate 15.0
- galvanised
- Ø 120mm
- height: 60mm
- width-across: 27mm
- perm. load with safety factor of 1.6: 120kN
- perm. load to DIN 18216: 90kN
- breaking load: > rod breaking load (>195kN)
- packed in units of 20

### Safety instruction:
Never weld or heat tie-rods - risk of fracture!

### Frami Universal Waling
- painted blue
- Frami Universal Waling 0.70m
- Frami Universal Waling 1.25m

### Frami Wedge Clamp
- galvanised
- length: 160mm
### Common Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight (kg)</th>
<th>Code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frami Corner Connector</td>
<td>0.40</td>
<td>FRAM-245</td>
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<tr>
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<tr>
<td>packed in units of 60</td>
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<td></td>
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<tr>
<td>Frami Flat Tie-Rod 100 - 800mm</td>
<td>2.1</td>
<td>FRAM-256</td>
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<tr>
<td>length: 970mm</td>
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<tr>
<td>perm. load: 5kN</td>
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<tr>
<td>Frami Panel Soldier Connector</td>
<td>0.7</td>
<td>FRAM-248</td>
</tr>
<tr>
<td>Frami 90° Universal Waling</td>
<td>4.5</td>
<td>FRAM-249</td>
</tr>
<tr>
<td>painted blue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frami 90° Universal Waling 0.4m</td>
<td>4.5</td>
<td>FRAM-249</td>
</tr>
<tr>
<td>Frami Anchoring Bracket</td>
<td>0.58</td>
<td>FRAM-255</td>
</tr>
<tr>
<td>galvanised</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frami Panel Soldier Connector</td>
<td>0.7</td>
<td>FRAM-248</td>
</tr>
<tr>
<td>Frami 90° Universal Waling 0.4m</td>
<td>4.5</td>
<td>FRAM-249</td>
</tr>
<tr>
<td>Frami Anchoring Bracket</td>
<td>0.58</td>
<td>FRAM-255</td>
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<td>galvanised</td>
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<td>Frami Panel Soldier Connector</td>
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<td>FRAM-248</td>
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<tr>
<td>Frami 90° Universal Waling 0.4m</td>
<td>4.5</td>
<td>FRAM-249</td>
</tr>
<tr>
<td>Frami Anchoring Bracket</td>
<td>0.58</td>
<td>FRAM-255</td>
</tr>
<tr>
<td>galvanised</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NB:** This item should be used in combination with superplate (FRAM-240) and dividag bar(ST15/500)
### Common Components

<table>
<thead>
<tr>
<th>Product</th>
<th>Weight (kg)</th>
<th>Code No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>End Cap for Frami Flat Tie-Rod</strong></td>
<td>0.1</td>
<td>FRAM-256</td>
<td>Yellow vinyl, sale only item</td>
</tr>
<tr>
<td><strong>Frami Clip</strong></td>
<td>0.26</td>
<td>FRAM-257</td>
<td>Galvanised, height: 120mm, width: 30mm, packed in units of 70</td>
</tr>
<tr>
<td><strong>Frami Foundation Clamp</strong></td>
<td>1.6</td>
<td>FRAM-258</td>
<td>Galvanised, height: 90mm</td>
</tr>
<tr>
<td><strong>Frami Adjusting Strut 260</strong></td>
<td>13.9</td>
<td>FRAM-259</td>
<td>Galvanised, length: min. 1.45m, max. 2.58m</td>
</tr>
<tr>
<td><strong>Frami Adjusting Strut 340</strong></td>
<td>27.0</td>
<td>FRAM-261</td>
<td>Galvanised, consisting of: - strut head x 2, strut shoe, adjusting prop 340 (length: 1.93m min, 3.4m max.), adjusting strut 120 (length: 0.8m min, 1.3m max.)</td>
</tr>
<tr>
<td><strong>Frami Floor Fixing Plate</strong></td>
<td>0.53</td>
<td>FRAM-262</td>
<td>Galvanised, length: 127mm, width: 67mm</td>
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<tr>
<td><strong>Express Anchor 16 x 125mm</strong></td>
<td>0.3</td>
<td>FRAM-263</td>
<td>Zinc plated, length: 170mm, diameter: 16mm</td>
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<tr>
<td><strong>16mm Coil</strong></td>
<td>0.01</td>
<td>FRAM-264</td>
<td>Zinc plated, length: 30mm, diameter: 16mm, sale only item, used in combination with the Express Anchor 16 x 125mm (FRAM-263)</td>
</tr>
</tbody>
</table>
# Light Panel Formwork System (Frami)

## Common Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight (kg)</th>
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<th>Weight (kg)</th>
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</thead>
<tbody>
<tr>
<td>Frami Lifting Hook</td>
<td>7.5</td>
<td>FRAM-270</td>
<td>17.3</td>
<td>FRAM-281</td>
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<tr>
<td>Frami Access Bracket</td>
<td>15.2</td>
<td>FRAM-278</td>
<td>5.0/m</td>
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</tr>
<tr>
<td>Guardrail Post</td>
<td>11.0</td>
<td>FRAM-279</td>
<td>0.1</td>
<td>SC-ENDCAP</td>
</tr>
</tbody>
</table>

### Frami Lifting Hook
- **Galvanised**
- **Height:** 210mm
- **Width:** 150mm
- **Max. Safe Working Load:** 500kg (5kN)
- **NB:** Follow the instructions on pages 27/28

### Frami Access Bracket
- **Galvanised**
- **Height:** 1.17m
- **Width:** 0.91m
- **Max. Load:** 150kg/m²
- **Max. Bracket Centres:** 1.35m
- **Always prop here with adjustable prop P0 or P1**

### Frami Adjustment Frame
- **Galvanised**
- **Length:** 1.03m
- **Height:** min. 0.94m, max. 1.43m
- **Given a max. load of 150kg/m², the Frami adjustment frames may be used with a max. spacing between frames of 1.35m.**
- **NB:** Please observe all applicable safety regulations.

### Guardrail Post
- **Painted**
- **Height:** 1.7m
- **(Note: provides 1.0m of protection above top of panels)**

### Handrail Post Adaptor
- **Used on Frami Adjustment Frame FRAM-276**
- **Weight:** 2.5kg
- **Code No.:** FRAM-280

### Scaffold Closure Bracket
- **Used at ends of walkway**
- **Overall Height:** 1.17m
- **Overall Width:** 0.91m
- **Max. Load:** 150kg/m²
- **Max. Bracket Centres:** 1.35m
- **Galvanised**
- **Always prop here with adjustable prop P0 or P1**

### Scaffold Tube
- **Galvanised**
- **Available in standard lengths of:**
  - 0.5m, 1.0m, 1.5m, 2.0m, 2.5m, 3.0m, 3.5m, 4.0m, 4.5m, 5.0m, 5.5m, 6.0m and 6.4m.

### Scaffold Tube Plastic End Cap
- **Plastic End Cap used with Scaffold Tube**
- **Weight:** 0.1kg
- **Code No.:** SC-ENDCAP
# Common Components

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<thead>
<tr>
<th>Weight (kg)</th>
<th>Code No.</th>
<th>Description</th>
<th>Dimensions</th>
<th>Load Capacity</th>
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</thead>
<tbody>
<tr>
<td>42.0</td>
<td>FRAM-289</td>
<td><strong>Strut Pallet</strong>&lt;br&gt;use for struts and scaffold tube only&lt;br&gt;galvanised&lt;br&gt;length: 1.5m&lt;br&gt;height: 0.77m&lt;br&gt;width: 0.8m</td>
<td>max. load capacity 1100kg (11kN)</td>
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<td>71.3</td>
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<td>78.0</td>
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<td>49.8</td>
<td>FRAM-288</td>
<td><strong>Transport Box 1200 x 800mm</strong>&lt;br&gt;galvanised&lt;br&gt;length: 1.5m&lt;br&gt;height: 0.77m&lt;br&gt;width: 0.8m</td>
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<tr>
<td>21.0</td>
<td>FRAM-329</td>
<td><strong>Release Agent</strong>&lt;br&gt;Separate Safety Data sheet available from Mabey Hire.&lt;br&gt;20 litre container</td>
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<tr>
<td>25.0</td>
<td>FRAM-328</td>
<td><strong>Release Agent</strong>&lt;br&gt;Separate Safety Data sheet available from Mabey Hire.&lt;br&gt;25 litre container</td>
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## Strut Pallet

**Frami Plywood Hole Plug**
- brown<br>Ø 20mm<br>packed in units of 500

**Frami Frame Hole Plug**
- brown<br>Ø 30mm<br>packed in units of 500

**Frami Perforated Tape 50 x 2.0mm, 25m**
- perm. load: 8kN

**Transport Box 1200 x 800mm**
- max. load capacity 1500kg (15kN)

**Frami Pallets**
- Frami Pallet 1.20m<br>length: 1.38m<br>width: 1.0m<br>height: 1.14m
- Frami Pallet 1.50m<br>length: 1.68m<br>width: 1.0m<br>height: 1.14m
- max. load capacity: 800kg (8kN)
**Light Panel Formwork System (Frami)**

**Common Components**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight (kg)</th>
<th>Code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tie Rods 15.0mm</strong></td>
<td>1.45/m</td>
<td></td>
</tr>
<tr>
<td>Based on 15mm dividag bar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95kN tie capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>190kN ultimate load</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Instruction: never weld or heat tie-rods - risk of fracture.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available in standard lengths of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5m, 1.0m, 1.5m, 2.0m, 2.5m, 3.0m, 4.0, 5.0m and 6.0m</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plastic End Cap</strong></td>
<td>0.1 ST15/25</td>
<td></td>
</tr>
<tr>
<td>For clarity purposes, end caps are not shown on the images in this user guide.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used with 15mm tie-rods</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plastic Cone</strong></td>
<td>0.1 ST15/1</td>
<td></td>
</tr>
<tr>
<td>Used with ST15/2 Spacer Tube</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single use cone gives 10mm cover</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>P.V.C. Spacing Tube</strong></td>
<td>0.4 ST15/2</td>
<td></td>
</tr>
<tr>
<td>Supplied in 2m lengths</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26mm external diameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22mm internal diameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>P.V.C. Stopper</strong></td>
<td>0.1 ST15/3A</td>
<td></td>
</tr>
<tr>
<td>Used with ST15/2 Spacer Tube</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23mm external diameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lifting Chain</strong></td>
<td>24.0 PSP-155</td>
<td></td>
</tr>
<tr>
<td>four leg 7mm chain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0m leg length complete with ‘C’ hooks and shortening clutches.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>refer to lifting chain user information for further details.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Adjustable Prop</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>painted blue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.07 to 1.82m long</td>
<td>14.7 P-0</td>
<td></td>
</tr>
<tr>
<td>1.75 to 3.12m long</td>
<td>21.0 P-1</td>
<td></td>
</tr>
</tbody>
</table>
Common Components

Installation and Dismantling of Light Panel Formwork

The following general guidance is for the manual installation and dismantling of reasonably straightforward double-sided formwork, erected with the panels stacked upright, no more than two panels (storeys) high. **As for all general guidance, it is the Customer’s responsibility to decide whether it should be followed for his specific application and to ensure a safe system of work.**

Other formwork arrangements will need extra consideration, e.g:
- Crane assisted assembly and dismantling
- **Single sided** formwork incorporating System 160 soldiers and props
- Wall formwork higher than two storeys.

1. Planning and preparation:

Before the commencement of the erection, there are a number of key points the User should have prepared and addressed before starting on the site.

- Has the User Information Brochure been received, read and understood?
- Has a working drawing been prepared? In particular check that:
  a) Chambers and U-shaped walls include striking timbers in the make-up
  b) Any timber infills positioned adjacent to an internal corner are at least 50mm thick (see Fig. 1).

Fig. 1

![Possible clash](image)

If the infill is less than 50mm wide, the Frami Adjustable Clamp will not fit, as it will clash with the rear of the internal corner.

- Has a method statement been prepared?
- Has a risk assessment been carried out?

Note: Manual handling and working at height should be considered for both of these activities.

- Is access equipment required? (See also items 7 and 8)
- Are temporary thrust blocks required for the bases of the plumbing struts and access supports?
- Have the required holding down bolts been designed and are they available?

2. Manual handling considerations:

- Component weights are given on pages 30 - 36
- Most panels have vertical ribs, which also form integral handles to assist with manual lifting (See Fig. 2)
- Gloves should be worn as the panels are supplied coated in release agent.

Fig. 2

3. Assembly - General points:

- Inspect all equipment before use or re-use (multiple pours) and reject damaged items
- It is suggested that the ties, sleeves and cones should be installed at the leading ends of the erected panels before the next panels are installed. *(It is difficult to do this later by reaching down the inside panel.)*
- Frami clamps should be attached loosely on a joint between panels until the ties at the other end have been positioned. After the ties, cones and sleeving have been installed, return and tighten the clamps using a 1lb hammer.
- 2-3 blows should be sufficient to tighten the clamp
- Avoid excessive force and do not use a sledgehammer as this may damage or break the clamp
- When fitting clamps close to the base level, ensure enough space is available to release the clamp by striking upwards from below.
- Fit high visibility caps to protruding ends of dividing ties as construction progresses
- Ensure the formwork is stable at all times, including throughout the installation/removal phases.
4. Starting points - Bottom storey of panels

a) Formwork with corners
   - Check to see if infills are required next to the internal corner.
   If no infills are required set up an internal corner and attach the adjacent panels (See Fig. 3).
   If timber infills are required, start with the external corner instead and attach the adjacent panels (See Fig. 4).

![Fig. 3](image1.png)
![Fig. 4](image2.png)
![Fig. 5](image3.png)

- Add the corresponding opposite panels and corner, complete with dividag ties, plastic tubes and tie plates
- An alternative to the external corner is the use of the Universal panel. Universal fixing bolts & Super Plates are used to connect the panel at 90°. A column-packing strip is required between the panels to set the holes for the universal bolts (See Fig. 5).

b) Straight formwork
   - Unless specified by the designer, the starting point can be at one end
   - Stand up a pair of opposing panels and connect them together with dividag ties, plastic tube and tie plates (See Fig. 6 & 7).

![Fig. 6](image4.png)
![Fig. 7](image5.png)

Straight wall allowing for stop-end construction.

Straight wall butting up against existing structure.

Ties to be positioned as close to existing structure as possible. Ties pass through holes in fixing rails.
5. Continuing the installation of single storey formwork

- In order to ensure stability of the panels, it may be necessary to fit Frami Adjustment Frames (FRAM-276) or Frami Adjusting Struts 260 (FRAM-259) as the work progresses (See Fig. 8, 9 & 10).

  - Note: For formwork panel heights 1.2 & 1.5m, Frami Adjusting frames may only be effective at stabilizing the formwork if they are held down at the base plate or used on both sides of the formwork.

6. Double storey formwork: Starting the upper storey

- For the second lift of formwork, it is possible to start erection shortly after the bottom storey has been installed, providing the bottom storey has been stabilized (See Fig. 11).

  - Second storey panels are normally inverted so that only three levels of ties are necessary. Check drawing requirements (See Fig. 11).

  - One possible method of erection is viz:
  Two operatives stand at ground level or on a suitable access platform, lift a panel into position, rest it on the bottom storey and hold it safely whilst a third operative clamps it securely.
  N.B. Access platforms are to be supplied by the contractor and should be in accordance with The Work at Height Regulations 2005.

  - Note: Corner units when stacked do not clamp together along the horizontal joint. At corners it may be necessary to erect a standard panel on one side of the corner, before the corner unit can be erected and clamped to the adjacent panel (See Fig. 11).

  - Final stage stability of the panels is achieved using Frami Adjusting Struts, connected to the upper storey panels, with their bases bolted down to suitable concrete foundations (See Fig. 12).
7. Double storey formwork: Continuation of erection

Fig. 13

As the erection of the formwork continues, the Frami Adjusting Frames are used to stabilize the lower panels, while the upper panels are installed. As the Frami Adjusting Struts 260 are installed the Frami Adjustment Frames can be moved forwards to stabilize the leading edge of the lower panels (See Fig. 13 & 14).

Fig. 14
8. High level access

High level access may be required for placing of the concrete. The options are:

a) The Customer supplies his own independent access

or

b) Mabey Hire supplies Frami Access Brackets (FRAM-278), Scaffold Closure Brackets (FRAM-281) and scaffold tubes to which the Customer adds his own boards, toe boards, etc. (See Fig. 15).

The Customer is responsible for ensuring that the access platform complies with The Work At Height Regulations 2005.

When using FRAM-278 Access Brackets and FRAM-281 Scaffold Closure Brackets, the vertical props should be installed under the rear of the brackets as the erection continues.

9. Far side edge protection

This may be required:

- In combination with low level access to single storey formwork (Fig. 16)

or

- In combination with high level access if the platform height is less than 950mm below the top of the formwork (Fig. 17).

Far side protection is available as part of the formwork system. Suitable access will be required to install/dismantle these components.
10. Clamping arrangements at external corners and within 1.80m of external corners

Extra clamps may be required at corners and within 1.80m of corners (depending on wall thickness and height). Check drawings for requirements or refer to pages 12-14.

11. Before pouring concrete

- Check carefully the final assembly is in full accordance with the drawing and that all components are tightened.
- Ensure that the concrete is delivered at the correct rate that does not exceed the specified rate of rise.

12. Dismantling

The procedure for dismantling is normally the reverse of the erection.
- For chambers and U-shaped structures, where the panels are “boxed in”, the striking timbers should be removed first, in order to avoid damaging the panels.
- Do not “crash strike” or throw the components to the ground. Lower and place them.

13. Re-use of equipment

- Clean and inspect the panels and components and reject damaged items.
- Apply release agent to the panels before re-use.

14. Storage after dismantling

- Clean and stack the equipment in the pallets provided.
- DO NOT - store 1.2m panels or corners in 1.50m pallets.
- Ensure the pallet gates are properly shut and locked before lifting the pallets.
- Always store the pallets on firm level ground and never stack more than two high.

Appendix A

Guidance on detailing stabilising struts and access systems for double sided Frami formwork

<table>
<thead>
<tr>
<th>Shutter Height (m)</th>
<th>Access System</th>
<th>Panel Height Make-Up</th>
<th>Strut Type</th>
<th>Strut Connection Height (m)</th>
<th>Max. Strut Centres (m) (Ref.7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.20</td>
<td>None</td>
<td>1.2</td>
<td>Frami Adjusting Strut 260</td>
<td>1.2</td>
<td>1.80</td>
</tr>
<tr>
<td>1.2 (Ref. 3)</td>
<td>Frami Adjustment Frame</td>
<td>1.2</td>
<td>Frami Adjustment Frame</td>
<td>0.9</td>
<td>1.35</td>
</tr>
<tr>
<td>1.50</td>
<td>None</td>
<td>1.5</td>
<td>Frami Adjusting Strut 260</td>
<td>1.5</td>
<td>1.80</td>
</tr>
<tr>
<td>1.5 (Ref. 3)</td>
<td>Frami Adjustment Frame</td>
<td>1.5</td>
<td>Frami Adjustment Frame</td>
<td>1.2</td>
<td>1.35</td>
</tr>
<tr>
<td>1.65</td>
<td>None</td>
<td>1.2 + 0.45</td>
<td>Frami Adjusting Strut 260</td>
<td>1.65</td>
<td>1.80</td>
</tr>
<tr>
<td>1.65 (Ref. 4)</td>
<td>Frami Adjustment Frame</td>
<td>1.2 + 0.45</td>
<td>Frami Adjusting Strut 260</td>
<td>1.65</td>
<td>1.80</td>
</tr>
<tr>
<td>1.80</td>
<td>None</td>
<td>1.2 + 0.60</td>
<td>Frami Adjusting Strut 260</td>
<td>1.8</td>
<td>1.80</td>
</tr>
<tr>
<td>1.80 (Ref. 4)</td>
<td>Frami Adjustment Frame</td>
<td>1.2 + 0.60</td>
<td>Frami Adjusting Strut 260</td>
<td>1.8</td>
<td>1.80</td>
</tr>
<tr>
<td>1.95</td>
<td>None</td>
<td>1.2 + 0.75</td>
<td>Frami Adjusting Strut 260</td>
<td>1.95</td>
<td>1.80</td>
</tr>
<tr>
<td>1.95 (Ref. 4)</td>
<td>Frami Adjustment Frame</td>
<td>1.2 + 0.75</td>
<td>Frami Adjusting Strut 260</td>
<td>1.95</td>
<td>1.80</td>
</tr>
<tr>
<td>2.10</td>
<td>None</td>
<td>1.2 + 0.90</td>
<td>Frami Adjusting Strut 260</td>
<td>2.1</td>
<td>1.80</td>
</tr>
<tr>
<td>2.10 (Ref. 4)</td>
<td>Frami Adjustment Frame</td>
<td>1.2 + 0.90</td>
<td>Frami Adjusting Strut 260</td>
<td>2.1</td>
<td>1.80</td>
</tr>
<tr>
<td>2.25</td>
<td>None</td>
<td>1.5 + 0.75</td>
<td>Frami Adjusting Strut 260</td>
<td>2.25</td>
<td>1.80</td>
</tr>
<tr>
<td>2.25 (Ref. 4)</td>
<td>Frami Adjustment Frame</td>
<td>1.5 + 0.75</td>
<td>Frami Adjusting Strut 260</td>
<td>2.25</td>
<td>1.80</td>
</tr>
<tr>
<td>2.40</td>
<td>None</td>
<td>1.2 + 1.2</td>
<td>Frami Adjusting Strut 260</td>
<td>2.1</td>
<td>1.80</td>
</tr>
<tr>
<td>2.40 (Ref. 5)</td>
<td>Frami Access Bracket</td>
<td>1.2 + 1.2</td>
<td>Frami Adjusting Strut 260</td>
<td>2.1</td>
<td>1.80</td>
</tr>
<tr>
<td>2.70</td>
<td>None</td>
<td>1.2 + 1.5</td>
<td>Frami Adjusting Strut 260</td>
<td>2.1</td>
<td>1.80</td>
</tr>
<tr>
<td>2.70 (Ref. 5)</td>
<td>Frami Access Bracket</td>
<td>1.2 + 1.5</td>
<td>Frami Adjusting Strut 260</td>
<td>2.1</td>
<td>1.80</td>
</tr>
<tr>
<td>3.00</td>
<td>None</td>
<td>1.5 + 1.5</td>
<td>Frami Adjusting Strut 260</td>
<td>2.1</td>
<td>0.90</td>
</tr>
<tr>
<td>3.00 (Ref. 6)</td>
<td>Frami Access Bracket</td>
<td>1.5 + 1.5</td>
<td>Frami Adjusting Strut 260</td>
<td>2.1</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Notes to accompany the above table

1. The maximum strut centres provided are suitable for horizontal wind pressures up to 1kN/m². This value is considered appropriate for most locations within the UK; however, the designer should check to ensure the value is not exceeded. Please feel free to contact Mabey Hire’s technical department if calculated horizontal wind pressure > 1kN/m².
2. The maximum strut centres provided are based on a maximum strut angle of 60° to the horizontal.
3. Shutter heights 1.2 and 1.5m – the Frami adjustment frame should be held down at the baseplate or used on both sides of the wall.
4. The access system should be located on the opposite side of the wall to the stabilising struts.
5. Type P0 props used to support access bracket.
6. Type P1 props used to support access bracket.
7. The actual strut positions are dependent on the panel arrangement. NB: It may not be possible to achieve the max. strut centres specified.
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