Doka framed formwork
Frami S
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**Doka framed formwork Frami**

*The Formwork Experts*

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999777014 - 01/2009 NK
Introduction

User information

Doka framed formwork Frami

Introduction

Basic safety warnings

User target groups

- This User Information booklet (Method Statement) is aimed at everyone who will be working with the Doka product or system it describes. It contains information on how to set up this system, and on correct, compliant utilization of the system.
- All persons working with the product described herein must be familiar with the contents of this manual and with all the safety instructions it contains.
- Persons who are incapable of reading and understanding this booklet, or who can do so only with difficulty, must be instructed and trained by the customer.
- The customer is to insure that the information materials provided by Doka (e.g. User Information booklets, Method Statements, Operating Instruction manuals, plans etc.) are available to all users, and that they have been made aware of them and have easy access to them at the usage location.

Remarks on this document

- This User Information booklet can also be used as a generic method statement or incorporated with a site-specific method statement.
- Many of the illustrations in this booklet show the situation during formwork assembly and are therefore not always complete from the safety point of view.
- Further safety instructions, especially warnings, will be found in the individual sections of this document!

Planning

- Provide safe workplaces for those using the formwork (e.g. for when it is being erected/dismantled, modified or repositioned etc). It must be possible to get to and from these workplaces via safe access routes!
- If you are considering any deviation from the details and instructions given in this booklet, or any application which goes beyond those described in the booklet, then revised static calculations must be produced for checking, as well as supplementary assembly instructions.

Rules applying during all phases of the assignment:

- The customer must ensure that this product is erected and dismantled, reset and generally used for its intended purpose under the direction and supervision of suitably skilled persons with the authority to issue instructions.
- Doka products are ONLY to be used in accordance with the Doka User Information booklets or other technical documentation provided by Doka.
- The stability of all components and units must be ensured during all phases of the construction work!
- The functional/technical instructions, safety warnings and loading data must all be strictly observed and complied with. Failure to do so can cause accidents and severe (even life-threatening) damage to health, as well as very great material damage.
- Fire-sources are not permitted anywhere near the formwork. Heating appliances are only allowed if properly and expertly used, and set up a safe distance away from the formwork.
- The work must take account of the weather conditions (e.g. risk of slippage). In extreme weather, steps must be taken in good time to safeguard the equipment, and the areas immediately around the equipment, and to protect employees.
- All connections must be checked regularly to ensure that they still fit properly and are functioning correctly.
- It is very important to check all screw-type connections and wedge-clamped joins whenever the construction operations require (particularly after exceptional events such as storms), and to tighten them if necessary.

Assembly

- The equipment/system must be inspected by the customer before use, to ensure that it is in suitable condition. Steps must be taken to rule out the use of any components that are damaged, deformed, or weakened due to wear, corrosion or rot.
- Combining our formwork systems with those of other manufacturers could be dangerous, risking damage to both health and property. If you intend to combine different systems, please contact Doka for advice first.
- The assembly work must be carried out by suitably qualified employees of the client's.
Erecting the formwork
● Doka products and systems must be set up in such a way that all loads acting upon them are safely transferred!

Pouring
● Do not exceed the permitted fresh-concrete pressures. Excessively high pouring rates lead to formwork overload, cause greater deflection and risk causing breakage.

Stripping the formwork
● Do not strip the formwork until the concrete has reached sufficient strength and the person in charge has given the order for the formwork to be stripped!
● When stripping the formwork, never use the crane to break concrete cohesion. Use suitable tools such as timber wedges, special pry-bars or system features such as Framax S bias-cut corners.
● When stripping the formwork, do not endanger the stability of any part of the structure, or of any scaffolding, platforms or formwork that is still in place!

Transporting, stacking and storing
● Observe all regulations applying to the handling of formwork and scaffolding. In addition, the Doka lifting equipment must be used - this is a mandatory requirement.
● Remove any loose parts or fix them in place so that they cannot be dislodged or fall free!
● All components must be stored safely, following all the Doka instructions given in the relevant sections of this User Information booklet!

Regulations; occupational health & safety
● Always follow all federal, state and local safety regulations and other safety rules applying to the use of our products.
Instruction as required by EN 13374:
● If a person or object falls against, or into, the sideguard system and/or any of its accessories, the sideguard component affected may only continue in use after it has been inspected and passed by an expert.

Maintenance
● Only original Doka components may be used as spare parts.

Symbols
The following symbols are used in this booklet:

Important note
Failure to observe this may lead to malfunction or damage.

Caution / Warning / Danger
Failure to observe this may lead to material damage, and to injury to health which may range up to the severe or even life-threatening.

Instruction
This symbol indicates that actions need to be taken by the user.

Sight-check
Indicates that you need to do a sight-check to make sure that necessary actions have been carried out.

Tip
Points out useful practical tips.

Reference
Refers to other documents and materials.

Miscellaneous
We reserve the right to make alterations in the interests of technical progress.
Product description

Frami - the hand-set framed formwork for all on-site requirements

The Doka framed formwork Frami is a complete system which also comprises high-performance safety and workplace accessories. The Frami panels are lightweight and easy to handle, so they can be erected very quickly by hand.

Frami lets you form extremely quickly and economically, even when no crane is available. On sites with a crane, it is also possible to lift several panels at a time, in a gang-form.

The ingenious panel size-grid (with six different widths and four different heights of panel) makes for optimum adaptability to all construction-site situations.

Frami is perfectly tailored for use in the fields of residential construction and civil engineering:

- Walls
- Columns
- Footings and grade beams
- Single-sided formwork

A range of practical accessories makes work on the site a lot easier and does away with the need for costly job site improvisations.

Areas of use
Wall formwork with Frami

The high load-bearing capacity and long lifespan of the Doka framed formwork Frami make it an economical solution for all wall-forming tasks.

Frami 9’-0” panels are hydrostatically loadable up to a pour height of 9’-0” (2.74 m).
When the formwork is vertically stacked, the maximum permitted pressure of fresh concrete acting on the whole area is 1000 psf (48 kN/m²).

Because the Frami panels have such high rigidity, you only need 2 form-ties for a pour height of 9’-0” (2.74 m).

Any spaces left between the Frami panels are very easy to close. The system gives you a choice between several different options, so that you can always get the best possible length adjustment in each case.
Frami also takes corners, bulkheads and wall junctions efficiently in its stride. Here too, it gives you perfect, cost-saving solutions.

Matching safety and workplace accessories make work with Frami even quicker and easier.

Frami is exceptionally versatile and flexible, so you can quickly form any layout with it.
The panels can be connected together at any point around the frame, quickly and safely, using the Frami clamp.
**Method statement**

**Using Frami as a manhandled formwork**

The sequence shown here is based on a straight wall. As a rule, formwork set-up should start in a corner, working outward.

**Transporting / handling the panels**

- For offloading panels from a truck, or lifting them onsite a stack at a time, use the Frami transport hook 2.5kN and the Doka 4-part chain 3.20m (see "Transporting, stacking and storing").

**Erecting the formwork**

- Spray the plywood face with release agent (see "Cleaning and care").
- Fix the first panel to the ground with a panel strut (see "Plumbing accessories"). This stabilizes the panel so that it cannot fall over.
- Use the nail-holes to fasten the panels to the ground or sills.

**Warning!**

- The Frami panels must be securely braced in every phase of the construction work!

**Erecting the opposing formwork**

Once the reinforcement has been placed, the formwork can be closed.

- Spray the form-facing of the opposing formwork with release agent.
- Stand up the first panel of the opposing formwork.
- Insert the form-ties (see "Form-tie system"). Now the opposing formwork is also secured against falling over.

**Caution!**

- Never use a sledge-hammer to plumb and align the panels! This would damage the profiles of the panels.
- Use only proper plumbing tools (e.g. a special pry-bar) that cannot cause any damage.
- Continue lining up panels in this way, clamp them together (see "Inter-panel connections") and attach panel struts.

The gang can now be exactly plumbed and aligned.
In the same way, continue lining up panels, clamping them together and fitting form-ties.

Mount the pouring platform and attach end-of-platform sideguards where necessary (see "Pouring platforms with single brackets").

Pouring

- Frami 9'-0" panels are hydrostatically loadable up to a pour height of 9'-0" (2.74 m).
- When the formwork is vertically stacked, the maximum permitted pour pressure acting on the whole area is 1000 psf (48 kN/m²).

Observe the following guidelines:
- Doka Calculation Guide, section headed "Concrete pressure on perpendicular formwork to DIN 18218"
- ACI 301 - "Specifications for Structural Concrete"
- ACI 309 - "Guide for Consolidation of Concrete"
- ACI 347 - "Guide to Formwork for Concrete"
- SP4 - "Formwork for Concrete"
- CAN/CSA S269.3 - "Concrete Formwork"

Do not exceed the maximum permissible rate of placing.

Pour the concrete.

Make only moderate use of vibrators, carefully coordinating the times and locations of vibrator use.

Stripping

Observe the stipulated stripping times.

Remove the pouring platform.

Beginning with the unbraced formwork side, take down the panels one-by-one - take out the form-ties and undo the connectors to the adjacent panel.

Lift the panel away and clean concrete residue off the form-face (see "Cleaning and care").
Using Frami as a crane-handled formwork

The sequence shown here is based on a straight wall. As a rule, formwork set-up should start in a corner, working outward.

Transporting / handling the panels
➤ For offloading panels from a truck, or lifting them on-site a stack at a time, use the Frami transport hook 2.5kN and the Doka 4-part chain 3.20m (see "Transporting, stacking and storing").

Pre-assembly
➤ Pre-assemble gang-forms face-down on an assembly bench (see "Inter-panel connections").
➤ Mount the pouring platform and attach end-of-platform sideguards where necessary (see "Pouring platforms with single brackets").
➤ With the gang-form still flat, mount panel struts to it (see "Plumbing accessories").

Erecting the formwork
➤ Attach the crane suspension tackle to the Frami lifting hook (see "Resetting by crane" and the Operating Instructions for the "Frami lifting hook").

Max. load:
1100 lbs (500 kg) per Frami lifting hook
Area of formwork that can be lifted with 2 lifting hooks: approx. 270 sq.ft. (25 m²)

➤ Pick up the gang-form by crane.
➤ Spray the plywood face with release agent (see "Cleaning and care").

Warning! ➤ Do not allow people to ride on the formwork or platform.

Important note:
➤ Guiding the gang should be done with tag-lines that are long enough to keep the person who is doing the guiding out of the way of the gang.
➤ Fly the gang-form to its new location.
Caution!
Never use a sledge-hammer to plumb and align the panels!
This would damage the profiles of the panels.
➤ Use only proper plumbing tools (e.g. a special pry-bar) that cannot cause any damage.

➤ Fix the panel struts firmly to the ground (see "Plumbing accessories").

The gang-form is now stable and can be plumbed and aligned exactly, with no need for the crane.
➤ Detach the gang-form from the crane.
➤ Use the nail-holes to fasten the panels to the ground or sills.

➤ Continue lining up adjacent gang-forms in this way, and clamp them together (see "Inter-panel connections").
Erecting the opposing formwork

Once the reinforcement has been placed, the formwork can be closed.

➤ Spray the plywood face with release agent (see "Cleaning and care").
➤ Fly the opposing formwork by crane to its next location.

➤ Insert the form-ties (see "Form-tie system").

Before disconnecting from the crane:
➤ If there are no panel struts on the opposing formwork, do not disconnect the gang from the crane until a large enough number of form-ties have been installed to keep it safely in an upright position.

➤ Detach the gang-form from the crane (wherever possible, operate the lifting hook from the opposite pouring platform).
➤ Continue lining up adjacent gang-forms in this way, and clamp them together (see "Inter-panel connections").

Pouring

➤ Frami 9'-0" panels are hydrostatically loadable up to a pour height of 9'-0" (2.74 m).
➤ When the formwork is vertically stacked, the maximum permitted pour pressure acting on the whole area is 1000 psf (48 kN/m²).

Observe the following guidelines:
● Doka Calculation Guide, section headed "Concrete pressure on perpendicular formwork to DIN 18218"
● ACI 301 - "Specifications for Structural Concrete"
● ACI 309 - "Guide for Consolidation of Concrete"
● ACI 347 - "Guide to Formwork for Concrete"
● SP4 - "Formwork for Concrete"
● CAN/CSA S269.3 - "Concrete Formwork"

☞  ➤ Do not exceed the maximum permissible rate of placing.
➤ Pour the concrete.
➤ Make only moderate use of vibrators, carefully coordinating the times and locations of vibrator use.
Stripping

➤ Observe the stipulated stripping times.

➤ Remove any loose items from the formwork and pouring platform, or secure them firmly.

➤ Attach the gang-form of the unbraced formwork side to the crane (wherever possible, operate the lifting hook from the opposite pouring platform).

➤ Take out the form-ties and undo the connectors to the adjacent panels.

In order to speed up operations when repositioning by crane, most of the form-ties can be taken out in advance.

Warning!

However, there must be at least as many form-ties left in place as are needed to keep the gang safely in an upright position.

Warning!

The formwork tends to adhere to the concrete. When stripping the formwork, do not try to break concrete cohesion using the crane! Risk of crane overload.

➤ Use suitable tools such as timber wedges or a special pry-bar to detach the formwork from the concrete.

➤ Pick up the gang-form and fly it to its next location. If the gang-form is “parked” prior to its next use, it must have sufficient stability (see “Plumbing accessories”). Gang-forms with only one panel strut must not be “parked” upright, but placed face-down.

➤ Clean residual concrete off the plywood face (see “Cleaning and care”).

➤ Where the gang-form has panel struts and a pouring platform attached to it, first attach this gang-form to the crane, and only then detach the floor anchorages of the panel struts.

Warning!

The formwork tends to adhere to the concrete. When stripping the formwork, do not try to break concrete cohesion using the crane! Risk of crane overload.

➤ Use suitable tools such as timber wedges or a special pry-bar to detach the formwork from the concrete.

➤ Pick up the gang-form and fly it to its next location. If the gang-form is “parked” prior to its next use, it must have sufficient stability (see “Plumbing accessories”). Gang-forms with only one panel strut must not be “parked” upright, but placed face-down.

➤ Clean residual concrete off the plywood face (see “Cleaning and care”).

➤ Where the gang-form has panel struts and a pouring platform attached to it, first attach this gang-form to the crane, and only then detach the floor anchorages of the panel struts.
The Frami panel in detail

High load-bearing capacity

- Frami 9'-0" panels are hydrostatically loadable up to a pour height of 9'-0" (2.74 m).
- When the formwork is vertically stacked, the maximum permitted pour pressure acting on the whole area is 1000 psf (48 kN/m²).

Form-tie holes

- Form-tie hole with formwork tie protection - this steel piece protects the form-facing and thus helps prolong the lifespan of the plywood face.

Dimensionally stable steel hollow-profile frame

- Dimensionally stable hollow profiles
- Hot-dip galvanized for long life
- Strong cross-profiles
- Edge faces are easy to clean - so panels always abut tightly
- All-round hardware slot for fastening clamps at any point required
- Edges of formwork sheet are protected by frame profile
- Cross bores for corner configurations and bulkheads

Accessories are easy to fasten in the cross profile

- The high-grade, 5/6" (16 mm) thick, all-birch, film-coated plywood is extremely resistant to wear and tear.
Safety handles

Note:
Do not access, get on the formwork or use the safety handles until the panels have been properly braced.

Warning!
Do not use the safety handles as slinging points for crane-handling!
Danger of formwork dropping from crane!
➤ Use only suitable load-carrying equipment and slinging points. See "Resetting by crane" and "Transporting, stacking and storing".

Nail-holes

● are integrated in the frame profile to make it easier to attach or nail the panel to the ground or sills
● the nail-holes are located all around the frame, so the panels can be arranged either vertically or horizontally

Warning!
Do not use the safety handles as slinging points for crane-handling!
Danger of formwork dropping from crane!
➤ Use only suitable load-carrying equipment and slinging points. See "Resetting by crane" and "Transporting, stacking and storing".
The logical system-grid

Framed formwork panels

Widths of panels

- 3'-0" (91.4 cm)
- 2'-6" (76.2 cm)
- 2'-0" (61.0 cm)
- 1'-6" (45.7 cm)
- 1'-0" (30.5 cm)
- 6" (15.2 cm)

Heights of panels

Dimensions in inch

For pour heights of up to 9'-0" (2.74 m) only **2 form-ties needed in the vertical.**
Universal panels

The 3'-0" wide panels are also available as Universal panels with heights of 2'-0", 3'-0", 4'-0", 6'-0" and 9'-0".

The special hole pattern makes these panels particularly suitable for efficient forming of:
- corners
- wall junctions
- bulkheads
- columns

Panel width

Heights of panels

Dimensions in inch

Dimensions in cm
Adaptability

Possible combinations
The perfect panel size-grid gives you innumerable possible combinations, in both width and height. You can use the panels either **vertical or horizontal**, and the **6" (15 cm) increment-grid** gives you optimum adaptability of the formwork to the dimensions of the structure, at all times.

Infinite height offset
The continuous hardware slot around the inside of the Frami panels enables the clamps to be fastened anywhere on the frame. This allows any adjacent panels to be **staggered to any height required**, i.e. without being confined to any fixed grid. This means that the formwork can easily be accommodated to e.g. steps, slopes and uneven ground, with no extra work.

Continue forming with job-built fillers
The framed formwork Frami also gives you easy connections when you need to "make up" with job-built timber formwork. The Frami universal waling and filler angle make it easy for you to join the panels to dimensional lumber and plywood.

**A** Frami universal waling  
**B** Frami wedge clamp  
**C** Frami S filler angle 3/4"  
**D** Frami clip  
**E** Dimensional lumber  
**F** Formwork sheet  
**G** Frami S panel
Joining gangs

Simple inter-panel connections

with the Frami clamp

The Frami clamp and the Frami adjustable clamp

- create fast, self-aligning and tension-proof joints
- have no loose parts which might get lost
- are hard-wearing and dirt-resistant for site use
- should only be fixed using a formwork hammer (max. 28 oz. / 800 g)

Upright panels:

<table>
<thead>
<tr>
<th>Panel height</th>
<th>Number of clamps</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot;</td>
<td>2</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>2</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>2</td>
</tr>
<tr>
<td>9'-0&quot;</td>
<td>3</td>
</tr>
</tbody>
</table>

Horizontal panels:

<table>
<thead>
<tr>
<th>Panel width</th>
<th>Number of clamps</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>1</td>
</tr>
<tr>
<td>1'-0&quot;</td>
<td>1</td>
</tr>
<tr>
<td>1'-6&quot;</td>
<td>1</td>
</tr>
<tr>
<td>2'-0&quot;</td>
<td>2</td>
</tr>
<tr>
<td>2'-6&quot;</td>
<td>2</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>2</td>
</tr>
</tbody>
</table>

For details regarding extra inter-panel connections for outside corners and bulkheads (for increased tensile loads): see "Inter-panel connections for increased tensile loads".

For details on the position of the connector components needed in vertical stacking, see "Vertical stacking of panels".

Important note:

Do not oil or grease wedge-clamped joints.

Frami clamp:

- Permitted tensile force: 2.245 kip (10.0 kN)
- Permitted shear force: 1.12 kip (5.0 kN)
- Permitted moment: 0.15 kip-ft (0.20 kNm)

The continuous hardware slot running around the inside of the frame profile means that panels can be fastened together anywhere on the frame. This allows adjacent panels to be staggered in height, infinitely.
Self-aligning inter-panel connections and fillers

with the Frami adjustable clamp

**Frami adjustable clamp:**
Permitted tensile force: 1.685 kip (7.5 kN)

Filler gaps can be closed easily and economically with Frami S steel fillers. With the Frami adjustable clamp, the panels are joined so that they are resistant to tensile forces, and are aligned at the same time. The adjustable clamp is placed directly over the cross profile.

In cases where the Frami adjustable clamp would collide with steel fillers, universal walings, etc., it must be located next to the cross profile (instead of directly over it).
Form-tie system

Tying the Frami panels:

Up to a pour height of 9'-0" (2.74 m) (with no vertically stacked panels), **only 2 form-ties** are required in the vertical.

Apart from this, the basic rule here is:

Place a form-tie in every form tie hole within a panel that is not covered by a tie washer (e.g. at a panel joint, only tie one of the two adjoining panels).

Always tie in the bigger (wider) of the two panels.

For exceptions, see "Length adjustment using fillers" and "Vertical stacking of panels".

Form-tie situations

<table>
<thead>
<tr>
<th>in the panel</th>
<th>when panels are vertically stacked</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="9777-232-01" alt="Image" /></td>
<td><img src="9714-202-01" alt="Image" /></td>
</tr>
</tbody>
</table>

- Only use approved tie-rods.
- Never weld or heat tie-rods.

Close off any unneeded tie-holes with Frami S frame-hole plugs.

Note:

Doka also offers economical solutions for creating watertight wall-ties.

For more information, see the User Information booklet "Doka form-ties for special requirements".

Taper-tie system 3/4" to 1"

A Super-plate 15.0
B Taper tie 3/4" to 1" & 5/8" [15.0] ends

For forming wall thicknesses in the 6" to 30" (15.2 to 76.2 cm) range, there are 4 different types of taper tie:

<table>
<thead>
<tr>
<th>Wall thickness:</th>
<th>Form-tie length</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; to 12&quot;</td>
<td>32&quot;</td>
</tr>
<tr>
<td>12&quot; to 18&quot;</td>
<td>38&quot;</td>
</tr>
<tr>
<td>18&quot; to 24&quot;</td>
<td>44&quot;</td>
</tr>
<tr>
<td>24&quot; to 30&quot;</td>
<td>52&quot;</td>
</tr>
</tbody>
</table>

Note:

Always loosen the Super-plate on the thinner end of the taper tie first.

Taper tie 3/4" to 1" & 5/8" [15.0] ends:
Permitted capacity allowing a 2 : 1 factor of safety against failure: 18,000 lbs (80 kN)
She-bolt system 7/8"

A She-bolt 7/8"x19"
B Super-plate 20.0 B
C Tie-rod 15.0mm (length = wall thickness - 4" (10 cm))

She-bolt system 7/8":
Permitted capacity allowing a 2 : 1 factor of safety against failure: 18,000 lbs (80 kN)

Form-tie system 15.0 (5/8"ø)
The Form-tie system 15.0 makes it possible to tie panels in narrow or confined spaces. For areas of application, see "Acute and obtuse-angled corners".

A Super-plate 15.0
B Tie-rod 15.0mm
C Plastic tube 22mm
D Universal cone 22mm

The "Plastic tubes 22mm" left behind in the concrete are sealed off with "Plugs 22mm".

Spanner for tie-rod 15.0/20.0
For turning and holding the tie-rods.

Inclined on one side
max. 4"

Inclined on both sides
max. 2 x 4"

Height mismatch
Form-tie system 15.0:
max. 1/2" per 6" wall thickness
(1.2 cm per 15 cm)

Taper tie 3/4" to 1" & 5/8" [15.0] ends:
max. 1/4" per 6" wall thickness
(0.6 cm per 15 cm)

Note:
Secure inclined panels against uplift.
### Form-tie situations

<table>
<thead>
<tr>
<th>Pour height up to 6'-0&quot; (1.82 m)</th>
<th>Pour height up to 8'-0&quot; (2.44 m)</th>
<th>Pour height up to 9'-0&quot; (2.74 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram 1" /></td>
<td><img src="image2.png" alt="Diagram 2" /></td>
<td><img src="image3.png" alt="Diagram 3" /></td>
</tr>
<tr>
<td><img src="image4.png" alt="Diagram 4" /></td>
<td><img src="image5.png" alt="Diagram 5" /></td>
<td><img src="image6.png" alt="Diagram 6" /></td>
</tr>
<tr>
<td>Stack max. 3'-0&quot; on top of one 6'-0&quot; high basic panel!</td>
<td>Stack max. 3'-0&quot; on top of one 6'-0&quot; high basic panel!</td>
<td>Stack max. 3'-0&quot; on top of one 6'-0&quot; high basic panel!</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pour height up to 10'-0&quot; (3.05 m)</th>
<th>Pour height up to 12'-0&quot; (3.66 m)</th>
<th>Pour height up to 15'-0&quot; (4.57 m)</th>
<th>Pour height up to 18'-0&quot; (5.48 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image7.png" alt="Diagram 7" /></td>
<td><img src="image8.png" alt="Diagram 8" /></td>
<td><img src="image9.png" alt="Diagram 9" /></td>
<td><img src="image10.png" alt="Diagram 10" /></td>
</tr>
<tr>
<td><img src="image11.png" alt="Diagram 11" /></td>
<td><img src="image12.png" alt="Diagram 12" /></td>
<td><img src="image13.png" alt="Diagram 13" /></td>
<td><img src="image14.png" alt="Diagram 14" /></td>
</tr>
<tr>
<td>Stack vertically or horizontally</td>
<td>Stack vertically or horizontally</td>
<td>Stack vertically</td>
<td>Stack vertically</td>
</tr>
</tbody>
</table>

**Pour height**
- up to 6'-0" (1.82 m)
- up to 8'-0" (2.44 m)
- up to 9'-0" (2.74 m)
- up to 10'-0" (3.05 m)
- up to 12'-0" (3.66 m)
- up to 15'-0" (4.57 m)
- up to 18'-0" (5.48 m)
Length adjustment using fillers

Filler gaps: 1" - 6" (2.5 - 15 cm)

with steel fillers and adjustable clamps

By combining the steel filler widths of 1", 1 1/2", and 2" in various ways, the closures can be made in 1/2" (13 mm) increments.

Note:

Form ties can be placed through the 2" (5 cm) wide Frami S steel filler. The steel filler through which the tie is being placed must be fitted in a central position.

Any unneeded tie-holes in the steel filler should be closed off with Frami plugs.

Frami universal waling:
Permitted moment: 0.96 kip-ft (1.3 kNm)

Note:

Where form-ties are inserted through the panel frames, the Universal waling must rest on the cross profile.

Tying through the panel

(A) Universal waling in the horizontal (over the cross profile)
(B) Universal waling at an angle (so that it rests on the cross profile)

Note:

We also offer a number of other solutions for filler widths of 2", 3", and 6" (5, 7.6 and 15 cm).
Vertical stacking with fillers
Due to the space constraints encountered here, the Universal waling is generally positioned on the panel joint at an angle.

Formwork height: 15'-0" (4.57 m)

Formwork height: 12'-0" (3.66 m)

Tying at the panel joint (through the filler)

Tying at the panel joint (through the panel)

(C) Universal waling at an angle

(D) Universal waling at an angle
Filler width 1" (2.5 cm)
Place form-ties in panel, with universal waling

Filler width 2" (5.1 cm)
Place form-ties in panel, without universal waling.

Filler width 1 1/2" (3.8 cm)
Place form-ties in panel, with universal waling

Filler width 2 1/2" (6.4 cm)
Place form-ties in panel, with universal waling

Filler width 2" (5.1 cm)
Place form-ties in panel, with universal waling

Filler width 3" (7.6 cm)
Place form-ties in panel, with universal waling

1 Frami S steel filler 1"

1 Frami S steel filler 2"

1 Frami S steel filler 1 1/2"

1 Frami S steel filler 1"
1 Frami S steel filler 1 1/2"

2 Frami S steel fillers 1"

2 Frami S steel fillers 1 1/2"
**Wall formwork**

**Filler width 3" (7.6 cm)**
Place form-ties in filler, with universal waling

1 Frami S steel filler 1"
1 Frami S steel filler 2"

---

**Filler width 4 1/2" (11.4 cm)**
Place form-ties in filler, with universal waling

1 Frami S steel filler 1"
1 Frami S steel filler 1 1/2"
1 Frami S steel filler 2"

---

**Filler width 3 1/2" (8.9 cm)**
Place form-ties in filler, with universal waling

1 Frami S steel filler 1 1/2"
1 Frami S steel filler 2"

---

**Filler width 4" (10.2 cm)**
Place form-ties in filler, with universal waling

2 Frami S steel fillers 2"

---

**Filler width 5" (12.7 cm)**
Place form-ties in filler, with universal waling

2 Frami S steel fillers 1 1/2"
1 Frami S steel filler 2"

---

**Filler width 5 1/2" (14 cm)**
Place form-ties in filler, with universal waling

1 Frami S steel filler 1 1/2"
2 Frami S steel fillers 2"

A Frami adjustable clamp
B Frami S steel filler
C Frami universal waling
D Form-tie
**Filler width: 6" (15.2 cm)**

Place form-ties in filler, with universal waling

3 Frami S steel fillers 2"
- **A** Frami adjustable clamp
- **B** Frami S steel filler
- **C** Frami universal waling
- **D** Form-tie

A combination of three Frami S steel fillers 2" is used if it is necessary to tie through a 6" (15 cm) filler.

**Filler width: 6" (15.2 cm)**

with 6" framed panel

**A** Frami clamp
**B** Frami S panel 6"x9'-0"
**C** Form-tie

- **a** ... 14" (35.5 cm)
- **b** ... 12" (30.5 cm)

**A** Frami S inside corner
**B** Frami S outside corner
**C** Frami clamp
**D** Frami adjustable clamp
**E** Frami universal waling
**F** Frami S steel filler
**G** Frami S panel 2'-0"
**H** Frami S panel 2'-0"
using filler angles and plywood

Required numbers of Frami clips:

<table>
<thead>
<tr>
<th>Frami S filler angle 3/4&quot;</th>
<th>N° of units</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot;</td>
<td>2</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>2</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>3</td>
</tr>
<tr>
<td>9'-0&quot;</td>
<td>4</td>
</tr>
</tbody>
</table>

Important note:
Where tensile loads occur (on corners and bulkheads), suitable tension anchoring must be provided.

Filler width: 4" - 10" (10.2 - 25.4 cm)

Frami S filler angle
Frami clip
Plywood 3/4"
Dimensional lumber 2 3/4"
Frami universal waling 0.70m and 1.25m
Frami wedge clamp
Form-tie

Filler width: > 10" - 20" (> 25.4 - 50.8 cm)

A Frami S filler angle
B Frami clip
C Plywood 3/4"
D Dimensional lumber 2 3/4"
E Frami universal waling 0.70m and 1.25m
F Frami wedge clamp
G Form-tie

a ... > 10" to 20" (> 25.4 to 50.8 cm)

a ... 4" to 10" (10.2 to 25.4 cm)
Possible ways of attaching Universal walings:

For accessories with an overall height of 2” (5 cm) (Frami universal waling (E)):
- Frami wedge clamps (F)

For accessories with an overall height of 2” to 4” (5 cm to 10 cm) (e.g. Framax S universal waling (H)):
- Frami universal fixing bolt (I) + Super-plate (J)
90 degree corners

The corner solutions are based on the strong, torsion-proof Frami inside corner.

with a Frami outside corner

The Frami outside corner is an easy and problem-free way of forming corners in narrow trench situations or where large wall thicknesses are called for.

Required numbers of Frami clamps and Frami clip:

<table>
<thead>
<tr>
<th>Outside corner</th>
<th>Up to a wall thickness of</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16&quot; (41 cm)</td>
</tr>
<tr>
<td>Outside corner 3'-0&quot;</td>
<td>4</td>
</tr>
<tr>
<td>Outside corner 4'-0&quot;</td>
<td>6</td>
</tr>
<tr>
<td>Outside corner 6'-0&quot;</td>
<td>6</td>
</tr>
<tr>
<td>Outside corner 9'-0&quot;</td>
<td>10</td>
</tr>
</tbody>
</table>

1) Number of Frami clips

There are 2 ways of forming right-angled outside corners:
- with a Frami universal panel
- with a Frami outside corner

For details regarding extra clamps on outside corners (for increased tensile loads) see "Inter-panel connections for increased tensile loads".
Example with a wall thickness of 28" (71 cm)

- A Frami S inside corner
- B Frami S outside corner
- C Frami clamp + Frami clip
- D Frami adjustable clamp
- E Frami universal waling
- F Frami S steel filler
- G Frami S panel 3'-0"
- H Frami S panel (max. 2'-0"

Example with a wall thickness of 30" (76 cm)

- A Frami S inside corner
- B Frami S outside corner
- C Frami clamp + Frami clip
- D Frami universal waling
- E Framax S universal waling
- F Frami S panel 3'-0"
- G Frami S panel 6"
- H Frami S panel (max. 2'-0"

9777-382-02

9777-383-02
with a Frami universal panel

When this panel is used, a wall-thickness grid with 2" (5.1 cm) increments is available.

Attainable wall thicknesses in a 2" (5.1 cm) increment-grid:

![Diagram showing wall formwork with Frami universal panel]

Required numbers of Frami universal fixing bolts + Super-plates 15.0:

<table>
<thead>
<tr>
<th>Universal panel</th>
<th>Required numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot;x3'-0&quot;</td>
<td>2</td>
</tr>
<tr>
<td>3'-0&quot;x4'-0&quot;</td>
<td>3</td>
</tr>
<tr>
<td>3'-0&quot;x6'-0&quot;</td>
<td>4</td>
</tr>
<tr>
<td>3'-0&quot;x9'-0&quot;</td>
<td>6</td>
</tr>
</tbody>
</table>

Chamfer Edges

with triangular chamfer

Triangular chamfers can also be used on corners formed using the Universal panel.

![Diagram showing chamfered corners with Frami S panel]

Note:

When steel fillers are used, it is also possible to handle wall thicknesses of up to 24" (61 cm).
T-junction with Frami inside corner

Wall thicknesses up to 20" (50.8 cm)

Where 4" steel fillers are used on both sides, wall thicknesses of up to 20" (50.8 cm) can be formed.

Wall thicknesses up to 30" (76.2 cm)

9777-282-01

A Frami S inside corner
B Frami clamp
C Frami S panel 3'-0"

A Frami S inside corner
B Frami clamp
C Frami S panel 3'-0"
D Frami S panel 1'-6"
E Multi-purpose waling WS10 Top50 6'-0"
F Frami universal waling

a ... 12" (30.5 cm)

a ... 30" (76.2 cm)
Pilasters

Pilasters can be formed quickly using pilaster panels.

The pilaster panel permits pilaster depths of up to 20" (51 cm) in 2" (5.1 cm) increments, and of 24" (61 cm) when outside corners are used.

2 positions / functions:

- bolted in place at right-angles → for pouring
- folded closed → for stripping and resetting the formwork

Required number of connectors per pilaster:

<table>
<thead>
<tr>
<th>Panel height</th>
<th>Universal fixing bolts + Super-plates 15.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot;</td>
<td>4</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>4</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>6</td>
</tr>
<tr>
<td>9'-0&quot;</td>
<td>8</td>
</tr>
</tbody>
</table>
T-junction  
with Frami pilaster panel

Wall thicknesses from 26" to 28" (66 to 71 cm)

Wall thicknesses up to 30" (76.2 cm)
Acute and obtuse-angled corners

Frami also has the perfect solution ready for acute and obtuse-angled corners - the Frami hinged corners.

### Hinged inside corner I

| a | 1/4" (0.7 cm) |
| b | 9 5/8" (24.3 cm) |

### Hinged outside corner A

| a | 3 1/4" (4.6 cm) |
| b | 5 1/8" (13.1 cm) |

When preparing the corners, remember the following points:

With angles of 120° and upward, Universal walings must be used on the inside corner (at every support level of the hinged corner).

On outside corners, Universal walings should generally be positioned (4 Universal walings per 9'-0" (2.74 m) pour height).

If there are fillers, fit extra Universal walings as shown in "Length adjustment using fillers".

For details regarding extra clamps on outside corners (for increased tensile loads) see "Inter-panel connections for increased tensile loads".

### Number of Frami clamps needed in the whole hinged outside corner (i.e. for both sides):

<table>
<thead>
<tr>
<th>Panel height</th>
<th>Width of panel next to hinged outside corner up to 2'-0&quot;</th>
<th>Width of panel next to hinged outside corner up to 3'-0&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot;</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>9'-0&quot;</td>
<td>8</td>
<td>12</td>
</tr>
</tbody>
</table>

Note:

Acute-angled (pointed) corners are tied using the Form-tie system 15.0 (5/8”Ø). This makes it possible to form angles of as little as 60°.
135° - 180° angles, with hinged inside corner I only

- **A** Frami S hinged inside corner I
- **B** Frami clamp
- **C** Frami universal waling
- **D** Frami wedge clamp
- **E** Form-tie
- **F** Frami S panel

**User information**

- **Doka framed formwork Frami**

**Doka framed formwork**

The Formwork Experts

9777-240-01

9777-243-01

9777-240-02

| 135° |

999777014 - 01/2009 NK
Shaft formwork

Shaft formwork with Bias-cut corner I

With the Bias-cut corner I, the entire shaft formwork unit is detached from the wall, in one piece, before being lifted and reset by crane.

Product features:
● No negative impression in the concrete.
● Formwork set-up and stripping function integrated in the inside corner (no need for crane – uses stripping spindles).
● Entire shaft formwork unit is lifted and reset in one piece (with lifting hooks and four-part lifting chain).

Stripping play:

- a ... 1 1/8" (30 mm)
- b ... 2 1/4" (60 mm)

Position of fillers (fitting-timbers) in the inside shaft formwork:
● as close as possible to the middle of the formwork
● not directly next to the bias-cut corners
Joining gangs
The Framax bias-cut corner I is joined onto the Frami panels by means of Framax quick-acting clamps RU. The difference in thickness between the profiles is bridged here by the Frami profile adapter.

Number of Framax quick-acting clamps RU needed:

<table>
<thead>
<tr>
<th>Height of Bias-cut corner I</th>
<th>Panel height</th>
<th>Number of clamps</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.35 m</td>
<td>3'-0&quot;</td>
<td>4</td>
</tr>
<tr>
<td>1.35 m</td>
<td>4'-0&quot;</td>
<td>4</td>
</tr>
<tr>
<td>2.70 m</td>
<td>6'-0&quot;</td>
<td>6</td>
</tr>
<tr>
<td>2.70 m</td>
<td>9'-0&quot;</td>
<td>6</td>
</tr>
</tbody>
</table>

In order to obtain the full available stripping-play, make sure that the Framax quick-acting clamps RU are mounted at staggered heights (i.e. not opposite one another).

Tying the panels
When tying the shaft formwork, the tie-hole positions of the Frami panels should be used. The difference in thickness between the profiles is bridged here by the Frami tie-adapter.

Vertical stacking of Framax bias-cut corners I
1) Pull out the coupling bolt.
2) Maneuver the Bias-cut corner I into place so that it is flush with the one below it.
3) Push the coupling bolt back in.
4) Bolt the Bias cut corners I together with two hexagonal bolts.

Mounting the Framax stripping spindle I
1) Pull out the U-bolt from the stripping spindle.
2) Place the stripping spindle on the centering stud of the bias-cut corner.
3) Twist the stripping spindle clockwise until fully engaged.
4) Position the ratchet between the holes in the push-rod.
5) Fix the stripping spindle with the U-bolt.
Operating the Framax stripping spindle I with ratchet
➤ Screw a Tie-rod 15.0mm into the Weldable coupler 15.0 of the ratchet.
➤ Setting up:
  - shift the change-over lever into the "L" position
  - turn the ratchet clockwise.
➤ Stripping:
  - shift the change-over lever into the "R" position
  - turn the ratchet anti-clockwise.

![Diagram of Framax stripping spindle]

- A Tie-rod 15.0mm
- B Weldable coupler 15.0
- C Ratchet
- D Change-over lever

You can also use a formwork hammer to operate the ratchet, instead of a Tie-rod 15.0mm.

Resetting by crane

Resetting by crane:

![Diagram of resetting by crane]

- A Frami lifting hook
- B Four-part lifting chain (e.g. Doka 4-part chain 3.20m)

⚠ The crane hook on the Bias-cut corner I is not allowed to be used for lifting the shaft formwork.
  ➤ The shaft formwork may only be reset using lifting hooks.

Permitted weight of the shaft formwork:
4400 lbs (2000 kg) with 4 Frami lifting hooks

Doka shaft platform

With its telescopic shaft beams, this platform can accommodate any dimension of structure. The inside formwork can be "parked" on the platform and repositioned together with the platform.

The Frami panel shoe provides increased stability on shaft platforms.

![Diagram of Doka shaft platform]

- E Frami panel shoe

Follow the directions in the "Doka shaft platform" User Information booklet.
Inter-panel connections for increased tensile loads

As a basic rule, only 3 clamps are needed per 9'-0" panel height, and 2 clamps per 6'-0", 4'-0" and 3'-0" panel height, as tension links between the panels. However, where increased tensile loads need to be sustained, especially near outside corners and bulkheads, extra clamps are needed.

Near bulkheads

for wall thicknesses from 16" to 24" (40 to 61 cm)

![Diagram]

<table>
<thead>
<tr>
<th>Number of clamps</th>
<th>Panel height</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In zone “X1” (panel joints within 6'-0&quot; (1.8 m) of a bulkhead)</td>
</tr>
<tr>
<td>9'-0&quot;</td>
<td>3 + 1</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>2 + 1</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>2</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>2</td>
</tr>
</tbody>
</table>

for wall thicknesses of over 24" and up to 30" (61 cm and up to 76 cm)

![Diagram]

<table>
<thead>
<tr>
<th>Number of clamps</th>
<th>Panel height</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In zone “X1” (panel joints up to 6'-0&quot; (1.8 m) away from a bulkhead)</td>
</tr>
<tr>
<td>9'-0&quot;</td>
<td>3 + 2</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>2 + 1</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>2</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>2</td>
</tr>
</tbody>
</table>
Near outside corners

for panel widths up to 2'-0"

Panel height | Number of clamps in zone "X1" (panel joints within 6'-0" (1.8 m) of an outside corner) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9'-0&quot;</td>
<td>3 + 1</td>
<td></td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>2 + 1</td>
<td></td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

e ... up to 2'-0" (panel width)

e ... > 2'-0" up to 3'-0" (panel width)

for panel widths over 2'-0" and up to 3'-0"

Panel height | Number of clamps in zone "X1" (panel joints within 6'-0" (1.8 m) of an outside corner) | Number of clamps in zone "X2" (panel joints 6'-0" to 10'-0" (1.8 to 3.0 m) from an outside corner) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9'-0&quot;</td>
<td>3 + 3</td>
<td>3 + 1</td>
<td></td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>2 + 2</td>
<td>2 + 1</td>
<td></td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>2 + 1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
for panel widths of over 3'-0" and up to 3'-6"

<table>
<thead>
<tr>
<th>Panel height</th>
<th>In zone “X1” (panel joints up to 6'-0&quot; (1.8 m) away from an outside corner)</th>
<th>In zone “X2” (panel joints between 6'-0&quot; and 10'-0&quot; (1.8 to 3.0 m) away from an outside corner)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9'-0&quot;</td>
<td>3 + 3</td>
<td>3 + 2</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>2 + 2</td>
<td>2 + 1</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>2 + 1</td>
<td>2</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
Bulkhead formwork

There are 3 possible ways of forming bulkheads:
- with Universal panels
- with Universal walings
- with outside corners

with Universal walings

The Universal waling makes it possible to form bulkheads continuously across any thickness of wall. The Universal walings are mounted using Universal fixing bolts 5-12cm and Super-plates 15.0.

<table>
<thead>
<tr>
<th>Positioning the Universal walings where the formwork height is 9'-0&quot; (2.74 m):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls up to 16&quot; (40 cm) thick</td>
</tr>
<tr>
<td>3 Frami universal walings</td>
</tr>
</tbody>
</table>

- Frami universal fixing bolt:
  - Permitted tensile load:
    - 2.92 kip (13.0 kN), when used in a standard panel
    - 3.51 kip (15.6 kN), when used in a Universal panel

- Frami universal waling:
  - Permitted moment: 0.96 kip-ft (1.3 kNm)

- Framax S universal waling:
  - Permitted moment: 3.85 kip-ft (5.2 kNm)

For details regarding extra clamps on bulkheads (for increased tensile loads) see "Interpanel connections for increased tensile loads".
with Universal panels
The continuous hole grid on the Universal panels makes it possible to form bulkheads in 2" (5.1 cm) increments.

with standard panel
For walls whose thickness corresponds exactly to the panel width.

Required numbers of Frami clamps per bulkhead:

<table>
<thead>
<tr>
<th>Panel height</th>
<th>Frami clamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot;</td>
<td>8</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>8</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>12</td>
</tr>
<tr>
<td>9'-0&quot;</td>
<td>16</td>
</tr>
</tbody>
</table>

The values given here apply up to a wall thickness of 24" (61 cm).

Required numbers of connectors:

<table>
<thead>
<tr>
<th>Panel height</th>
<th>Universal fixing bolt + Super-plate</th>
<th>Frami clamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot;</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>9'-0&quot;</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

The values given here apply up to a wall thickness of 24" (61 cm).
Wall junctions

Right-angled connections

with Universal panels

[Diagram]

- A Frami S universal panel
- B Tie-rod 15.0 (on the Universal panel 9'-0", 3 form-ties are required)
- C In-place timber brace

with standard panels and dimensional lumber:

[Diagram]

- A Frami S panel
- B Dimensional lumber, max. 4" (10 cm)
- C Universal waling (not needed where the dimensional lumber is up to 2" (5 cm) wide)
- D Frami wedge clamp
- E Form-tie
- F In-place timber brace

In-line connections

with Universal panels

[Diagram]

- A Frami S universal panel
- B Tie-rod 15.0

<table>
<thead>
<tr>
<th>Form-tie position X</th>
<th>Number of form-ties in the Universal panel 9'-0&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 6&quot; (15 cm)</td>
<td>4</td>
</tr>
<tr>
<td>up to max. 10&quot; (25 cm)</td>
<td>6</td>
</tr>
</tbody>
</table>

with standard panels and dimensional lumber:

[Diagram]

- A Frami S panel
- B Dimensional lumber
- C Adjustable clamp
- D Form-tie

X ... max. 2" (5 cm)

with a standard panel from the previous casting section:

[Diagram]

- A Frami S panel
- B Form-tie
Corner connections

with standard panels and dimensional lumber:

A Frami S panel
B Dimensional lumber, max. 4" (10 cm)
C Frami S panel 6"
D Universal walings (not needed where the dimensional lumber is up to 2" (5 cm) wide)
E Frami wedge clamp
F Frami clamp
G Form-tie
H In-place timber brace

A Frami S panel
B Dimensional lumber, max. 2" (5 cm)
C Dimensional lumber
D Adjustable clamp
E Form-tie
F In-place timber brace
### Vertical stacking of panels

**Positions of the interconnecting and form-tie components and accessories needed for:**
- lifting and setting down
- crane-handling
- platform loads
- pouring

**Note:**
When panels are vertically stacked, the arrows point upward.

**Frami clamp:**
- Permitted tensile force: 2.245 kip (10.0 kN)
- Permitted shear force: 1.12 kip (5.0 kN)
- Permitted moment: 0.15 kip-ft (0.20 kNm)

**Frami universal waling:**
- Permitted moment: 0.96 kip-ft (1.3 kNm)

- A Tie-rod + Super-plate 15.0
- B Frami clamp
- C Frami wedge clamp
- D Frami universal waling 1.25m

**Important note:**
Do not oil or grease wedge-clamped joints.

**Formwork height:**
- 6'-0" to 8'-0" (183 to 244 cm)

**Formwork height:**
- 7'-6" to 9'-0" (228 to 274 cm)

**Formwork height:**
- 8'-6" and 9'-0" (259 and 274 cm)

**Formwork height:**
- 9'-6" and 10'-0" (289 and 305 cm)

Stack max. 3'-0" on top of one 6'-0" high basic panel!
Formwork height:
10'-0" (305 cm)

Formwork height:
10'-6" to 12'-0" (320 to 365 cm)

Formwork height:
12'-0" (365 cm)

Formwork height:
12'-6" and 13'-0" (381 and 396 cm)

Formwork height:
13'-0" (396 cm)
Wall formwork

Formwork height:
13'-6" to 15'-0" (411 to 457 cm)

Formwork height:
14'-6" and 15'-0" (442 and 457 cm)

Formwork height:
15'-0" (457 cm)

Formwork height:
15'-6" and 16'-0" (472 and 487 cm)
Formwork height: 15'-6" and 16'-0" (472 and 487 cm)

Formwork height: 16'-6" to 18'-0" (503 to 548 cm)

Formwork height: 16'-6" to 18'-0" (503 to 548 cm)

Formwork height: 18'-0" (548 cm)
Note:
When adding narrow gangs, observe the following rules for vertical stacking of panels:

The illustrations given here show the most economical solutions for each formwork height.
Other combinations require correspondingly more connector components.
Notes
**Plumbing accessories**

The Frami plumbing strut 260, Struts 340 / 540, and the Pipe brace 12'-0"-21'-0", ensure that the formwork remains stable against wind loads, and make it easier to plumb and align the formwork.

**Important note:**
The formwork gangs must be securely braced in every phase of the construction work!
Observe all applicable safety rules!

Caution!
There is a risk of the formwork tipping over in high winds.

- If high wind speeds are likely, and when work finishes for the day or before prolonged work-breaks, always take extra precautions to fix the formwork in place.

**Suitable precautions:**
- set up the opposing formwork
- place the formwork against a wall
- anchor the formwork to the ground

**Permitted spacing of the struts:**

<table>
<thead>
<tr>
<th>Formwork height</th>
<th>Plumbing strut 260</th>
<th>Struts 340*</th>
<th>Struts 540 / Pipe brace 12'-0&quot;-21'-0&quot;**</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'-0&quot; (1.83 m)</td>
<td>9'-0&quot; (2.75 m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9'-0&quot; (2.75 m)</td>
<td>4'-6&quot; (1.37 m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12'-0&quot; (3.66 m)</td>
<td></td>
<td>12'-0&quot; (3.66 m)</td>
<td></td>
</tr>
<tr>
<td>15'-0&quot; (4.57 m)</td>
<td></td>
<td>12'-0&quot; (3.66 m)</td>
<td></td>
</tr>
<tr>
<td>18'-0&quot; (5.48 m)</td>
<td></td>
<td>9'-0&quot; (2.75 m)</td>
<td></td>
</tr>
</tbody>
</table>

Max. anchoring load: 3.0 kip (13.5 kN)

Values apply up to a wind pressure of 15 psf (0.72 kN/m²). In cases where higher wind pressure is encountered, the number of props must be determined by statical calculation.

* in conjunction with the Frami S bracing head or the Frami S connection profile.

**Note:**
Every gang-form must be supported by at least 2 panel struts.

For more information (wind loads etc.) see the section headed "Vertical and horizontal loads" in the Doka Calculation Guide.

**Fixing to the floor**

► Anchor the plumbing accessories in such a way as to resist tensile and compressive forces!

**Boreholes in the footplates**

<table>
<thead>
<tr>
<th>Plumbing strut 260</th>
<th>Struts 340 / 540</th>
<th>Pipe brace 12'-0&quot;-21'-0&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>a ... 1&quot;ø (26 mm)</td>
<td>b ... 1 1/16&quot;ø (18 mm)</td>
<td>c ... 1 1/16&quot;ø (27 mm)</td>
</tr>
<tr>
<td>d ... 13/16&quot;ø (20 mm)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Anchoring the footplate**
The Doka Express anchor can be re-used many times over - the only tool needed for screwing it in is a centering fork-wrench or a rebar.

Cylinder compressive strength of concrete: min. 3000 psi (20 N/mm²)

Follow the Fitting Instructions!

**Required safe working load of alternative anchor for foot-plates:** min. 3.0 kip (13.5 kN)
Follow the manufacturer’s applicable fitting instructions.
The rule-of-thumb here is:
The length of the struts or pipe-braces should be the same as the height of the panel to be supported.

➤ Use the nail-holes to fasten the panels to the ground or sills.

**Plumbing strut 260**

**Fixing the struts to the formwork**

➤ Fix the Plumbing strut into the cross boreholes in the cross profiles (frame profiles) with a pin.

---

**Strut 540**

**Pipe brace 12'-0"-21'-0"**

---

**Strut 340**

---
Fixing the struts to the formwork

with Frami S bracing head
The Frami S bracing head allows bracing to be attached to the frame profile.

Fixing the Frami S bracing head to Struts 340 / 540 (A)
➤ Attach the Frami S bracing head to the strut with the included bolt and spring cotter.

Fixing the Frami S bracing head to the Pipe brace 12'-0"-21'-0" (B)
➤ Attach the Frami S bracing head to the pipe brace using a speed bolt and speed nut.

Attaching the Frami S bracing head to the frame profile
1) Place the bracing head onto an empty cross profile.
2) Slide the bracing head until it is flush with the frame profile.
   The stud-pins will slide into the cross boreholes of the frame profiles.
3) Push the U-bolt to secure the head in place.
with Frami S connection profile

This connection method is used on column formwork, circular formwork and wherever it is not possible to attach the Frami S bracing head to the frame profile.

The Frami S connection profile is suitable for both Frami standard and universal panels.

➤ Use Frami wedge clamps to fasten the Frami S connection profile in the cross boreholes of the cross-profiles or frame profiles.

On framed panels

On universal panels

On the panel joint (stacked horizontally)

Attaching the struts to the Frami S connection profile

On the Frami S connection profile there are connection points for the Pipe brace 12'-0"-21'-0" and for the Struts 340 / 540.

➤ Guide the Pipe brace 12'-0"-21'-0" to the relevant connection point and fix it in place with a speed bolt and speed nut.

➤ If using Struts 340 / 540, attach the Frami S connection profile with a bolt and a spring cotter.
Pouring platforms with single brackets

The Frami brackets 60 enable you to assemble pouring platforms that can easily be mounted by hand.

**Preconditions for use:**

Only fix the pouring platform onto formwork constructions that are sufficiently stable to transfer the expected loads.

Also brace the formwork in a windproof manner when erecting it and when it is temporarily "parked" in the standing position.

Ensure that the formwork gang has sufficient stiffness.

Observe all applicable safety rules.

**with Frami bracket 60**

The Frami bracket 60 is a "use-anywhere" bracket for making pouring platforms (platform width 2'-0" (60 cm)).

**Note:**

The scaffold planks and guard-rail material shall meet or exceed any local, state, provincial or national regulations.

Plank thicknesses for support centers of up to 6'-6"
(2.00 m):

- 2 scaffold planks 2 x 10, min. 1 1/2 x 9 1/2" (4 x 24 cm)
- 1 scaffold plank 2 x 6, min. 1 1/2 x 5 1/2" (4 x 14 cm)
- 2 guard-rail planks 2 x 4, min. 1 1/2 x 3 1/2" (4 x 9 cm)
- 1 guard-rail plank 2 x 6, min. 1 1/2 x 5 1/2" (4 x 14 cm)
  (toe-board)

**Fastening the scaffold planks:**

with 3 carriage bolts 3/8-16 x 4 3/4 (cup square screws M 10x120) per bracket (not included with product).

**Fastening the guard-rail boards:** Use nails

---

**Permitted service load:** 25 psf (120 kg/m²)

Max. influence width: 6'-0" (1.80 m)

Complies with the following Standards:

- OSHA 1926, Subpart L
- CAN/CSA S269.2 - "Access Scaffolding for Construction Purposes" (light-duty scaffolds)

The brackets must be secured against accidental lift-out

Multi-panel gangs without an opposing formwork and with pouring platforms must be fixed on the ground so as to prevent slippage.

On upright panel (fixed in the cross profile)
On horizontal panel (fixed in the cross profile)

On upright or horizontal panel (fixed in the frame profile)

Sideguards on exposed platform-ends

On pouring scaffolds that do not completely encircle the structure, suitable sideguards must be placed across exposed end-of-platform zones.

with Handrail clamp S

Note:
The scaffold planks and guard-rail material shall meet or exceed any local, state, provincial or national regulations.

The sideguard consists of:
- 2 Handrail clamps S
- 2 guard-rail planks min. 1 1/2" x 3 1/2" (4 x 9 cm), site-provided
- 1 guard-rail plank min. 1 1/2" x 5 1/2" (4 x 14 cm), site-provided

How to mount:
➤ Fasten the handrail clamps to the deck planking of the pouring scaffold, using the wedge (clamping range 1" - 1 1/2" (2 to 43 cm)).
➤ Secure the guardrail planks to the loops on the handrail clamps with one d10 (28x65) nail per loop.

Follow the directions in the User Information booklet "Handrail clamp S"!

When the platform is fixed in the frame profile, the formwork does not provide any fall-protection.
➤ For this reason, mount an opposing guard-rail on the opposing formwork.
Resetting by crane

Safe crane-handling of Frami is made possible by the Doka 4-part chain 3.20m and the Frami lifting hook. The lifting hook locks automatically after being hung into place.

Doka 4-part chain 3.20m

➤ Attach the Doka 4-part chain 3.20m to the Frami lifting hooks.
➤ Hang the remaining chain-lengths back in place.

Max. load-bearing capacity (as 2-part chain):
Up to spread-angle $\beta$ of 30°: 5200 lbs (2400 kg).

Max. load:
1100 lbs (500 kg) per Frami lifting hook
Area of formwork that can be lifted with 2 lifting hooks: approx. 270 sq.ft. (25 m²)

Follow the directions in the Operating Instructions!

Positioning the lifting hooks

● Never use the lifting hook to move the gangs in a horizontal position.
● Always position the lifting hook over the panel joint, to prevent the hook sliding from side to side.
Exception: On horizontally-placed panels, the lifting hook must be placed over a cross profile.
● Suspend the gang-form symmetrically (center-of-gravity position).
● Spread-angle $\beta$ max. 30°!
How to operate the lifting hook

1) Raise the handle (locking lever) as far as it will go.
2) Push the lifting hook onto the frame profile as far as the rear stop, and close the handle (spring-loaded).
   
   Do a sight-check to make sure that there is a secure form-fit between the lifting hook and the frame profile!
   The handle must be closed!

3) When the panels are lifted by the crane, a load-dependent locking mechanism is activated.

Stripping and resetting the panels

Before lifting: Remove any loose items from the formwork and platforms, or secure them firmly.

Important note:

➤ Guiding the gang should be done with tag-lines that are long enough to keep the person who is doing the guiding out of the way of the gang.

Warning!
The formwork tends to adhere to the concrete. When stripping the formwork, do not try to break concrete cohesion using the crane!
Risk of crane overload.
➤ Use suitable tools such as timber wedges or a special pry-bar to detach the formwork from the concrete.

➤ Fly the gang to its next location (guide with tag-lines if necessary).
Transporting, stacking and storing

Bundling the panels
1) Place sleepers (W x H approx. 4” x 4” (10 x 10 cm)) under the cross profile.
2) Strap the sleepers and the bottom framed panel together with metal banding.

⚠️ Caution!
- Stack max. 10 panels on top of one another (results in a stack height, incl. sleepers, of approx. 3’-4” (100 cm)).
3) Strap the whole stack together tightly with metal banding.

Transporting the panels

Dokamatic lifting strap 13.00m
The Lifting strap 13.00m is a practical tool for offloading and loading trucks, and for lifting and setting down stacks of panels.

With closely stacked bundles of panels:
- lever up the bundle of panels (e.g. with a piece of dimensional lumber (D)), to make a space for threading in the lifting straps.

⚠️ Caution!
When doing this, always make sure that the bundle of panels remains stable!

⚠️ Warning!
- The Lifting straps 13.00 m may only be used as shown here if there is no risk of the straps sliding towards one another, or of the load being displaced.

Max. load: 4400 lbs (2000 kg)

Follow the directions in the Operating Instructions!
**Doka 4-part chain 3.20m**

The Doka 4-part chain 3.20m is a multi-functional slinging means:
- used with the integrated eye-hooks for hoisting formwork, platforms and multi-trip packaging containers
- used in conjunction with Frami transport hook 2.5kN for hoisting stacks of panels and individual panels

The Doka 4-part chain 3.20m can be adjusted to the center-of-gravity position by shortening the lengths of the individual chains.

**Max. load:**

<table>
<thead>
<tr>
<th>Spread-angle β</th>
<th>0°-30°</th>
<th>30°-45°</th>
<th>45°-60°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using 1 chain</td>
<td>3000 lbs (1400 kg)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Using 2 chains</td>
<td>-</td>
<td>5200 lbs (2400 kg)</td>
<td>4400 lbs (2000 kg)</td>
</tr>
<tr>
<td>Using all 4 chains</td>
<td>-</td>
<td>7900 lbs (3600 kg)</td>
<td>6600 lbs (3000 kg)</td>
</tr>
</tbody>
</table>

Follow the directions in the Operating Instructions!

**Frami transport hook 2.5kN with Doka 4-part chain 3.20m**

Close-up of Frami transport hook 2.5kN

---

**Warning!**

Using the Frami transport hook 2.5kN to lift either single panels or multi-panel gangs into the upright is forbidden.

➤ Use the Frami lifting hook to lift panels or gangs into the upright.

---

**Max. load:**

550 lbs (250 kg) per Frami transport hook 2.5kN
Doka multi-trip packaging

Utilize the benefits of Doka multi-trip packaging on your worksite.
Our Multi-trip packaging such as transport boxes, stacking pallets, accessory boxes and skeleton transport boxes keep everything in place on the site.

Doka multi-trip transport box 1.20x0.80m

The ideal container for all small components:
● durable
● stackable
● safe to lift by crane

The multi-trip transport box is used for delivering e.g.:
● Frami clamps
● Frami adjustable clamps
● Frami universal walings 0.70m
● Frami wedge clamps
● Frami filler angles
● Frami universal fixing bolts 5-12cm

Multi-trip transport box partition

Different items in the Multi-trip transport box can be kept separate with the Multi-trip transport box partitions 1.20m or 0.80m.

Possible ways of dividing the box

<table>
<thead>
<tr>
<th>Multi-trip transport box partition</th>
<th>Lengthways</th>
<th>Crossways</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.20m</td>
<td>max. 3 units</td>
<td>-</td>
</tr>
<tr>
<td>0.80m</td>
<td>-</td>
<td>max. 3 units</td>
</tr>
</tbody>
</table>

Max. load: 3300 lbs (1500 kg)

Follow the directions in the Operating Instructions!
**Column formwork with Frami**

There are several different ways of using Frami framed formwork to make column formworks:

- **with universal panels**
  - for flexible accommodation to column cross-sections of up to 32" x 32" (81 x 81 cm) in 2" (5.1 cm) increments

- **combining Universal panels and standard panels**
  - is a highly economical solution for certain cross-sections of column

- **with standard panels and outside corners**
  - for the dimensions 6", 12", 18" and 24" (15.2 cm, 30.5 cm, 45.7 cm and 61 cm)

Permitted pressure of fresh concrete: 1650 psf (80 kN/m²)
Design of column formwork

- To achieve exact plumbing & aligning of the column formwork, the best arrangement of the panel struts is as shown above.
- Always attach panel struts to free-standing formwork halves to prevent them from falling over.

To obtain the highest possible dimensional accuracy, the panels must be pushed apart (i.e. towards the outside) while being assembled.

with Universal panels

The practical 2" (5.1 cm) hole-grid is ideal for forming columns. Cross-sections of up to 32" x 32" (81 x 81 cm). By combining panels with heights of 9'-0", 6'-0", 4'-0", 3'-0" and 2'-0", an incremental height grid of 1'-0" (30.5 cm) can be achieved.

Possible cross-sections in a 2" (5.1 cm) increment-grid

Example: 16" x 30" (40.6 x 76.2 cm) column

### Materials schedule:

<table>
<thead>
<tr>
<th>Formwork height (H)</th>
<th>Universal panel (A)</th>
<th>Frami clamp (B)</th>
<th>Universal fixing bolt (C)</th>
<th>Super-plate 15.0 (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9'-0&quot; (2.74 m)</td>
<td>4</td>
<td>24</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>10'-0&quot; (3.05 m)</td>
<td>4 4 4 8 28</td>
<td>28 8 28</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>11'-0&quot; (3.35 m)</td>
<td>4</td>
<td>4 8 28</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>12'-0&quot; (3.65 m)</td>
<td>4 4 8 32 32</td>
<td>32 8 32</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>13'-0&quot; (3.96 m)</td>
<td>4 4 8 36 36</td>
<td>36 8 36</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>14'-0&quot; (4.26 m)</td>
<td>4 4 4 16 36</td>
<td>36 8 36</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>15'-0&quot; (4.57 m)</td>
<td>4 4 4 16 44</td>
<td>44 8 44</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>16'-0&quot; (4.87 m)</td>
<td>4 4 4 16 48</td>
<td>48 8 48</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>17'-0&quot; (5.18 m)</td>
<td>4 4 4 16 48</td>
<td>48 8 48</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>18'-0&quot; (5.48 m)</td>
<td>8</td>
<td>48 8 48</td>
<td>48</td>
<td></td>
</tr>
</tbody>
</table>

Table gives number of items needed

A 2'-0" high Universal panel as the topmost panel requires only one Universal fixing bolt 5-12cm + Super-plate at each corner of the column.
with Universal panels and standard panels

Certain cross-sections of column can be formed highly economically by combining Universal panels and standard panels.

Possible cross-sections:

- a ... up to 28" (71 cm), in 2" (5.1 cm) increments
- Example: 16" x 24" (40.6 x 61 cm) column

| A | Frami S universal panel |
| B | Frami S panel (max. 2'-0") |
| C | Frami universal fixing bolt 5-12cm |
| D | Super-plate 15.0 |

Materials schedule:

<table>
<thead>
<tr>
<th>Formwork height (H)</th>
<th>Universal panel (A)</th>
<th>Frami universal fixing bolt 5-12cm (D)</th>
<th>Standard panel (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot; (0.91 m)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>4'-0&quot; (1.22 m)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6'-0&quot; (1.83 m)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>7'-0&quot; (2.13 m)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8'-0&quot; (2.44 m)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>9'-0&quot; (2.74 m)</td>
<td>2</td>
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<tr>
<td>10'-0&quot; (3.05 m)</td>
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<td>13'-0&quot; (3.96 m)</td>
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<tr>
<td>14'-0&quot; (4.26 m)</td>
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<td>18'-0&quot; (5.48 m)</td>
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</table>

Table gives number of items needed
with outside corners and standard panels

The dimensions 6", 12", 18" and 24" (15.2 cm, 30.5 cm, 45.7 cm and 61 cm) can also be formed with outside corners and standard panels.

Example: 18" x 18" (45.7 x 45.7 cm) column
- A Frami S panel (max. 2'-0")
- B Frami S outside corner
- C Frami clamp
- D Triangular chamfer

Materials schedule:

<table>
<thead>
<tr>
<th>Panel height (H)</th>
<th>Standard panel (A)</th>
<th>Outside corner (B)</th>
<th>Frami clamp (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9'-0&quot;</td>
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<td>9'-0&quot;</td>
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</table>

For 24" (61 cm) wide columns, 4 Frami clips for every 9'-0" (2.74 m) of column height are also required in the Frami outside corner.

<table>
<thead>
<tr>
<th>Panel height (H)</th>
<th>Universal panel (A)</th>
<th>Outside corner (B)</th>
<th>Frami clamp (C)</th>
<th>Frami clip (D)</th>
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<tr>
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Example: Outside corners 9'-0" with Frami S universal panels 3'-0"x9'-0"

Important note: For 24" (61 cm) wide columns, 4 Frami clips for every 9'-0" (2.74 m) of column height are also required in the Frami outside corner.

Materials schedule:

<table>
<thead>
<tr>
<th>Panel height (H)</th>
<th>Universal panel (A)</th>
<th>Outside corner (B)</th>
<th>Frami clamp (C)</th>
<th>Frami clip (D)</th>
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</table>

Example: Outside corners 9'-0" with Universal panels 3'-0"x9'-0"

Table gives number of items needed

Example: Outside corners 9'-0" with Universal panels 3'-0"x9'-0"
with column hinge and standard panels

The Frami S column hinge makes for easy opening and closing of the column formwork. This does away with time-consuming assembly and dismantling work. In conjunction with standard panels and outside corners, they can be used to form columns with widths of 6", 12", 18" and 24" (15.2 cm, 30.5 cm, 45.7 cm and 61 cm).

Example: 18" x 18" (45.7 x 45.7 cm) column

<table>
<thead>
<tr>
<th></th>
<th>Frami S panel (max. 2'-0&quot;)</th>
<th>Frami S outside corner</th>
<th>Frami clamp</th>
<th>Frami S column hinge</th>
<th>Hexagon bolt DIN 933 M18x50 8.8 galv. + Hexagon nut DIN 934 M18 8 galv.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Frami S panel (max. 2'-0&quot;)</td>
<td>Frami S outside corner</td>
<td>Frami clamp</td>
<td>Frami S column hinge</td>
<td>Hexagon bolt DIN 933 M18x50 8.8 galv. + Hexagon nut DIN 934 M18 8 galv.</td>
</tr>
</tbody>
</table>

Materials schedule:

Example with standard panel 1'-6"x9'-0"

Example with standard panel 2'-0"x9'-0"

Important note:

- For 24" (61 cm) wide columns, 4 Frami clips for every 9'-0" (2.74 m) of column height are also required in the Frami outside corner.
- For 24" (61 cm) wide columns, 4 bolts for every 9'-0" (2.74 m) of column height are also required in the Frami column hinge.

<table>
<thead>
<tr>
<th>Panel height (H)</th>
<th>Standard panel (A)</th>
<th>Outside corner (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3'-0&quot; 6'-0&quot; 9'-0&quot;</td>
<td>3'-0&quot; 6'-0&quot; 9'-0&quot;</td>
</tr>
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<td>3'-0&quot;</td>
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<td>9'-0&quot;</td>
<td>4</td>
<td>3</td>
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</table>

<table>
<thead>
<tr>
<th>Panel height (H)</th>
<th>Column hinge (D)</th>
<th>Hexagon bolt + hexagon nut (E)</th>
<th>Frami clamp (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot;</td>
<td>1</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>1</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>1</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>9'-0&quot;</td>
<td>1</td>
<td>18</td>
<td>36</td>
</tr>
</tbody>
</table>

Table gives number of items needed.
Pouring platform with Frami bracket 60

Note:
Where the two floor planking units meet, a board must be screwed onto the underside.

For more information on constructing pouring platforms, see "Pouring platforms with single brackets".

A  Frami bracket 60 (floor and railing planking provided at site)
B  Handrail clamp S (railing planking provided at site)
C  Board for screwing the floor planking onto
Footing and grade beam formwork

The Frami panels can also be used for footings and grade beams.
This is particularly advantageous where it is intended to continue forming (i.e. the walls) using the same panels. Footings and grade beams can quickly be formed with any of the Frami panels, with the panels either upright or horizontal. Frami clamps, and a blow with the hammer, are all it takes to join the panels. Length adjustments and corners are solved just as simply as in "normal" walls. A range of practical accessories makes the work very much easier.
**Design of the footing and grade beam formwork**

### Horizontal framed panels

**Tying the panels**
- **at top**: with Frami S top yoke (A) and Frami clip (B)
- **at bottom**: with Frami foundation clamp (C) and Doka perforated tape (D)

In this way, there is no need to place form-ties through the concrete.

**Frami S top yoke 4"-30":**
- Permitted capacity: 1.12 kip (5.0 kN)

**Frami clip:**
- Permitted tensile force: 2.245 kip (10.0 kN)
- Permitted shear force: 1.12 kip (5.0 kN)
- Permitted moment: 0.15 kip-ft (0.20 kNm)

**Frami foundation clamp:**
- Permitted capacity: 1.795 kip (8.0 kN)

**Doka perforated tape**

- **Top tie**
  - **Frami top yoke and Frami clip**
    - These fix the spacing between the panels and
    - permit wall thicknesses of 4" - 30" (10 - 76 cm), in 2" (5.1 cm) increments

- **Number of Frami top yokes (rule-of-thumb):**
  - Horizontal 3'-0" and 4'-0" panels:
    - 1 in each panel
    - 2 in the first panel and the last panel
  - Horizontal 6'-0" and 9'-0" panels:
    - 2 in each panel

- **Bottom tie**
  - **Doka perforated tape and Frami foundation clamp**
    - These fix the spacing between the panels and
    - permit wall thicknesses in 2" (5.1 cm) increments

- **Number of Doka-perforated tapes (rule-of-thumb):**
  - On horizontal panels **up to a formwork height of 2'-6" (76 cm):**
    - 1 per 3'-0" or 4'-0" panel
      - right next to the panel joint
    - 2 per 6'-0" panel
      - right next to the panel joint
    - 2 per 9'-0" panel
      - each 2'-0" (61 cm) from the panel joint
  - On horizontal panels **up to a formwork height of 3'-0" (91 cm):**
    - 1 per 3'-0" panel
      - right next to the panel joint
    - 2 for each 4'-0" or 6'-0" panel
      - right next to the panel joint
    - 3 per 9'-0" panel
      - 2 right next to the panel joint
      - 1, located 4'-0" (122 cm) from the panel joint
Practical example

Framed panel 3'-0"x3'-0"

Horizontal Universal panels

Tying the panels

● In the panel: with Taper tie 3/4" to 1" & 5/8" [15.0] ends

This makes it possible to tie the panels above a joint-sealing tape. The max. tying height is 1'-0" (30 cm) - do not place the tie higher than this!

Pressure bracing

● At top: with Frami top yoke (A) and Frami clip (B)

Universal panel 3'-0"x6'-0"

a ... max. tying height = 1'-0" (30 cm)
b ... 3'-0" (91 cm)

Universal panel 3'-0"x9'-0"

a ... max. tying height = 1'-0" (30 cm)
b ... 3'-0" (91 cm)
Upright panels

Variant 1 - with top yoke and perforated tape

- At top: with Frami top yoke and Frami clip
- At bottom: with Frami foundation clamp and Doka perforated tape

<table>
<thead>
<tr>
<th>Panel width</th>
<th>Max. pour height</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot;</td>
<td>3'-2&quot; (96 cm)</td>
</tr>
<tr>
<td>2'-6&quot;</td>
<td>3'-6&quot; (106 cm)</td>
</tr>
<tr>
<td>2'-0&quot;</td>
<td>4'-0&quot; (122 cm)</td>
</tr>
</tbody>
</table>

Number of Frami top yokes (rule-of-thumb):

- Upright panels: 3'-0" and 4'-0":
  - 1 per panel
    - right next to the panel joint

Number of Doka-perforated tapes (rule-of-thumb):

- Upright panels: 3'-0" and 4'-0":
  - 1 per panel
    - above the panel joint

with Frami anchoring bracket

- At top: with Frami anchoring bracket (A) and Taper tie 3/4" to 1" & 5/8" [15.0] ends (B)
  - enables the form-tie to be placed above the framed panel
  - tie-rods cannot be knocked off; anchor-plate cannot slide out of position
- In the panel: with Taper tie 3/4" to 1" & 5/8" [15.0] ends

Position of the Frami anchoring bracket (normally):

- Always above the panel joint.

Practical example
Plumbing accessories
The Doka plumbing accessories are the safe, reliable way to set up and plumb the panels of the footing and grade beam formwork.

Plumbing the panels with the Frami plumbing strut 260

![Diagram of Frami plumbing strut 260]

a ... min. 4'-9" (145 cm)
For more information, see the section headed "Plumbing accessories".

Plumbing the panels with the Adjusting strut 120

![Diagram of Adjusting strut 120]

a ... min. 2'-7 1/2" - max. 4'-3" (80 - 130 cm)

A Adjusting strut 120
B Frami strut head
C Strut shoe for Frami plumbing strut 260
Frost walls

1st casting section

2nd casting section

A  Frami S panel 4'-0"
B  Frami S panel 6'-0"
C  She-bolt 7/8"x19"
D  Super-plate 20.0 B
E  Tie rod 15.0mm
F  Wooden spacer
G  Frami plumbing strut 260
Cleaning and care of your equipment

To keep formwork cleaning costs as low as possible, please observe the following:

### Concrete release agent

**Before every pour**

➤ Apply release agent to the formwork sheet and the end faces extremely thinly, evenly and in a continuous layer (make sure there are no traces of release-agent running down the formwork sheet)! Applying too much release agent will spoil the concrete finish.

To determine the right dosage and to make sure that you are using the agent correctly, test it on less important parts of the structure first.

### Cleaning

**Immediately after pouring**

➤ Remove any blobs of concrete from the back-face of the formwork, using water (without any added sand).

**Immediately after stripping the formwork**

➤ Clean the formwork with a concrete scraper.

### Cleaning equipment

**Concrete scraper**

For removing any concrete remnants, we recommend using a **Double scraper Xlife** and a spatula.

**Functional description:**

- A Blade for dealing with heavy soiling
- B Blade for dealing with slight soiling

**Note:**

Do not use any pointed or sharp objects, wire brushes, rotating grinding disks or pan scourers.
**Care**

- No hammer-blows to the frame profiles

- Never push over panels or allow them to fall

- Only stack panel gangs on top of one another with timber battens (A) between each layer.

  ![Diagram showing correct stacking of panels](image)

  This prevents the formwork sheets from being damaged by the connector components.
Frami combined with . . .

Starting block D22
With the Starting block of the Dam formwork D22, you can also use the Frami panels for single-sided wall formwork.

Follow the directions in the “Doka dam formwork” User Information!
Doka service offerings

Doka Reconditioning Service

So that your formwork is in "top form" for its next assignment

Inspecting, cleaning and maintaining your Doka framed formwork - all jobs which the Doka Reconditioning Service will be pleased to take care of for you. Its highly qualified staff and special equipment will soon get your formwork back in top form, quickly and economically.

The big benefit for you: You always have formwork that is ready for use, and also extend the service life of your equipment.

What's more: It is only with well-maintained formwork that you will achieve the desired quality of concrete surface.

In our modern plants, your formwork will be carefully cleaned using energy-saving and environmentally sound technology.

The panels are then inspected for damage and dimensional accuracy, and overhauled where necessary. Any damaged form-ply is repaired, or - if necessary - replaced.

Doka customer training

Formwork training pays

Forming operations account for the lion's share of labor costs on concrete construction sites. Modern formwork equipment helps to rationalize operations. By improving the overall construction sequence at the same time, however, further very worthwhile gains in efficiency can be achieved.

This requires not only better equipment, but also greater skill in making optimum use of this equipment. Doka can help here, with its specialist training program - to help each and every member of the team do his bit towards boosting efficiency and lowering costs.

Doka customer training events also look at the formwork equipment and handling methods that are needed in order to achieve optimum safety - giving your people knowledge and awareness which can only enhance workplace safety on the site.

You'll find the Doka training program well worth looking into.

The Doka branch in your region will be pleased to tell you more about Doka's various training offerings.
<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>[lbs]</th>
<th>Article #</th>
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Galvanized

Corners marked in blue

Galvanized

Powder-coated, blue
Length: 2' (61 cm)
Width: 6" (15 cm)
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<tr>
<th>Article</th>
<th>[lbs]</th>
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<td>Frami-Ankeradapter für Ausschalecke I</td>
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</table>

**User information**

**Doka framed formwork Frami**

**Component overview**

- **Powder-coated, blue**
- **Galvanized**
- **Height: 10" (24.8 cm)**
- **Height: 4 1/2" (11 cm)**
### Component overview

<table>
<thead>
<tr>
<th>Article #</th>
<th>Article</th>
<th>[lbs]</th>
<th>Description</th>
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<tr>
<td>588491000</td>
<td>Frami profile adapter for bias cut corner I</td>
<td>1.3</td>
<td>Frami-Profiladapter für Ausschalecke I (Galvanized, Height: 3 1/2″ (8 cm))</td>
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<td>588153400</td>
<td>Framax quick acting clamp RU</td>
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<td>Framax-Schnellspanner RU (Galvanized, Length: 8″ (20 cm))</td>
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<td>588490000</td>
<td>Frami panel shoe</td>
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<td>Frami-Elementschuh (Galvanized, Length: 6 1/4″ (16 cm))</td>
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<td>588433000</td>
<td>Frami clamp</td>
<td>2.6</td>
<td>Frami-Spanner (Galvanized, Length: 4 1/2″ (11 cm))</td>
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<td>588436000</td>
<td>Frami adjustable clamp</td>
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<td>Frami-Ausgleichsspanner (Galvanized, Length: 1′-4″ (40 cm), Never weld or heat tie-rods - risk of fracture!)</td>
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<td>588439000</td>
<td>Frami universal waling 0.70m</td>
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<td>Frami-Klemmschiene (Length: 6 1/2″ (16 cm), Max. load: 0.44 lbs (200 kg))</td>
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<td>Framax S universal waling 0.90m</td>
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<td>Framax S Klemmschiene (Length: 1′-1″ (33 cm), Max. load: 0.88 lbs (400 kg))</td>
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<td>Framax S Klemmschiene (Length: 1′-1″ (33 cm), Max. load: 1.45 lbs (650 kg))</td>
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<td>Frami-Klemme (Galvanized, Length: 6 1/2″ (16 cm))</td>
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<td>Frami universal fixing bolt 5-12cm</td>
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<td>Frami-Universalverbinder 5-12cm (Galvanized, Length: 0.9″ (23 cm), Packed in units of 50)</td>
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<td>588493000</td>
<td>Frami profile connector 5-18cm</td>
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<td>Frami-Profilverbinder 5-18cm (Galvanized, Length: 1′-1″ (33 cm))</td>
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<td>588384000</td>
<td>Frami lifting hook</td>
<td>16.5</td>
<td>Frami-Umsetzbügel (Galvanized, Width: 6″ (15 cm), Height: 8″ (21 cm), Max. load: 1,100 lbs (500 kg), Follow the directions in the &quot;Operating Instructions&quot;)</td>
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<tr>
<td>588437000</td>
<td>Frami plumbing strut 260</td>
<td>30.6</td>
<td>Frami-Justiersäule 260 (Galvanized, Length: 4′-9″ - 8′-6″ (145 - 258 cm), Observe all applicable safety regulations.)</td>
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<td>588438000</td>
<td>Frami lifting hook</td>
<td>16.5</td>
<td>Frami-Umsetzbügel (Galvanized, Width: 6″ (15 cm), Height: 8″ (21 cm), Max. load: 1,100 lbs (500 kg), Follow the directions in the &quot;Operating Instructions&quot;)</td>
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<td>Frami lifting hook</td>
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<td>Frami-Umsetzbügel (Galvanized, Width: 6″ (15 cm), Height: 8″ (21 cm), Max. load: 1,100 lbs (500 kg), Follow the directions in the &quot;Operating Instructions&quot;)</td>
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<td>Frami-Umsetzbügel (Galvanized, Width: 6″ (15 cm), Height: 8″ (21 cm), Max. load: 1,100 lbs (500 kg), Follow the directions in the &quot;Operating Instructions&quot;)</td>
</tr>
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</table>

**Adjusting strut 120**

- **Justiersrebe 120**
  - Galvanized, Length: 2′-7″ - 4′-3″ (80 - 130 cm), Observe all applicable safety regulations.

**Strut shoe for Frami plumbing strut 260**

- **Strebensockel f. Frami-Justiersäule 260**
  - Galvanized, Width: 3 1/4″ (8 cm), Height: 5″ (13 cm)

**Strut 340**

- **Stütze 340**
  - Consisting of:
    - **(A) Plumbing strut 340**
      - Galvanized, Length: 6′-3″ - 11′-2″ (190 - 341 cm)
    - **(B) Prop shoe**
      - Galvanized, Length: 8″ (20 cm), Width: 4 1/2″ (11 cm), Height: 4″ (10 cm)
  - Galvanized, Delivery condition: separate parts, Observe all applicable safety regulations.

**Consisting of:**

- **Plumbing strut 340**
  - Galvanized, Length: 6′-3″ - 11′-2″ (190 - 341 cm)

- **Prop shoe**
  - Galvanized, Length: 8″ (20 cm), Width: 4 1/2″ (11 cm), Height: 4″ (10 cm)

**Observe all applicable safety regulations.**
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<tr>
<th>Component</th>
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<td>Stütze 540</td>
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<td><strong>Plumbing strut 540</strong></td>
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<td>Galvanized Length: 10'-2&quot; - 18'-1&quot; (309 - 550 cm)</td>
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<td><strong>Prop shoe</strong></td>
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<td><strong>Pipe brace 12'-0&quot;-'21'-0&quot;</strong></td>
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<td>Elementstütze 12'-0&quot;-'21'-0&quot;</td>
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<td>Galvanized Delivery condition: separate parts Observe all applicable safety regulations.</td>
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<td>Frami-Abdeckstopfen</td>
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Galvanized Delivery condition: separate parts Observe all applicable safety regulations.

Painted blue Length: 3'-5" (105 cm)

Galvanized Length: 7" (18 cm) Packed in units of 10 Follow fitting instructions!

Galvanized Diameter: 1/2" (1,6 cm) Packed in units of 100 Follow fitting instructions!

Galvanized Length: 3'-3" (98 cm) Height: 5'-2" (157 cm) Observe all applicable safety regulations.

Galvanized Height: 4'- 5'-7" (123 - 171 cm)

Brown Diameter: 1 1/8" (3 cm)

Brown Diameter: 3/4" (2 cm)
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<td>Doka multi-trip transport box 1.20x0.80m (Doka-Mehrwegcontainer 1,20x0,80m)</td>
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<td>Super plate 15.0 (Superplatte 15,0)</td>
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</table>

### Component overview
**User information**

**Doka framed formwork Frami**

- **Frami anchoring bracket (Frami-Ankerhaltewinkel)**
  - Galvanized
  - Packed in units of 20

- **Frami S top yoke 4”-30” (Frami-Flachanker 4”-30”)**
  - Galvanized
  - Length: 3’-3” (99 cm)

- **Frami clip (Frami-Stecker)**
  - Galvanized
  - Width: 1 ¼” (3 cm)
  - Height: 4 ¼” (12 cm)
  - Packed in units of 60

- **Frami foundation clamp (Frami-Fundamentspanner)**
  - Galvanized
  - Height: 3 ½” (9 cm)

- **Doka perforated tape S 2” 25m (Doka-Lochband S 2” 25m)**
  - Perm. capacity: will depend on the foundation clamp of the formwork system used.

- **Doka perforated tape 50x2.0mm 25m (Doka-Lochband 50x2,0mm 25m)**
  - Perm. capacity: will depend on the foundation clamp of the formwork system used.

- **Frami S frontal triangular ledge 3/4” 9'-0”**
  - Perm. capacity with safety factor of 2: 18,000 lbs (80,07 kN)
  - Never weld or heat tie-rods - risk of fracture!

- **Frami S frontal triangular ledge 3/4” 6'-0”**
  - Perm. capacity with safety factor of 2: 22,000 lbs (97,87 kN)
  - Breaking load: > rod breaking load (> 43,830 lbs) (195 kN)

- **Frami S frontal triangular ledge 3/4” 4'-0”**
  - Perm. capacity with safety factor of 2: 18,000 lbs (80,07 kN)
  - Never weld or heat tie-rods - risk of fracture!

- **Frami S frontal triangular ledge 3/4” 3'-0”**
  - Perm. capacity with safety factor of 2: 18,000 lbs (80,07 kN)
  - Never weld or heat tie-rods - risk of fracture!

- **Frami S frontal triangular ledge 3/4” 2'-0”**
  - Perm. capacity with safety factor of 2: 18,000 lbs (80,07 kN)
  - Never weld or heat tie-rods - risk of fracture!

- **Doka 4-part chain 3.20m (Doka-Vierstrangkette 3,20m)**
  - Max. load: With angle of inclination \( \beta = 30° \): 5200 lbs (2400 kg) with 2 cables or 7900 lbs (3600 kg) with 4 cables
  - Follow the directions in the "Operating Instructions!"

- **Doka multi-trip transport box 1.20x0.80m (Doka-Mehrwegcontainer 1,20x0,80m)**
  - Galvanized
  - Height: 2-7” (78 cm)
  - Max. load: 3,300 lbs (1500 kg)
  - Follow the directions in the "Operating Instructions!"

- **Doka multi-trip transport box partition 0.80m (Mehrwegcontainer Unterteilung)**
  - Timber parts varnished yellow
  - Steel parts galvanized

- **Taper tie system 3/4” to 1”**
  - Perm. capacity with safety factor of 2: 18,000 lbs (80,07 kN)
  - Never weld or heat tie-rods - risk of fracture!

- **Super plate 15.0 (Superplatte 15,0)**
  - Galvanized
  - Height: 2 ¼” (6 cm)
  - Diameter: 4 ½” (12 cm)
  - Width-across: 27 mm
  - Packed in units of 800
  - Perm. capacity with safety factor of 2: 22,000 lbs (97,87 kN)
  - Breaking load: > rod breaking load (> 43,830 lbs) (195 kN)
<table>
<thead>
<tr>
<th>Component overview</th>
<th>[lbs]</th>
<th>Article #</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>She-bolt system 7/8”</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frami S she-bolt 7/8”x19”</td>
<td>3.7</td>
<td>588873000</td>
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<tr>
<td>Frami S-Ankerkopf 7/8”x19”</td>
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<tr>
<td>Perm. capacity with safety factor of 2: 18,000 lbs (80.7 kN)</td>
<td></td>
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<tr>
<td>Never weld or heat tie-rods - risk of fracture!</td>
<td></td>
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<tr>
<td>Super plate 20.0 B</td>
<td>4.4</td>
<td>581424000</td>
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<tr>
<td>Superplatte 20.0 B</td>
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</tr>
<tr>
<td>Galvanized</td>
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</tr>
<tr>
<td>Height: 2 3/4” (7 cm)</td>
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<tr>
<td>Diameter: 5 1/2” (14 cm)</td>
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<tr>
<td>Width-across: 34 mm</td>
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<tr>
<td>Packed in units of 400</td>
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<tr>
<td>Perm. capacity with safety factor of 2: 38,000 lbs (169.05 kN)</td>
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<tr>
<td>Breaking load: &gt; rod breaking load (&gt; 79,580 lbs) (354 kN))</td>
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<tr>
<td><strong>Form tie system 15.0</strong></td>
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<tr>
<td>Tie rod 15.0mm galvanized 0.50m</td>
<td>1.6</td>
<td>581821000</td>
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<tr>
<td>Tie rod 15.0mm galvanized 0.75m</td>
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<td>581822000</td>
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<td>Tie rod 15.0mm galvanized 1.25m</td>
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<td>Tie rod 15.0mm galvanized 1.50m</td>
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<td>581827000</td>
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<tr>
<td>Tie rod 15.0mm galvanized 1.75m</td>
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<td>581829000</td>
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<tr>
<td>Tie rod 15.0mm galvanized 2.00m</td>
<td>6.4</td>
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<td>Tie rod 15.0mm non-treated 2.00m</td>
<td>6.4</td>
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<tr>
<td>Tie rod 15.0mm non-treated 2.50m</td>
<td>7.9</td>
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<td>Tie rod 15.0mm non-treated 3.00m</td>
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<td>Tie rod 15.0mm non-treated 3.50m</td>
<td>11.0</td>
<td>581888000</td>
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<td>Tie rod 15.0mm non-treated 4.00m</td>
<td>12.6</td>
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<td>Tie rod 15.0mm non-treated 5.00m</td>
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<td>Tie rod 15.0mm non-treated 6.00m</td>
<td>19.0</td>
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<td>Perm. capacity with safety factor of 2: 22,000 lbs (97.87 kN)</td>
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<tr>
<td>Breaking load: 43,830 lbs (195 kN))</td>
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<td></td>
</tr>
<tr>
<td>Never weld or heat tie-rods - risk of fracture!</td>
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</tbody>
</table>

**Wing nut 15.0**

<table>
<thead>
<tr>
<th>Component overview</th>
<th>[lbs]</th>
<th>Article #</th>
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<tbody>
<tr>
<td>Wing nut 15.0</td>
<td>0.68</td>
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<tr>
<td>Galvanized</td>
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<tr>
<td>Length: 4&quot; (10 cm)</td>
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<td></td>
</tr>
<tr>
<td>Height: 2&quot; (5 cm)</td>
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<tr>
<td>Perm. load with safety factor of 2: 21,000 lbs (mounted on steel)</td>
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<tr>
<td>Breaking load: &gt; rod breaking load (&gt; 79,580 lbs) (354 kN))</td>
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</table>

**Angle anchor plate 12/18**

<table>
<thead>
<tr>
<th>Component overview</th>
<th>[lbs]</th>
<th>Article #</th>
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<tbody>
<tr>
<td>Angle anchor plate 12/18</td>
<td>2.9</td>
<td>581934000</td>
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<tr>
<td>Galvanized</td>
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<tr>
<td>Packed in units of 12</td>
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<tr>
<td>Perm. load with safety factor of 2: 19,840 lbs (mounted on steel)</td>
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</tr>
<tr>
<td>6,600 lbs (mounted on timber)</td>
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<tr>
<td>Special order only!</td>
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**Tie rod wrench 15.0/20.0**

<table>
<thead>
<tr>
<th>Component overview</th>
<th>[lbs]</th>
<th>Article #</th>
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<tbody>
<tr>
<td>Tie rod wrench 15.0/20.0</td>
<td>4.2</td>
<td>580594000</td>
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<tr>
<td>Galvanized</td>
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<tr>
<td>Length: 1’-3&quot; (37 cm)</td>
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</tr>
<tr>
<td>Diameter: 3 1/4&quot; (8 cm)</td>
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</tbody>
</table>

**Plastic tube 22mm 2.50m**

<table>
<thead>
<tr>
<th>Component overview</th>
<th>[lbs]</th>
<th>Article #</th>
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</thead>
<tbody>
<tr>
<td>Plastic tube 22mm 2.50m</td>
<td>0.99</td>
<td>581951000</td>
</tr>
<tr>
<td>Kunststoffrohr 22mm 2,50m</td>
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</tr>
</tbody>
</table>
Frami - the super-sturdy, room-high manhandled formwork

Walls, columns and footings & grade beams can all be swiftly and easily formed by hand using the story-high panels of the Frami system. Their hot-dip galvanized, torsion-proof steel frames make for plane concrete surfaces and long formwork service life.