meva

Mammut 350

Assembly and Operating Instructions

Product features

The Mammut 350 formwork is based on the experience made with the Mammut wall formwork since 1982. Mammut 350 offers the following improvement:

- Seven multi-function profiles
- Tie holes at multi-function level
- Bump notches for panels that are 250 and 125 cm wide
- Symmetry on the inside and outside
- An even tie hole and joint pattern
- Fully compatible with the Mammut formwork

The accessories are the same as for Mammut. Mammut 350 is a crane-dependent frame formwork system and ideally suited for use in industrial and civil engineering as well as administration and housing projcets that have a demand for a visible concrete surface.

Mammut 350 features panels with heights of 350, 300, 250 and 125 cm. A complete formwork set including accessories weighs approx. 62 kg/m². The admissible fresh concrete pressure is 100 kN/m² if tie rods DW 20 are used (required for a panel width of 100 cm or more).

The high admissible fresh concrete pressure results in short concreting cycles since walls up to 400 cm can be poured without taking the pouring rate into account.

The panels have a 20 mm all-plastic forming face made of polypropylene and aluminium, it is riveted to the panel on the concreting side. Inside the frame the facing is protected with silicone.

Abbreviations, measurements, figures and tables
The abbreviation M 350 is used for the Mammut 350 system series and the abbreviation M for the Mammut system series.

DIN means Deutsche Industrie-Norm (German Industrial Standard). E DIN (E = Entwurf / draft) means that the DIN is in draft status and not yet approved of. Any further abbreviations are explained where they are used the first time.

TÜV means Technischer Überwachungsverein. This is the independent German organisation that tests the safety of technical installations, machinery and motor vehicles. If a product passes the test, it is permitted to carry the GS seal. GS stands for Geprüfte Sicherheit (approved safety).

Measurements: These instructions use the metric system and thus m (for metre), cm (for centimetre) and mm (for millimetre). Dimensions without a measure are in cm.

The page numbers in these instructions start with M350. The figures and tables are numbered per page. Depending on its product abbreviation, a cross reference in the text refers to a page, table or figure in these instructions or in other instructions

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Please note

These Assembly and Operating Instructions contain information, instructions and hints describing how to use the MEVA equipment on the construction site in a proper, quick and economic way. Most examples shown are standard applications that will occur in practice most often. For more complicated or special applications not covered in these instructions, please contact the MEVA experts for advice.

When using our products the federal, state and local codes and regulations must be observed. Many of the details shown do not illustrate the wall formwork system in the ready-to-pour condition as to the aforementioned safety regulations. Please adhere to these technical instructions when applying the equipment described here. Deviations require engineering calculations and analysis to guarantee safety.

Please observe the assembly instructions that your local contractor or employer has created for the site on which the MEVA equipment is used. Such instructions are intended to minimise site-specific risks and must contain the following details:

- The order in which all working steps including assembly and disassembly must be carried out
- The weight of the panels and other system parts
- The type and number of ties and braces as well as the distance between them
- The location, number and dimensions of working scaffolds including working area and protection against falling down
- Pick points for panel transport by crane. With regard to panel tranport, please observe these Assembly and Operating Instructions. Any deviation will require a static proof.

Important: Generally, only well maintained material may be used. Damaged parts must be replaced. Apply only original MEVA spare parts for replacement.

Attention: Never wax or oil assembly locks.

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The panel

Fig. 4.1
Tie hole with conical anchor sleeve (see p. M350-8)

Fig. 4.2
Panel connection with the M assembly lock (see p. M350-7)

Fig. 4.3
Cross stiffener made of closed and solid steel profile

Fig. 4.4
Fast and solid attachment of accessories at the multi-function profile (see p. M350-11).

Fig. 4.5
Transport hole for attaching the crane slings 60. It allows a fast loading and unloading of panel stacks as well as moving them at ground or slab level (see p. M350-48).

Fig. 4.6
The steel frames are made of closed hollow profiles and welded in mitred joints. The profiles are provided with a groove and an edge protection. Panels with a width of 125 and 250 cm are equipped with 4 bump notches that are diagonally welded in. An exact panel positioning in all directions is feasible without a hammer.

Note
For a list and details of the available panels, their description and reference numbers refer to the Product List.

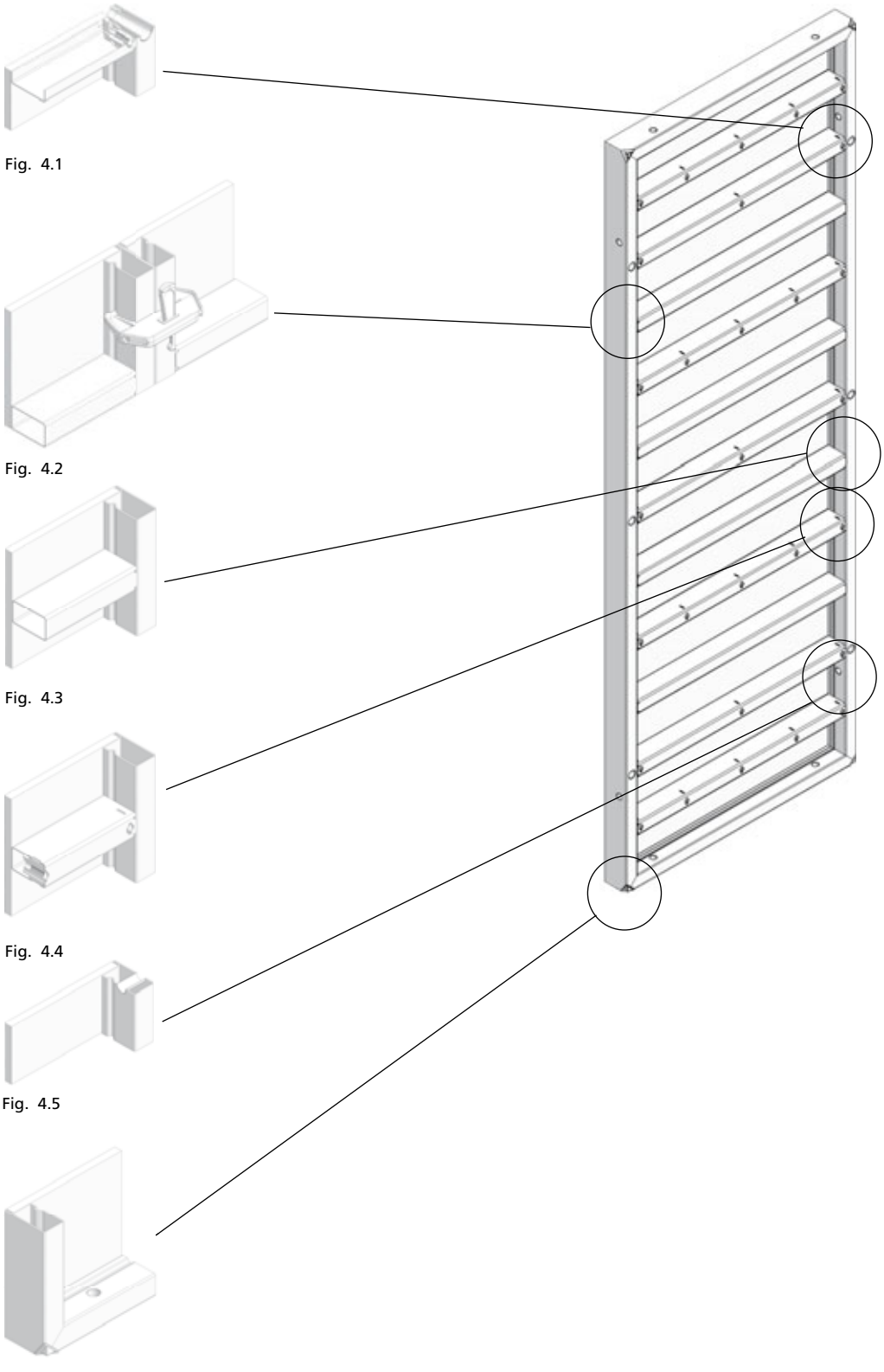

Fig. 4.1

Fig. 4.2

Fig. 4.3

Fig. 4.4

Fig. 4.5

Fig. 4.6

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The M 350 panels 350/250 and 300/250

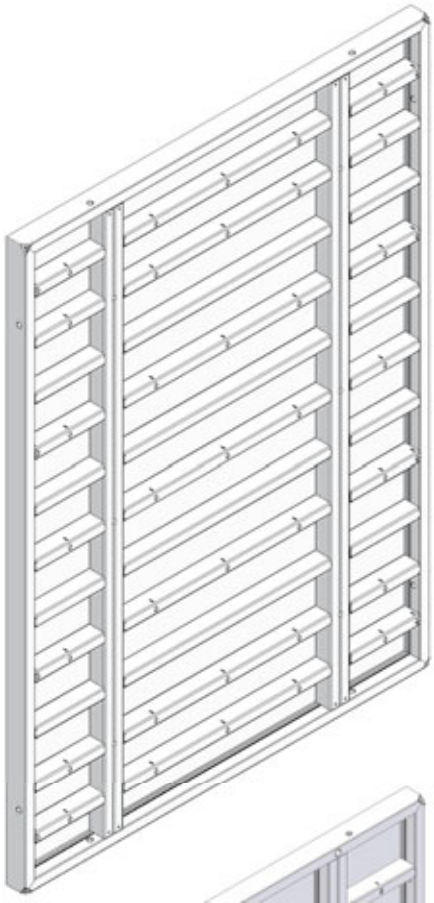

Fig. 5.1

Fig. 5.2

The large-size panels 350/250 (Fig. 5.1) and 300/250 (Fig. 5.2) are ideally suited for vertical and horizontal use. Since the tie holes are located inside, the 8.75 m² facing of the 350/250 panel requires only 6 ties and the 7.50 m² facing of the 300/250 panel requires only 4 ties.

Panels can be connected to existing walls without alignment rails and additional panels or fillers. The panel can overlap up to 50 cm (see p. M350-27).

If 250 cm high panels are extended horizontally on top of each other, an even joint pattern with uninterrupted vertical joints can be assured.

Vertical and horizontal panels can be combined freely. Each panel joint requires 3 assembly locks for a panel height of 350 cm, or 2 assembly locks for a panel height of up to 300 cm.

Panels with a width of 125 and 250 cm are equipped with 4 bump notches that are diagonnally welded in. An exact panel positioning in all directions is feasible without a hammer (Fig. 4.6).

Description	Ref. No
M 350 panel AL 20 350/250	**23-005-05**
M 350 panel AL 20 300/250	**23-006-05**

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alkus plastic sheet

The polypropylene and aluminium composite forming face has all the positive properties of plywood plus important advantages: longer lifespan, greater load-bearing capacity, better nail-holding ability, fewer and easier repairs, 100 % recyclability.

Besides the obvious advantages, such as considerably reduced cleaning effort, minimum consumption of release agent and an excellent concrete finish, alkus offers substantial ecological benefits.

Substituting plastic for wood saves valuable timber resources. Also, further releasing of highly toxic dioxin is avoided, which is released in the process of burning plywood (that is bonded with phenolic resin).

Used or damaged alkus plastic sheets can be recycled into the same product. It is 100 % recyclable, and the manufacturer guarantees reacceptance.

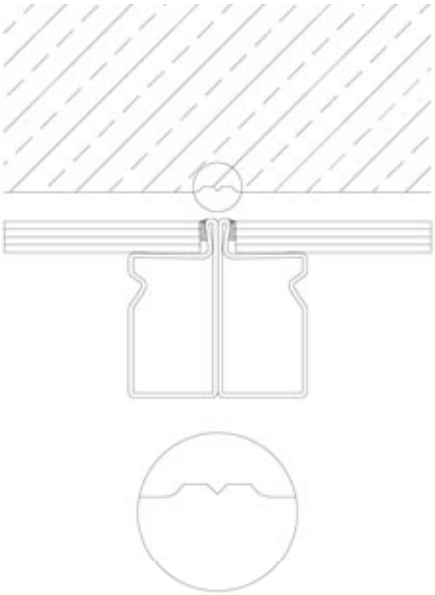

Fig. 6.1 Frame profile with plywood face: Negative imprint in the concrete when using panels with a conventional plywood face

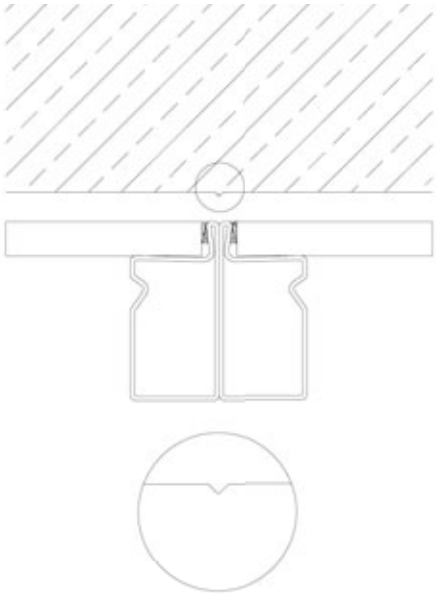

Fig. 6.2 Frame profile with alkus facing: Smooth and even concrete surface as there is no projecting profile of the panel frame

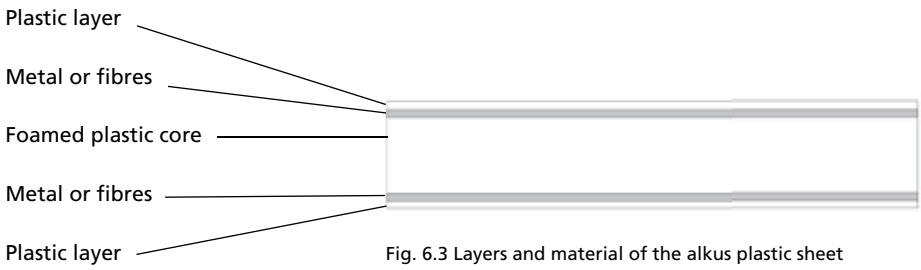

Fig. 6.3 Layers and material of the alkus plastic sheet

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Panel connection

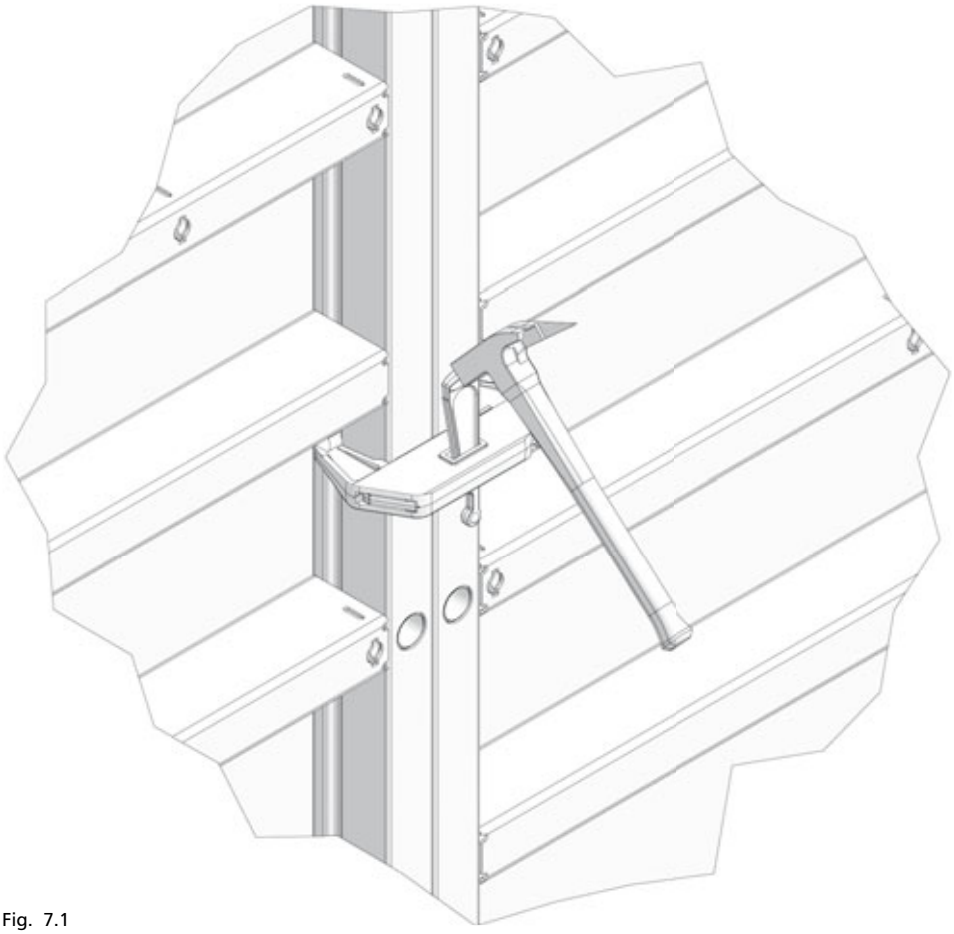

Fig. 7.1

The fast and efficient connection of the panels is accomplished with the Mammut assembly lock (Fig. 7.1) no matter if the panels are assembled side by side or on top of each other. The lock can be attached on the frame at any position.

Its 5-point contact (Fig. 7.2. and 7.3) does not only draw the panels together, it also aligns them. With only a few hammer blows a safe connection and a perfect alignment are achieved.

Since the lock weighs only 3 kg, it can easily be attached with only one hand.

Panels with a height of 350 cm are connected with 3 assembly locks. All other panels, no matter if vertical or horizontal, are connected with 2 assembly locks.

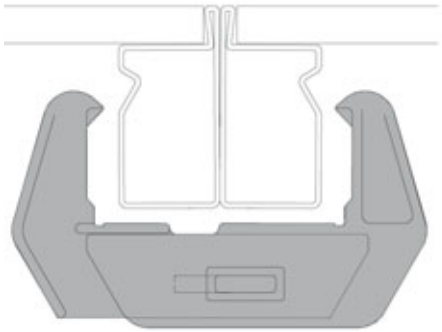

Fig. 7.2

= 5-point contact

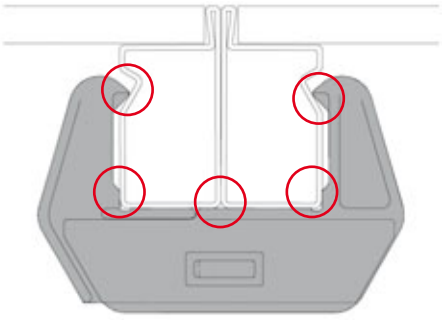

Fig. 7.3

Description	Ref. No.
M assembly lock	**29-400-71**

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Tie holes

The conical anchor sleeves (Fig. 8.4) for the insertion of the tie rods DW 15 and DW 20 with an admissible load capacity of 90 kN (DW 15) and 150 kN (DW 20) are welded inside the panel frame.

The M 350 formwork can be inclined on one or on both sides (Fig. 8.1 and 8.2). Inclined formwork requires articulated flange nuts and must be secured against uplift. Articulated flange nuts 15/120 must be used for tie rods DW 15 and articulated flange nuts 20/140 for tie rods DW 20.

Note
When assembling two M 350 panels with different widths, the ties should always be placed through the panel with the larger width (Fig. 8.3). Always use all tie holes, i.e. all usable tie holes must be used for tieing and non usable tie holes closed with plug D27/30.

Outside the frame, M 350 panels can also be tied with a Uni-tie claw, a tie rod and a flange nut.

Description	Ref. No.
Tie rod	
DW 15/90	**29-900-80**
DW 20/120	**29-900-97**
Articulated flange nut	
15/120	**29-900-10**
20/140	**29-900-05**
Spanner	
SW 27	**29-800-10**
SW 36	**29-800-15**
Uni-tie claw	**29-901-41**
Plug D27/30	**29-902-61**

Maximum inclination: 8 cm per metre with tie rod DW 15 or 5 cm per metre with tie rod DW 20

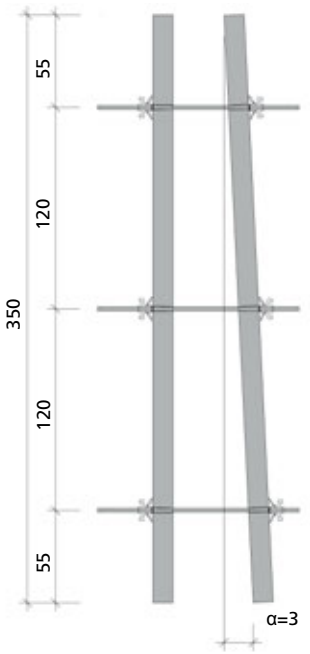
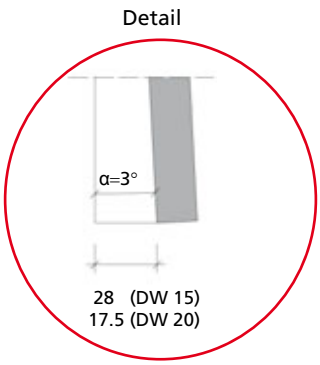


Fig. 8.1

Fig. 8.2



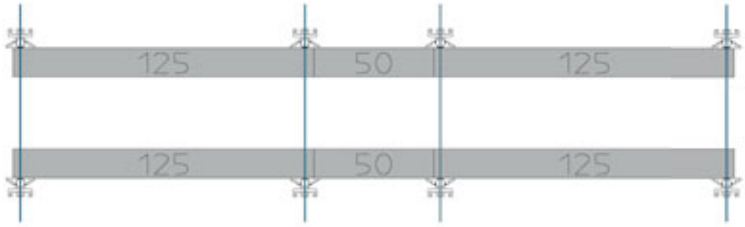


Fig. 8.3

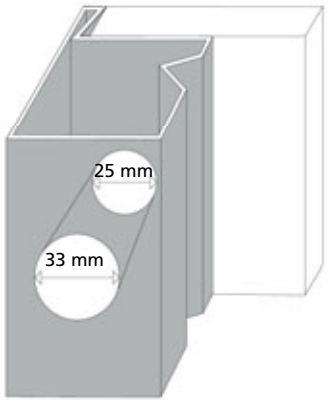


Fig. 8.4

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Rate of placing

Specific values of tie rods DW 15 and DW 20

Tie rod DW	15	20
d_1[mm]	15	20
d_2[mm]	17	22.4
Nominal cross section in mm²	177	314
Admissible working load in kN according to DIN 18216	90	150
Tie rod elongation in mm/m when using the admissible working load	2.5	2.35

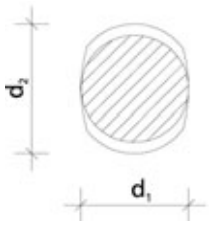

Table 9.1

Walls up to 4.00 m

Concrete can be poured without consideration of the pouring rate.

Walls higher than 4.00 m

Observe the rate of placing shown in the tables below. They show the recommended rate of placing that according to E DIN 18218:2008-01 is compatible with the fresh concrete pressure and applicable when using tie rod DW 15 together with the articulated flange nut 15/120 (Table 9.2) or when using tie rod DW 20 with the articulated flange nut 20/140 (Table 9.3).

Maximum rate of placing v_b (depending on the consistency and end of setting of concrete t_E)* in m/h					
Mammut (DW 15)		t_E = 5 h	t_E = 7 h	t_E = 10 h	t_E = 15 h
Consistency ragne	F3	3.00	2.43	1.81	1.14
	F4	2.53	1.76	1.08	0.47
	F5	1.36	0.97	0.68	0.45
	F6	0.96	0.69	0.48	0.32
	SVB	1.14	0.82	0.57	0.38

Table 9.2

Maximum rate of placing v_b (depending on the consistency and end of setting of concrete t_E)* in m/h					
Mammut (DW 20)		t_E = 5 h	t_E = 7 h	t_E = 10 h	t_E = 15 h
Consistency range	F3	5.64	4.72	3.72	2.63
	F4	4.71	3.46	2.36	1.38
	F5	2.20	1.57	1.10	0.73
	F6	1.55	1.11	0.78	0.52
	SVB	1.85	1.32	0.92	0.62

Table 9.3

* According to E DIN 18218:2008-01 (fresh concrete pressure on plumb-vertical formwork)
t_E = End of setting of concrete (to be asked at the concrete supplier or knead-bag test according to DIN 18218)
v_b = Maximum rate of placing

Recommendation for concrete placing

- For walls higher than 4.00 m observe the values in tables 9.2 when using tie rod DW 15, or the values in table 9.3 when using tie rod DW 20.
- According to DIN 4235, concrete should be placed in layers, the thickness of which can vary from 0.50 to 1.00 m.
- Concrete must not be placed from heights at free fall (1.50 m or higher).
- When vibrating the concrete, which is done layer by layer, the vibrator must not penetrate more than 0.50 m into the layer below.
- A final vibrating over the overall concrete height is not recommended. It does not provide any advantage since concrete that has been vibrated once cannot be compacted further. This may result in water bubbles (shrinkage cavities) on the concrete surface.

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Flatness of surface

The admissible deflection of formwork parts is defined in DIN 18202 Ebenheitstoleranzen (flatness tolerances), table 3, lines 5 through 7 (Table 10.1). There, the maximum admissible deflection is laid down in relation to the distance between the measuring points. The admissible fresh concrete pressure that is in line with the flatness tolerances as defined in DIN 18202, table 3, line 7 is 100 kN/m² for full load.

DIN 18202, Table 3, Lines 5 through 7

Column	1	2	3	4	5	6
		Distances as critical value in mm Distances between measuring points in m				
Line	Reference	0.1	1*	4*	10*	15*
5	Not exposed walls and undersides of slabs	5	10	15	25	30
6	Exposed walls and undersides of slabs, e.g. plastered walls, paneling, suspended ceiling	3	5	10	20	25
7	Like line 6, but with increased requirements	2	3	8	15	20

Table 10.1

* Interim values can be found in fig. 10.2. Round up found values to full mm.

Tolerances of deflection of walls and undersides of slabs
(according to DIN 18202, Table 3)

The measuring lath is placed on the highest protruding points of the surface and the deflection is measured at the deepest point in-between.

The distance between measuring points means the distance between the highest protruding points.

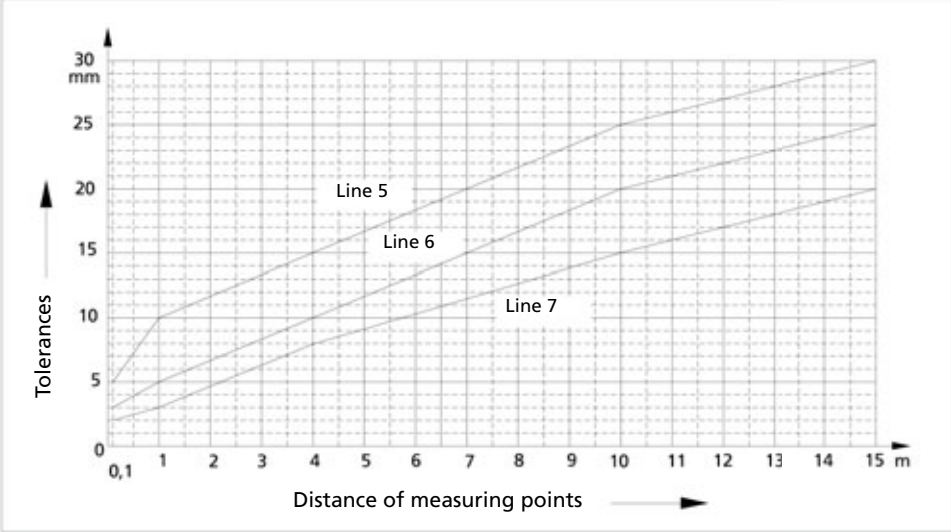

Fig. 10.2

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Attachment of accessories

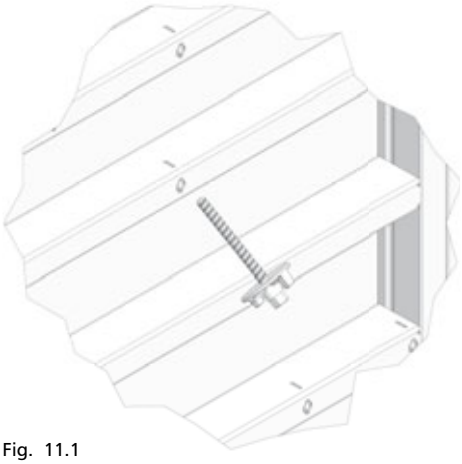

Fig. 11.1

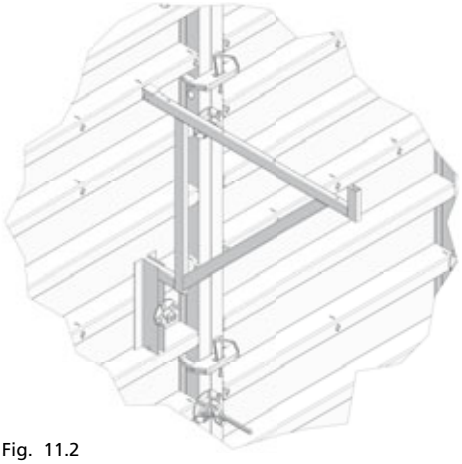

Fig. 11.2

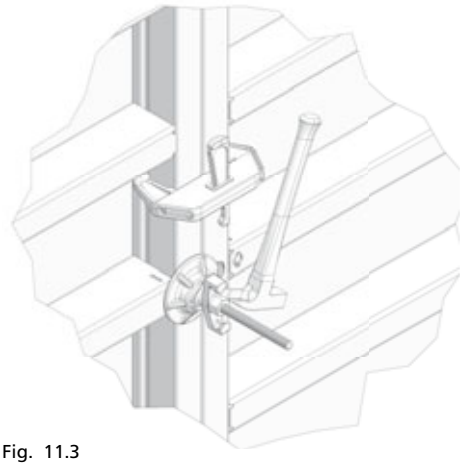

Fig. 11.3

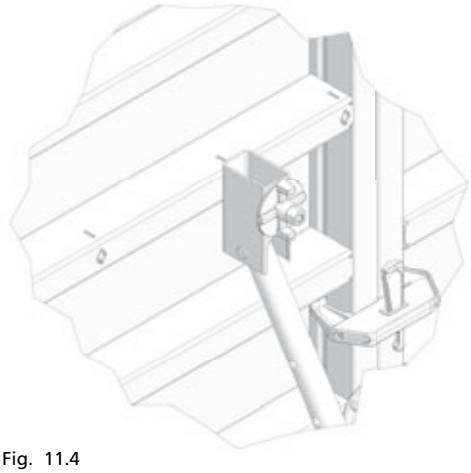

Fig. 11.4

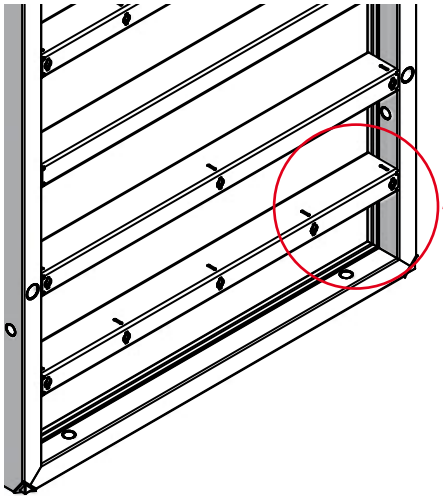

Fig. 11.5

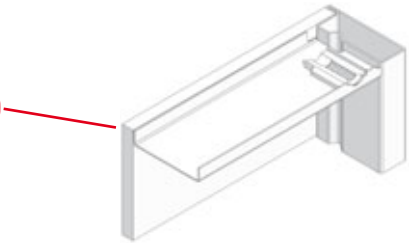

Fig. 11.6

All panels are provided with multi-function profiles. Dywidag threaded nuts are welded inside the profile (Fig. 11.1). The difference between these multi-function profiles and the cross stiffeners is that the multi-function profile allows for attachment of forming accessories.

Scaffolding brackets are provided with self-locking pins (Fig. 11.2) and thus can be mounted on the multi-function profile. The scaffolding bracket can be secured with a flange screw 18.

Alignment rails must be attached to the multi-function profile to ensure proper load transfer.

Formwork can be set plumb by using a push-pull prop that is attached to the panel with the formwork-prop-connector as shown in fig 11.4.

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Wall braces

Wall braces are attached to the multi-function profiles with formwork-prop connectors and flange screws 18 (Fig. 12.1). If they are used to align wall formwork, we recommend a max. brace spacing of 4.00 m. For transfer of wind loads a max. spacing of 2.50 m is recommended (Table 12.2). For further applications contact our technical department.

Please note

- Wall braces and push-pull props must be anchored to the ground by using foot plates and dowels.
- Before anchoring the formwork to the ground, the properties of the ground and the rating of the dowels or nails must be verified according to the federal, state and local codes and regulations. Observe any regulations that apply when working with high walls.
- The formwork height and the length of the push-pull props should be identical. The angle between a) and b) – see fig. 12.1 – should be less than 60 degrees.
- We recommend using the MEVA heavy duty braces Triplex R for formwork higher than 6.00 m.

Brace frame 250

This brace frame consists of a push-pull prop 250, a brace SRL 120 and a double-jointed foot plate.

Description	Ref. No.
Brace frame 250 with formwork-prop connector	**29-109-20**
Brace frame 250 without formw.-prop connnector	**29-109-25**
Flange screw 18	**29-401-10**

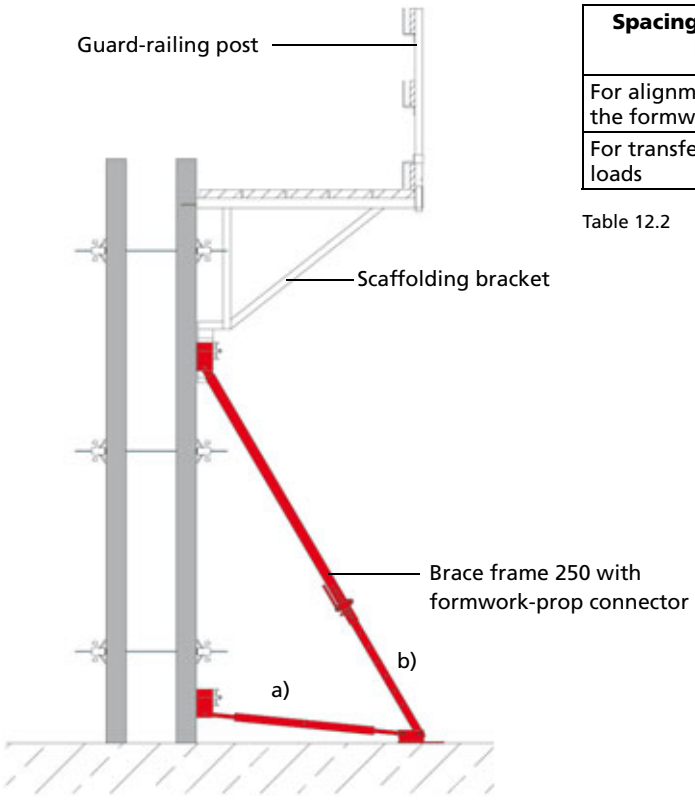

Fig. 12.1

Spacing of push-pull props / brace frames	
For alignment of the formwork	Max. 4.00 m
For transfer of wind loads	Max. 2.50 m

Table 12.2

Description	Ref. No.	Adjustment range [m]	Adm. press. [kN]	Adm. tension [kN]	Weight [kg]	Recommended use
Braces SRL						
SRL 120	29-108-80	0.90–1.50	20.0	30.0	6.0	Horizontal alignment of the bottom formwork, wall brace 250, climbing formwork
SRL 170	29-108-90	1.20–2.20	25.0	40.0	10.5	Folding shaft formwork
Push-pull props R						
R 160	29-109-40	1.35–2.00	25.0	25.0	11.0	Horizontal and vertical alignment
R 250	29-109-60	1.90–3.20	25.0	30.0	18.5	Upper prop of wall brace 250 for formwork up to 4.05 m
R 460	29-109-80	3.40–5.20	20.0	30.0	35.8	Wall formwork up to 6.00 m
R 630	29-109-85	5.10–7.60	9.5	25.0	68.0	Wall formwork up to 9.00 m
Heavy-duty braces Triplex R for formwork higher than 6.00 m						
R 680	—	6.40–7.20	45.0	45.0	123.0	Wall and column formwork
R 780	—	7.40–8.20	45.0	45.0	139.0	Wall and column formwork
R 880	—	8.40–9.20	45.0	45.0	149.0	Wall and column formwork
R 980	—	9.40–10.20	35.0	45.0	160.0	Wall and column formwork

Table 12.3

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Wall braces

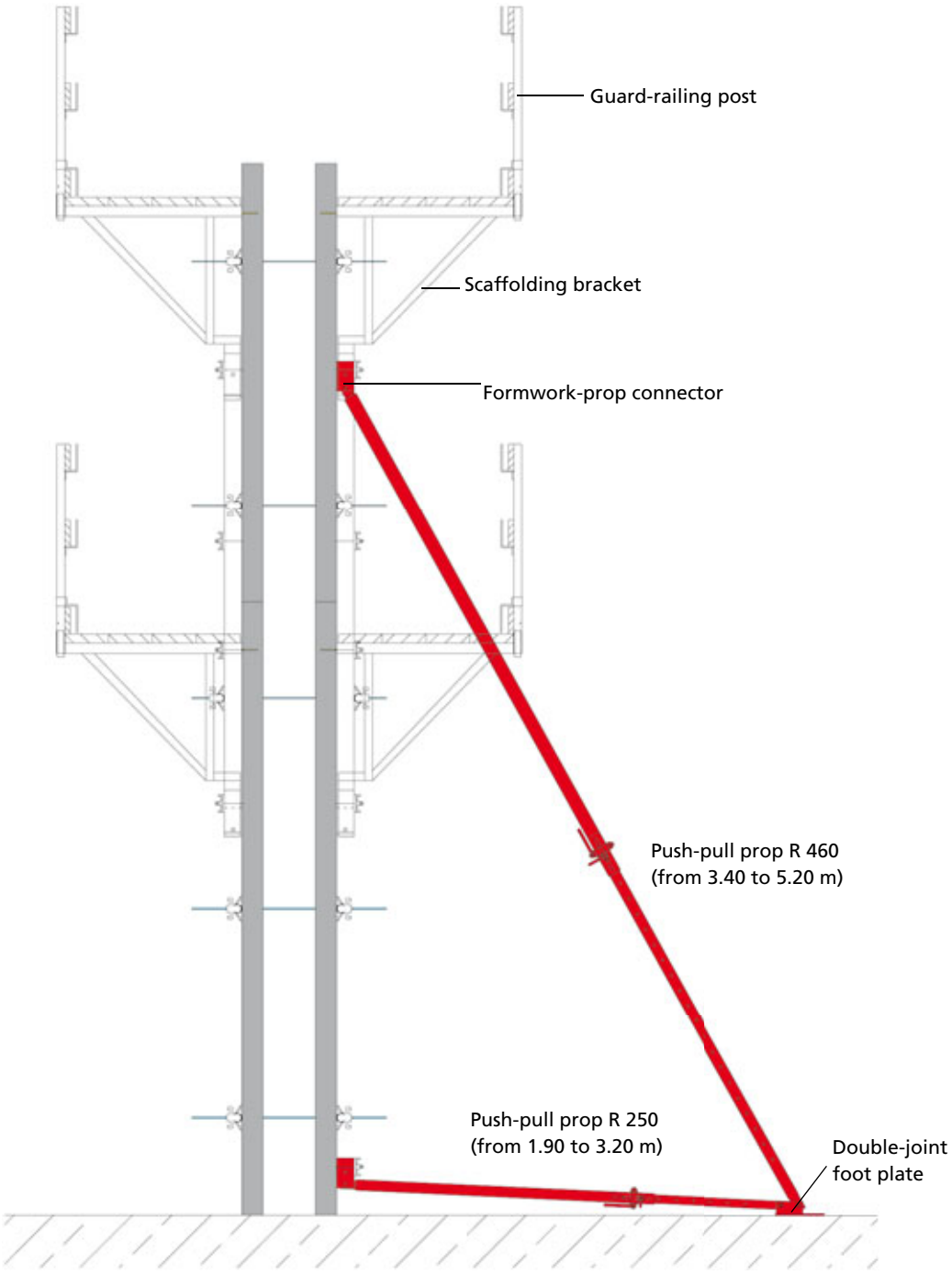

Fig. 13.1

Bracing high formwork

For wall formwork up to 6 m we recommend assembling an on-site brace frame consisting of the push-pull props R 250 und R 460. The required formwork-prop connectors and double-joint foot plates must be ordered separately (Fig. 13.1).

For wall formwork higher than 6.00 m we recommend using the Triplex R push-pull props. They are designed to brace and align high formwork.

Please observe the Triplex Assembly and Operating Instructions.

Description	Ref. No.
Push-pull prop R 460	**29-109-80**
Push-pull prop R 250	**29-109-60**
Formwork-prop connector	**29-804-85**
Double-jointed foot plate	**29-402-32**

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Folding access platform BKB 125
The ready-made folding access platform BKB 125 unfolds quickly and provides a safe access and a 125 cm wide working scaffold (Fig. 14.1 through 14.3).

The 48 mm thick planks have a rough surface and a metal lining at the edges.

The platform length of 235 cm makes the BKB 125/235 truck-transportable as it fits crosswise on any truck. When stacked, the BKB 125 is only 17 cm high. The permissible load is 2 kN/m² (200 kg).

The side railing BKB 125 can be mounted at an angle of 90° or 105°. Two flange screws 18 are required to attach the side railing to the platform.

Attention
Do not fly formwork units when the platform BKB 125 is attached to the formwork.

When using our products, the federal, state and local codes and regulations must be observed.

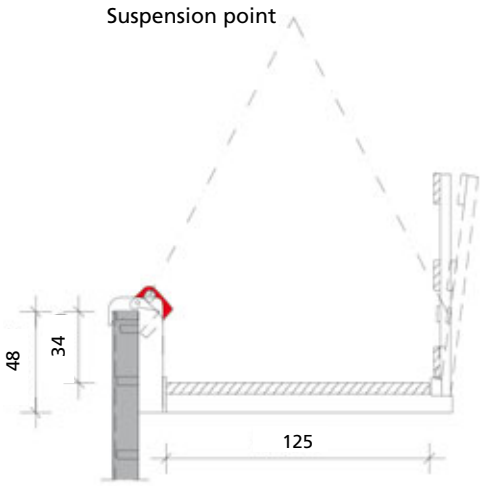

Fig. 14.1

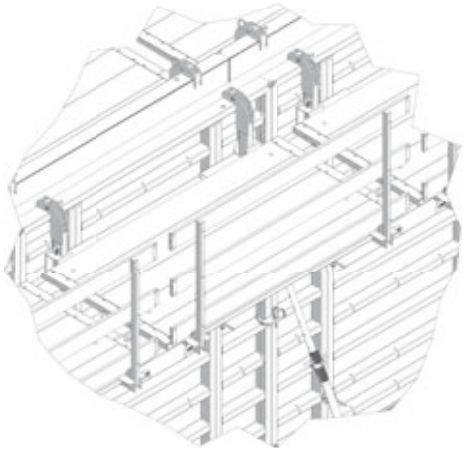
Fig. 14.2

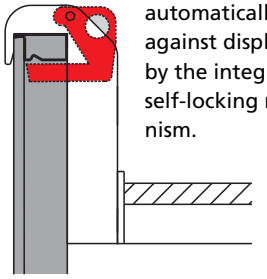
The access platform is automatically secured against displacement by the integrated self-locking mechanism.

Fig. 14.3

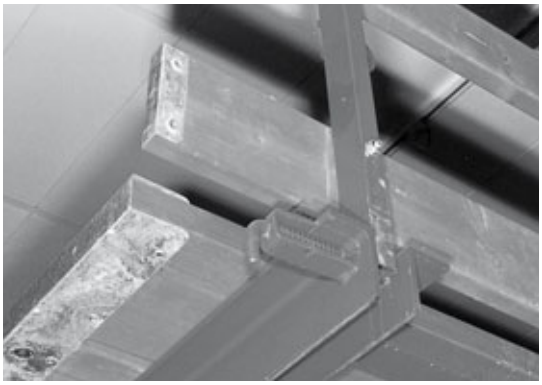
Fig. 14.4

Examples for corner configurations and length compensation

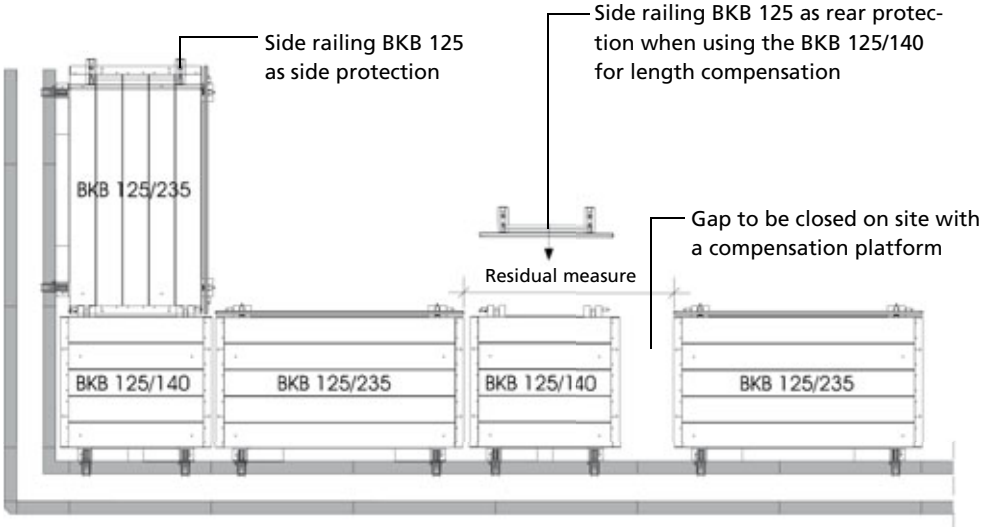

Fig. 14.5

Description	Ref. No.
Folding access platform	
BKB 125/140	**79-417-00**
BKB 125/235	**79-417-10**
BKB 125/300	**79-417-20**
Side railing	
BKB 125	**79-417-30**

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Working scaffold according to DIN 4420, Part 1
and Sheet 8 - 10/01 of the Bauberufsgenossenschaft (German Professional Construction Association)

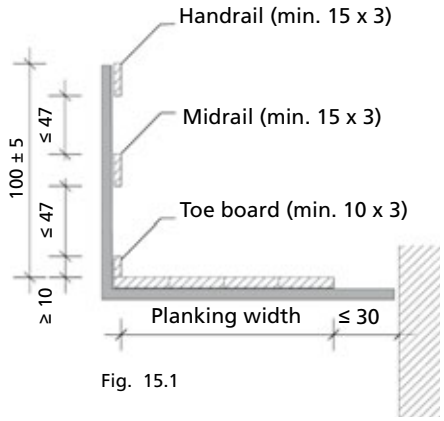

Fig. 15.1

Please note
The minimum cross section of the handrail and midrail (Fig. 15.1) is:
- 15 x 3 cm for a post distance of up to 2 m
- 20 x 4 cm for a post distance of up to 3 m

Scaffolding bracket
The scaffolding bracket 90 or 125 (Fig. 15.2) is mounted to a multi-function profile. To insert the bracket, turn it by 45°, then turn it back to vertical position and secure it with a flange screw 18. Then planks can be bolted to the brackets. The max. bracket spacing for an admissible load of 150 kg/m² (scaffold group 2) is 2.50 m, depending on the type of planks and in line with DIN 4420. The minimum plank thickness is 4.5 cm.

Guard-railing post and side railing
The guard-railing post is plugged into the scaffolding bracket. If the fall height exceeds 2 m, a side railing consisting of handrail, midrail and toe board is required (Fig. 15.1).

M profile for extension for guard railing KLK
An M profile and the railing extension KLK 230 can be used to erect a fall-down protection on the side opposite the platform (Fig. 15.5 and 15.6). The M profile is attached to the panel with 2 M assembly locks.

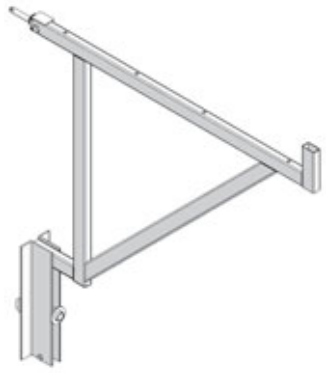

Fig. 15.2 Scaffolding bracket 90 / 125

Fig. 15.3 Guard-railing post 100 / 140

Fig. 15.4 Guard-railing post 48/120 UK

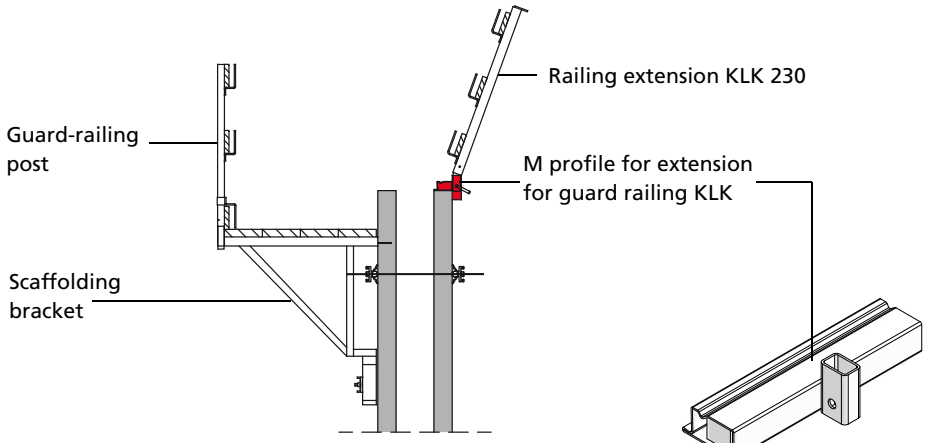

Fig. 15.5

Fig. 15.6

Description	Ref. No.
Scaffolding bracket	
90	**29-106-00**
125	**29-106-50**
Guard-railing post	
100	**29-106-75**
140	**29-106-85**
48/120 UK	**29-106-80**
Side railing 90/100	**29-108-20**
Side railing 125/100	**29-108-30**
M profile for extension for guard-railing KLK	**29-411-72**
Extension for guard-railing KLK 230	**29-411-75**

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Crane hook

The admissible load of an M crane hook (Fig. 16.1) is 15 kN (1.5 tons).

The handling is easy:
1. Open the safety lever as far as possible (Fig. 16.3).
2. Push the crane hook over the panel profile until the claw engages completely in the groove.
3. Let go of the safety lever and it will go back to its start position and lock the crane hook (Fig. 16.4).

When moving gangs, make sure each crane hook is attached at a panel joint (Fig. 16.5). This avoids displacement of the crane hook. Also make sure to always use 2 crane hooks and attach them symmetrically to the centre of gravity.

When moving single horizontal panels, both crane hooks must be attached at the centre of gravity over the cross stiffeners of the profile (Fig. 16.6).

Safety check
Always check the crane hook before use. Do not overload the crane hook. Overloading causes damage. A damaged crane hook is not capable of full load and its safe use can no longer be guaranteed.

When to replace the crane hook
If the reference dimension exceeds 61 mm, the crane hook must be replaced immediately. Replace it also if only one side of the hook exceeds this dimension (Fig. 16.2).

Safety regulations
When using our products, the federal, state and local codes and regulations must be observed. Also observe the operating instructions delivered with the crane hook.

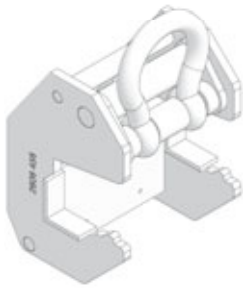

Fig. 16.1

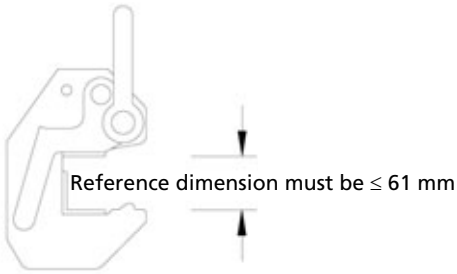

Fig. 16.2

Fig. 16.3

Fig. 16.4

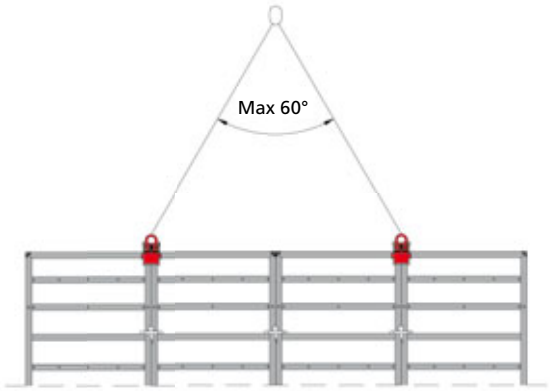

Fig. 16.5

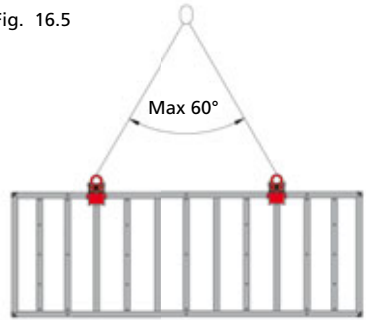

Fig. 16.6

Approved safety

Description	Ref. No.
M crane hook	**29-401-21**

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Inside corner 90°

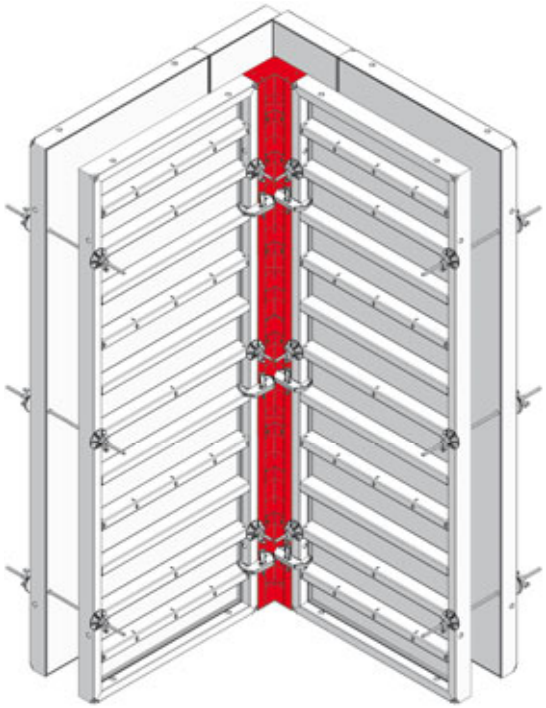

Fig. 17.1

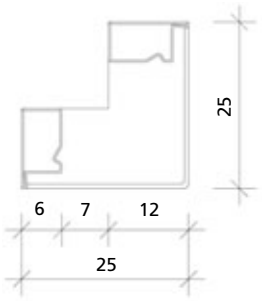

Fig. 17.2

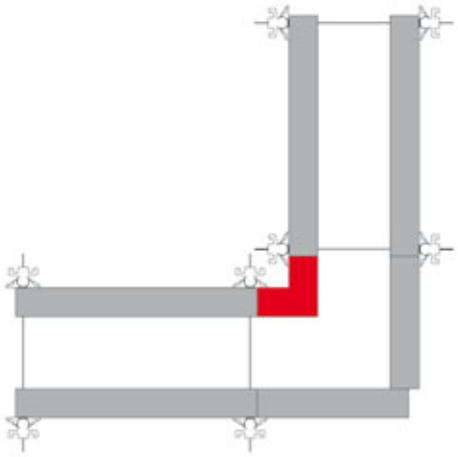

Fig. 17.3

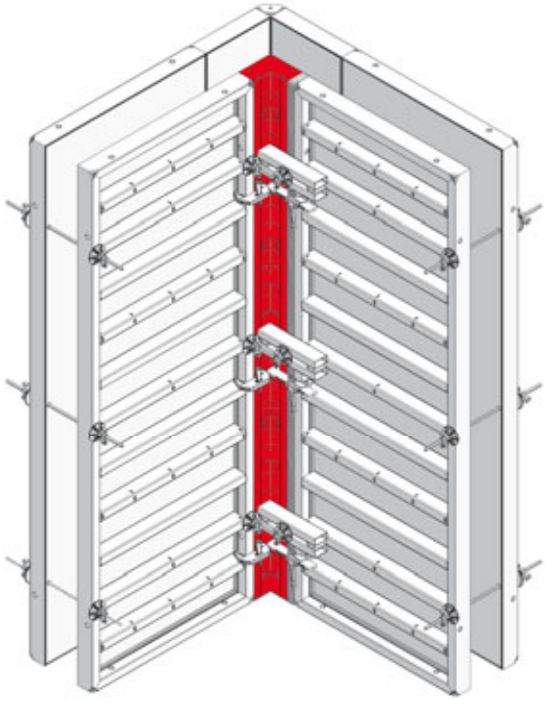

Fig. 17.4

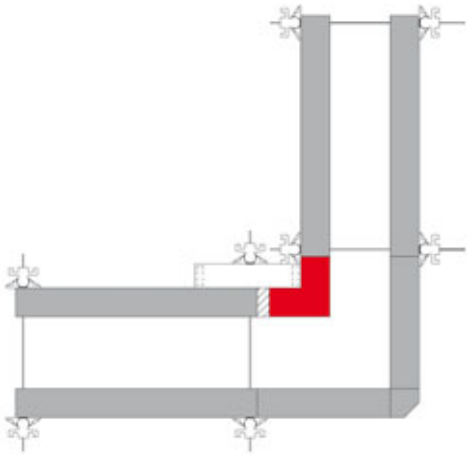

Fig. 17.5

The two-piece M 350 inside corner is equipped with an alkus facing or with a replaceable plastic-coated steel sheet with tie holes. Like the standard panels, the inside corner is connected with only 3 assembly locks per joint. Each corner side is 25 cm long (Fig. 17.1 through 17.3).

Inside corner with filler

The connection is achieved with 3 Uni-assembly locks for each panel height. For stabilisation, an M alignment rail 44 must be attached with a flange screw 18 to the multi-function profiles at tie hole elevation (Fig. 17.4 and 17.5).

Description	Ref. No.
M 350 inside corner	
350/25 AL 20	**23-136-40**
300/25 AL 20	**23-136-50**
250/25 AL 20	**23-136-60**
125/25 AL 20	**23-136-70**
350/25 two parts	**23-136-30**
M alignment rail 44	**29-401-02**
M assembly lock	**29-400-71**
Uni-assembly lock	
22	**29-400-85**
28	**29-400-90**

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Outside corner 90°

Together with the M 350 panels and the M assembly lock, the M 350 outside corner provides a solid 90° corner solution (Fig. 18.1 through 18.4).

A panel height of 350 cm requires 4 assembly locks per joint. Concreting heights over 475 cm also require alignment rails.

.

The corner bracket 40/60 can be used to stabilise the outside corner area and is attached with flange screws to the multi-function profiles at tie hole elevation (Fig. 18.5).

The number of required corner brackets depends on the height:

- 5 for height 350
- 7 for height 475
- 8 for height 600
- 10 for height 700

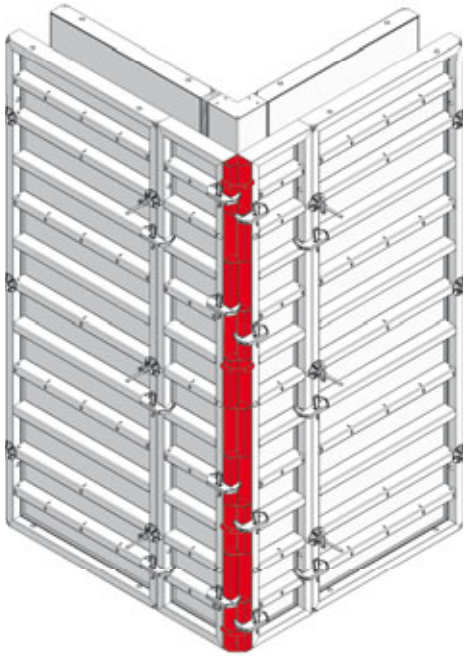

Fig. 18.1

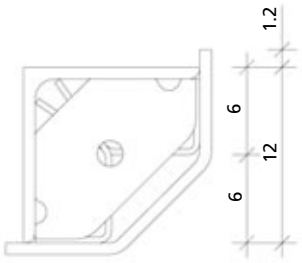

Fig. 18.2

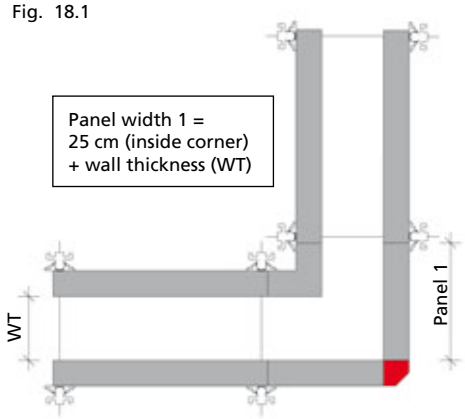

Fig. 18.3

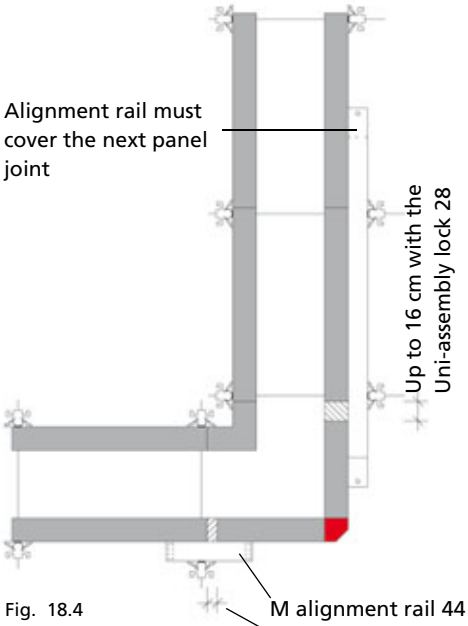

Fig. 18.4

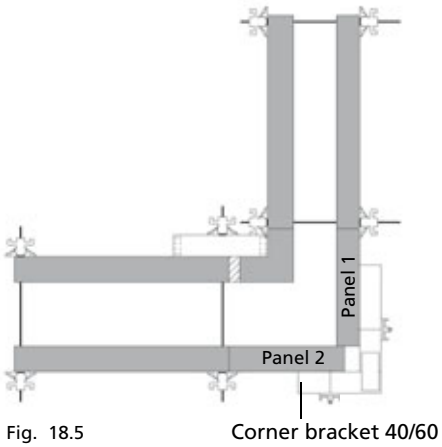

Fig. 18.5

Fig. 18.6 Detailed view of the Uni-assembly lock

Description	Ref. No.
M 350 outside corner 350	**23-140-30**
Corner bracket 40/60	**29-402-25**
M alignment rail 44	**29-401-02**
M assembly lock	**29-400-71**
Uni assembly lock 22	**29-400-85**
Uni assembly lock 28	**29-400-90**

How to determine the panel widths for 90° corners applications:

- Panel 1 = Inside corner (side length 25 cm) + wall thickness
- Panel 2 = Inside corner (side length 25 cm) + wall thickness + 5 or 10 cm

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135° corners

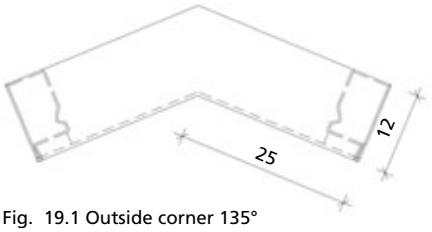

Fig. 19.1 Outside corner 135°

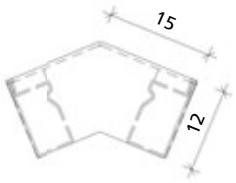

Fig. 19.2 Inside corner 135°

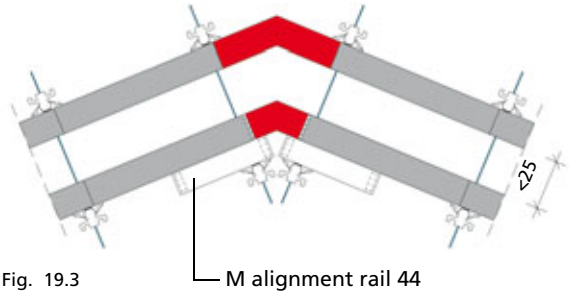

Fig. 19.3

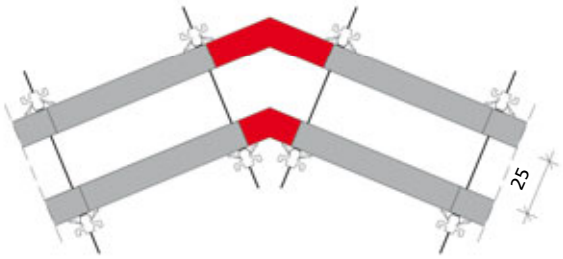

Fig. 19.4

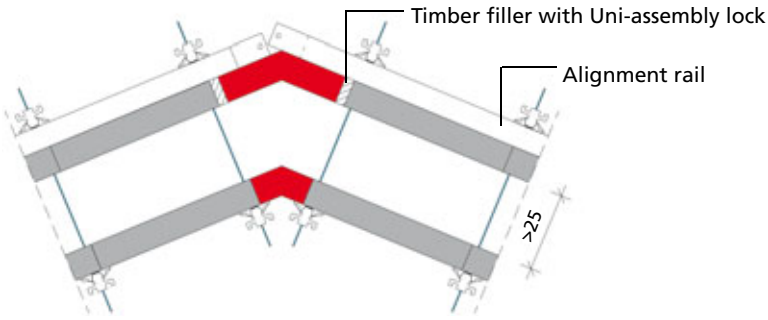

Fig. 19.5

Corners with a 135° angle are formed with the rigid 135° outside and inside corners (Fig. 19.3 through 19.5).

Side length

- Outside corner 25 cm (Fig. 19.1)
- Inside corner15 cm (Fig. 19.2).

Depending on the wall thickness, different timber fillers must be used according to the values in table 19.6. Timber fillers with a maximum width of 2 cm do not require an alignment rail if articulated flange nuts are used for tieing.

Width of timber fillers

Wall thickness	Inside filler	Outside filler	Alignment rails
20	2.0	–	QR 44
24/25	–	–	–
30	–	2.0	QR 44
35	–	4.0	RS 180
40	–	6.3	RS 180

Table 19.6

Description	Ref. No.
M 350 outside corner 135°	
350/25	**23-150-30**
350/15	**23-150-80**

Hinged corners

Acute and obtuse angled corners are formed using hinged inside and outside corners (Fig. 20.1).

The outside corner requires alignment rails to be attached to the multi-function profiles with flange screws.

Timber fillers and Uni-assembly locks are used for length compensation (Fig. 20.1 and 20.3).

With a locking device, the hinged outside and inside corners can be set to an angle of 70°, 90°, 120°, 135° or 180° (Fig. 20.2).

Side length
- Outside corner 12.5 cm
- Inside corner 40 cm

Adjustment range
60° to 180°

Fig. 20.1

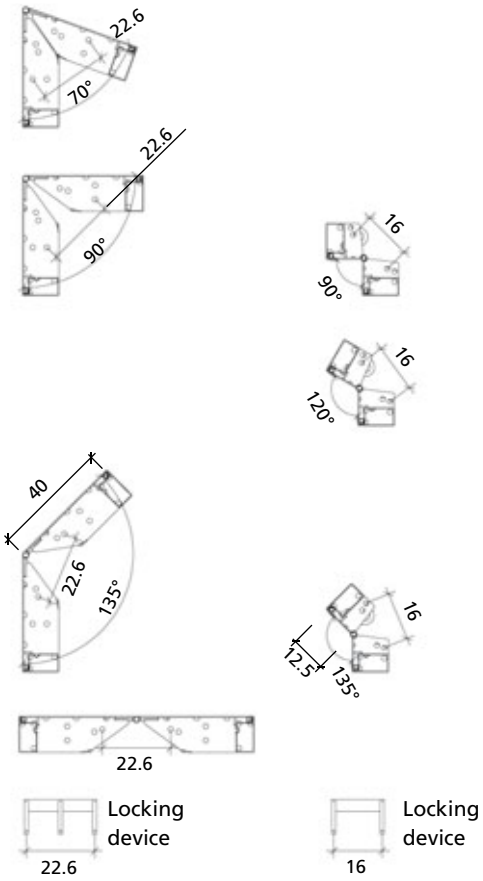

Fig. 20.2

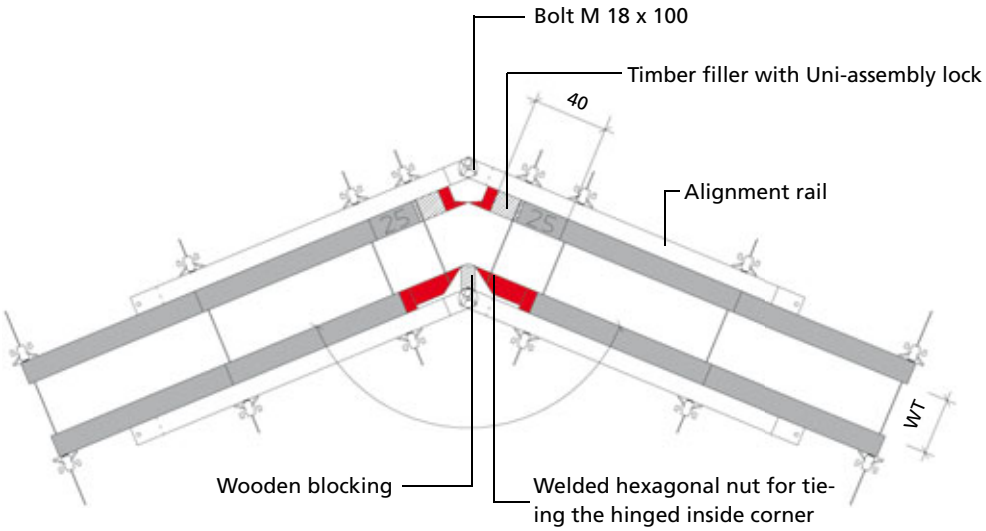

Fig. 20.3

WT = Wall thickness

Description	Ref. No.
M 350 hinged outside corner 350/12.5	**23-137-70**
M 350 hinged inside corner 350/40	**23-137-30**

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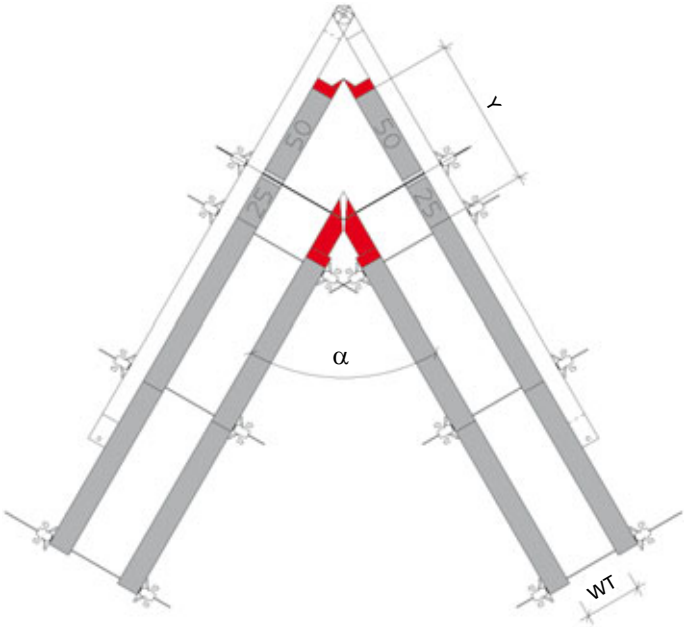
Hinged corners



WT = wall thickness

Fig. 21.1

Equation to calculate the width $y = \frac{WT}{\tan\frac{\alpha}{2}} + 27.5$ [cm]

The tie rods are screwed into the welded-in hexagonal nuts of the hinged inside corner. For this purpose, holes are drilled at the required positions of the timber filler (Fig. 21.1).

If the inside angle α is larger than 100°, alignment rails and a wooden blocking are required on the inside (see fig. 20.3 on p. M350-20).

See table 21.2 to determine the dimension (y) between the hinged outside corner and the first panel where a tie can be used.

Inside angle	Wall thickness						
α	24 cm	25 cm	30 cm	35 cm	40 cm	45 cm	50 cm
60°	Y = 69.1	Y = 70.8	Y = 79.5	Y = 88.1	Y = 96.8	Y = 105.4	Y = 114.1
65°	Y = 65.2	Y = 66.7	Y = 74.6	Y = 82.4	Y = 90.3	Y = 98.1	Y = 106.0
70°	Y = 61.8	Y = 63.2	Y = 70.3	Y = 77.5	Y = 84.6	Y = 91.8	Y = 98.9
75°	Y = 58.8	Y = 60.1	Y = 66.6	Y = 73.1	Y = 79.6	Y = 86.1	Y = 92.7
80°	Y = 56.1	Y = 57.3	Y = 63.3	Y = 69.2	Y = 75.2	Y = 81.1	Y = 87.1
85°	Y = 53.7	Y = 54.8	Y = 60.2	Y = 65.7	Y = 71.2	Y = 76.6	Y = 82.1
90°	Y = 51.5	Y = 52.5	Y = 57.5	Y = 62.5	Y = 67.5	Y = 72.5	Y = 77.5
95°	Y = 49.5	Y = 50.4	Y = 55.0	Y = 59.6	Y = 64.2	Y = 68.7	Y = 73.3
100°	Y = 47.6	Y = 48.5	Y = 52.7	Y = 56.9	Y = 61.1	Y = 65.3	Y = 69.5
105°	Y = 45.9	Y = 46.7	Y = 50.5	Y = 54.4	Y = 58.2	Y = 62.0	Y = 65.9
110°	Y = 44.3	Y = 45.0	Y = 48.5	Y = 52.0	Y = 55.5	Y = 59.0	Y = 62.5
115°	Y = 42.8	Y = 43.4	Y = 46.6	Y = 49.8	Y = 53.0	Y = 56.2	Y = 59.4
120°	Y = 41.4	Y = 41.9	Y = 44.8	Y = 47.7	Y = 50.6	Y = 53.5	Y = 56.4
125°	Y = 40.0	Y = 40.5	Y = 43.1	Y = 45.7	Y = 48.3	Y = 50.9	Y = 53.5
130°	Y = 38.7	Y = 39.2	Y = 41.5	Y = 43.8	Y = 46.2	Y = 48.5	Y = 50.8
135°	Y = 37.4	Y = 37.9	Y = 39.9	Y = 42.0	Y = 44.1	Y = 46.1	Y = 48.2
140°	Y = 36.2	Y = 36.6	Y = 38.4	Y = 40.2	Y = 42.1	Y = 43.9	Y = 45.7
145°	Y = 35.1	Y = 35.4	Y = 37.0	Y = 38.5	Y = 40.1	Y = 41.7	Y = 43.3
150°	Y = 33.9	Y = 34.2	Y = 35.5	Y = 36.9	Y = 38.2	Y = 39.6	Y = 40.9
155°	Y = 32.8	Y = 33.0	Y = 34.2	Y = 35.3	Y = 36.4	Y = 37.5	Y = 38.6
160°	Y = 31.7	Y = 31.9	Y = 32.8	Y = 33.7	Y = 34.6	Y = 35.4	Y = 36.3
165°	Y = 30.7	Y = 30.8	Y = 31.4	Y = 32.1	Y = 32.8	Y = 33.4	Y = 34.1
170°	Y = 29.6	Y = 29.7	Y = 30.1	Y = 30.6	Y = 31.0	Y = 31.4	Y = 31.9
175°	Y = 28.5	Y = 28.6	Y = 28.8	Y = 29.0	Y = 29.2	Y = 29.5	Y = 29.7
180°	Y = 27.5	Y = 27.5	Y = 27.5	Y = 27.5	Y = 27.5	Y = 27.5	Y = 27.5

Table 21.2

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M stripping corner

The M strippping corners 350 (Fig. 22.1), 300, 250 and 125 allow gangs for elevator shafts and core walls to be set and stripped without disassembling the gangs. The stripping corners work according to the "jumping jack" principle.

The corner is designed with 3 pieces to permit inward movement when the bell-crank lever is pushed upwards.

After removing the integrated wedge, the bell-crank lever is pushed upwards with a crowbar at position A (Fig. 22.2 A) or at position B (Fig. 22.3 B). This breaks the bond between formwork facing and concrete without much effort.

The stripping corner can be reset for the next pour by positioning the crowbar at the top and pushing the bell-crank lever down. After that the wedge can be put back into its starting position with a few hammer blows (Fig. 22.5 C).

The stripping corner can easily be extended with another one by connecting the bell-crank levers of the stripping corners.

The bolt must be secured with a pin through the crane eye (Fig. 22.6 D).

Description	Ref. No.
M stripping corner	
350/25	**23-151-00**
300/25	**23-151-10**
250/25	**23-151-20**
125/25	**23-151-30**

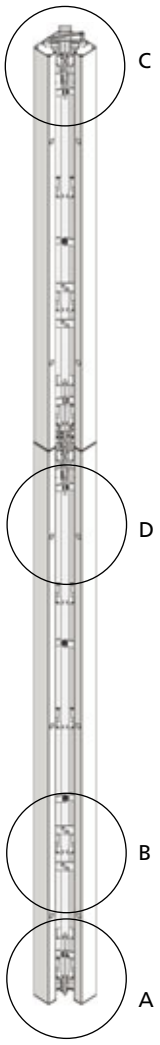

Fig. 22.1

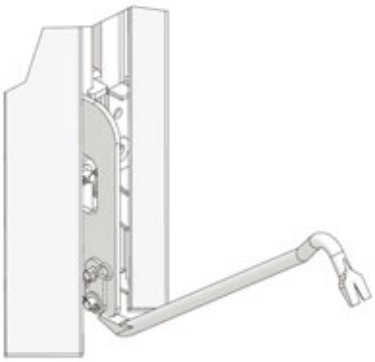
Fig. 22.2 A

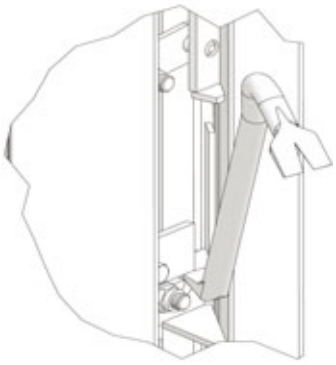
Fig. 22.3 B

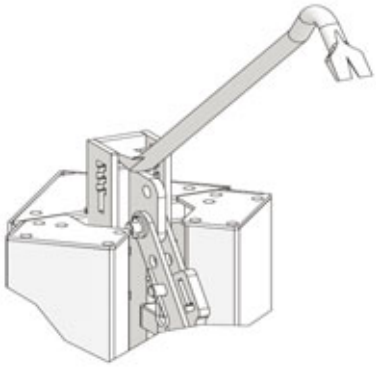
Fig. 22.4 C

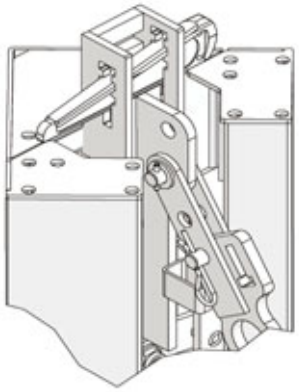
Fig. 22.5 C

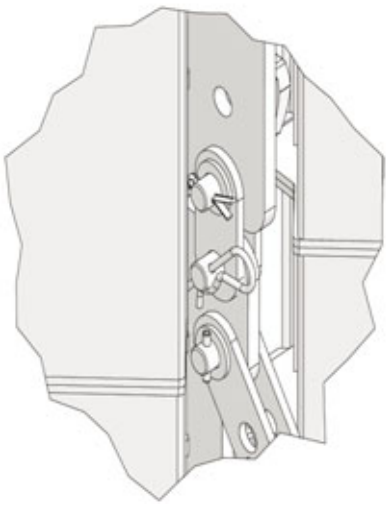
Abb. 22.6 D

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M stripping corner

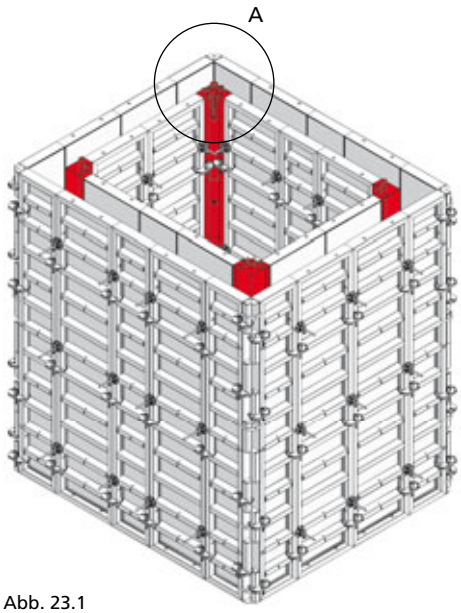

Abb. 23.1

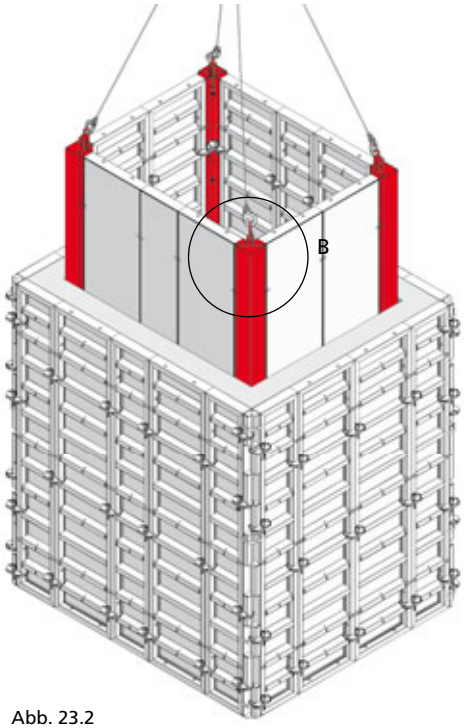

Abb. 23.2

Minimal crane time is required because the stripping corners turn all sides of the gang into 1 movable unit which can be lifted out of the shaft by using 4-rope crane slings (Fig. 23.1 and 23.2). There is no need to disassemble the gang. For details see fig. 23.3 A and 23.4 B.

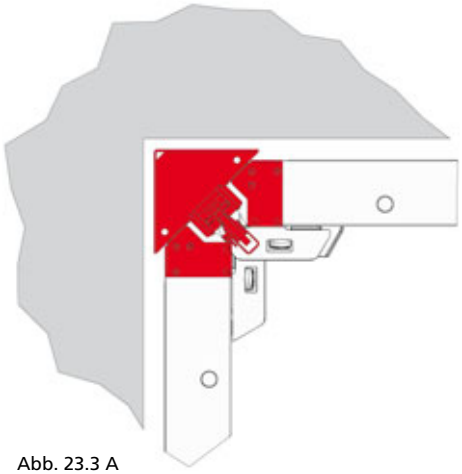

Abb. 23.3 A

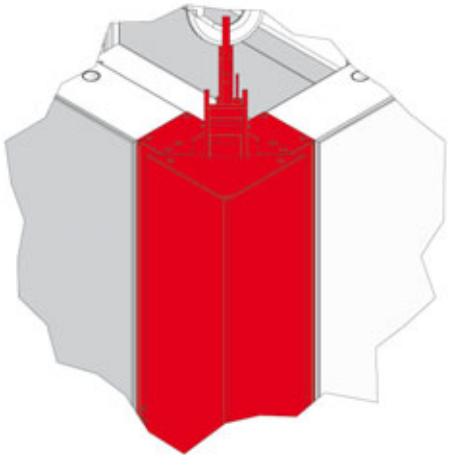

Abb. 23.4 B

Description	Ref. No.
M stripping corner	
350/25	**23-151-00**
300/25	**23-151-10**
250/25	**23-151-20**
125/25	**23-151-30**

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Length compensation

Timber Filler
Gaps up to 14 cm can be formed on site by using timber fillers and Uni-assembly locks 22 while for gaps up to 20 cm timber fillers and Uni-assembly locks 28 are used. Compensation areas are reinforced with alignment rails which must always be attached to the multi-function profile.

Timber profile
Timber profiles are used for gaps exceeding 17 cm. A forming face is cut to size and attached to the timber profiles. Reinforcement is achieved with alignment rails which are attached with articulated flange nuts to the multi-function profiles at tie hole elevation using (Fig. 24.1 and 24.2).

For problem areas, the job-built formwork is attached to the panels using M timber profiles and M assembly locks (Fig. 24.3 through 24.5).

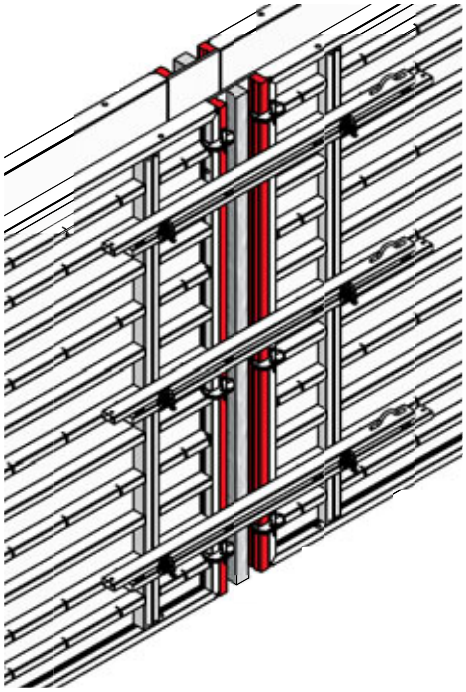

Fig. 24.1

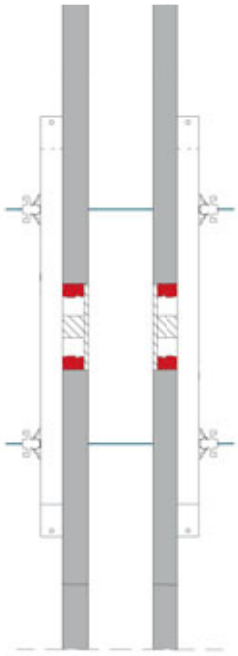

Fig. 24.2

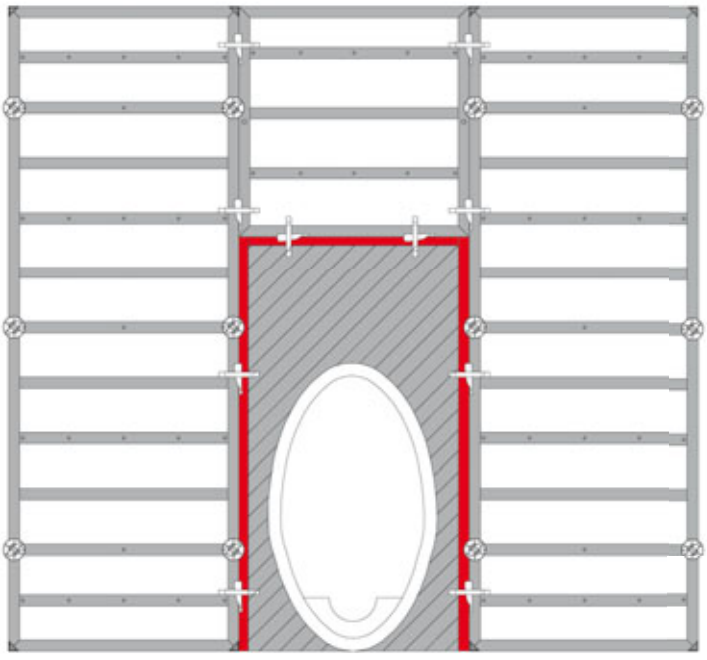

Fig. 24.3

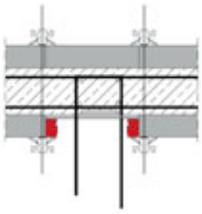

Fig. 24.4

Fig. 24.5

Description	Ref. No.
Uni-assembly lock	
22	**29-400-85**
28	**29-400-90**
M timber profile	
350/21	**29-400-02**
300/21	**29-400-05**
250/21	**29-400-15**
125/21	**29-400-17**

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Length Compensation

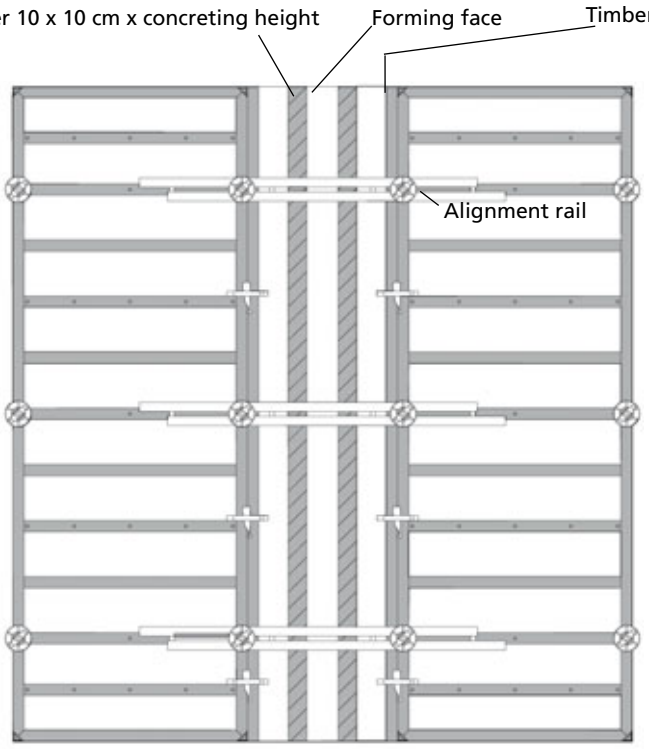

Fig. 25.1 Alignment rails at tie hole elevation

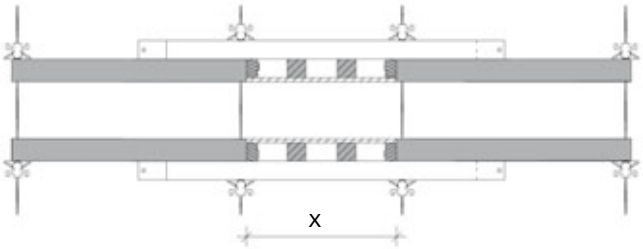

Fig. 25.2

The maximum filler width (X) for the bracing at tie hole elevation (Fig. 25.1 and 25.2) is determined depending on the admissible fresh concrete pressure and the type of alignment, see table 25.3

Please Note
When compensating gaps near outside corners or stop ends, the vertical tensile force must be taken into consideration. In this case, fasten the alignment rail with flange screws on both sides of the filler at tie hole elevation (Fig. 25.1).

Table to determine the admissible compensation width X depending on the bracing and admissible fresh concrete pressure (flatness according to DIN 18202, table 3, line 6)

Alignment rail	Section	Compensation width X [cm]	
		At tie hole elevation	
		70 kN/m²	100 kN/m²
M alignment rail 80	2 RR 100 x 50 x 3	1.00 m	1.00 m
M alignment rail 250		1.10 m	1.00 m *
Cross beam 300	2 RR 100 x 60 x 4	1.75 m	1.45 m *
M alignment rail 450		1.75 m	1.45 m *
M alignment rail 450 reinforced	2 U 140	2.65 m	2.25 m

* refers to multiple span beams

Table 25.3

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T-wall connection

Fig. 26.1 through 26.4 show a T-wall connection using 2 inside corners.

Different wall widths can be compensated with timber fillers (Fig. 26.4).

For the load capacity of the alignment rails see p. M350-25.

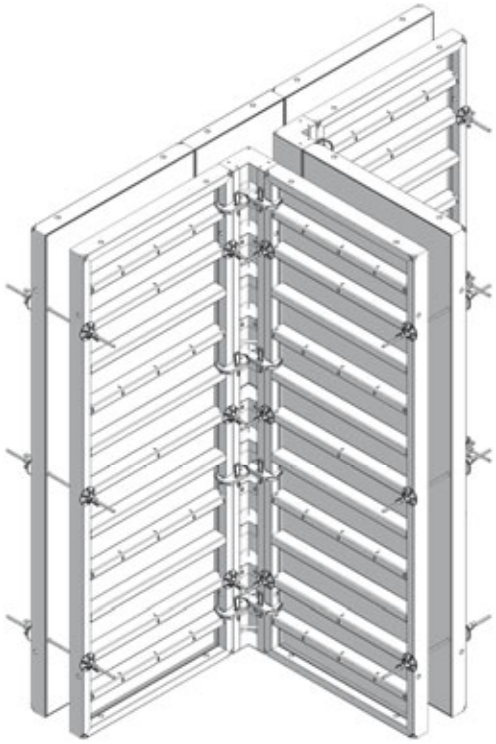

Fig. 26.1

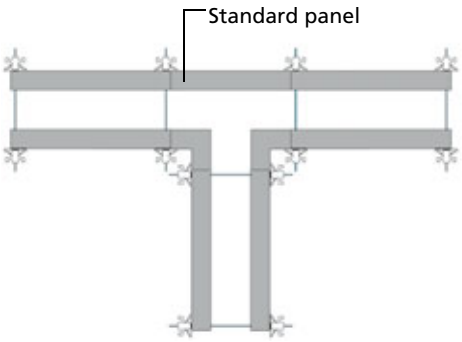

Fig. 26.2

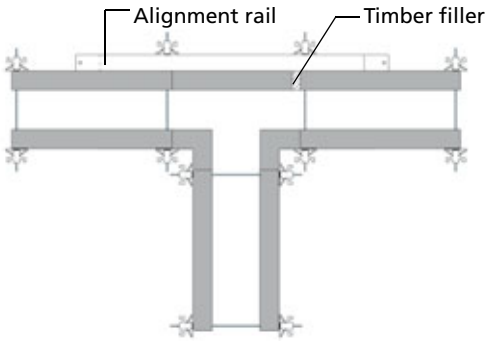

Fig. 26.3

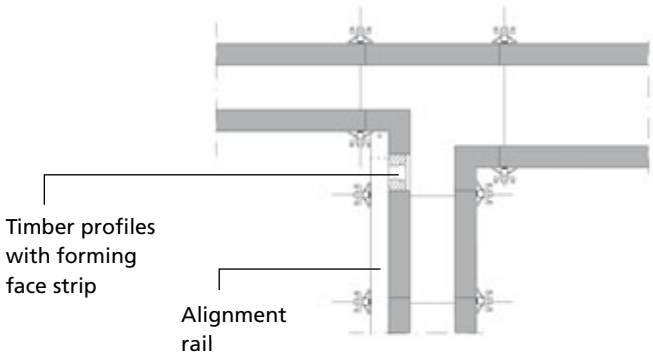

Fig. 26.4

Description	Ref No
M alignment rails	
450 reinforced	**29-402-38**
450	**29-402-40**
250	**29-402-50**
180	**29-400-92**
44	**29-401-02**
Uni-assembly lock	
22	**29-400-85**
28	**29-400-90**
M assembly lock	**29-400-71**

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Connection to existing walls

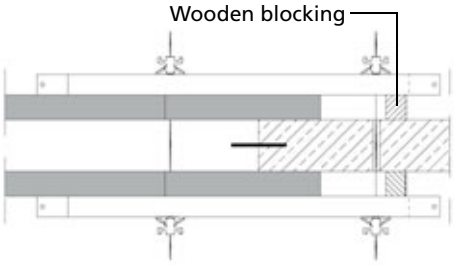

Fig. 27.1

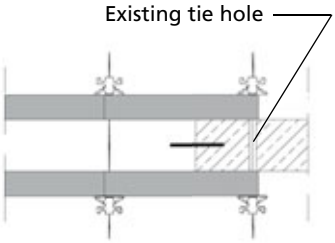

Fig. 27.2

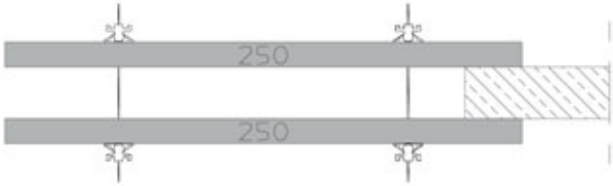

Fig. 27.3

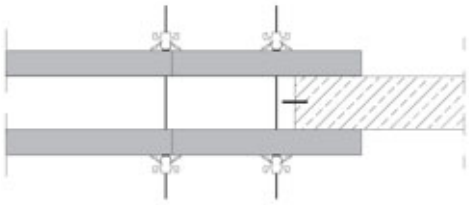

Fig. 27.4

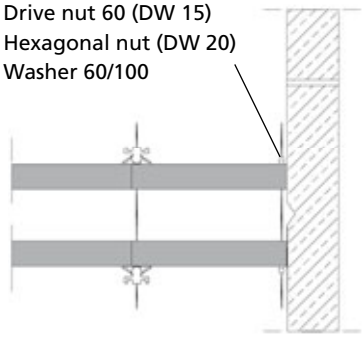

Fig. 27.5

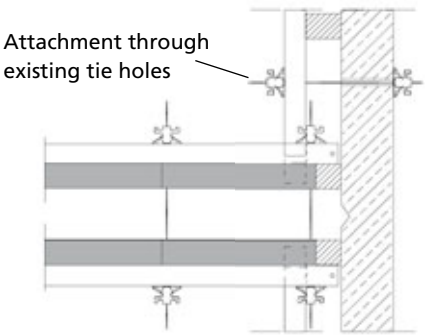

Fig. 27.6

Fig. 27.1 through 27.6 show some options for connecting formwork to an existing wall. Depending on the wall layout and conditions on the construction site, the most suitable solution may vary from site to site.

Make sure the formwork is securely attached to the existing wall in order to avoid a leakage of the fresh concrete and a patchy concrete surface.

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Stop ends

A stop end can be formed either with a stop end bracket, a column clamp and an alignment rail or with a column bracket size 1 and standard panels. The stop end bracket is placed at tie hole elevation and replaces the tie rod (Fig. 28.1). Round stop ends can be formed with the circular steel column formwork Circo (Fig. 28.2).

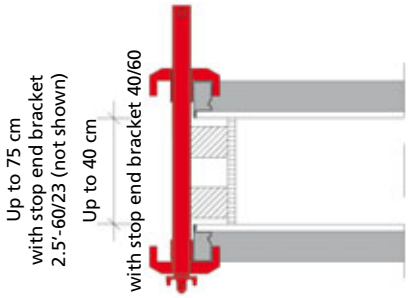

Fig. 28.1

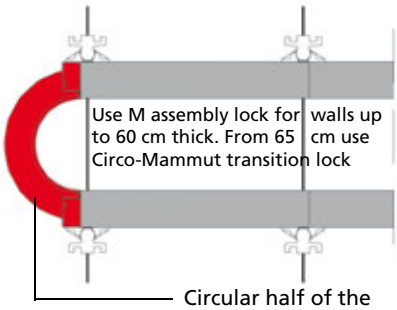

Fig. 28.2

Column clamps with alignment rails are placed at tie hole elevation (Fig. 28.3). Tieing is done either outside the panels with Uni-tie claws and tie rods (Fig. 28.3 and 28.4) or at the tie holes. Column brackets size 1 are attached to the multi-function profiles at tie hole elevation. The stop end can be built with square timbers and a facing (Fig. 28.5) or with standard panels that match the wall thickness (Fig. 28.6). Tieing is done through the column bracket.

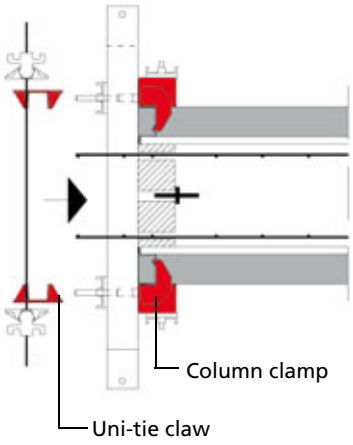

Fig. 28.3

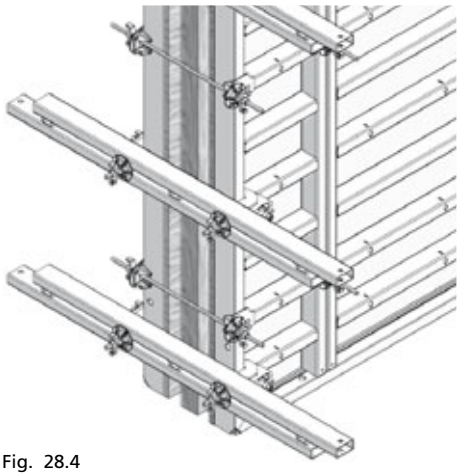

Fig. 28.4

Attention
Never use DW tie rods for stop ends if these are going to be subject to shearing stress. Tieing must be done at the columnn bracket, see fig. 28.5.

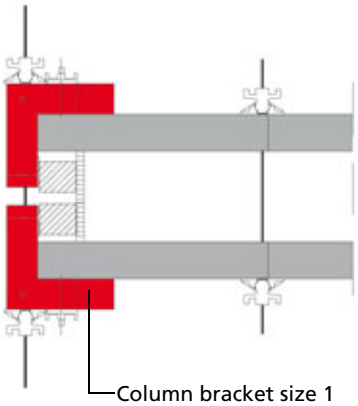

Fig. 28.5

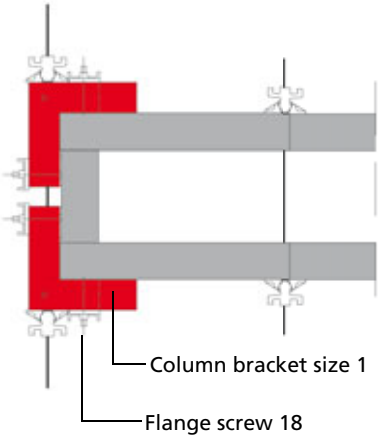

Fig. 28.6

Description	Ref. No.
Stop end bracket	
2.5'-60/23	**29-105-60**
40/60	**29-105-50**
Column bracket size 1	**79-402-13**
Column clamp 21	**29-402-70**
Uni-tie claw	**29-901-41**
M assembly lock	**29-400-71**
Transition lock Circo-Mammut	**29-400-80**

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Wall offset

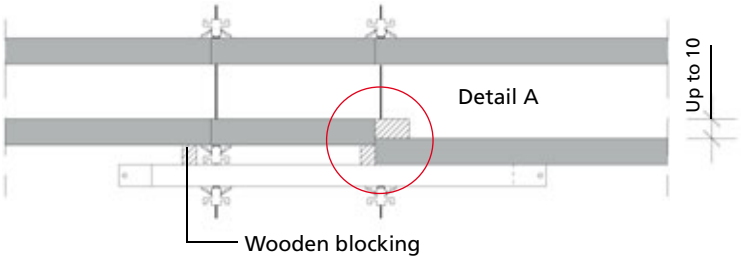

Fig. 29.1

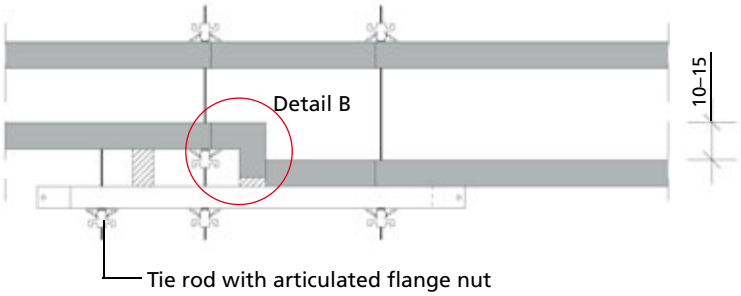

Fig. 29.2

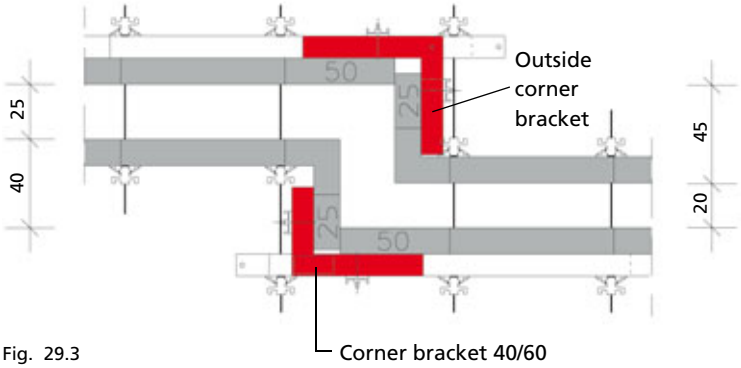

Fig. 29.3

Detail A

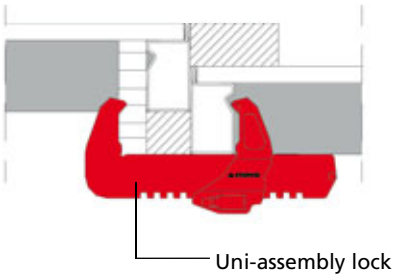

Fig. 29.4

Detail B

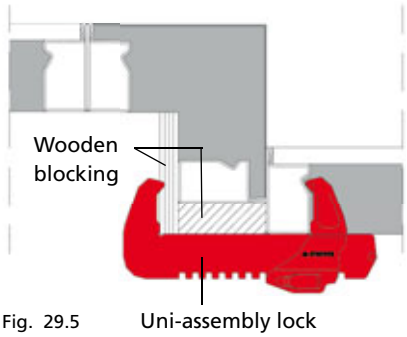

Fig. 29.5

One-sided wall off-sets of up to 10 cm are formed by moving back the corresponding panel (Fig. 29.1 and 29.4).

For offsets exceeding 10 cm, inside corners should be used (Fig. 29.2 and 29.5).

If both sides of the wall are offset as shown in fig. 29.3, inside corners and M outside corner brackets or corner brackets 40/60 should be used.

All types of wall offset require alignment rails for reinforcement.

If the panels are arranged as shown in fig. 29.4 and 29.5, a Uni-assembly lock 22 or 28 can be used.

Description	Ref. No.
M outside corner bracket	**23-137-63**
Corner bracket 40/60	**29-402-25**
Uni-assembly lock 22	**29-400-85**
Uni-assembly lock 28	**29-400-90**

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Pilasters

Pilasters are easily formed with inside corners, standard panels and, where necessary, wooden blockings.
Stop end brackets and alignment rails must be placed for reinforcement (Fig. 30.1 through 30.4).

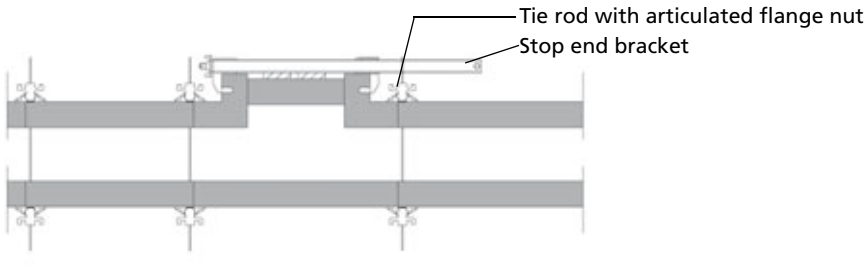

Fig. 30.1

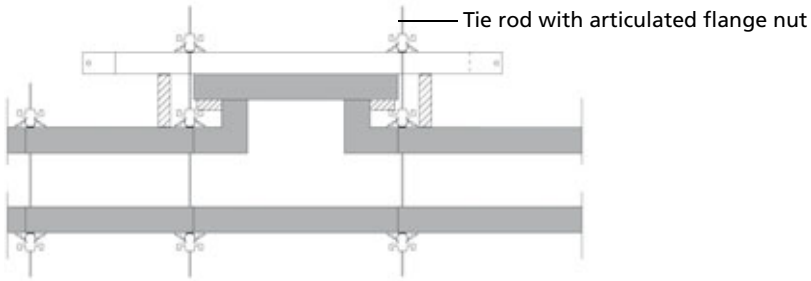

Fig. 30.2

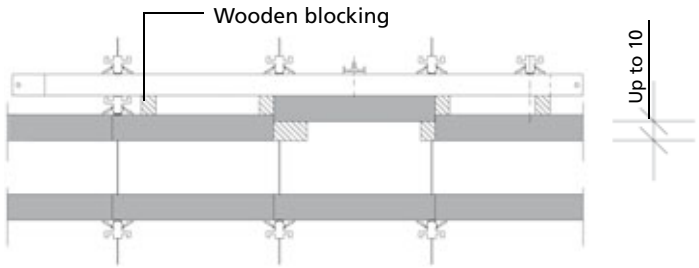

Fig. 30.3

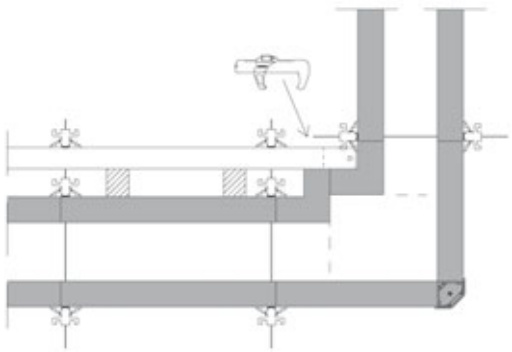

Fig. 30.4

Description	Ref. No.
Stop end bracket	
40/60	**29-105-50**
2.5'-60/23	**29-105-60**

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Differences in height

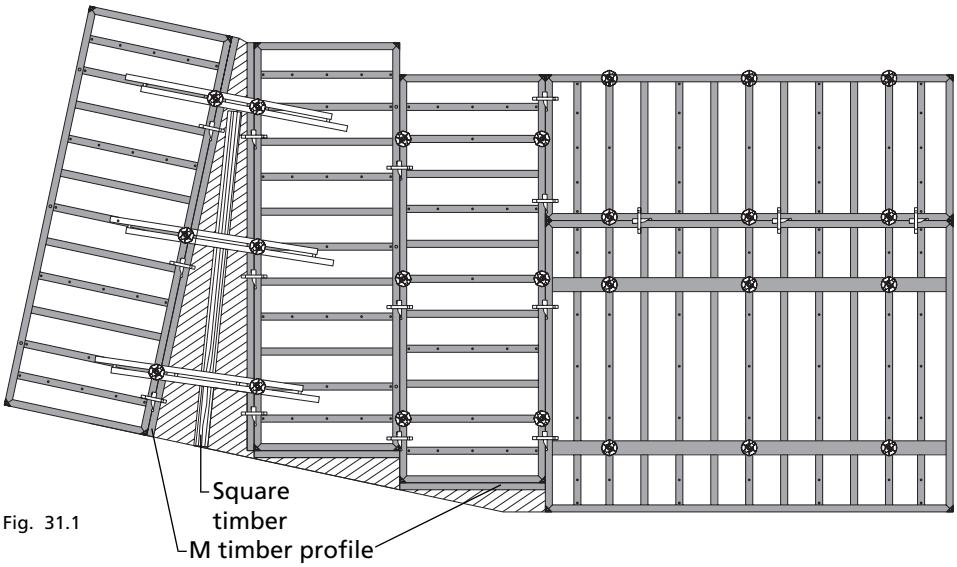

Fig. 31.1

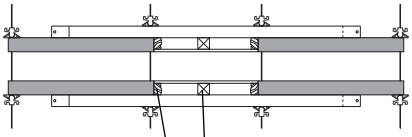

Fig. 31.2

The assembly lock can be attached at any position on the frame profile (Fig. 31.1), so the formwork needs no connection grid and requires no additional accessories for assembly. Vertical, horizontal and even inclined panels can all be safely connected with M assembly locks, even with differences in height.

Job-built fillers are made with square timbers and an alkus plastic sheet or plywood cut to size. If required, use a square timber for reinforcing. A compensation larger than 36 cm requires a centered square timber to support the facing.

Square timbers and panels are simply connected with M assembly locks.
The wood filler areas need special attention (see page M350-24). The use of rails and/or blockings may be required.

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Panels in horizontal position

A lot of forming problems can easily be solved by arranging panels horizontally. These include basin walls in water treatment plants, foundations and strip footings which often require a certain height.

When using foundation tapes and tensioners for foundation tapes, there is no need to put tie rods through the lower tie holes, a task that is very time-consuming (Fig. 32.1).

When using panels horizontally, tie rods can nevertheless be installed at bottom tie holes. However, in this case drive nut 60 must be used as well (Fig. 32.2).

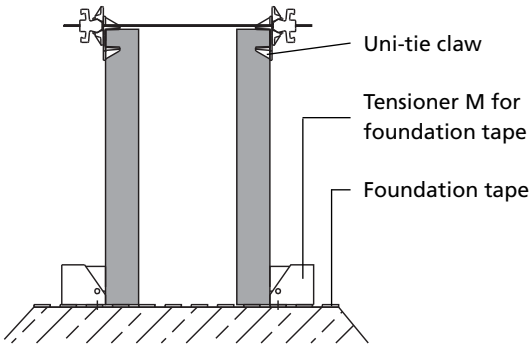

Fig. 32.1

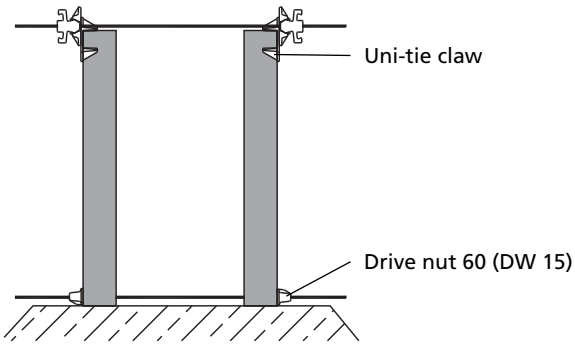

Fig. 32.2

Description	Ref. No.
Foundation tape 50 m roll	**29-307-50**
Tensioner M for foundation tape	**29-307-60**
Trolley for foundation tape	**29-307-55**
Uni-tie claw	**29-901-41**
Drive nut 60	**29-900-23**

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Substitution of ties

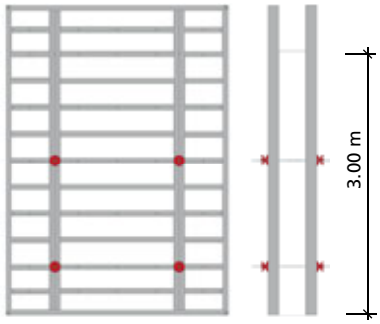

Fig. 33.1

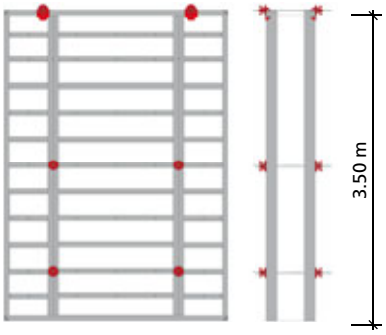

Fig. 33.2

In certain cases tie rods need not be installed at certain tie holes or tie rods can be reduced by using alignment rails.

- Panels up to 3.00 m concreting height do not require tieing at the top tie holes (Fig. 33.1).
- For a maximum concreting height of 3.50 m, a Uni-tie claw can be attached over the panel instead of installing ties in the top tie holes (Fig. 33.2).
- When using a panel with a maximum width of 30 cm horizontally for extension and the total formwork does not exceed 3.80 m, (Fig. 33.3), it is not required to install ties in the tie holes of the extended panel as long as the scaffolding bracket is attached to the panel below. However, if the scaffolding bracket is attached to the top panel, a tie must be installed in the top tie holes. The Uni-tie claw in combination with a tie rod and a flange nut 100 can also be used to tie this configuration.
- When placing a panel with a maximum width of 1.25 m horizontally for extension and the total formwork height does not exceed 4.75 m, the top panel does not need tieing at its bottom tie holes if you instead use 2 alignment rails RS 180 (Fig. 33.4).

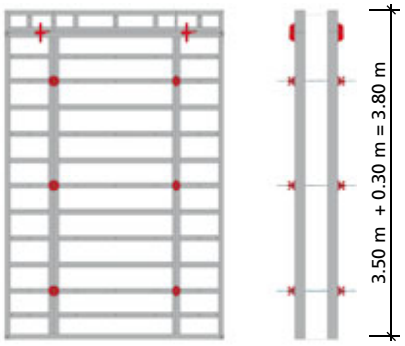

Fig. 33.3

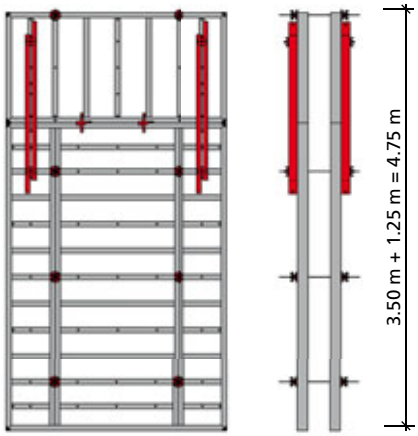

Fig. 33.4

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Substitution of ties

■ When horizontally adding 2 panels with a width of 1.25 m for extension and the total formwork height does not exceed 6.00 m, the bottom row of ties does not tieing when using 2 alignment rails RS 250 (Fig. 34.1).

■ When extending 2 M 350 panels vertically for a total formwork height of 7.00 m, the top panel does not need tieing at its top if a Uni-tie claw is attached over the top panel (Fig. 34.2).

■ A formwork height of 8.25 m is achieved by extending a vertical M 350 panel with another vertical M 350 panel and a horizontal panel that is 1.25 m wide. For this configuration no ties need to be installed at the bottom tie holes of the top panel if using alignment rails (Fig. 34.3). The same is true when adding another panel with a width of 1.25 m in horizontal position for a total formwork height of 9.50 m (Fig. 34.4).

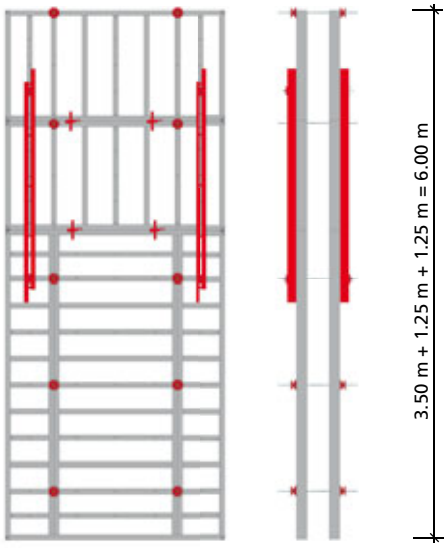

Fig. 34.1

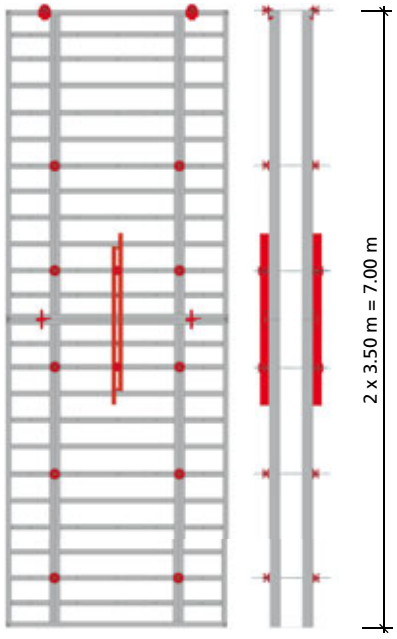

Fig. 34.2

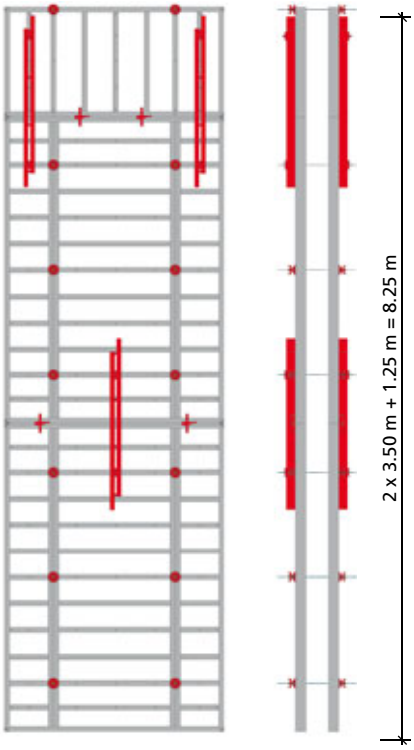

Fig. 34.3

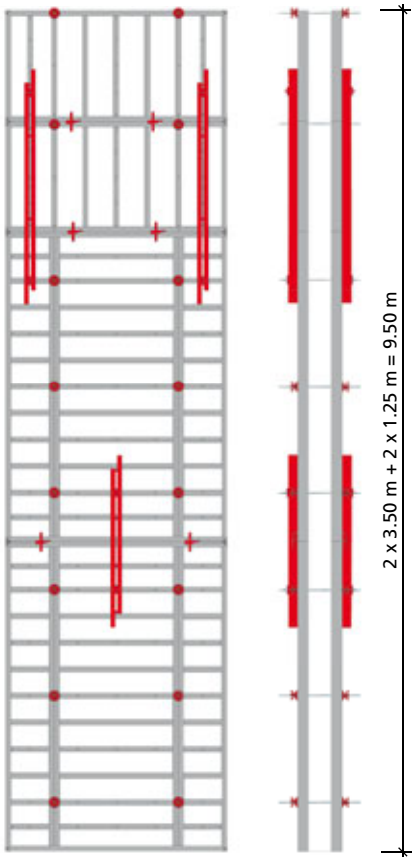

Fig. 34.4

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Height extension

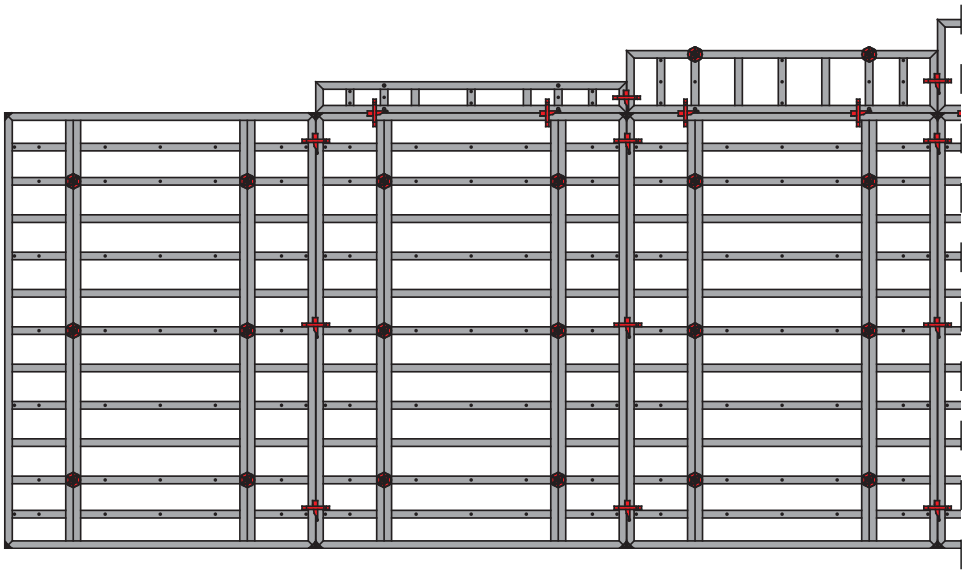

Fig. 35.1

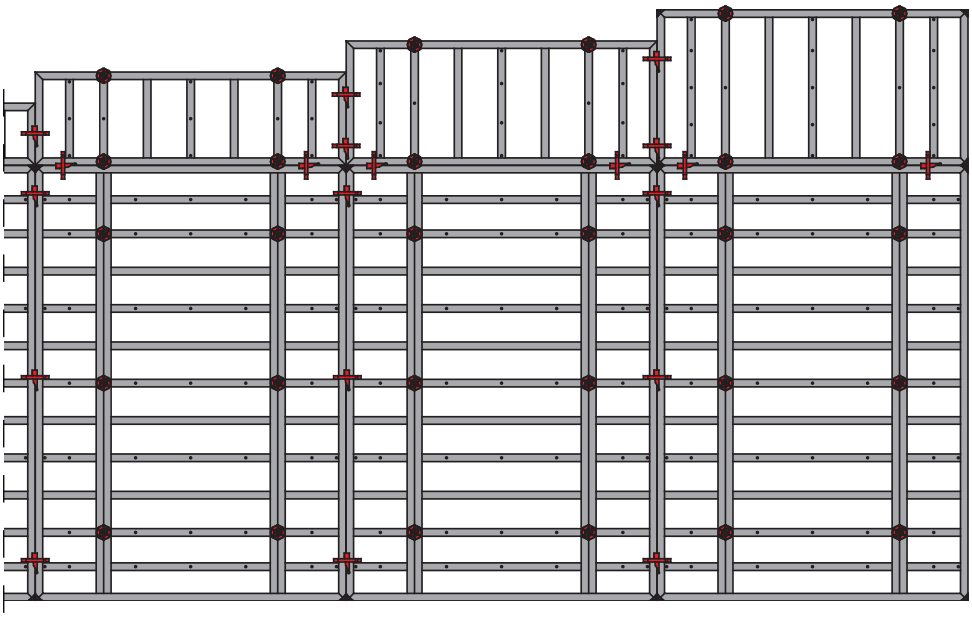

Fig. 35.2

Combinations for height extension
All panels can be combined vertically or horizontally (Fig. 35.1 and 35.2) and must always be connected with the Mammut assembly lock (see p. M350-7).

As you can freely combine vertical and horizontal panels and thus build economic formwork heights in increments of 25 cm, you always have formwork projections as well as even and joint patterns.

Functionality
The panels have an all-around groove and thus allow for a step-less positioning of the assembly locks.

User-friendly and economic
The panel height of 3.50 m requires only 3 tie rods and 3 assembly locks.

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Height extension

In certain cases the number of tie rods can be reduced by using alignment rails (see p. M350-33 and M350-34). Make sure the maximum load-bearing capacity of tie rods and alignment rails is not exceeded, see p. M350-25.

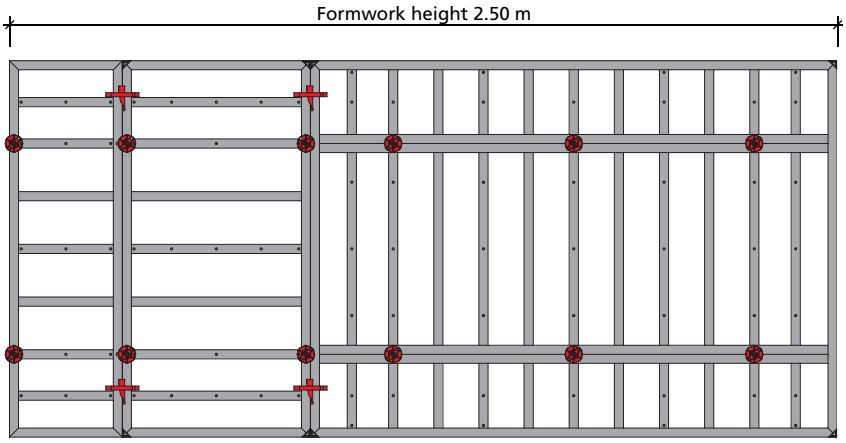

Fig. 36.1

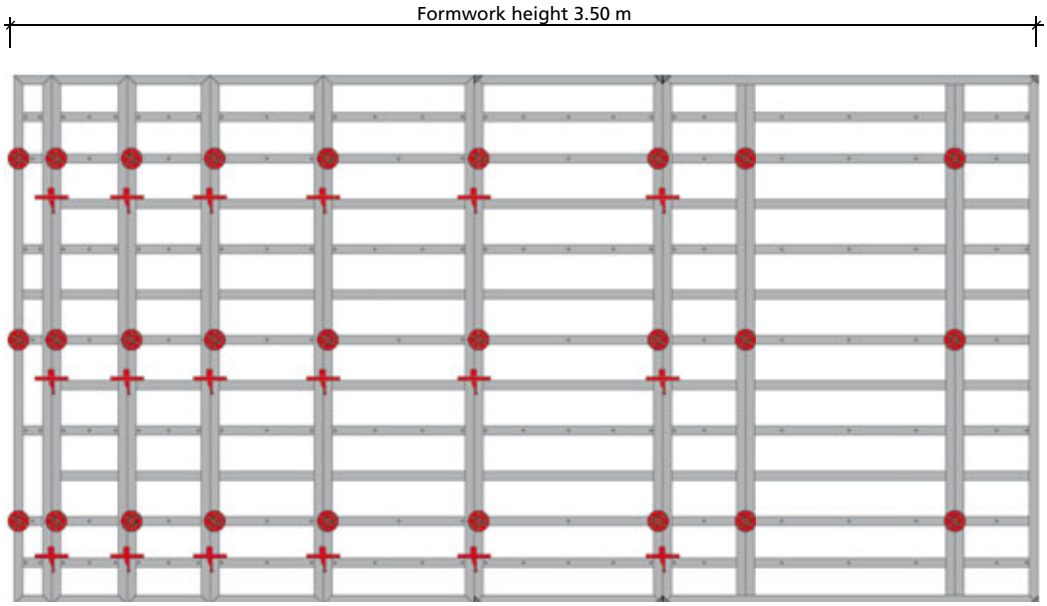

Fig. 36.2

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Crane ganging

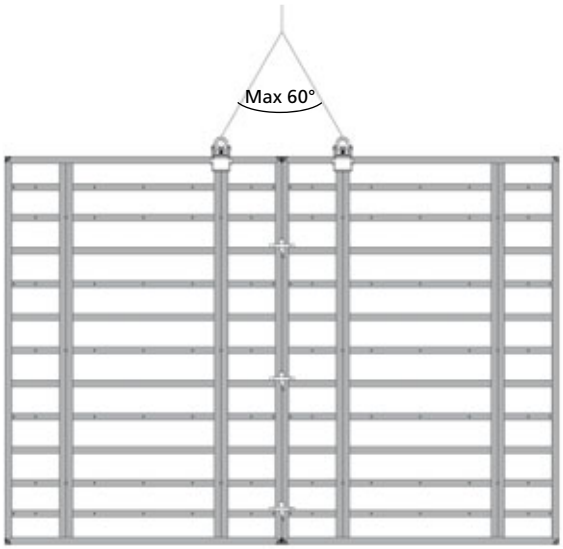

Fig. 37.1

Fig. 37.2

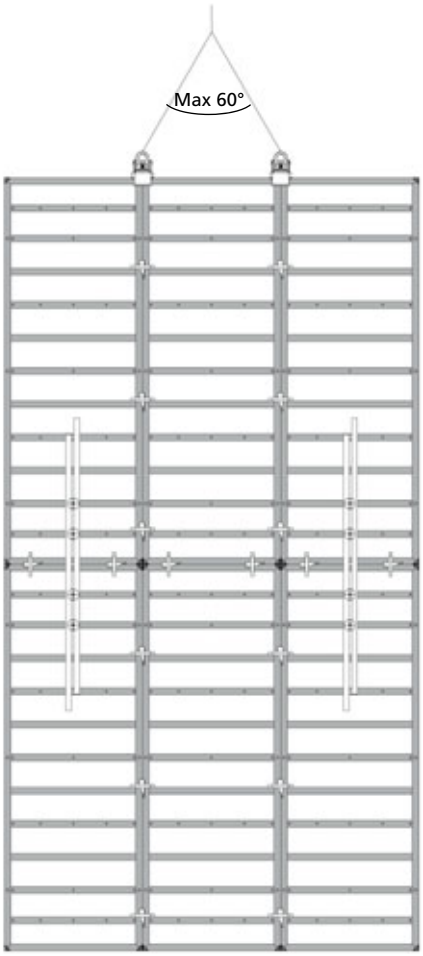

Fig. 37.3

Each transport unit requires two M crane hooks with a load capacity of 15 kN (1.5 tons). They must be attached symmetrically to the centre of gravity.

In order to provide the necessary flexural rigidity when lifting and laying down gangs, alignment rails are mounted with flange screws (Fig. 37.3).

For gangs with horizontally assembled panels on top, the crane hook must be attached above the horizontal profiles so that the crane hook cannot disengage (Fig. 37.2).

Fig. 37.1
Panel unit 3.50 m x 5.00 m = 17.50 m²
Weight 1200 kg

Fig. 37.2
Panel unit 4.75 m x 2.50 m = 11.88 m² and 1 M alignment rail 180
Weight 820 kg

Fig. 37.3
Panel unit 7.00 m x 3.75 m = 26.25 m² and 2 M alignment rails 250
Weight 1710 kg

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Crane ganging

Fig. 38.1
Panel unit 3.75 m x 3.50 m = 13.13 m² with 2 M alignment rails 180
Weight: 830 kg

Fig. 38.2
Panel unit 7.00 m x 5.00 m = 35.00 m² with 2 M alignment rails 250 und 2 M alignment rails 44
Weight 2500 kg

Fig. 38.1

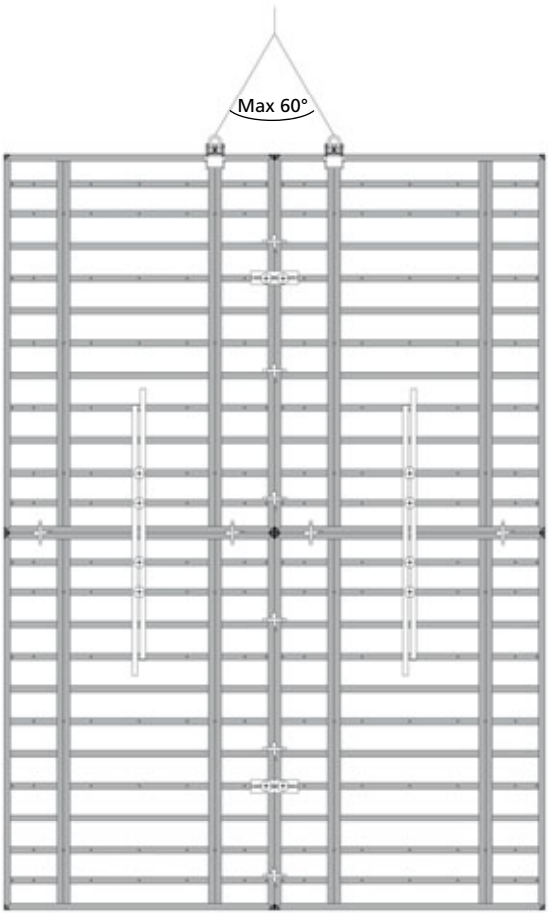

Fig. 38.2

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Column formwork

Concreting height [cm]	Number of required alignment rails for reinforcement from bottom to top					Number of M assembly locks
	Column side length [cm]					
	25	50	75	100	125	
125	—	—	—	—	—	3
250	—	—	—	—	—	5
300	—	—	—	—	—	6
350	—	—	—	—	—	7
425	—	—	—	—	1	10
475	—	—	—	1	1	10
500	—	—	—	1	1	10
550	—	—	—	1	1	11
600	—	—	—	2	2	12
650	—	—	1	2	2	13
700	1	1	1	2	2	14
750	1	1	1	2	2	15
800	1	1	1	2	2	16
850	2	2	2	3	3	17
900	2	2	2	3	3	18
950	2	2	2	3	3	19

Table 39.1

Note for the horizontal joint of all standard panels:
- A panel width of 125 cm requires 4 M assembly locks.
- A panel width of 100 cm requires 3 M assembly locks.
- A panels width < 100 cm requires 2 M assembly locks.

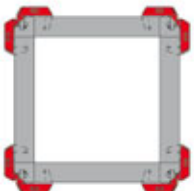

Fig. 39.2

Height 350

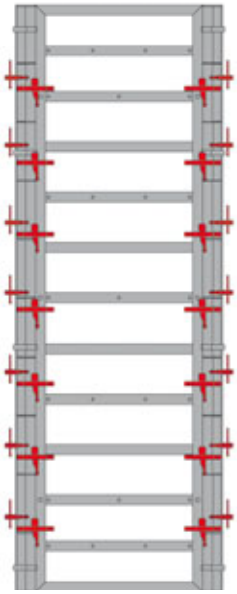

Fig. 39.3

Height 700

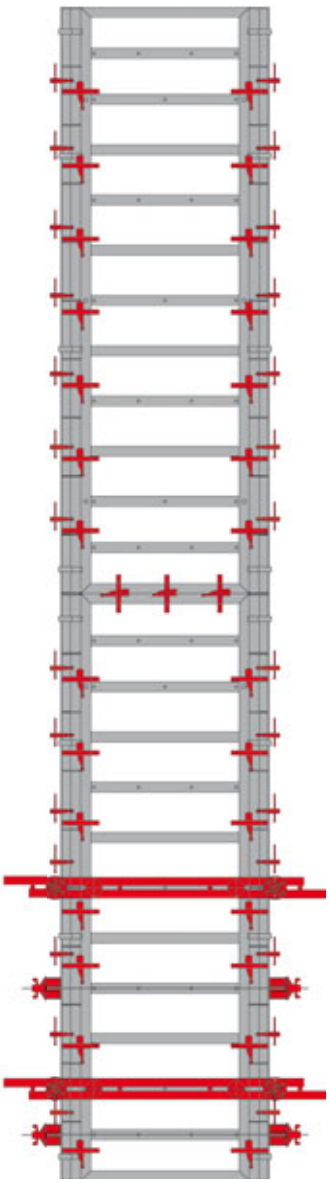

Fig. 39.4

Columns with a maximum side length of 100 cm and a concreting height below 425 cm (Fig. 39.3) can be formed using standard panels and outside corners (Fig. 39.2).

Columns with a side length exceeding 100 cm and a minimum height of 425 cm require an additional stabilisation with M alignment rails and tie rods DW 15. Check table 39.1 to determine the number of required alignment rails and M assembly locks for stabilisation, depending on the concreting height and the column side length.

Each strengthening collar must be attached to the panel with 2 flange nuts 18. When attaching the strengthening collars make sure that beginning at the bottom all multi-function profiles are used all-around (Fig. 39.4). Also observe DIN 18218 for fresh concrete pressure and DIN 4235 for the vibration of concrete with a vibrator.

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Panel with filling nozzle / concreting window

The M panel 250/50 with a filling nozzle (Fig. 40.1) is used when concrete cannot be poured from above, e.g. in the case of tunnel formwork.

The manual gate valve SK (Fig. 40.2) is used to avoid the return flow of concrete when pumping is interrupted. This valve is attached to the filling nozzle with the lever coupling SK-H (Fig. 40.3)

After taking off the concrete hose, the filling nozzle cleaner SK (Fig. 40.4) is attached to the manual gate valve with the lever coupling, the manual gate valve opened and the concrete pressed behind the forming face. One sealing washer A SK is required for each lever coupling.

The panel with a concreting window (Fig. 40.6) has a covered opening of 25 x 36 cm that allows you to look behind the facing when you loosen the 4 flange screws and take off the cover.

Description	Ref. No.
M panel 250/50 AL 20 with filling nozzle	**23-121-05**
with concreting window 25x36	**23-121-10**
Manual gate valve SK 100 - 4 1/2	**29-914-50**
SK 125 - 5 1/2	**29-914-45**
Filling nozzle cleaner SK 100/800	**29-207-50**
SK 125/800	**29-207-55**
Lever coupling SK-H DN 100 - 4 1/2	**29-207-60**
125 - 5 1/2	**29-207-65**
Sealing washer A SK 100 - 4 1/2	**62-031-55**
SK 125 - 5 1/2	**62-031-56**

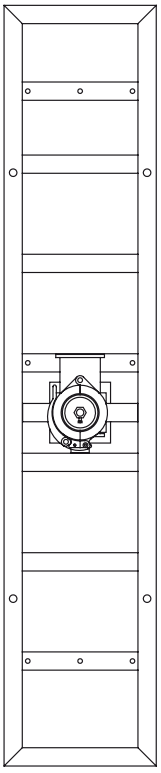

Fig. 40.1 Panel with filling nozzle

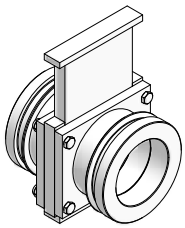

Fig. 40.2 Manual gate valve SK

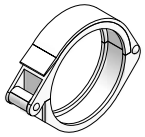

Fig. 40.3 Lever coupling SK-H

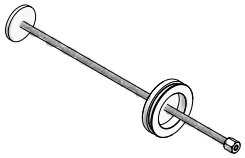

Fig. 40.4 Filling nozzle cleaner SK

Description	Quantity
M panel 250/50 with filling nozzle	1
Manual gate valve SK	1
Sealing washer A SK	2
Lever coupling SK-H	2
Filling nozzle cleaner SK	1

Table 40.5 Required material for each panel with filling nozzle

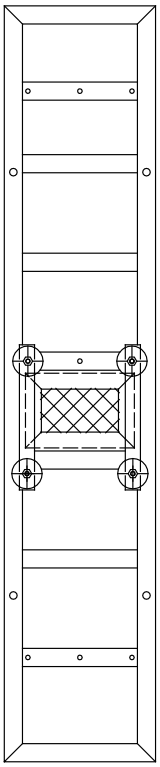

Fig. 40.6 Panel with concreting window

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Further possibilities of use of Mammut 350

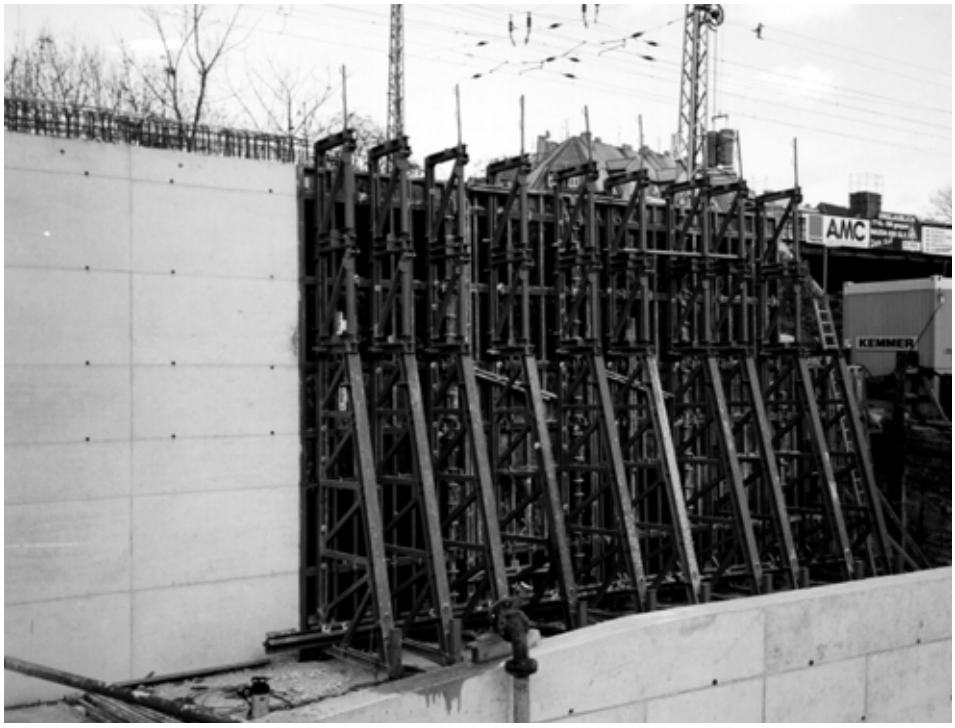

Fig. 41.1

Support frame STB for single-sided formwork
The M 350 formwork – together with support frames STB – can also be used when concrete has to be poured against an existing wall or the like, i.e. when a single-sided formwork is required.

Support frames STB 300 allow for walls up to 3.30 m while support frames STB 450 togehter with height extensions allow for wall heights over 12 m (Fig. 41.1).

Please observe the Assembly and Operating Instructions for the support frame.

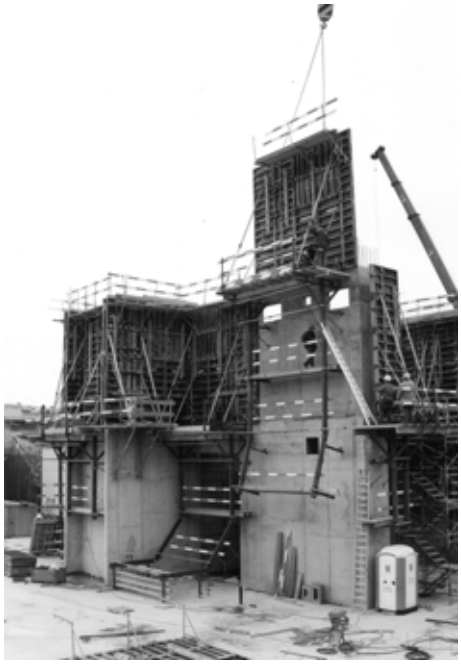

Fig. 41.2

Fig. 41.3

Climbing scaffold KLK 230
When forming high walls, facades, pillars, staircases or elevator shafts, the M 350 formwork is set and secured on climbing scaffolds KLK 230 (Fig. 41.2).

Please observe the Assembly and Operating Instructions for the climbing scaffold.

Please note
The use of support frame and climbing scaffold requires detailed formwork planning.

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Formwork assembly and stripping

Important!
When assembling and stripping formwork, strictly observe the local accident prevention rules.

Planning
If you want to benefit fully from the efficient and economical use that the M 350 formwork offers, we recommend you first plan and prepare its use. Start planning by determining the optimum formwork quantity to be held in stock (such quantity is usually based on the amount of formwork required for a one day's work). When determining the quantity, consider this:

- the formwork weight
- the time required for formwork assembly and stripping
- transport of gangs from one pour to the next considerably reduces forming time
- capacity of the lifting devices
- a logical cycle plan that takes corner configurations, reinforcements etc. into account

Once all these aspects have been considered, the quantities of formwork items can be specified.

Ground
The ground on which the formwork is going to be placed should be clean, even and capable of bearing the expected load because this will help reduce the time required for the assembly and stripping.

Panel transport
When unloading panels or moving panel stacks make sure you use appropriate transport devices that can bear the load. For detailed information see p. M350-46 through M350-49.

The steps required for the assembly
For ergonomic reasons, the outside formwork is ususally assembled and placed first. Start the assembly in a corner or at a determined point and perform the following steps:

Step 1 – Place and brace the outside formwork

Step 2 – Define and mark the concreting height, build in the reinforcements and boxouts

Step 3 – Place the inside formwork and tie the outside and inside formwork

Refer to the following pages for a detailed description of these steps including the working platform and formwork stripping.

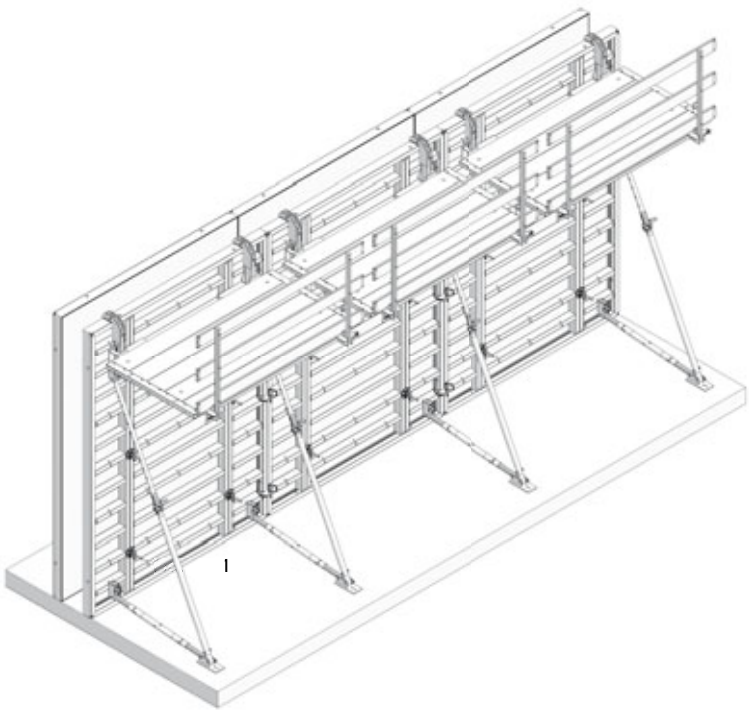

Fig. 42.1 Double-sided formwork

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Formwork assembly and stripping

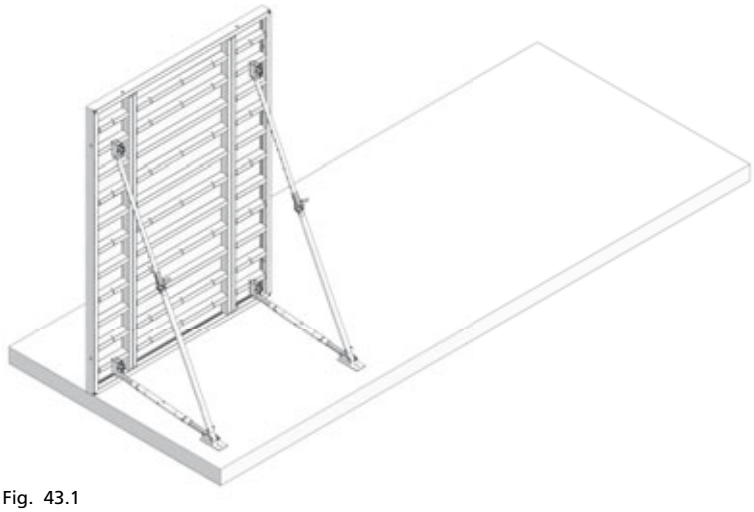

Fig. 43.1

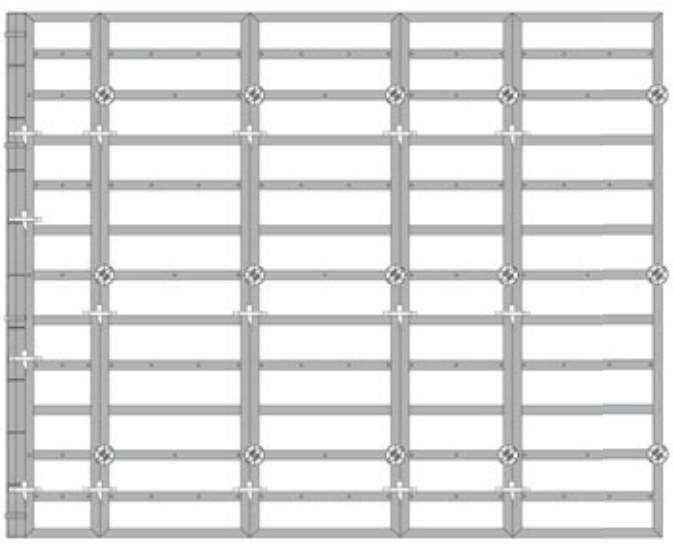

Fig. 43.2

Filler for easy stripping

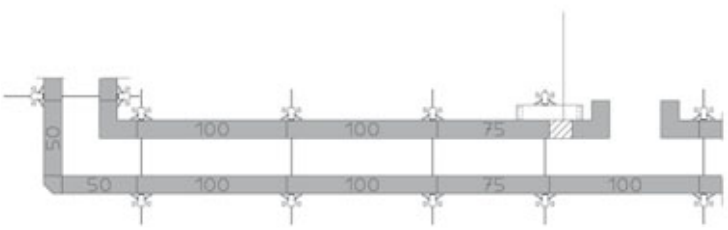

Fig. 43.3

Step 1 – Place and brace the outside formwork
The following description is based on an even wall. Before starting, keep in mind:
- When preassembling large panel units on an even surface, attach the wall braces and the scaffolding bracket as well, i.e. before executing step 1.
- Walls of less than 6 m require a filler for easy stripping (Fig. 43.3) as otherwise the formwork may wedge when stripping and stick to the concrete.

1. Spray the facing with the release agent MevaTrenn FT8.

2. Place the first panel and immediately attach it with two brace frames to the ground to prevent it from falling over (Fig. 43.1). Attach the foot plates firmly to the ground, with two soil nails when attached directly to the soil or with two heavy-duty dowels when attached to a concrete foundation.

After placing panels, always reinforce them immediately with push-pull props or brace frames so they withstand tensile force and pressure and are protected against displacement and wind. The push-pull prop spacing depends on the application.

If the scaffolding bracket was not preassembled before step 1, you can now assemble the working platform and attach it. Fig. 44.2 on page M350-44 shows a working platform being lifted with a crane for attachment at a braced outside formwork.

3. String further panels together and connect them with M assembly locks (see p. M350-7).

Panels with a height of 350 cm are usually connected with 3 assembly locks. However, outside corner configurations require 4 assembly locks (Fig. 43.2 and 43.3).

Step 2 – Concreting height, reinforcements and boxouts
Following step 1, the concreting height is defined and marked, the reinforcements and boxouts, if required, are installed.

Step 3 – Place the inside formwork and tie the outside and inside formwork
The inside formwork is placed after the outside formwork. Then the inside and outside formwork are tied firmly with tie rods and articulated flange nuts.

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Formwork assembly and stripping

Working scaffold
The plug-in scaffolding bracket (Fig. 44.1) is the basis for the working scaffold. The maximum bracket spacing for a load of 150 kg/m² (platform group 2) is 2.50 m as defined in DIN 4420. The planking must at least be 4.5 cm thick.

The planking and scaffolding bracket can be firmly connected. Do not place any planks before having secured the formwork with push-pull props or before having tied the inside and the outside formwork.

Do not forget to attach a side railing to the working scaffold if such a protection is required.

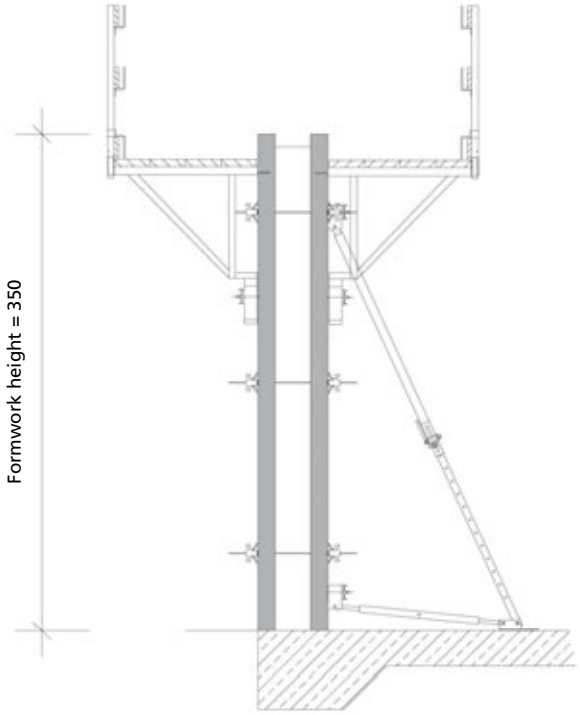

Fig. 44.1

Pouring concrete
Once you have placed, attached and closed the formwork, you can start pouring concrete. When doing so, observe the admissible rate of placing, taking the temperature and cement type into account (see p. M350-9).

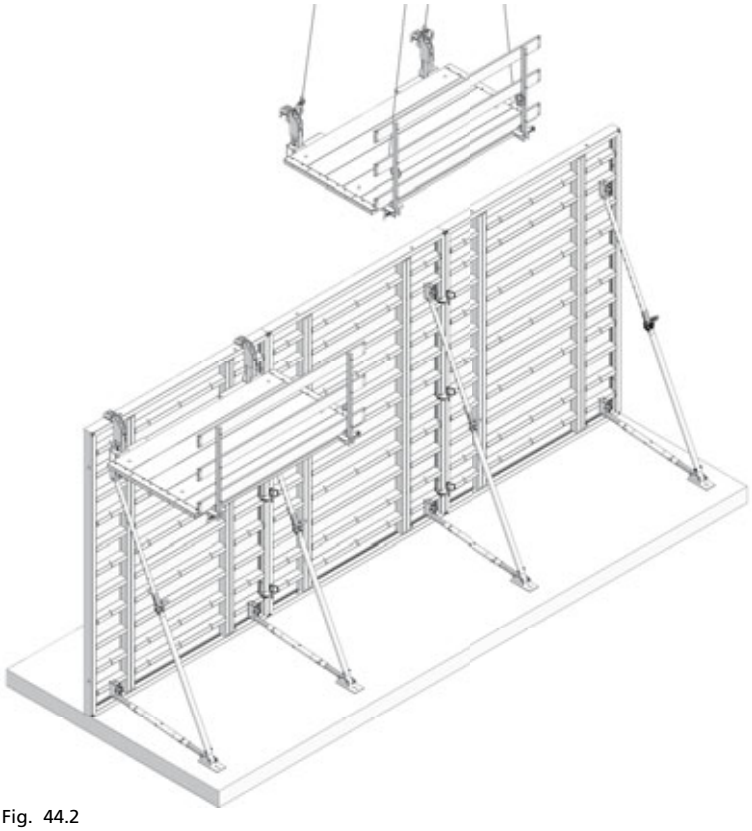

Fig. 44.2

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Formwork assembly and stripping

Fig. 45.1

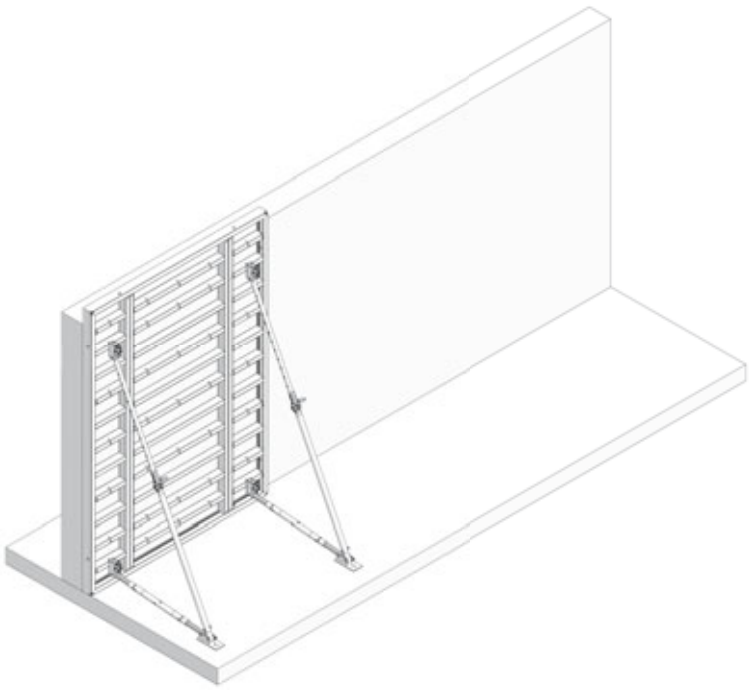

Fig. 45.2

Stripping
Do not start stripping before the concrete has set to the point where it cannot deform anymore. It is best to start stripping at the stop ends or at a corner. Walls of less than 6 m require a filler for easy stripping at the inside formwork (Fig. 43.3 on page M350-43) as otherwise the formwork may wedge and stick to the concrete. Start stripping with the inside formwork. Stripping of both the outside and inside formwork is done as follows:

1. Remove the platform.
2. Remove the articulated flange nuts and tie rods section by section. Make sure the unbraced formwork is immediately secured against falling over or strip it immediately.
3. Loosen the formwork panels or large panel units by removing the assembly locks at the panel joints and remove them manually or with a crane. Before removing them with a crane, make sure the formwork is detached from the concrete.
4. Clean the facing and remove any concrete. Before the next use, spray the facing with the release agent MevaTrenn FT8 (for alkus). Observe the operating instructions for the alkus facing.

Please note
When stripping manually, detach and disassemble the working scaffold and the brace frames before stripping the panels.

When transporting large panel units with a crane, the working scaffold and wall braces are not detached from the panel units. While in vertical position, all components are cleaned and sprayed before being transported together to the next site of use (see p. M350-37 and M350-38).

If there is no further use for the panel units, the working scaffold and wall braces are detached and disassembled in horizontal position, cleaned and stacked for transport.

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Crane slings Stapos 60

These crane slings are made of polyester tape with double-sided textile coating. The load-bearing capacity is stamped on the coating. The sling is provided with a galvanized self-locking fastening device (Fig. 46.1).

Attention
Four crane slings Stapos 60 are needed to move and transport panel stacks. They loop securely to the 4 corners.

Handling
1. Place the panel stack on square timbers of 10 cm (Fig. 46.2).
2. Push the suspension device under the stack with your foot (Fig. 46.3).
3. Yank the sling up (Fig. 46.5). The elastic fastening pin will engage completely in the profile groove and secure the stack against accidental uplift (Fig. 46.4).

Fig. 46.1

Fig. 46.2

Fig. 46.3

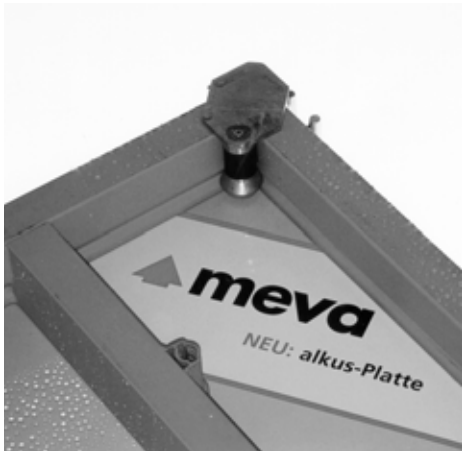

Fig. 46.4

Fig. 46.5

Description	Ref. No.
Crane slings Stapos 60	**29-403-25**

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Crane slings Stapos 60

Fig. 47.1

While transporting the stack by crane the load-bearing capacity is uniformly distributed to all slings. Just one person is required for attachment and removal of the slings.

Attention
The Stapos crane slings may only be used in conjunction with double-rope crane devices in compliance with applicable safety regulations (Fig. 47.1) .

Only 2 crane slings may be used to calculate the admissible load.

Technical data

Description	Crane slings Stapos 60
Ref. No.	29-403-25
Weight	3.2 kg
Colour	Blue
Admissible load	10 kN (1 ton) per sling
Admissible unit load	2 tons
Usable for frame profile thickness	60 mm
Maximum stack height	126 cm (10 panels)
Maximum stack height for large-size panels	3 panels Mammut 350/250

Table 47.2

Approved safety

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Crane slings 60

The crane slings (Fig. 48.1) help to quickly load and unload trucks and move the Mammut 350 panel stacks near the ground. The lifting hooks are inserted into the welded sleeves of the bottom panel frame (Fig. 48.3). After tightening the crane slings check to make sure the hooks are safely locked (Fig. 48.2).

Attention
A lifting hook must only be used if its eccentric is easy to turn or automatically falls into the locked position (Fig. 48.2). Never use a lifting hook if you need force to turn its eccentric. Turning the eccentric with force may not the lock the lifting hook but only make it appear to be in the locked position. This may cause the lifting hook to slip off its position when lifting the panel stack.

Technical Data
- Max. load 20 kN (2 tons) per panel stack
- Max. stack height: 5 M 350 panels 350/250 or 10 M 350 panels with a max. width of 125 cm

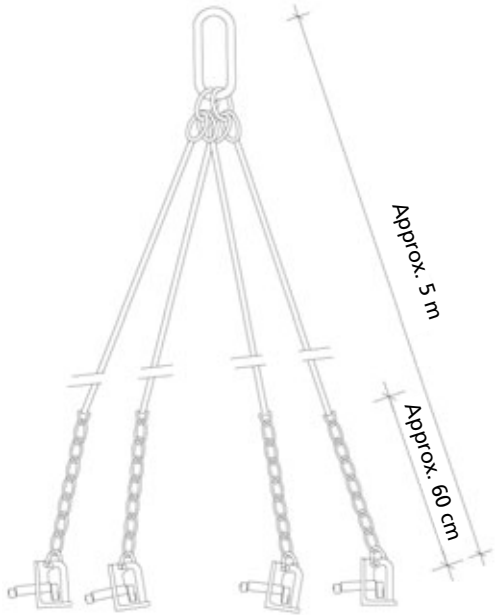

Fig. 48.1

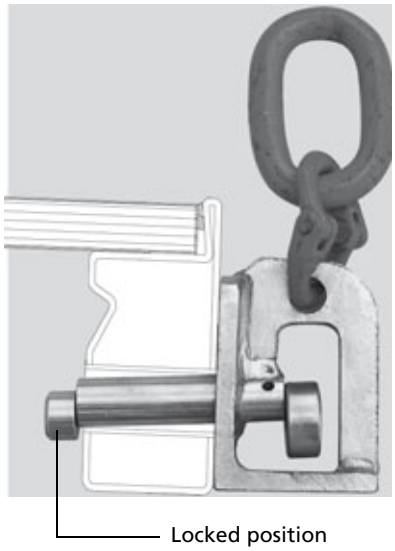

Fig. 48.2

Fig. 48.3

Description	Ref. No.
Crane slings 60	**29-401-45**

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Lifting hook 60

Fig. 49.1

Fig. 49.2

The lifting hook (Fig. 49.1 and 49.2) can be used with any four-rope crane device on the construction site to transport panel stacks. Always use 4 hooks together. To calculate the admissible load-bearing capacity, assume only 2 hooks.

Attention
A lifting hook must only be used if its eccentric is easy to turn or automatically falls into the locked position (Fig. 48.2 on p. M350-48). Never use a lifting hook if you need force to turn its eccentric. Turning the eccentric with force may not the lock the lifting hook but only make it appear to be in the locked position. This may cause the lifting hook to slip off its position when lifting the panel stack.

Technical data
- Weight 2.0 kg
- Max. load 10 kN (1 ton)

Moving panel stacks
When moving panel stacks, make sure panels are secured against slipping. MEVA secures them with safety bolts and, for truck transport, also with load/cargo straps (see p. M350-50).

Description	Ref. No.
Lifting hook 60	**29-401-40**

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Transport

Make sure that all material is secured properly.

Recommendation
Use one load/cargo strap per 1 metre of cargo (Fig. 50.1). That means for a fully loaded truck with a trailer length of 13.60 m, 14 load or cargo straps would be required.

M 350 panels require 2 or 3 straps. Due to their low weight, M 350 corners require only 2 straps.

When moving panel stacks make sure that panels are secured. MEVA secures M 350/250 panels with the grey M 350/250 safety bolt (Fig. 50.2) and all other M 350 panels with the black M safety bolt. These plugs should also be used by the job-site when returning material.

Safety regulations
When using or transporting our products, the federal, state, and local codes and regulations must be observed.

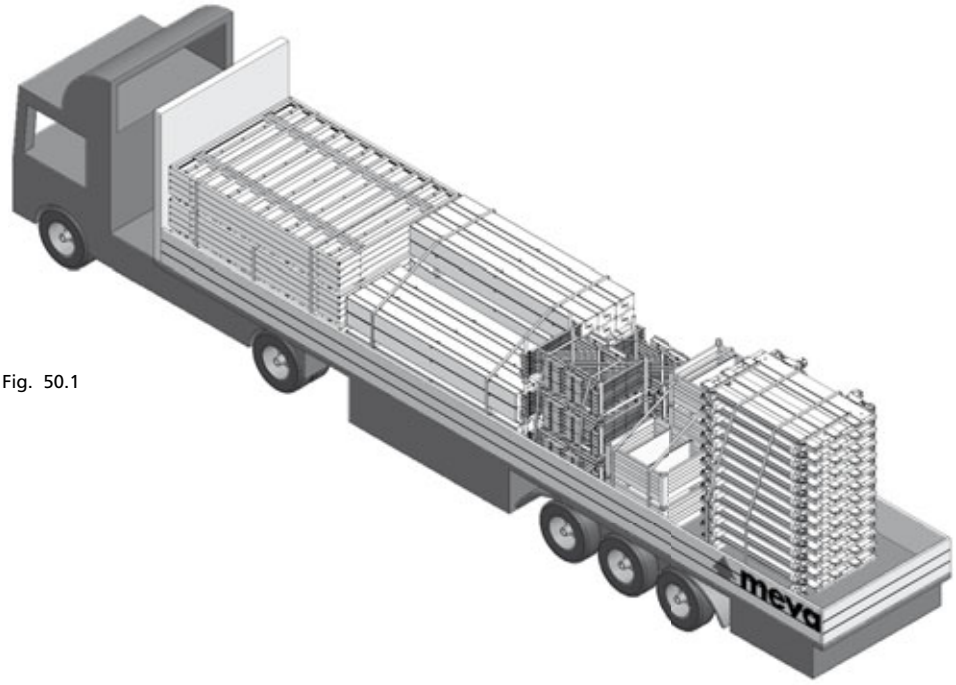

Fig. 50.1

Fig. 50.2

Description	Ref. No.
Safety bolt	
M black	**40-131-20**
M 350/250 grey	**40-131-25**

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Cleaning
The formwork is cleaned professionally upon return. Cleaning is done using industrial equipment with assembly lines.

Regeneration
The regeneration is carried out as follows: The frames are checked and, if necessary, repaired, painted and provided with a new facing.

As long as the formwork equipment is up-to-date, a regeneration will always be a more economical solution than purchasing new formwork.

Please note that the cleaning and regeneration service is not available in all countries in which MEVA does business.

Rentals
With much equipment on stock, we offer our customers the option of renting supplementary material during peak times. We also give prospective customers the chance to test MEVA formwork so they can see its benefits for themselves in actual use.

RentalPlus
Since MEVA started the flat rate for cleaning and repair of rented formwork systems in early 2000, more and more contractors experience the outstanding advantages. Ask our representatives about the details!

Formwork drawings
Of course, all offices in our technical department have CAD facilities. You get expert, clearly represented plans and work cycle drawings.

MBS
MEVA Basic Support
MBS is an addition to AutoCAD, developed by MEVA Formwork Systems in 2000. MBS is based on standard programs (AutoCAD and Excel) and can be used on any PC that has these two programs installed. It includes pull down menues for AutoCAD and applications to ease forming. It also includes the possibility to create take-offs.

Special solutions
We can help with special parts, custom-designed for your project, as a supplement to our formwork systems.

Static calculations
Generally, this is only necessary for applications like single-sided formwork where the anchor parts are embedded in the foundation or the base slab. If requested, we can perform static calculations for such applications at an additional charge.

Formwork seminars
To make sure that all our products are used properly and efficiently, we offer formwork seminars. They provide our customers a good opportunity to keep themselves up-to-date and to benefit from the know-how of our engineers.

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Notes

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